

Business Process Maturity Model (BPMM), v1.0 - Beta 2

*OMG Adopted Specification
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This OMG document replaces the Beta 1 document (dtc/07-07-02). It is an OMG Adopted Beta 2 Specification and is the recommended convenience document from the first FTF. It incorporates the issues/comments that were submitted during the finalization phase.

The FTF Recommendation and Report for this specification lists the changes that were made to this document. OMG provides two versions of the Beta 2 document, with and without Change Bars.

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Preface

About the Object Management Group

OMG

Founded in 1989, the Object Management Group, Inc. (OMG) is an open membership, not-for-profit computer industry standards consortium that produces and maintains computer industry specifications for interoperable, portable and reusable enterprise applications in distributed, heterogeneous environments. Membership includes Information Technology vendors, end users, government agencies, and academia.

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Foreword

The development of the Business Process Maturity Model (BPMM) began in 2002 but the lineage can be traced back much further.

The origin of modern quality management practices is usually traced back to Walter Shewart, working at Western Electric and Bell Telephone Laboratories in the 1920s and 1930s. This original work was further refined by W. Edwards Deming and Joseph M. Juran. In the 1970s Philip Crosby conceived of a quality management maturity grid to incrementally improve quality.

In the 1980s, Watts Humphrey, working at IBM, explored how to best introduce quality practices into software organizations. The approach he and his colleagues developed was a staged introduction of practices. This approach led to the development of the process maturity framework which was the basis for the first CMM - the CMM for Software. Version 1.0 of the CMM for Software was released in August 1991 [Weber-1991] [Paulk-1991].

In early 2002 Barry Hore, the Chief Executive of Nedbank Limited, Technology and Operations (T&O) in South Africa, and the T&O Executive Committee began to realize that the value they were achieving with the CMM for Software might also be achieved in the rest of their banking operations - if these same process maturity principles could be adapted and applied in the operations. Since over 80 percent of their business was operations, proportionately larger benefits could be achieved in that part of the business. The Executive Committee at that time included Barry Hore, John Cruickshank, Michael Gould, Mike Jarvis, Andre Meyer, Willie Scholtz, Len de Villiers, and Harry Wilson.

Barry contacted TeraQuest Metrics to work on a model to cover the rest of their business. The model development was initiated in April 2002, with the initial focus on a Service Operations CMM. TeraQuest worked with Nedbank managers and staff to develop an understanding of service operations and gather practices for the model. Nedbank was instrumental in formulating the strategy for developing and applying the Service Operations CMM within their organization. But just as important, they committed the funding and resources to make the Service Operations CMM a reality. They also decided, very early in their discussions, that this model would not be a Nedbank-only model, but would be made available to the international community.

Over the next few years, the Service Operations CMM was applied in several companies in various industries. In applying it, it became clear that the service operations practices in the model were very close to the practices applicable to the general problem of developing, preparing, deploying, operating, and supporting products and services in any industry - covering the full life cycle from conception to retirement. With continuing support of Nedbank and other companies, the authors evolved the Service Operations CMM into the BPMM.

TeraQuest Metrics was acquired by Borland Software Corporation in January 2005.

Charles Weber is the BPMM project manager. The author team includes Charles Weber and Bill Curtis, from Borland, and Tony Gardiner, from Nedbank.

Several other people contributed to the concepts and practices in this document. The contributors are listed in Section 6.2.

The BPMM is intended for anyone interested or involved in improving an organization's business process related to their products and services - whether the products and services are for internal or external use. This includes members of appraisal teams, members of process engineering groups, managers, and professional staff. The BPMM can be used as a process model by itself or it can be used as a framework for improvement efforts based on other models such as the Control Objectives for Information and related Technology (COBIT) [COBIT-2000], Information Technology Infrastructure Library (ITIL) [ITIL-2002], and ISO-9000 [ISO-2005].

Part I - Overview of the BPMM

This part contains the following Clauses:

1. Scope
2. Conformance
3. References
4. Terms and Definitions
5. Symbols/Acronyms
6. Additional Information

1 Scope

1.1 Introduction

Introducing the BPMM specifications will address at least five current challenges to the success of enterprise systems:

- Management has few standards for appraising the maturity of their business process workflows and needs proven methods for identifying the risks process weaknesses pose for deploying enterprise IT projects and achieving business objectives.
- Management has few proven methods for appraising the fidelity between how tasks are actually performed and how they are described in model-based representations of process workflows. This problem compromises the validity of system requirements, the accuracy of use cases and model-based representations, and the effectiveness of the application in use.
- Management is often unaware of the extent to which organic growth or acquisitions have resulted in multiple ways of performing similar tasks. The creation of standard, tailorable processes simplifies the requirements for enterprise applications and as a result will reduce the complexity of enterprise systems.
- Organization's have few proven methods for appraising a supplier's capability for delivering outsourced IT and other business services within the parameters claimed in a proposal. Further they need a proven basis for specifying contractual requirements for improvements in a supplier's business processes.
- Management needs guidance on how to implement the business process foundations required for organizational agility and lower operating costs.

The IT trade press is filled with articles about failed enterprise applications that wasted millions of dollars before being terminated. While some of these failures can be blamed on technology issues, the causes of many failures are rooted in the state of the organization into which the application is being deployed. Many, perhaps most of these organizational problems manifest themselves as weaknesses in the business processes that are the target of an enterprise application. Improving organizational readiness for technology deployment is the motivation for making the BPMM available as a standard from OMG.

First formulated by Phil Crosby in his book, *Quality is Free* (1979), the modern use of maturity models began with Watts Humphrey's creation of the Process Maturity Framework at the Software Engineering Institute in the late 1980s (Humphrey, 1989) based on ideas he had developed with a group of colleagues at IBM (Radice, et al., 1985). Humphrey's framework was elaborated into the Capability Maturity Model® for Software (CMM®, Paulk, et al., 1995) and later into Capability Maturity Model Integration® (CMMI®, Chrissis, et al., 2002). It has become the preeminent standard for assessing the capability of organizations that develop software intensive systems.

1.2 Foundation Principles

The foundation principles are:

- attributes of a process can be evaluated to determine its capability to contribute to organizational objectives.
- capable processes cannot survive unless the organization is mature enough to sustain them.
- process improvement is best approached as an organizational change program that stages the improvements to achieve successively more predictable states of organizational capability
- each stage or maturity level lays a required foundation on which future improvements can be built.

The Business Process Maturity Model (BPMM) rigorously follows the principles of Humphrey's Process Maturity Framework and was developed by co-authors of the CMM for Software, CMMI, and the People CMM. The BPMM can be mapped to CMMI, but has been written to guide improvement of business processes which tend to be more transactional and are better characterized as workflows across organizational boundaries rather than the more bounded project orientation of CMMI. The BPMM incorporates improvements in coverage, structure, and interpretation that have been developed since the publication of its predecessor models.

1.3 Maturity Levels

Like all maturity models guided by the Process Maturity Framework, the BPMM is divided into five maturity levels that represent different states through which an organization is transformed as its processes and capability are improved. These successive stages of maturity include:

- *Level 1: Initial* — wherein business processes are performed in inconsistent sometimes ad hoc ways with results that are difficult to predict.
- *Level 2: Managed* — wherein management stabilizes the work within local work units to ensure that it can be performed in a repeatable way that satisfies the workgroup's primary commitments. However, work units performing similar tasks may use different procedures.
- *Level 3: Standardized* — wherein common, standard processes are synthesized from best practices identified in the work groups and tailoring guidelines are provided for supporting different business needs. Standard processes provide an economy of scale and a foundation for learning from common measures and experience.
- *Level 4: Predictable* — wherein the capabilities enabled by standard processes are exploited and provided back into the work units. Process performance is managed statistically throughout the workflow to understand and control variation so that process outcomes can be predicted from intermediate states.
- *Level 5: Innovating* — wherein both proactive and opportunistic improvement actions seek innovations that can close gaps between the organization's current capability and the capability required to achieve its business objectives.

Maturity levels 2-5 are composed of process areas that collectively enable the capability to be achieved at that level. Each process area is designed to achieve specific goals in creating, supporting, or sustaining the organizational state characteristic of the level. Each process area consists of a collection of integrated best practices that indicate what should be done, but not how it should be done. Thus, organizations are free to define their own methods and approaches to satisfying the goals and objectives of each process area.

1.4 The BPMM Principles

The success of the CMM for Software in the 1990s has encouraged the development of maturity models for other processes, the most widely used of which has been the People CMM (Curtis, et al., 2002) which applied the maturity framework to the management and development of an organization's workforce. Most estimates of the number of existing maturity models run over 200. Few of these maturity models follow the principles established in the process maturity framework. Most often they describe states in deploying a collection of related best practices without providing the infrastructure of practices that constitutes the improvement roadmap.

2 Conformance

2.1 BPMM Conformance

Establishing conformance in relation to the BPMM is different than conformance for technical specifications. Evaluating the BPMM conformance is not like verifying that a system has been implemented correctly according to its specifications and requirements, but is more akin to validating that the system as implemented meets the actual needs of the client. That is, the BPMM conformance can only be evaluated within the workings of the customer's business environment. Although truly objective verification of conformance is impossible with a maturity model, an effective appraisal technique gathers multiple, overlapping forms of evidence to evaluate the performance of the practices contained in the BPMM.

Conformance with the BPMM is evaluated in appraisals led by an authorized Lead Appraiser who has been trained extensively in both the BPMM and its associated appraisal methods. Appraisals are conducted by a Lead Appraiser who is external to the organization leading a team that includes at least some members from the organization being appraised. The team collects and evaluates evidence regarding the implementation of practices described in the BPMM and makes judgments about their strengths and weaknesses and the extent to which they collectively satisfy the goals of the process areas at the maturity levels within the scope of the appraisal.

Conformance is evaluated using following forms of evidence:

1. Review of artifacts that are produced by performing a process
2. Review of artifacts that support performing a process
3. Interviews with individuals or groups who perform a process
4. Interviews with individuals who manage or oversee the performance of a process
5. Interviews with individuals who support the performance of the process
6. Quantitative data used to characterize the state of the organization or the attitudes and behaviors of those in it
7. Quantitative data describing the performance of a process, its outcomes, and business results
8. Conformance

There are four types of appraisals envisioned for the BPMM with varying levels of assurance that the practices of the model have been implemented in ways that achieve the intent of the practices and the goals of their associated process areas. These four appraisal forms include:

- *Starter appraisal* — a lightweight, inexpensive appraisal lasting a few days to achieve an overview of conformance to the BPMM. Evidence is not reviewed in depth and limited interviews are conducted. Quantitative data is collected.
- *Progress appraisal* — an investigation of all process areas and practices within the maturity level scope of an appraisal to establish progress toward achieving a maturity level or to anticipate the results of a confirmatory appraisal. This appraisal is time consuming, but does not involve the same level of rigor and completeness of a confirmatory appraisal. Quantitative data is collected and compared to the results obtained from interviews and reviewing artifacts.
- *Supplier appraisal* — an appraisal normally performed during source selection that is identical to a progress appraisal except that the appraisal team includes no members from the appraised organization. Quantitative data is collected. The findings may be used to develop contractual commitments for improvements that can be verified during the period of contract performance by performing a Progress, Supplier, or Confirmatory appraisal. Quantitative data is collected to verify claims made in proposals and establish contractual levels of performance or improvement.

- *Confirmatory appraisal* — a thorough investigation of all process areas and practices within the maturity level scope of the appraisal. This type of appraisal involves investigating all five types of evidence described above. Evidence is sampled broadly across the organization in order to assure that the appraisal team is able to appraise the breadth of conformance. Quantitative data is collected to investigate the performance and results of the practices. The appraisal team evaluates whether each practice has been implemented and is achieving its intent, and whether the goals of each process area within the appraisal scope have been satisfied. If all goals for all process areas within a maturity level and at each lower level have been satisfied, then the organization is appraised to have achieved that maturity level. Organizations can claim achievement of a maturity level only if established by a confirmatory appraisal.

2.2 Conformance with the Specification

This section defines the BPMM conformance points, with reference to Maturity Levels and the realization of associated Goals.

The Maturity Levels and Goals are specified in Part II, Chapter 7 - Normative Content and Structure. That specification shows Maturity Levels 2 through 5 as comprising Process Areas, and these Process Areas in turn are specified as sets of Goals.

Process Areas provide a notional grouping of related Goals, but do not play any operational role in specifying Maturity Levels, and so are not referenced in the definition of Conformance.

1. Maturity Levels 2, 3, 4, and 5 are defined Conformance Points:
An organization may conform to this specification at a Maturity Level of 2 or higher.
2. Conformance defined cumulatively by reference to Goals realized:
A compliant organization at a given Maturity Level shall realize all Goals specified for Maturity Levels up to and including the given Level.
3. Goal realization:

An organization realizes a Goal if and only if the organization has implemented practices which, in combined effect, achieve that Goal. The actually implemented practices may differ in name and scope from the practices shown in Part II, Chapter 7, provided their net effect is to achieve the Goal.

3 Normative References

Allamaraju-1999	Subrahmanyam Allamaraju, “Nuts and Bolts of Transaction Processing,” www.subrahmanyam.com/articles/transactions/ NutsAndBoltsOfTP.html , 1999. <i>{Note: This reference is only used in the BPMM for Service Operations.}</i>
ASQ-2001	American Society for Quality, “ASQ Glossary of Terms,” www.asq.org/info/glossary , March 20, 2001.
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4 Terms and Definitions

Terms like the following may be used in this document

- Capability Maturity Model®
- CMM®
- CMMI®

Capability Maturity Model, CMM, and CMMI are registered in the U.S. Patent and Trademark Office. Business Process Maturity Model and the BPMM are service marks of Borland Software.

NOTE: When the term, “process area” is used in this document, it refers to the BPMM process areas contained in Part III, Chapter 14 of this document (or to similar components of other process models).

The following is a quick reference of terminology used throughout this specification. See additional glossary in Part IV, Annex D.

Term	Sample BPMM meaning	Traditional OMG meaning
Adoption	Publication of a framework of best practices that can be applied for improving business processes in a broad range of organizational contexts. Adoption of the BPMM fills an unmet market requirement which strongly supports OMG’s mission.	Publication of technical specification precisely describing interoperability interfaces or data formats, to enable interoperability of tools by using those interfaces and formats.
Certification program	Issuing certificates based an evaluation of proficiency that attest to an individual’s knowledge of details of the BPMM or to their ability to conduct licensed training, licensed appraisals, or improvement programs using the BPMM.	Issuing certificates of knowledge of details of an OMG specification (e.g. UML) to individuals, based on a knowledge test.
Conformance	The extent to which an organization has implemented work practices that satisfy the intent of the practices and process area goals enumerated in the BPMM.	Extent to which software being evaluated correctly realizes data formats and interfaces documented in standard (q.v.), as objectively measured against that specification.

Implement/implementation	Install, use, and institutionalize business processes according to guidance in the BPMM and/or related frameworks or specifications.	Create software that uses data formats and interfaces published in the named OMG specification.
Maturity Model	<p>A maturity model is an evolutionary roadmap for implementing the vital practices from one or more domains of organizational process. The five levels of maturity guide an organization in evolving from poorly defined and inconsistent practices, to repeatable practices at the unit level, to standard organization-wide end-to-end business processes, to statistically managed and predictable processes, and finally to continuous process innovation and optimization.</p> <p>Maturity Level 1 is a designation for organizations that have not achieved one of the other levels of the model.</p> <p>Organizations achieving Maturity Level 3, 4, or 5 must also meet all the requirements associated with lower Maturity Levels beginning with Level 2.</p>	(none)
Method	A set of work steps accompanied by usage rules, sequencing instructions, and coordination guidelines that specify a unique procedure for performing a task, activity, or process.	A set of guidelines for software development. A software development process (q.v.).
Model	An abstraction of some aspect of the static structure or dynamic behavior of an organizational system. When used with maturity models this definition implies an abstraction of the vital practices required to achieve a specific state in the dynamic behavior of an organizational system.	A machine-readable abstraction of some aspect of the static structure or dynamic behavior of a computer system.
Model-based	Use of a human-readable model to reduce the human variation in implementing evaluating some aspect of a process or organizational system.	Using machine-readable models (q.v.) describing some aspect of a process or system to realize that process or system with relatively little human intervention.
Open Standard	Organizations need a trusted and open standard against which to evaluate the capability of themselves or their vendors for meeting their service level, quality, price, and functionality commitments.	Freely-available standard (q.v.) with no IPR restrictions that prevent its widespread implementation (q.v.).

Process	A set of tasks or activities performed to achieve a given purpose or a specified result.	Documented procedure for performing some task within an organization e.g. software construction, payroll, order processing etc).
Program	A set of predefined tasks or activities performed to achieve a given purpose or a specified result.	Software that implements (q.v.) a specification (q.v.).
Standard	Widely-used Maturity Models containing the vital practices required to improve the process capability of an organization.	Widely-used specification of data formats and interfaces, designed to assist tool interoperability.
Transactional	In the BPMM a transaction is a sequence of discretely defined tasks and/or exchanges of information, data, or tangible items that when completed achieve a specified outcome agreed to by both parties. There is no assumption made in the BPMM about whether the intermediate states of a transaction can be externally observed. Thus, 'transactional' implies business activities conducted through frequent, discrete, repetitive transactions rather than through an extensive process that unfolds over time and which may not involve repeated tasks.	Possessing the property that a particular action is carried out completely, or not at all — but cannot be externally observed in a partially-completed state.

5 Symbols/Acronyms

There are no symbols defined in this specification. The acronyms used throughout this specification are listed below.

BPMM	Business Process Maturity Model
CCI	Continuous Capability Improvements (process area)
CI	configuration item
CM	configuration management
CM	Configuration Management (process area)
CMM	Capability Maturity Model
CMMI	Capability Maturity Model Integration
DPP	Defect and Problem Prevention (process area)
G-MA	Guidelines for Measurement and Analysis

G-OCD	Guidelines for Organizational Change and Development
G-PDR	Guidelines for Problem and Decision Resolution
G-RM	Guidelines for Risk Management
G-WPI	Guidelines for Work Product Inspection
IDEAL	Initiating, Diagnosing, Establishing, Acting, Learning
InG	institutionalization goal
InP	institutionalization practice
IMM	Integrated Marketing Management (process area) <i>{Note: This acronym is only used in the BPMM for Marketing.}</i>
ISM	Integrated Service Management (process area) <i>{Note: This acronym is only used in the BPMM for Service Operations.}</i>
IT	Information Technology
MM	maturity model
MOA	Market Offering Analysis (process area) <i>{Note: This acronym is only used in the BPMM for Marketing.}</i>
MOBM	Market Offering Business Management (process area) <i>{Note: This acronym is only used in the BPMM for Marketing.}</i>
MOI	Market Offering Introduction (process area) <i>{Note: This acronym is only used in the BPMM for Marketing.}</i>
MOP	Market Offering Preparation (process area) <i>{Note: This acronym is only used in the BPMM for Marketing.}</i>
OBG	Organizational Business Governance (process area)
OCAM	Organizational Common Asset Management (process area)
OID	Organizational Improvement Deployment (process area)
OIP	Organizational Improvement Planning (process area)
OPA	Organizational Performance Alignment (process area)
OCM	Organizational Configuration Management (process area)
OCPM	Organizational Capability and Performance Management (process area)
OII	Organizational Innovative Improvement (process area)
OPL	Organizational Process Leadership (process area)
OPM	Organizational Process Management (process area)

ORM	Organizational Resource Management (process area)
OSM	Organizational Skills Management (process area)
OT	Organizational Training (process area)
PA	process area
PDCA	Plan-Do-Check-Act
P-CMM	People Capability Maturity Model
PPA	Process and Product Assurance (process area)
PSBM	Product and Service Business Management (process area)
PSD	Product and Service Deployment (process area)
PSO	Product and Service Operations (process area)
PSP	Product and Service Preparation (process area)
PSPI	Product and Service Process Integration (process area)
PSS	Product and Service Support (process area)
PSWM	Product and Service Work Management (process area)
QPM	Quantitative Process Management (process area)
QPSM	Quantitative Product and Service Management (process area)
SDEL	Service Delivery (process area) <i>{Note: This acronym is only used in the BPMM for Service Operations.}</i>
SDEP	Service Deployment (process area) <i>{Note: This acronym is only used in the BPMM for Service Operations.}</i>
SDEV	Service Development (process area) <i>{Note: This acronym is only used in the BPMM for Service Operations.}</i>
SG	specific goal
SLA	service level agreement
SM	Sourcing Management (process area)
SMS	Service Maintenance and Support (process area) <i>{Note: This acronym is only used in the BPMM for Service Operations.}</i>
SO-CMM	Service Operations Capability Maturity Model
SP	specific practice
SPC	statistical process control

SPI	Service Process Integration (process area) <i>{Note: This acronym is only used in the BPMM for Service Operations.}</i>
SW-CMM	Software Capability Maturity Model
V	version
WBS	work breakdown structure
WUCM	Work Unit Configuration Management (process area)
WUMC	Work Unit Monitoring and Control (process area)
WUP	Work Unit Performance (process area)
WUPC	Work Unit Planning and Commitment (process area)
WURM	Work Unit Requirements Management (process area)

6 Additional Information

6.1 The BPMM Uses

There are four primary ways in which the BPMM will be used and each will have different requirements for appraisals.

- *Guiding business process improvement programs* — The BPMM Is designed to guide improvement programs, and this is anticipated to be its most frequent use. Improvement programs should be initiated with an evaluation of the organization’s current strengths and weaknesses. The Starter Appraisal provides findings sufficient to initiate an improvement program. Either Starter Appraisals or Progress Appraisals can be used to determine the status and effectiveness of improvement activities during their deployment. Progress Appraisals are sufficient for internal evaluations of maturity level status. However, if the organization wants to present its maturity results publicly, a Confirmatory Appraisal would be required.
- *Assessing risk for developing and deploying enterprise applications* — The BPMM will be used to identify risks to the successful implementation of systems and to provide guidance on the actions to be taken to improve them prior to system deployment. The importance of reducing the risks to enterprise applications requires information derived from either a Progress Appraisal or a Confirmatory Appraisal. If an external organization is developing the system, findings from a Confirmatory Appraisal may be included in the agreements as actions the customer will take to prepare for system deployment.
- *Evaluating the capability of suppliers* — The CMM for software was originally developed to help DoD move beyond using lowest price as the basis for selecting among bidders. Similarly, organizations need a trusted and open standard against which to evaluate the capability of their vendors for meeting their service level, quality, price, and functionality commitments. They will want to perform Supplier Appraisals during the selection process and use Progress, Supplier, or Confirmatory Appraisals during contract performance to evaluate progress in eliminating process deficiencies identified during source selection.
- *Benchmarking* — Management may want to evaluate where they stand relative to the maturity of business processes in their industry segment. Progress Appraisals will provide an approximate benchmark, while Confirmatory Appraisals will provide more rigorous benchmarking results and measures. OMG can develop repositories of data and information collected during appraisals regarding industry trends and best practices in different areas of business process.

6.2 Acknowledgements

Contributors to the Business Process Maturity Model

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Part II - BPMM Normative Content

This Part contains the following chapter and sections:

- 7. BPMM Normative Content and Structure
 - 7.1 Institutionalization Goal and Practices
 - 7.2 Maturity Level 2: Managed
 - 7.3 Maturity Level 3: Standardized
 - 7.4 Maturity Level 4: Predictable
 - 7.5 Maturity Level 5: Innovating

7 BPMM Normative Content and Structure

In this section, Maturity Levels are specified using the following structure for each Maturity Level except Level 1:

Process Areas (PAs)

- Process Area name
- Purpose statement
- Specific Goals
- Institutionalization Goals
- Practice to Goal Relational Table
- Specific Practices
- Institutionalization Practices

In the above structure, Process Areas are labeled sets of Goals with a common high-level purpose; as such, Process Areas are groupings for purposes of presentation and understanding.

Establishing an organization’s process maturity using the BPMM means providing evidence that organizational practices have been successfully implemented to realize certain Goals. The rationale behind this section is to provide the BPMM user with a clear tabular presentation of the relevant information, ranked in order according to Maturity Level, with just enough supporting information to enable quick comprehension.

The key information determining conformance concerns the Goals which must be realized for a given Maturity Level, and the practices which achieve those goals.

The extent to which the Goals have been realized is an indicator of how much capability the organization has established at that Maturity Level. The Goals specify the scope, boundaries and intent of each process area, and provide criteria by which conformance is evaluated.

The content in this section is repeated verbatim in Part III of this document, where considerable informative material is included. The detailed description of the practices, subpractices and illustrative examples will be helpful and necessary for organizations building performance improvement programs around the BPMM.

Maturity Level	Focus	Process Areas
5 Innovating	Organization’s processes are continually improved	Organizational Improvement Planning Organizational Performance Alignment Defect and Problem Prevention Continuous Capability Improvement Organizational Innovative Improvement Organizational Improvement Deployment

<p>4 Predictable</p>	<p>Work processes are managed quantitatively to establish predictable results</p>	<p>Organizational Common Asset Management Organizational Capability and Performance Management Product and Service Process Integration Quantitative Product and Service Management Quantitative Process Management</p>
<p>3 Standardized</p>	<p>Organization establishes standard processes and assets for performing the product and service work</p>	<p>Organizational Process Management Organizational Competency Development Organizational Resource Management Organizational Configuration Management Product and Service Business Management Product and Service Work Management Product and Service Preparation Product and Service Deployment Product and Service Operations Product and Service Support</p>
<p>2 Managed</p>	<p>Managers establish a stable work environment in their work unit</p>	<p>Organizational Process Leadership Organizational Business Governance Work Unit Requirements Management Work Unit Planning and Commitment Work Unit Monitoring and Control Work Unit Performance Work Unit Configuration Management Sourcing Management Process and Product Assurance</p>
<p>1 Initial</p>	<p>Individual efforts with no explicit process or organizational support</p>	

7.1 Institutionalization Goal and Practices

Each process area contains the same Institutionalization Goal and the same set of five institutionalization practices. For simplification, they are listed one time here, rather than repeated in each process area.

The institutionalization goal (InG) is stated simply as:

InG The practices for [process_area_name] are institutionalized.

The five Institutionalization Practices (InPs) and the mapping to the Institutionalization Goal are as follows

Goal	Practice
InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)

7.1.1 Institutionalization Practices

InP 1	A description of the process that is used in performing the practices for [process_area_name] is documented.
InP 2	The work involved in performing the practices for [process_area_name] is planned.
InP 3	The people performing, supporting, or affected by the practices for [process_area_name] are provided with the needed knowledge and skills.
InP 4	The performance, activities, status, and results of [process_area_name] are measured and monitored, and appropriate corrective actions are performed to control the performance and results.
InP 5	The practices for [process_area_name] are objectively verified for conformance to applicable laws, regulations, standards, organizational policies, business rules, process descriptions, and work procedures; and non-conformances are addressed.

7.2 Maturity Level 2: Managed

The following section contains the process areas that belong to maturity level 2. The maturity level 2 process areas of the BPMM are as follows:

- Organizational Process Leadership (OPL)
- Organizational Business Governance (OBG)
- Work Unit Requirements Management (WURM)
- Work Unit Planning and Commitment (WUPC)
- Work Unit Monitoring and Control (WUMC)
- Work Unit Performance (WUP)
- Work Unit Configuration Management (WUCM)
- Sourcing Management (SM)
- Process and Product Assurance (PPA)

7.2.1 Organizational Process Leadership (OPL)

7.2.1.1 Purpose

Organizational Process Leadership establishes the executive sponsorship and accountability for the management and performance of the organization's process improvement activities.

7.2.1.2 Specific and Institutionalization Goals¹

- SG 1 The organization's process improvement activities are sponsored by executive management
- SG 2 The organization's management systems and activities are aligned with the organization's process improvement goals and strategies
- InG The practices for Organizational Process Leadership are institutionalized.

7.2.1.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,3,4,5,6
SG 2	SP 7,8,9,10,11
InG	InP 1,2,3,4,5

7.2.1.4 Specific Practices

- SP 1 Business reasons justifying the organization's investment in process improvement are established and maintained by executive management
- SP 2 The description of the process improvement goals and strategies for the organization are established and maintained by executive management.
- SP 3 Executive management's expectations for process improvement are communicated to the organization by process improvement goals and strategies.
- SP 4 Funding and other resources needed to implement the organization's process improvement strategies are provided.
- SP 5 Executive management reviews and approves the plans for implementing the process improvement strategies
- SP 6 Executive management coordinates with external customers and other relevant stakeholders external organizations to address effects the process improvement activities have on them

1. The designations of SG n, InG, SP n, InP are designations used to identify Specific Goals, Institutionalization Goals, Specific Practices, or Institutionalization Practices, respectively.

- SP 7 Definitions of the measures used to plan, manage, and evaluate results of the organization’s process improvement program are established and maintained.
- SP 8 The responsibilities and commitments of the units and their managers are kept consistent with the process improvement goals and strategies
- SP 9 The performance management and compensation systems are adjusted as needed to recognize contributions to the organization’s business performance and process improvement goals and strategies.
- SP 10 Progress in achieving the organization’s process improvement goals is reviewed by executive management on a periodic basis.
- SP 11 The managers and staff are kept informed of the status and results of the process improvement activities and changes to the improvement goals and strategies.

7.2.2 Organizational Business Governance (OBG)

7.2.2.1 Purpose

Organizational Business Governance establishes executive accountability for the management and performance of the organization’s work and results.

7.2.2.2 Specific and Institutionalization Goals

- SG 1 Executive management aligns the business activities involved in the organization’s product and service work with the organization’s business goals.
- SG 2 Executive management approves, measures, and manages the business activities of the organization’s units.
- InG The practices for Organizational Business Governance are institutionalized.

7.2.2.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,3,4,5
SG 2	SP 6,7,8,9
InG	InP 1,2,3,4,5

7.2.2.4 Specific Practices

- SP 1 Establish and maintain the organization’s business goals.
- SP 2 Definitions of the business outcome measures related to the organization’s near-term and long-term business goals are established and maintained.

- SP 3 Descriptions of the business activities and workflows required to develop, prepare, deploy, operate, and support the organization’s products and services are established and maintained.
- SP 4 Executive management establishes and maintains performance goals for business workflows that are drawn from the organization’s business strategy and goals.
- SP 5 Executive management establishes and maintains the organizational policies that govern the performance of the business activities.
- SP 6 Executives and middle managers review and approve work commitments the units make to external stakeholders.
- SP 7 Resources for the units are allocated based on what they need to perform their assigned work and satisfy their requirements, plans, and commitments
- SP 8 Definitions of the workflow measures used to monitor the performance of the units and business activities are established and maintained.
- SP 9 Executives and middle managers review the performance, status, and results of the organization’s business activities, and ensure appropriate corrective actions are performed when necessary

7.2.3 Work Unit Requirements Management (WURM)

7.2.3.1 Purpose

Work Unit Requirements Management establishes and maintains the documented and agreed-to requirements for the work that a work unit or project performs.

7.2.3.2 Specific and Institutionalization Goals

- SG 1 The requirements and requirements changes for a work unit and the impact of these requirements on the work unit are identified and evaluated.
- SG 2 The requirements baseline for a work unit is documented, maintained, and agreed to by the work unit.
- InG The practices for Work Unit Requirements Management are institutionalized.

7.2.3.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,3
SG 2	SP 4,5,6
InG	InP 1,2,3,4,5

7.2.3.4 Specific Practices

- SP 1 The requirements and requirements changes proposed for a work unit are identified.
- SP 2 The proposed requirements and requirements changes for a work unit are reviewed by the work unit to ensure they are understood, and clarifications are obtained where needed
- SP 3 The proposed requirements and requirements changes for a work unit are evaluated by a work unit to ensure they can be implemented within the scope of responsibility, capability, and capacity of a work unit.
- SP 4 The proposed requirements and requirements changes for a work unit are negotiated with the requirements providers and owners of affected products and services to ensure they are consistent with the scope of responsibility, capability, and capacity of the work unit.
- SP 5 The specification of the agreed-to baseline requirements for a work unit is established and maintained.
- SP 6 A work unit’s agreed-to requirements are reviewed on a periodic and event-driven basis, to identify requirements that are inconsistent with the business needs.

7.2.4 Work Unit Planning and Commitment (WUPC)

7.2.4.1 Purpose

Work Unit Planning and Commitment establishes and maintains the plans and commitments for performing and managing the work required of a work unit or project.

7.2.4.2 Specific and Institutionalization Goals

- SG 1 Quantitative estimates of the planning parameters are derived and documented to describe the magnitude of the work to be done by a work unit.
- SG 2 The commitments a work unit needs to perform its work are identified, planned, documented, and agreed to by relevant stakeholders.
- SG 3 Plans that describe how a work unit will perform its work are documented and kept consistent with its requirements, its commitments, and related plans.
- InG The practices for Work Unit Planning and Commitment are institutionalized.

7.2.4.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,4,5,6,7,8
SG 2	SP 3,9,10,11,12,17
SG 3	SP 13,14,15,16,18,19
InG	InP 1,2,3,4,5

7.2.4.4 Specific Practices

- SP 1 Individuals and workgroups in a work unit participate or are appropriately represented in estimating and planning the work.
- SP 2 Lessons learned by a work unit are used in estimating and planning future work.
- SP 3 A description of the workflow for the work unit is established and maintained.
- SP 4 A work breakdown structure that partitions work assigned to a work unit into activities is established and maintained.
- SP 5 Definitions of the measures used to plan and manage a work unit are established and maintained
- SP 6 Estimates are established and maintained for the base attributes of the work activities and work products for a work unit.
- SP 7 Estimates are established and maintained for the demand/production schedule the work unit needs to support.
- SP 8 Estimates are established and maintained for the effort, budget, and other resources required to satisfy a work unit's requirements, demand/production schedule, and commitments.
- SP 9 Commitments to address critical dependencies are established and maintained between a work unit and other work units and other relevant stakeholders.
- SP 10 Commitments between a work unit and other work units, other workgroups, and other relevant stakeholders, and changes to the commitments are reviewed and agreed to by the individuals and workgroups within the work unit.
- SP 11 Schedules for a work unit are established and maintained to describe the milestones, activities, and application of resources that are needed to satisfy the requirements, commitments, and demand/production schedule.
- SP 12 The requirements, planning constraints, and the estimates of the planning parameters for a work unit are balanced with the available levels of resources, schedule, and budget.
- SP 13 Plans are established and maintained for obtaining, assigning, and preparing the people to perform their roles in a work unit, and for reassigning people who are not needed.
- SP 14 Plans for acquiring and deploying the non-people resources needed to perform a work unit's work and reallocating these resources that are not needed are established and maintained.
- SP 15 Plans are established and maintained for the collection, storage, management, and disposal of the critical data and information for a work unit.
- SP 16 Risks that could jeopardize satisfying a work unit's requirements and commitments are identified and analyzed, and plans to manage them are established and maintained.
- SP 17 Mechanisms to assign and regularly monitor the work performed by the individuals and workgroups in a work unit are established and maintained.
- SP 18 The plans and commitments for a work unit are reconciled with the plans and commitments of related work units and workgroups.

SP 19 The component plans for a work unit are organized into a course of action for performing the work.

7.2.5 Work Unit Monitoring and Control (WUMC)

7.2.5.1 Purpose

Work Unit Monitoring and Control measures, monitors, and adjusts the work assignments, resources, and other work factors for the individuals and workgroups in the work unit or project and keeps performance and results in line with the requirements and plans.

7.2.5.2 Specific and Institutionalization Goals

- SG 1 Work assignments and work activities for a work unit are managed against its requirements, estimates, plans, and commitments.
- SG 2 The actual performance and results of a work unit are monitored against its requirements, estimates, plans, and commitments.
- SG 3 Corrective actions are performed when the performance or results of a work unit deviate significantly from its requirements, plans, or commitments.
- InG The practices for Work Unit Monitoring and Control are institutionalized.

7.2.5.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,3,4
SG 2	SP 5,6,7,8,9,10
SG 3	SP 11,12,13,14,15
InG	InP 1,2,3,4,5

7.2.5.4 Specific Practices

- SP 1 Work requests received by a work unit are analyzed, prioritized, and planned into the work unit's activities.
- SP 2 The people needed to perform the work unit's work are obtained, assigned, and prepared according to the plans and the needs of the work unit.
- SP 3 The non-people resources needed to perform a work unit's work are acquired and deployed or reallocated, as appropriate, according to the plans and the needs of the work unit.
- SP 4 The assignment of work activities to individuals and workgroups within the work unit is established and maintained.
- SP 5 The overall workflow of a work unit is monitored against the defined workflow description.

- SP 6 The work assigned to individuals and workgroups in a work unit is monitored on a regular basis, and adjustments are made as needed.
- SP 7 Measures defined in the plans for a work unit are collected, analyzed, and used in managing the work
- SP 8 The performance and the status of the activities, work products, and services for a work unit are reviewed against its requirements, plans, and commitments on a regular basis.
- SP 9 The critical data and information for a work unit are collected, stored, managed, and disposed according to the data management plans.
- SP 10 The identified risks for a work unit are managed.
- SP 11 Significant deviations from a work unit's requirements, estimates, plans, and commitments are identified and addressed.
- SP 12 The likely causes of significant deviations from a work unit's requirements, estimates, plans, and commitments and other significant work unit issues are identified and addressed
- SP 13 The work unit's status, accomplishments, issues, and risks for a work unit are reviewed with relevant stakeholders as needed.
- SP 14 The plans for a work unit are revised to reflect status, risk changes, commitment changes, and changes in the planning parameters.
- SP 15 Lessons learned in performing and managing the work for a work unit are recorded and used in establishing future requirements, estimates, plans, and commitments.

7.2.6 Work Unit Performance (WUP)

7.2.6.1 Purpose

Work Unit Performance establishes work agreements for the individuals and workgroups with the work unit manager and performs the work to produce the agreed-to results.

7.2.6.2 Specific and Institutionalization Goals

- SG 1 Individuals and workgroups within a work unit understand their work assignments and are provided with the resources needed to perform the work.
- SG 2 The work performed and work products and services delivered by the individuals and workgroups within a work unit satisfy their plans and commitments.
- SG 3 Individuals and workgroups within a work unit measure and improve the performance of their work activities.
- InG The practices for Work Unit Performance are institutionalized.

7.2.6.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,3,4
SG 2	SP 5,6,7
SG 3	SP 8,9
InG	InP 1,2,3,4,5

7.2.6.4 Specific Practices

- SP 1 Work assignments are received by the individuals and workgroups and are analyzed, prioritized, and scheduled appropriately into their work activities.
- SP 2 The dependencies and interactions among the individuals and workgroups needed to perform the work assignments are defined, and commitments are agreed to by relevant stakeholders.
- SP 3 The information and resources that individuals and workgroups within a work unit need to perform their work activities are obtained.
- SP 4 Individuals and work groups within a work unit prepare for their work assignments as defined in the relevant process descriptions and work procedures.
- SP 5 The assigned work is performed by the individuals and workgroups within a work unit in accordance with work requirements, work procedures, and work agreements.
- SP 6 The authenticity and integrity of the data and information that are input to, created by, and output from the work steps performed by the individuals and workgroups within a work unit are maintained.
- SP 7 The individuals and workgroups performing the work provide status of the work to the work unit manager and other relevant stakeholders on a regular basis.
- SP 8 Measures of the work activities performed by the individuals and work groups within a work unit and the work products produced are collected and analyzed to understand the performance and results.
- SP 9 Improvements are identified and incorporated into the way individuals and workgroups within a work unit perform their work.

7.2.7 Work Unit Configuration Management (WUCM)

7.2.7.1 Purpose

Work Unit Configuration Management identifies, manages, and controls the content and changes to a work unit's configuration management (CM) product baselines.

7.2.7.2 Specific and Institutionalization Goals

- SG 1 A work unit's CM product baselines and their configuration items are identified.
- SG 2 The content of a work unit's CM product baselines and their configuration items are managed and controlled.
- SG 3 Information that describes the content and status of a work unit's CM product baselines and their configuration items is maintained and reported to relevant stakeholders.
- InG The practices for Work Unit Configuration Management are institutionalized.

7.2.7.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,3
SG 2	SP 4,5,6
SG 3	SP 7,8,9
InG	InP 1,2,3,4,5

7.2.7.4 Specific Practices

- SP 1 Configuration management repositories for a work unit are established and maintained.
- SP 2 A list of configuration items that will be controlled by a work unit is established and maintained.
- SP 3 Specifications of the CM product baselines that will be created by a work unit for use internal to the organization and for delivery to customers are established and maintained.
- SP 4 Changes to a work unit's configuration items are managed
- SP 5 A work unit's CM product baselines or controlled service packs, as appropriate, are created for internal use and for delivery to customers.
- SP 6 A work unit's CM product baselines or controlled service packs, as appropriate, are delivered for their intended use.
- SP 7 Records of a work unit's configuration items and CM product baselines are established and maintained.
- SP 8 A work unit's CM product baselines, their component configuration items, and associated records are audited to ensure their integrity, and corrective actions are performed.
- SP 9 Reports are provided to relevant stakeholders on the work unit's configuration management activities, and on the status and content of the configuration items and CM product baselines.

7.2.8 Sourcing Management (SM)

7.2.8.1 Purpose

Sourcing Management manages the acquisition of products and services from suppliers external to the organization.

7.2.8.2 Specific and Institutionalization Goals

- SG 1 Commitments with a qualified supplier to provide selected products and services for a work unit are agreed to by relevant stakeholders.
- SG 2 The sourcing agreements and work agreements between a work unit and supplier are satisfied by the supplier and work unit.
- SG 3 The acquired products and services are accepted and incorporated into a work unit's infrastructure, processes, products, and services.
- InG The practices for Sourcing Management are institutionalized.

7.2.8.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,3,4,5,6,7
SG 2	SP 8,9,10,11,18
SG 3	SP 12,13,14,15,16,17
InG	InP 1,2,3,4,5

7.2.8.4 Specific Practices

- SP 1 Descriptions of the sourcing needs of a work unit are established and maintained.
- SP 2 The requirements for the products and services to be acquired for a work unit are established and maintained.
- SP 3 Off-the-shelf products are selected, as appropriate, that satisfy a work unit's sourcing needs and other established criteria.
- SP 4 A supplier is selected based on its capability to satisfy the sourcing requirements and its ability to work with the work unit and organization.
- SP 5 The sourcing agreement for a selected supplier are established and maintained.
- SP 6 A supplier is selected to perform each work order.
- SP 7 Work orders are established and maintained with a supplier to provide specified products and services.
- SP 8 A supplier's plans and commitments are balanced with a work unit's internal plans and commitments.

- SP 9 The specified responsibilities of the work units and other involved workgroups to support the supplier are satisfied.
- SP 10 A supplier's progress and performance in providing specified products and services are monitored against the sourcing agreement, work orders, plans, commitments, and needs of the work unit.
- SP 11 The overall relationship with a supplier is monitored and adjusted as needed to effectively and efficiently satisfy the sourcing agreement, work orders, plans, commitments, and needs of the work unit and organization.
- SP 12 The products and services provided by a supplier are evaluated against their requirements and the needs of the work unit.
- SP 13 The work unit's facilities, capability, and capacity are established and maintained to accept, incorporate, control, maintain, and support the acquired products.
- SP 14 The acquired products are transitioned into a work unit.
- SP 15 Significant deviations from the sourcing agreement, work orders, performance results, and acceptability of the products and services are identified, and addressed by a supplier and the acquiring work unit as appropriate.
- SP 16 The likely causes of significant deviations from the sourcing agreement, work orders, performance results, and acceptability of the products and services are identified, and addressed by a supplier and the acquiring work unit as appropriate.
- SP 17 Each work order in a sourcing agreement is closed when the work is completed and commitments are satisfied or when other termination conditions are realized.
- SP 18 The sourcing relationship with a supplier is ended when the sourcing agreement and associated work orders are satisfied or when other termination conditions are realized.

7.2.9 Process and Product Assurance (PPA)

7.2.9.1 Purpose

Process and Product Assurance provides appropriate conformance guidance and objectively reviews the activities and work products of work efforts within the organization to ensure they conform with applicable laws, regulations, standards, organizational policies, business rules, process descriptions, and work procedures.

7.2.9.2 Specific and Institutionalization Goals

- SG 1 Activities and work products are objectively evaluated for conformance to the applicable laws, regulations, standards, organizational policies, business rules, process descriptions, and work procedures.
- SG 2 Non-conformance issues are tracked, communicated, and resolved.
- InG The practices for Process and Product Assurance are institutionalized.

7.2.9.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,3,4,5
SG 2	SP 6,7,8,9,10
InG	InP 1,2,3,4,5

7.2.9.4 Specific Practices

- SP 1 Assistance is provided to the individuals, work units, and workgroups so they can understand and comply with the laws, regulations, organizational policies, business rules, and standards that are applicable to their work.
- SP 2 Information and assets obtained from performing the process and product assurance reviews are provided to the management and staff of the work units so they can effectively plan, manage, and perform their work.
- SP 3 The process descriptions and work procedures used in performing the work are objectively evaluated against the applicable laws, regulations, standards, organizational policies, and business rules.
- SP 4 The performance of selected work activities is objectively evaluated against the applicable laws, regulations, standards, organizational policies, business rules, process descriptions, and work procedures.
- SP 5 Selected work products and services that are outputs of the process are objectively evaluated against the applicable laws, regulations, standards, organizational policies, and business rules.
- SP 6 The results of the process and product assurance evaluations are reviewed with the responsible individuals, work units, workgroups, and managers on a regular basis.
- SP 7 Potential and actual non-conformance issues are reviewed and resolved with the responsible individuals, work units, workgroups, and managers, if possible.
- SP 8 Non-conformance issues not resolvable within the work unit or workgroup are escalated to designated higher level managers and tracked to closure.
- SP 9 The likely causes of significant non-conformance issues are identified and addressed.
- SP 10 Records of the process and product assurance activities and results are established, maintained, and made available.

7.3 Maturity Level 3: Standardized

The following section contains the process areas that belong to maturity level 3. The maturity level 3 process areas of the BPMM are as follows:

- Organizational Process Management (OPM)
- Organizational Competency Development (OCD)

- Organizational Resource Management (ORM)
- Organizational Configuration Management (OCM)
- Product and Service Business Management (PSBM)
- Product and Service Work Management (PSWM)
- Product and Service Preparation (PSP)
- Product and Service Deployment (PSD)
- Product and Service Operations (PSO)
- Product and Service Support (PSS)

7.3.1 Organizational Process Management (OPM)

7.3.1.1 Purpose

Organizational Process Management develops usable standard processes and related process assets for the organization, deploys them for use, and improves them based on understanding their strengths and weaknesses.

7.3.1.2 Specific and Institutionalization Goals

- SG 1 The strengths and weaknesses of the organization’s processes and process assets are understood and improvements are made.
- SG 2 The organization’s standard processes and process assets are established and made available for developing, preparing, deploying, operating, and supporting the organization’s products and services.
- SG 3 The organization’s processes and process assets are analyzed and improved based on developing and using them.
- InG The practices for Organizational Process Management are institutionalized.

7.3.1.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,3,4,5
SG 2	SP 6,7,8,9,10
SG 3	SP 11,12,13
InG	InP 1,2,3,4,5

7.3.1.4 Specific Practices

- SP 1 The descriptions of the process needs, goals, and standards for the organization are established and maintained.

- SP 2 The processes and process assets of the organization are appraised periodically and as needed to maintain an understanding of their strengths and weaknesses.
- SP 3 Improvements to the organization’s processes and process assets are identified and prioritized.
- SP 4 Process action plans that address selected improvements to the organization’s processes and process assets are established and maintained.
- SP 5 The organization’s process action plans are implemented.
- SP 6 Descriptions of the organization’s standard processes are established and maintained.
- SP 7 Definitions of measures are established and maintained to characterize the organization’s standard processes and process assets.
- SP 8 Guidelines and criteria for tailoring the organization’s standard processes are established and maintained.
- SP 9 Repositories for storing and making available the organization’s process descriptions and measures and information on their use are established and maintained.
- SP 10 The organization’s process assets and changes to them are deployed across the organization.
- SP 11 Process-related work products, measures, and improvement information derived from performing the organization’s processes are collected, packaged, and maintained in the organizational repositories.
- SP 12 Information, work products, and measures derived from performing the organization’s processes are analyzed to provide insight into and improve the organization’s standard processes and related process assets.
- SP 13 Status and results of the organization’s process management activities are provided to relevant stakeholders.

7.3.2 Organizational Competency Development (OCD)

7.3.2.1 Purpose

Organizational Competency Development develops the competencies within the organization’s workforce that are needed to perform the organization’s work using the organization’s standard processes.

7.3.2.2 Specific and Institutionalization Goals

- SG 1 The development of the workforce competencies needed to perform the organization’s standard processes and support the organization’s strategic goals is planned.
- SG 2 Individuals develop the knowledge, skills, and process abilities needed to perform their roles in the organization’s standard processes.
- InG The practices for Organizational Competency Development are institutionalized.

7.3.2.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,3,4
SG 2	SP 5,6,7,8,9,10,11
InG	InP 1,2,3,4,5

7.3.2.4 Specific Practices

- SP 1 Descriptions of the workforce competencies required to perform the various roles in the organization's standard processes and to support the organization's strategic goals are established and maintained.
- SP 2 Descriptions of graduated development opportunities that support growth in the organization's workforce competencies are established and maintained.
- SP 3 Identify the competency development needs for each of the organization's workforce competencies.
- SP 4 Plans for developing capabilities in each of the organization's workforce competencies are established and maintained.
- SP 5 Materials needed to perform the organization's competency development activities are established and maintained.
- SP 6 Competency development activities are performed as defined in the organization's competency development plans.
- SP 7 Individuals participate in competency development activities as defined in the organizational competency development plans.
- SP 8 Status and performance in meeting the organization's competency development plans are monitored, and significant deviations are identified.
- SP 9 The effectiveness of the organization's competency development activities is measured and evaluated, and significant deficiencies are identified.
- SP 10 Corrective actions are performed to address significant deviations from the organization's competency development plans and significant deficiencies in the effectiveness of the competency development activities.
- SP 11 Records of the organization's competency development activities are established and maintained.

7.3.3 Organizational Resource Management (ORM)

7.3.3.1 Purpose

Organizational Resource Management plans and manages the acquisition, allocation, and reassignment of people and other resources needed to develop, prepare, deploy, operate, and support the organization's products and services.

7.3.3.2 Specific and Institutionalization Goals

- SG 1 The organization’s available resources are aligned with the resources needed for the organization’s product and service portfolio.
- SG 2 The resources provided for the product and service offerings are sustained and balanced with the capacity plans of the offerings.
- InG The practices for Organizational Resource Management are institutionalized.

7.3.3.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,3,4,5
SG 2	SP 6,7,8,9,10,11
InG	InP 1,2,3,4,5

7.3.3.4 Specific Practices

- SP 1 A description of the organization’s portfolio of products and services is established and maintained.
- SP 2 Organizational budgets are established and maintained for the products and services in the organization’s portfolio.
- SP 3 Estimates are established and maintained for each of the organizational resources that are needed to support the product and service portfolio.
- SP 4 The budgeted resources that are available and planned to support the organization’s portfolio of products and services are reconciled with the capacity plans.
- SP 5 Plans are established and maintained to provide the units with the resources they need to perform the product and service work for the organization’s portfolio of products and services.
- SP 6 The organization’s resource management activities are integrated into the organization’s standard processes and other organizational process assets for the product and service work.
- SP 7 The organization’s available and planned resources to support the portfolio are allocated to the units based on what they need to perform their assigned product and service work
- SP 8 The sources and suppliers of organizational resources needed for the product and service work are integrated into the organizational resource management process and the processes for performing the product and service work.
- SP 9 The quantity of each organizational resource consumed in supporting the organization’s product and services portfolio is monitored, and problems are identified.
- SP 10 Trends and predictions of the acquisition, allocation, and utilization of organizational resources are used to adjust the organizational resource estimates, budgets, and plans.

SP 11 The organization’s resources of each type are reallocated to the units and product and service offerings, as needed, to maintain appropriate balance of capacity and plans.

7.3.4 Organizational Configuration Management (OCM)

7.3.4.1 Purpose

Organizational Configuration Management identifies, manages, and controls the content and changes to the organization’s configuration management (CM) product baselines that compose and support the organization’s product and service offerings.

7.3.4.2 Specific and Institutionalization Goals

- SG 1 The organization’s CM product baselines and their configuration items that will be controlled are identified.
- SG 2 The content of the organization’s CM product baselines and their configuration items are managed and controlled.
- SG 3 Information that describes the content and status of the organization’s CM product baselines and their configuration items is maintained and reported to relevant stakeholders.
- InG The practices for Organizational Configuration Management are institutionalized.

7.3.4.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,3,4,5
SG 2	SP 6,7,8
SG 3	SP 9,10,11,12
InG	InP 1,2,3,4,5

7.3.4.4 Specific Practices

- SP 1 The strategy for performing and coordinating configuration management for the organization is established and maintained.
- SP 2 Configuration management repositories for the organization are established and maintained.
- SP 3 A list of configuration items that will be controlled by the organization is established and maintained.
- SP 4 Specifications of the organization’s CM product baselines that compose the organization’s product and service offerings and support their use are established and maintained. that.
- SP 5 The description of the organizational configuration architecture is established and maintained.
- SP 6 Changes to the organization’s configuration items are managed.

- SP 7 The organization’s CM product baselines or controlled service packs, as appropriate, are created for internal use and for delivery to customers.
- SP 8 The organization’s CM product baselines or service packs, as appropriate, are delivered for their intended use.
- SP 9 Records of the organization’s configuration items and CM product baselines are established and maintained.
- SP 10 The organization’s configuration management activities, the configuration management repositories, and the associated records are audited, periodically and as needed, to ensure their integrity, and corrective actions are performed.
- SP 11 The organization’s CM product baselines, service packs, their component configuration items, and associated records are audited to ensure they are ready for use, and corrective actions are performed.
- SP 12 Reports are provided to relevant stakeholders on the organization’s configuration management activities, and on the status and content of the configuration items and CM product baselines.

7.3.5 Product and Service Business Management (PSBM)

7.3.5.1 Purpose

Product and Service Business Management plans and manages the business and financial aspects of a product and service offering.

7.3.5.2 Specific and Institutionalization Goals

- SG 1 Capabilities and features of a product and service offering are defined based on the needs of the customers and it’s positioning in the market.
- SG 2 The business case for including a product and service offering in the organization’s portfolio is available for making business and management decisions.
- SG 3 The business and financial aspects of a product and service offering are managed.
- InG The practices for Product and Service Business Management Are Institutionalized.

7.3.5.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,3,4,5,6
SG 2	SP 7,8,9,10,11,12
SG 3	SP 13,14,15,16,17,18
InG	InP 1,2,3,4,5

7.3.5.4 Specific Practices

- SP 1 The current market situation and trends related to a product and service offering are regularly evaluated to identify their effects on customer needs and on their likely buying decisions.
- SP 2 The current competitive situation for a product and service offering and likely changes in the competitive situation are regularly evaluated.
- SP 3 Descriptions of the customer needs for a product and service offering are established and maintained.
- SP 4 Business goals covering quality, market share, financial returns, and other business and technical factors for a product and service offering are established and maintained.
- SP 5 Descriptions of the business requirements, including the capabilities and features, for a product and service offering are established and maintained to address the business goals.
- SP 6 Laws, regulations, and standards that are applicable to a product and service offering are identified.
- SP 7 Estimates of the potential sales and consumption of a product and service offering are established and maintained.
- SP 8 Estimates of the organization's costs for a product and service offering are established and maintained.
- SP 9 The pricing structure and pricing strategy for a product and service offering are established and maintained.
- SP 10 Estimates of the financial return, revenue/profit timeline, and other impacts and benefits of a product and service offering are established and maintained.
- SP 11 The characteristics, financial position, core competencies, and capacity of the organization are evaluated against what is needed for the product and service offering.
- SP 12 The business justification for including a product and service offering in the organization's portfolio is established and maintained.
- SP 13 Business strategies and plans for a product and service offering are established and maintained.
- SP 14 Business risks inherent in a product and service offering are determined, and plans to manage them are established and maintained.
- SP 15 Business performance and financial results achieved for a product and service offering are tracked against the business plans.

- SP 16 Business risks inherent in a product and service offering are managed.
- SP 17 Significant deviations from the business plans and financial estimates and plans for a product and service offering are identified and addressed.
- SP 18 Progress, accomplishments, issues, and risks related to the business plans and financial estimates for a product and service offering are reviewed with relevant stakeholders as needed.

7.3.6 Product and Service Work Management (PSWM)

7.3.6.1 Purpose

Product and Service Work Management plans and manages the work and results for a product and service offering using the organization’s process assets and defined processes that are tailored from the organization’s standard processes.

7.3.6.2 Specific and Institutionalization Goals

- SG 1 The product and service work for an offering is estimated and planned using defined processes and organizational process assets.
- SG 2 The actual work activities, performance, and results for a product and service offering are monitored against the defined processes, plans, and commitments.
- SG 3 Corrective actions are performed when the work activities, performance, or results for a product and service offering deviate significantly from the requirements, plans, and commitments.
- InG The practices for Product and Service Work Management are institutionalized.

7.3.6.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,3,4,5,6,7,8
SG 2	SP 9,10,11,12
SG 3	SP 13,14,15,16,17
InG	InP 1,2,3,4,5

7.3.6.4 Specific Practices

- SP 1 The defined processes covering the product and service work for an offering are established and maintained.
- SP 2 The master schedule for producing products and providing services for a product and service offering are established and maintained.
- SP 3 The master plans for satisfying the operations and support requirements for a product and service offering are established and maintained.

- SP 4 Definitions of the measures used to plan and manage the product and service work for an offering and to satisfy organizational measurement requirements are established and maintained.
- SP 5 Assignment of work responsibilities are established and maintained for each unit and workgroup involved in the product and service work for an offering.
- SP 6 Commitments to address critical dependencies for the product and service work for an offering are established and maintained.
- SP 7 Risks that could jeopardize the product and service work for an offering are determined, and plans to manage them are established and maintained.
- SP 8 Integrated work plans for the product and service offering, including plans for the participating units and workgroups, are established and maintained.
- SP 9 The product and service work for an offering is managed using the integrated plans and the defined processes.
- SP 10 Risks that could jeopardize the product and service work for an offering are managed.
- SP 11 The amount of each type of resource needed to perform the product and service work for an offering is determined and reported to executive management for use in managing the organizational resources.
- SP 12 Work products, measures, documented experiences, and improvements from the product and service work for an offering are contributed to the organization's process assets.
- SP 13 Significant deviations from the requirements, estimates, plans, and commitments for the product and service offering results and work are identified and addressed.
- SP 14 The likely causes of significant deviations from the requirements, estimates, plans, and commitments for the product and service offering results and work for an offering and other significant issues are identified and addressed.
- SP 15 Progress, accomplishments, and issues related to the product and service work for an offering are reviewed with relevant stakeholders as needed.
- SP 16 The estimates, commitments, and plans related to the product and service work for an offering are revised to reflect accomplishments, progress, risk changes, corrective actions, and plan changes.
- SP 17 Lessons learned in planning, performing, and managing the product and service work for an offering are recorded and used in establishing future requirements, estimates, plans, and commitments.

7.3.7 Product and Service Preparation (PSP)

7.3.7.1 Purpose

Product and Service Preparation establishes the requirements for a product and service offering and develops prepares the offering so that it is ready for deployment and use.

7.3.7.2 Specific and Institutionalization Goals

- SG 1 The requirements for a product and service offering are defined and documented.

- SG 2 A product and service offering is designed, constructed, and documented to satisfy its requirements.
- SG 3 A product and service offering is demonstrated to be ready to be deployed, operated, and supported.
- InG The practices for Product and Service Preparation are institutionalized.

7.3.7.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,3,4
SG 2	SP 5,6,7,8,9,10,11
SG 3	SP 12,13,14,15,16,17
InG	InP 1,2,3,4,5

7.3.7.4 Specific Practices

- SP 1 The requirements specification for a product and service offering is established and maintained.
- SP 2 The requirements for a product and service offering are validated.
- SP 3 The allocation of the requirements for a product and service offering to the components of the offering is established and maintained.
- SP 4 Bi-directional traceability is established and maintained between the requirements for a product and service offering and the associated plans and work products.
- SP 5 Capacity models for the product and service offering are established and maintained.
- SP 6 Business risks inherent in a product and service offering are identified, and support to manage the risks is included in the design, construction, and documentation of the product and service offering.
- SP 7 The overall design of a product and service offering is established and maintained.
- SP 8 The designs of the components that comprise a product and service offering are established and maintained.
- SP 9 Descriptions of additions and revisions to the organization’s standard processes and other organizational process assets that are needed for the product and service work are established and maintained.
- SP 10 The hardware, software, supplies, and other components that comprise a product and service offering and that are needed to deploy, operate, and support the offering are developed or acquired.
- SP 11 Documentation needed for deploying, operating, and supporting a product and service offering and for training those who perform these activities is established and maintained.
- SP 12 The design and construction of the components of a product and service offering are reviewed on a regular basis to determine if they satisfy their requirements, and corrective actions are performed.
- SP 13 The components that comprise a product and service offering are integrated.

- SP 14 A product and service offering is verified against the applicable requirements.
- SP 15 A product and service offering is validated for use.
- SP 16 A product and service offering is approved and accepted by the owner of the offering as ready for deployment and operations.
- SP 17 The components for a product and service offering are assembled into a package for delivery and deployment.

7.3.8 Product and Service Deployment (PSD)

7.3.8.1 Purpose

Product and Service Deployment installs, modifies, replaces, and removes the people, equipment, computing and communication infrastructure, supplies, and other resources used in operating and supporting a product and service offering.

7.3.8.2 Specific and Institutionalization Goals

- SG 1 The plans for deploying a product and service offering are defined, documented, and agreed to.
- SG 2 A product and service offering is deployed to support the needed capacity.
- SG 3 When a product and service offering is deployed, that offering and the other affected offerings are demonstrated to be ready for operations.
- InG The practices for Product and Service Deployment are institutionalized.

7.3.8.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,3,4,5
SG 2	SP 6,7,8,9,10,11
SG 3	SP 12,13,14,15
InG	InP 1,2,3,4,5

7.3.8.4 Specific Practices

- SP 1 Estimates of the changes in capacity needed for the deployment of a product and service offering are determined.
- SP 2 The approach for deploying a product and service offering is defined.
- SP 3 Plans for deploying a product and service offering are established and maintained.

- SP 4 Plans are established and maintained for migrating customers and the people performing the operations and support work following the deployment of a product and service offering.
- SP 5 Plans for deploying a product and service offering and for migrating the customers and the people performing the product and service work are reconciled and coordinated with related plans and ongoing activities.
- SP 6 A product and service offering is deployed according to the plans.
- SP 7 Changes to the capacity are made, as needed, when deploying a product and service offering.
- SP 8 When a product and service offering is deployed, the appropriate documentation or documentation changes needed to operate and support the offering are deployed.
- SP 9 Processes and process changes needed to operate and support a product and service offering are deployed as needed when the offering is deployed.
- SP 10 The support activities needed to accomplish a smooth transition during and following the deployment of a product and service offering are established and maintained.
- SP 11 Staffing skills are adjusted and additional skills are obtained, as needed, when deploying a product and service offering.
- SP 12 The changes deployed for a product and service offering are verified against the requirements for the offering and the service-level agreements.
- SP 13 Each deployment of a product and service offering is approved and accepted by the owner for that offering, owners of related offerings, and other relevant stakeholders.
- SP 14 Customers and the people performing the product and service operations, maintenance, and support work for an offering that is being terminated are migrated in accordance with the migration plans.
- SP 15 Each terminated or replaced product and service offering is continued as needed to allow the customers and users to transition off the terminated or replaced offering.

7.3.9 Product and Service Operations (PSO)

7.3.9.1 Purpose

Product and Service Operations provides the customers of a product and service offering with the capabilities and features of the offering.

7.3.9.2 Specific and Institutionalization Goals

- SG 1 Resources, information, and support for a product and service offering are provided, as needed, to the customers.
- SG 2 The transactions for a product and service offering are performed and intermediate and final results are verified and communicated to relevant stakeholders.
- SG 3 Results of the transactions for a product and service offering are assembled, verified, stored, and communicated to relevant stakeholders.

InG The practices for Product and Service Operations are institutionalized.

7.3.9.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,3,4
SG 2	SP 5, 6,7,8,9
SG 3	SP 10,11,12
InG	InP 1,2,3,4,5

7.3.9.4 Specific Practices

- SP 1 The customers of a product and service offering are provided with the information they need to understand the nature of a product and service offering and its transactions.
- SP 2 The customers of a product and service offering are provided with the equipment, computing and communication infrastructure, supplies, and other resources they need to perform their roles in the product and service offering.
- SP 3 The customers of a product and service offering are provided with a point of contact for asking questions, getting information, and resolving issues regarding any aspect of the product and service offering.
- SP 4 Assistance is provided, as needed, to the customers of a product and service offering to address problems in understanding and using any component of the offering.
- SP 5 The information and resources needed to perform each transaction of a product and service offering are obtained and verified, as appropriate.
- SP 6 The requested transactions for a product and service offering are performed.
- SP 7 Exceptional conditions in performing each transaction of a product and service offering are identified.
- SP 8 Actions for handling exceptional conditions encountered in performing each transaction of a product and service offering are defined, approved, and performed.
- SP 9 The customers of a product and service offering are provided with intermediate status and other intermediate information they need to perform their role in the transactions.
- SP 10 The results of each transaction of a product and service offering are provided to the affected customers.
- SP 11 Information on the results of the transactions for a product and service offering is conveyed to relevant stakeholders.
- SP 12 The final permanent information and data for each completed transaction are assembled, verified, and stored in accordance with applicable laws, regulations, organizational policies, and service level agreements.

7.3.10 Product and Service Support (PSS)

7.3.10.1 Purpose

Product and Service Support maintains the infrastructure, supplies, and other resources needed to sustain the operations and availability of a deployed product and service offering.

7.3.10.2 Specific and Institutionalization Goals

- SG 1 The offering infrastructure, supplies, and other resources needed to operate and support a product and service offering are maintained over the life of the offering.
- SG 2 The offering infrastructure, supplies, resources, mechanisms, data, and information are managed to be able to operate a product and service offering during and following disruptive events.
- SG 3 Problems and issues identified in deploying, operating, and supporting a product and service offering are resolved.
- InG The practices for Product and Service Support are institutionalized.

7.3.10.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,3,4
SG 2	SP 5,6,7,8
SG 3	SP 9,10,11,12,13,14,15
InG	InP 1,2,3,4,5

7.3.10.4 Specific Practices

- SP 1 The supply of consumables needed to support the operations of a product and service offering is established and maintained.
- SP 2 Data, rules, and other information that are subject to change and that are built into the product and service offering and used to perform the transactions are updated as required.
- SP 3 Periodic and event-driven maintenance is performed on the offering infrastructure.
- SP 4 The operations and availability of the offering infrastructure are monitored continually, and adjustments are made to address problems and maintain the service-level agreements.
- SP 5 Plans are established and maintained to prepare for and recover from disasters and other disruptive events and to continue operations of a product and service offering during and following these events.
- SP 6 The infrastructure, supplies, and other resources that comprise the disaster recovery facilities are established and maintained.

SP 7	The data and information needed for a product and service offering are backed-up on a regular basis to support both disaster recovery and other operational recovery needs.
SP 8	The backed-up product and service offering data and information are restored as needed to support both disaster recovery and incidental operational recovery needs.
SP 9	Assistance is provided, as needed, to the people performing the product and service work, to address problems in using any component of the offering.
SP 10	Problem reports and change requests against any component used in the product and service work are documented, collected, and tracked.
SP 11	Each product and service offering problem report and change request is analyzed to determine its priority, and the plans for making and deploying any needed changes are defined.
SP 12	Each change package for a product and service offering, consisting of changes for a set of problem reports and change requests, is approved, implemented, verified, and validated.
SP 13	Each change package for a product and service offering, consisting of changes for a set of problem reports and change requests, is approved and accepted for use by the owner for that offering, the owners of other affected offerings, and other relevant stakeholders.
SP 14	Each change package for a product and service offering, consisting of approved changes for a set of problem reports and change requests, is deployed to affected locations.
SP 15	The owner of a product and service offering, the people performing the product and service work, and other relevant stakeholders are provided with information on the operational and performance status and change plans for the equipment and computing and communication infrastructure.

7.4 Maturity Level 4: Predictable

The following section contains the process areas that belong to maturity level 4. The maturity level 4 process areas of the BPMM are as follows:

- Organizational Common Asset Management (OCAM)
- Organizational Capability and Performance Management (OCPM)
- Product and Service Process Integration (PSPI)
- Quantitative Product and Service Management (QPSM)
- Quantitative Process Management (QPM)

7.4.1 Organizational Common Asset Management (OCAM)

7.4.1.1 Purpose

Organizational Common Asset Management determines the common characteristics of the organization's current and future products and services and exploits this commonality to improve the performance, quality, cycle time, throughput, and predictability of the organization's processes.

7.4.1.2 Specific and Institutionalization Goals

- SG 1 Work products, lessons, knowledge, and other results from performing the organization's processes are captured and developed into common assets.
- SG 2 Common assets are deployed for use across the organization.
- InG The practices for Organizational Common Assets Management are institutionalized.

7.4.1.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,3,4
SG 2	SP 5,6,7,8
InG	InP 1,2,3,4,5

7.4.1.4 Specific Practices

- SP 1 The organization's products and services and the processes, work products, and infrastructure used in developing, preparing, deploying, delivering, and supporting them are analyzed to identify common attributes and characteristics.
- SP 2 Work products, lessons, knowledge, and other results that emerge from the organization's product and service work and that are potentially reusable are captured.
- SP 3 Common assets for the organization are identified based on the organization's product and service portfolio and business strategies.
- SP 4 Common assets for the organization are established and maintained using selected elements captured from the organization's product and service work.
- SP 5 The organization's standard processes are revised as necessary to encourage and support the identification, development, and improvement of common assets.
- SP6 Provisions for the use of common assets are included in the organization's standard processes and related infrastructure, as appropriate.
- SP 7 Common assets and changes to them are deployed across the organization.

SP 8 Information on the development, maintenance, contents, and use of common assets is captured and made available to relevant stakeholders.

7.4.2 Organizational Capability and Performance Management (OCPM)

7.4.2.1 Purpose

Organizational Capability and Performance Management quantitatively characterizes the capability of the organization’s standard processes, and develops and provides the capability data, baselines, and models to quantitatively manage the organization’s products and services and associated work efforts.

7.4.2.2 Specific and Institutionalization Goals

- SG 1 Quantitative performance and quality goals for the organization’s products and services, and quantitative methods for managing the capability of the processes for the product and service work are defined.
- SG 2 Capability baselines and quantitative predictive models are developed and made available for use in quantitatively managing the organization’s product and service work.
- SG 3 The capability of the organization’s standard processes is understood in quantitative terms.
- InG The practices for Organizational Capability and Performance Management are institutionalized.

7.4.2.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,3
SG 2	SP 4,5,6,7
SG 3	SP 8,9,10
InG	InP 1,2,3,4,5

7.4.2.4 Specific Practices

- SP 1 Quantitative performance and quality goals for the organization’s products and services are established and maintained based on the organization’s business goals and the quantitative capability of the organization’s processes.
- SP 2 The critical process elements, attributes, and measures that are used to quantitatively characterize the performance of the organization’s standard processes are identified.
- SP 3 Definitions of statistical and other quantitative techniques for evaluating the capability of organization’s product and service processes for achieving performance and quality goals are established and maintained.

- SP 4 Measures of process attributes and performance and quality results emerging from the organization’s product and service work are collected on a periodic basis and stored in the organizational measurement repository.
- SP 5 Capability baselines for the organization’s standard product and service processes and process elements are established and maintained.
- SP 6 Quantitative predictive models that support the quantitative planning and managing of the organization’s product and service work and achievement of the its performance and quality goals are established and maintained.
- SP 7 The organization’s capability baselines, quantitative predictive models, and guidance for using them in the planning and managing the organization’s product and service work are made available for use.
- SP 8 The organization’s capability baselines, quantitative predictive models, and process attribute data are analyzed on a regular basis to understand the performance and quality results of the organization’s product and service work.
- SP 9 Corrective actions are performed to address issues in the organization’s performance and quality results.
- SP 10 Reports describing the results of analyses of organizational capability baselines, predictions from the organization’s predictive models, and the performance and quality results of the product and service work are made available to relevant stakeholders.

7.4.3 Product and Service Process Integration (PSPI)

7.4.3.1 Purpose

Product and Service Process Integration interweaves the work processes of the different disciplines and roles involved in the product and service offering to improve the efficiency and effectiveness of interdependent work.

7.4.3.2 Specific and Institutionalization Goals

- SG 1 The processes of the disciplines involved in a product and service offering are integrated to improve the efficiency and effectiveness of interdependent work.
- SG 2 Integrated product and service processes are used in planning, managing, and performing the work involved in a product and service offering.
- InG The practices for Product And Service Process Integration are institutionalized.

7.4.3.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,3
SG 2	SP 4,5,6,7
InG	InP 1,2,3,4,5

7.4.3.4 Specific Practices

SP 1	Dependencies and interfaces among the functions, disciplines, and roles involved in the product and service work are analyzed to identify processes that would benefit if integrated.
SP 2	Highly interdependent processes among the functions, departments, and roles that are involved in the product and service work are integrated to improve the efficiency and effectiveness of the product and service offering.
SP 3	Definitions of measures used to plan and manage the product and service work using functionally integrated processes are established and maintained.
SP 4	Organizational structures and workforce practices to support the product and service work are adjusted as needed to encourage and support the performance of functionally integrated processes.
SP 5	Product and service work activities are adjusted to incorporate the integrated processes.
SP 6	The estimating, planning, monitoring, and control of the work involved in the product and service work are based on the integrated processes.
SP 7	Individuals, work units, and workgroups perform their product and service work using functionally integrated processes where appropriate.

7.4.4 Quantitative Product and Service Management (QPSM)

7.4.4.1 Purpose

Quantitative Product and Service Management plans and manages the work involved in a product or service so that the product or service achieves its quantitative performance and quality goals.

7.4.4.2 Specific and Institutionalization Goals

- SG 1 Quantitative performance and quality goals for a product or service and the defined processes, plans, models, and methods needed to achieve these goals are defined.
- SG 2 The product and service work is statistically managed to achieve the defined quantitative goals.
- InG The practices for Quantitative Product And Service Management are institutionalized.

7.4.4.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,3,4
SG 2	SP 5,6,7,8
InG	InP 1,2,3,4,5

7.4.4.4 Specific Practices

- SP 1 Quantitative performance and quality goals for a product or service are established and maintained.
- SP 2 Defined processes and plans that can achieve the quantitative performance and quality goals for a product or service are established and maintained.
- SP 3 Intermediate performance and quality goals are established and maintained for identified process elements involved in the product and service work.
- SP 4 Quantitative predictive models and other quantitative methods for managing the achievement of the goals for a product and service offering are defined and calibrated.
- SP 5 The performance and quality results of the work efforts involved in the product and service work are monitored and compared to their quantitative performance and quality goals.
- SP 6 The defined processes and plans for the product and service work are quantitatively analyzed on a regular basis to determine if they are capable of achieving the quantitative performance and quality goals.
- SP 7 Corrective actions are performed when it is determined that the defined processes and plans for the product and service work are not capable of achieving the quantitative performance and quality goals.
- SP 8 The performance and quality goals, measures, analyses, predictions, and results of corrective actions for a product or service are recorded for local use and stored in the organizational measurement repository.

7.4.5 Quantitative Process Management (QPM)

7.4.5.1 Purpose

Quantitative Process Management statistically manages the performance of a work effort that performs work for developing, preparing, deploying, operating, or supporting a product or service so that the performance and quality goals assigned to that work effort are achieved.

7.4.5.2 Specific and Institutionalization Goals

- SG 1 A work effort is planned to achieve its quantitative goals.
- SG 2 Variation in the performance of the work processes for a work effort is understood and managed to support achieving its quantitative goals.
- SG 3 A work effort is statistically managed to achieve its quantitative goals.
- InG The practices for Quantitative Process Management are institutionalized.

7.4.5.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,3
SG 2	SP 4,5,6
SG 3	SP 7,8,9,10
InG	InP 1,2,3,4,5

7.4.5.4 Specific Practices

- SP 1 The quantitative performance and quality goals allocated to the process elements performed by a work unit or work group are approved and incorporated into plans for the work effort.
- SP 2 The definitions of the measurable attributes of a work effort that are relevant for understanding and controlling the variation in the work processes and managing the achievement of the work effort's quantitative performance and quality goals are established and maintained.
- SP 3 Quantitative and other analytic techniques needed to understand and control the variation in the work processes and manage the achievement of a work effort's quantitative performance and quality goals are identified and adapted for use.
- SP 4 The defined processes and other characteristics of a work effort are analyzed to identify the significant sources of variation.
- SP 5 The assignable causes of variation in the performance of the work processes of a work effort are identified.
- SP 6 Corrective actions are performed to address identified assignable causes of variation and manage their impact on the performance of product and service work.
- SP 7 The results of a work effort's processes are quantitatively evaluated to determine their impact on achieving their allocated performance and quality goals, and significant issues are identified.
- SP 8 Assignable causes for deviations between the product and service results and the capability required to achieve the allocated performance and quality goals are identified.
- SP 9 Corrective actions are taken to address significant deviations between the results of the product or service work and the capability required to achieve the allocated performance and quality goals.
- SP 10 The performance and quality goals, performance and capability measures, analyses, and the results of corrective actions for a work effort are recorded for local use and organizational use.

7.5 Maturity Level 5: Innovating

The following section contains the process areas that belong to maturity level 5. The maturity level 5 process areas of the BPMM are as follows:

- Organizational Improvement Planning (OIP)
- Organizational Performance Alignment (OPA)
- Defect and Problem Prevention (DPP)
- Continuous Capability Improvement (CCI)
- Organizational Innovative Improvement (OII)
- Organizational Improvement Deployment (OID)

7.5.1 Organizational Improvement Planning (OIP)

7.5.1.1 Purpose

Organizational Improvement Planning establishes the organization’s quantitative improvement goals (based on the organization’s business issues, goals, and strategies), establishes the infrastructure for systematically pursuing improvements, and defines the strategy for achieving the goals.

7.5.1.2 Specific and Institutionalization Goals

- SG 1 The organizational infrastructure and management systems are aligned to support the organization’s strategies for continuous and measurable improvement of its performance and quality.
- SG 2 The organization’s improvement goals are defined in quantitative terms.
- SG 3 The organization’s improvement activities and results are kept consistent with the organization’s improvement strategies and quantitative improvement goals.
- InG The practices for Organizational Improvement Planning are institutionalized.

7.5.1.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,3
SG 2	SP 4,5,6,7
SG 3	SP 8,9,10,11,12
InG	InP 1,2,3,4,5

7.5.1.4 Specific Practices

- SP 1 Descriptions of the organization’s critical improvement issues and their priorities are established and maintained.
- SP 2 An organizational improvement program is established to plan and direct the organization’s efforts to continuously and measurably improve its performance and quality.

- SP 3 Quantitative improvement goals for the organization and their priorities are established and maintained.
- SP 4 Measures of the organization's processes, activities, performance, and results are analyzed on a regular basis to identify areas that are most in need of improvements.
- SP 5 Inputs are gathered periodically and as needed from the people performing the organization's processes to identify changes that would improve performance, quality, and employee satisfaction.
- SP 6 Improvement ideas are obtained from the organization's customers and other relevant external stakeholders and by analyzing the organization's business and competitive environment.
- SP 7 Plans for improvement efforts that the organization will perform are established and maintained.
- SP 8 The organization's improvement activities and results are monitored against the organization's improvement strategies and quantitative improvement goals.
- SP 9 Measures and quantitative projections of the organization's improvements are monitored against the organization's quantitative improvement goals.
- SP 10 Corrective actions are performed when the organization's improvement activities and results deviate significantly from the improvement strategies and quantitative improvement goals.
- SP 11 Lessons learned in planning, performing, and monitoring the organization's improvement activities are recorded and incorporated into the organization's improvement activities as appropriate.
- SP 12 Information, status, measures, and other results of the organization's improvement activities are provided to relevant stakeholders and communicated across the organization.

7.5.2 Organizational Performance Alignment (OPA)

7.5.2.1 Purpose

Organizational Performance Alignment maintains proper alignment of the organization's business strategies and the organization's quantitative business goals up and down the organizational levels and across the organization's product and service offerings.

7.5.2.2 Specific and Institutionalization Goals

- SG 1 The plans, commitments and quantitative goals for the product and service offerings, units, workgroups, and individuals are aligned with the organization's business strategies and quantitative business goals.
- SG 2 The performance and results of the individuals, workgroups, units, product and service offerings, and organization are adjusted to address the organization's business strategies and achieve the organization's quantitative business goals.
- InG The practices for Organizational Performance Alignment are institutionalized.

7.5.2.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,3
SG 2	SP 4,5,6,7,8
InG	InP 1,2,3,4,5

7.5.2.4 Specific Practices

- SP 1 The allocation of the organizational quantitative business goals and responsibilities to the organization’s product and service offerings and units is established and maintained.
- SP 2 The responsibilities, plans, and commitments of the units are evaluated and aligned to ensure that, individually and in aggregate, they provide the best fit for the organization’s business strategies and goals.
- SP 3 The work assignments of workgroups and individuals in the work units are established and maintained to support the achievement of the business goals for the units.
- SP 4 The performance and results of the individuals, workgroups, units, and product and service offerings are monitored on a regular basis against their business goals.
- SP 5 Corrective actions are performed when the performance and results of the individuals, workgroups, units, and product and service offerings deviate significantly from their business goals.
- SP 6 The overall performance and results of organization are monitored on a regular basis against the organization’s quantitative improvement goals and strategies.
- SP 7 Corrective actions are performed when the performance and results of the organization deviate significantly from the organization’s quantitative business goals.
- SP 8 The likely causes of misaligned performance are identified and addressed.

7.5.3 Defect and Problem Prevention (DPP)

7.5.3.1 Purpose

Defect and Problem Prevention identifies and addresses the causes of defects and other problems that are the primary obstacles to achieving a work unit’s or workgroup’s plans and quantitative improvement goals so these defects and problems do not recur.

7.5.3.2 Specific and Institutionalization Goals

- SG 1 Root causes of defects and other problems that are the primary obstacles to achieving the plans and quantitative improvement goals of a work unit or workgroup are systematically determined.

- SG 2 Root causes of defects and other problems that are the primary obstacles to achieving the plans and quantitative improvement goals of a work unit or workgroup are systematically addressed to prevent them from recurring.
- SG 3 Information from the work unit's or workgroup's defect and problem prevention activities of a work unit or workgroup that is useful in other improvement activities is disseminated to relevant stakeholders.
- InG The practices for Defect and Problem Prevention are institutionalized.

7.5.3.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,3,4
SG 2	SP 5,6,7,8
SG 3	SP 9,10
InG	InP 1,2,3,4,5

7.5.3.4 Specific Practices

- SP 1 Defects and other problems that are the primary obstacles to achieving the work unit's or workgroup's plans and goals are selected for analysis and preventive action.
- SP 2 Defects and other problems that are similar to the selected defects and problems are identified and included with those selected for analysis and preventive action.
- SP 3 Root causes of the selected defects and problems are identified.
- SP 4 Process weaknesses that allowed the selected defects and problems to remain undetected are identified.
- SP 5 Corrective actions are identified and performed to address the root causes of the selected defects and problems and process weaknesses that allowed the defects and problems to remain undetected.
- SP 6 Defect and problem prevention activities are coordinated within a work effort.
- SP 7 Those performing the work within the work unit or workgroup are informed of actions they can perform to prevent the selected defects and problems from recurring.
- SP 8 The effects of the work unit's or workgroup's defect and problem prevention actions on its plans and quantitative improvement goals are measured and analyzed.
- SP 9 The work unit's and workgroup's defect and problem prevention information, measures, analyses, and results are documented.
- SP 10 The defect and problem prevention information, results, and records of a work unit or workgroup are shared with those who are responsible for related processes and work efforts.

7.5.4 Continuous Capability Improvement (CCI)

7.5.4.1 Purpose

Continuous Capability Improvement continually and measurably improves the performance of the organization's processes by identifying and deploying incremental improvements.

7.5.4.2 Specific and Institutionalization Goals

- SG 1 The performance and results of the individuals' personal work processes are continually and measurably improved.
- SG 2 The performance and results of the workgroups' work processes are adjusted for the workgroup characteristics and continually and measurably improved.
- InG The practices for Continuous Capability Improvement are institutionalized.

7.5.4.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,3,4,5,6
SG 2	SP 7,8,9,10,11,12,13
InG	InP 1,2,3,4,5

7.5.4.4 Specific Practices

- SP 1 Each individual establishes and maintains quantitative and qualitative descriptions of the performance and results of their personal work process.
- SP 2 Each individual evaluates their personal work process to identify opportunities for improvement.
- SP 3 Each individual establishes and maintains quantitative improvement goals and improvement plans for their personal work process.
- SP 4 Each individual develops, documents, and incorporates selected improvements into their personal work process to improve their performance and results.
- SP 5 Changes made to each individual's personal work processes are coordinated with relevant stakeholders.
- SP 6 Improvements identified by each individual that are also potential improvements to other processes are documented and provided to those responsible for these related processes.
- SP 7 Each workgroup establishes and maintains quantitative and qualitative descriptions of the performance and results of their processes.
- SP 8 Each workgroup makes adjustments to how their work is performed to account for the skills and other unique characteristics of the workgroup and its members.
- SP 9 Each workgroup evaluates their processes to identify opportunities for improvement.

- SP 10 Each workgroup establishes and maintains quantitative improvement goals and improvement plans for their processes.
- SP 11 Each workgroup develops, documents, and incorporates selected improvements into their processes to improve their performance and results.
- SP 12 Changes made to each workgroup's work processes are coordinated with relevant stakeholders.
- SP 13 Improvements identified by each workgroup that are also potential improvements to other processes are documented and provided to those responsible for these related processes.

7.5.5 Organizational Innovative Improvement (OII)

7.5.5.1 Purpose

Organizational Innovative Improvement formulates a complete improvement solution that, when deployed, will achieve specific assigned quantitative improvement goals.

7.5.5.2 Specific and Institutionalization Goals

- SG 1 Improvements are identified to address specific quantitative improvement goals assigned to a planned improvement effort.
- SG 2 A complete improvement solution that, when deployed, will achieve specific quantitative improvement goals, is developed and verified.
- SG 3 A complete improvement solution that, when deployed, will achieve specific quantitative improvement goals, is prepared for deployment.
- InG The practices for Organizational Innovative Improvement are institutionalized.

7.5.5.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,3,4
SG 2	SP 5,6,7
SG 3	SP 8,9
InG	InP 12,3,4,5

7.5.5.4 Specific Practices

- SP 1 An improvement workgroup is established and assigned responsibility and authority for achieving specific quantitative improvement goals.
- SP 2 A work plan to achieve the assigned quantitative improvement goals is established and maintained by the improvement workgroup or unit.

- SP 3 Candidate improvements that address the quantitative improvement goals assigned to an improvement workgroup or unit are identified and selected for evaluation.
- SP 4 Candidate innovative improvements are rigorously evaluated to determine their costs, impacts, and contribution to achieving the quantitative improvement goals assigned to an improvement workgroup.
- SP 5 A set of changes that makes up a complete improvement solution are prepared and evaluated to determine if the solution will achieve the assigned quantitative improvement goals.
- SP 6 Corrective actions are performed when the results and predictions of the pilots and other measurements and evaluations activities indicate that the assigned improvement goals will not be achieved or indicate other significant problems.
- SP 7 Lessons learned in performing and managing a planned improvement effort are recorded and incorporated in planning and performing this and other process improvement efforts.
- SP 8 The complete improvement solution that will be deployed to achieve the assigned quantitative goals is prepared for deployment.
- SP 9 Information, status, measures, and other results of a planned improvement effort are provided to relevant stakeholders and communicated across the organization.

7.5.6 Organizational Improvement Deployment (OID)

7.5.6.1 Purpose

Organizational Improvement Deployment continually and measurably improves the organization’s performance and quality by transitioning improvements into use in a systematic manner.

7.5.6.2 Specific and Institutionalization Goals

- SG 1 Deployment of improvements that contribute to meeting the organization’s quantitative improvement goals is planned, and the results are predicted in quantitative terms.
- SG 2 Improvements are deployed that continually and measurably improve the organization’s performance and quality.
- SG 3 Information on the organization’s process improvement activities and results is recorded, analyzed, and communicated to improve the organization’s improvement program.
- InG The practices for Organizational Improvement Deployment are institutionalized.

7.5.6.3 Practice-to-Goal Relationship Table

Goal	Practice
SG 1	SP 1,2,3
SG 2	SP 4,5,6
SG 3	SP 7,8,9

InG	InP 1,2,3,4,5
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7.5.6.4 Specific Practices

- SP 1 Improvements that will be deployed across the organization are selected.
- SP 2 Plans for deploying the selected improvements are established and maintained.
- SP 3 The costs, contribution to achieving the organization’s quantitative improvement goals, and other significant impacts and benefits of the improvements are predicted initially and updated during deployment.
- SP 4 The deployment of the selected improvements is managed in accordance with the deployment plans.
- SP 5 The costs, contribution to achieving the organization’s quantitative improvement goals, and other significant impacts and benefits of the deployed improvements are measured and compared to the predicted values throughout and following the deployment.
- SP 6 Corrective actions are performed when the results and measurements of the deployed improvements indicate significant deviations from the deployment plans, predicted results, or indicate other significant problems.
- SP 7 Lessons learned in deploying improvements are recorded and incorporated in planning, managing, and performing the deployment of this and other improvements.
- SP 8 Records of the organization’s improvement deployment activities are established and maintained.
- SP 9 Information, status, measures, and other results of the organization’s improvement deployment activities are provided to relevant stakeholders and communicated across the organization.

Part III - BPMM Informative Content

This Part contains the following chapters:

8 - Introduction

9 - BPMM Family

10 - BPMM Concepts

11 - Overview of BPMM Process Areas

12 - Structure of BPMM

13 - Institutionalization

14 - Process Areas

8 Introduction

A number of organizations have been using maturity models such as the Capability Maturity Model (CMM) for Software and CMMI for several years, and have realized significant benefits. These maturity models have been used primarily in projects or system development applications. However, for many organizations (for example, banks, financial services, medical supplies, retailers, equipment manufacturers, and consulting services) these maturity models only address the applications development (AD) part of their business — maybe 10 to 20 percent of their operations. They do not address the core of their overall operations — the development, preparation, deployment, operations, and support of their products and services.

From a process perspective, there are many similarities between the domains where maturity models were initially applied (that is, development and maintenance projects) and other domains¹ — and there are some important differences.

All these domains have similar process problems, including

- Managers and staff who are overworked due to poor estimating and planning
- Excessive rework
- Lack of consistent, stable processes, often with multiple ways to do similar things
- Lack of basis for measurement and management by fact
- Lack of foundation for organization-wide approaches and solutions
- Disappointing results from automation
- Mixed results in implementing programs such as Six Sigma and Business Process Reengineering
- Process improvements and fixes that are too localized and sub-optimal from an overall business perspective

Because these different domains all experience similar problems, the same process maturity concepts that have been successful in projects should, if properly applied, provide similar benefits in these other domains. That is the primary premise for adapting these concepts to create a more general Business Process Maturity Model (BPMM) that can be targeted to any of a number of domains.

8.1 Introducing the BPMM

A model is an abstraction of reality. A model defines a precedent to be followed or imitated because of intrinsic excellence, worth, etc.

The BPMM is a conceptual model based on “best practices” that are in actual use in a domain (for example, marketing, banking operations, manufacturing, finance, or IT operations). It describes the essential elements of effective processes for one or more selected domains. These process elements provide a foundation for quantitative control of the process, which is the basis for continuous process improvement.

1. A “domain” is a sphere of activity, concern, or function where the people involved shared interests. A domain could require the involvement and participation of multiple disciplines. Examples of domains include software engineering, manufacturing, marketing, banking operations, and finance).

Without a clearly defined strategy for improvement, it is difficult to achieve consensus among an organization's managers and staff on the priorities and order of improvement activities. To achieve lasting results from process improvement efforts, it is necessary to define an evolutionary path that increases an organization's process maturity in stages.

The BPMM describes an evolutionary improvement path that guides organizations in moving from immature, inconsistent processes to mature, disciplined processes. The BPMM orders these stages so that improvements at each stage provide a foundation on which to build improvements undertaken at the next stage. An improvement strategy drawn from the BPMM provides a roadmap for continuous process improvement. It helps identify process deficiencies in the organization and guides the improvements in logical, incremental steps. This path is characterized by five levels of maturity — maturity levels 1 through 5 — as shown in Figure 8.1.

The BPMM provides organizations with guidance on how to gain control of their business processes. Following this guidance they evolve toward a culture of performance and management excellence. In following the BPMM improvement path, organizational behavior and culture will change and the organization can produce continually improving business results.

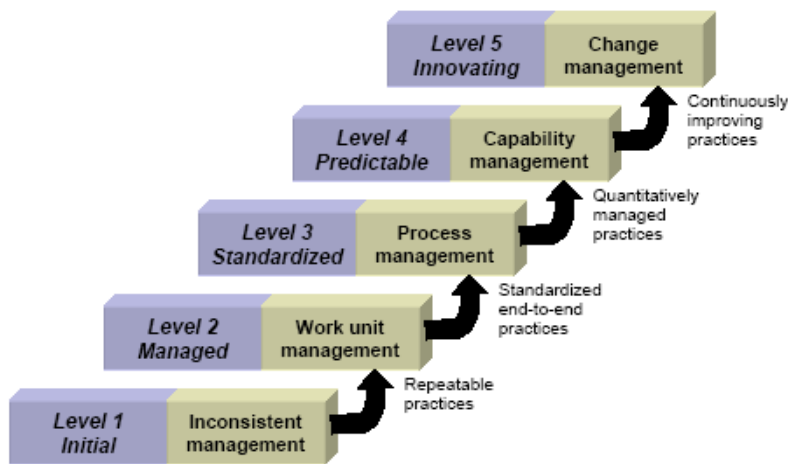


Figure 8.1 - The Five Maturity Levels of Process Maturity

Some of the uses of the BPMM include the following:

- Executive management uses the BPMM to understand the activities necessary to launch and sustain a process improvement program in their organization.
- Appraisal teams use the BPMM to characterize the maturity of an organization's existing processes and identify the strengths and weaknesses.
- An organization uses the BPMM to identify the most critical process issues for improving their processes, products, and services, and to guide them in defining and improving their processes.
- An organization, assisted by appraisal teams, uses the BPMM to help select qualified suppliers and to monitor the performance of suppliers.

Effective use of the BPMM allows an organization to introduce process improvements in stages. Each of these stages represents a set of process-based transformations. Each stage creates a foundation for later stages, and can change the organization's culture.

8.2 The BPMM Compared to Other Best Practices Models

There are a number of “best practices” models and standards that organizations are using very effectively in their work. Some of the most widely used models that are most closely related to the BPMM include *Control Objectives for Information and related Technology (COBIT)* [COBIT-2000], *Information Technology Infrastructure Library (ITIL)* [ITIL-2002], *A Guide to the Project Management Body of Knowledge (PMBOK)* [PMI-2000], *Baldrige National Quality Program: Criteria* [NIST-2005], and *ISO-9000* [ISO-2005].

The BPMM is not intended to replace these “best practices” models. The BPMM was developed to provide a framework that can guide an evolutionary staged approach to implementing best practices in different domains. The BPMM provides the overall improvement framework and summary practices with hooks to these other “best practice” models. These “best practice” models in turn provided the detailed best practices for that domain that are not in the BPMM.

As such, the BPMM can be used as an improvement model independent of these other best practice models or it can be used as an overarching model to guide an organization in implementing these models. The BPMM can also be used to determine how the processes and activities of multiple domains and units come together as an overall business solution. For example, the BPMM can be used to separately guide (1) units involved in the technical aspects of an offering, (2) units involved in the internal business aspects of an offering, and (3) units involved in the marketing and sales of an offering. Then the BPMM can also be used as a model to view the entire end-to-end process activities for all these units.

The distinctive power of the BPMM (and CMMs in general) is that it integrates the best practices of a domain and other transformative practices into a model of organizational change. Each stage of this evolutionary approach removes a set of organizational barriers that impede true sustainable improvement and installs practices that change the culture of the organization.

8.3 Historical Perspective of the BPMMs

The evolution of the maturity model concepts into the BPMM is illustrated in Figure 8.2. The shaded blocks are the most significant steps in this evolution.

The BPMM is the application of Total Quality Management (TQM) concepts to the processes of various domains. TQM places heavy emphasis on meeting customer requirements. It involves all the processes and everyone in the organization. The philosophy of TQM is continual improvement in all of the organization’s processes and in the organization’s products and services.

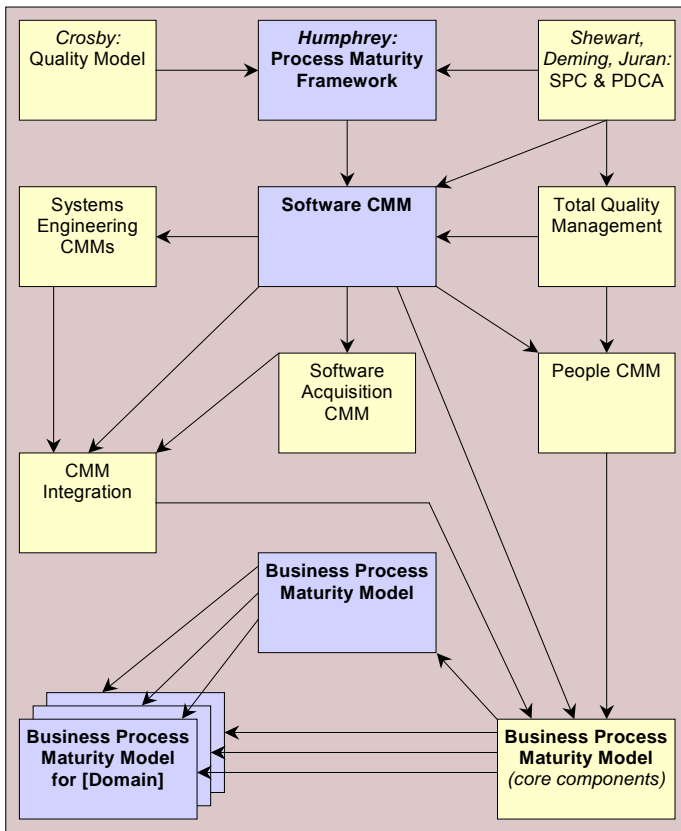


Figure 8.2 - Genealogy of the BPMM

The staged structure of the BPMM is based on principles of product quality that have existed for over 70 years. In the 1920s and 1930s, Walter Shewhart, promulgated the principles of statistical quality control [Shewhart-1931]. His principles were further developed and successfully demonstrated in the work of W. Edwards Deming, Joseph Juran, and Philip Crosby [Deming-1986, Juran-1992, Crosby-1979].

Crosby's quality management maturity grid was adapted to the software process by Watts Humphrey, Ron Radice and their colleagues at IBM [Radice-1985]. Humphrey brought this maturity framework to the Software Engineering Institute in 1986, added the concept of maturity levels, and developed the foundation for its current use throughout the software industry [Humphrey-1987]. This maturity framework is the basis for CMMs and the BPMM.

Work on the first CMM (the CMM for Software) was started at the Software Engineering Institute in 1989. Version 1 of the CMM for Software was published in August 1991 [Weber-1991]. It established the basic architecture and design for subsequent CMMs and the BPMMs.

The design and concepts of the CMM for Software have been adapted and applied to other project domains such as systems engineering and software acquisition [SEI-2001], and later these concepts were extended and applied to human resource management [Curtis-2001].

9 The BPMM Family

9.1 Use of the BPMM for Different Domains

For many domains, the underlying process model depicts the development and delivery of products and services. Even domains that are not typically viewed as product and service domains have this underlying process model. For example, the processes for a Finance unit in an organization are concerned with developing and providing products (for example, forms, databases, and documented procedures) to its customers (that is, the managers and staff of an organization). The Finance unit is also involved in providing services to these customers (for example, support in planning new work, collecting and storing measures for the units, and analyzing and reporting business financial data). Human Resource Management processes are similarly concerned with providing products and services for functions such as recruiting, hiring, assigning, developing, evaluating performance, and terminating the people of an organization.

This underlying process model is the basis for the BPMM. The BPMM describes the essential practices for the development, preparation, deployment, operations, and support of product and service offerings. The BPMM covers the life cycle activities and support activities for a generic product and service offering, from determining customer needs and establishing the business justification for the offering through operations, support, and disposal.

The terms “Business Process Maturity Model” or “BPMM” are used when referring to this model that covers the generic product and service offering practices.

The BPMM can be adapted and applied to a number of domains, including domains that provide products and services for internal or external use.

The BPMM can also be used as the overarching model to guide an organization in looking at how the processes and activities of multiple domains and units involved in product and service offerings come together as an overall business solution. For example, the BPMM can be used to separately guide (1) units involved in the technical aspects of an offering, (2) units involved in the internal business aspects of an offering, and (3) units involved in the marketing and sales of an offering. Then the BPMM can also be used as a model to view the entire end-to-end process activities for all these units.

As with other maturity models such as the CMM for Software and CMMI, the BPMM prioritizes improvements and provides a reference model for appraising business processes and their institutionalization. The BPMM provides a process model and organizational change support for improving the organization processes. Because the BPMM is based on the same fundamentals as other maturity models, it will yield the same benefits in terms of rework reduction, consistency, and quality improvements.

9.2 BPMM as Basis for Domain BPMMs

Although the BPMM provides a model that is applicable to a broad range of domains, in some instances users might want to have a Domain BPMM that specifically addresses the unique aspects of the domain processes and in the domain terminology. The need for this may be driven by the special characteristics of the domain, because a more detailed or domain-specific description is needed, or because the domain is a critical core competency for an organization. For example, at one level of abstraction, the BPMM covers the practices for the finance domain. But an organization may want a model that provides a more detailed, specific description of the finance practices.

For these cases, the BPMMs for specific domains can be (and have been) developed. Creation of these Domain BPMMs is discussed in Annex C.

10 BPMM Concepts¹

10.1 Immature Versus Mature Processes

In an immature organization, processes are generally improvised by practitioners and their managers as the work is performed. Even if a process has been specified, it is not rigorously followed or enforced. The immature organization is reactionary and managers are usually focused on solving immediate crises - this is sometimes referred to as “fire fighting.” Budget, schedule, and service level agreements are often not met because they are not based on realistic estimates. When hard deadlines are imposed, product and service functionality and quality are often compromised to meet the schedule or throughput expectations.

In an immature organization, there is no objective basis (such as data or measures) for judging the quality of products or services, or for solving product, service, or process problems. There is little understanding of how the steps of the process affect quality, and quality is difficult to predict. Compromises are made without understanding the overall effects of these compromises. Activities intended to enhance quality, such as reviews and verification activities, are often seen as not adding value and are curtailed or eliminated when work units² and workgroups³ fall behind their schedule or throughput plans. The product and service customers have little insight into the products and services until they receive them.

On the other hand, a mature organization possesses an organization-wide capability for effectively defining, performing, and managing its processes. The processes are accurately communicated to both existing and newly-assigned staff, and work activities are carried out according to the planned processes.

The planned processes are documented and usable, and the work is performed according to the planned processes. Roles and responsibilities within the processes are clearly understood by the people in the work efforts and across the organization. The process descriptions are updated when necessary. In general, a disciplined process is consistently followed because all of the participants understand the value of doing so, and the necessary infrastructure exists to support the processes.

Improvements are developed, verified through controlled pilot-tests and cost-benefit analyses, and they are deployed into practice in a controlled and systematic manner. There is broad-scale, active involvement of the people in the organization's process improvement activities.

In a mature organization, managers monitor the quality of the products and services, as well as the processes that produce them. There is an objective, quantitative basis for analyzing problems with the products, services, and processes, and judging the quality of products and services. When changes are needed to address problems, there is an understanding of the options and the overall effects of these options. Budget, schedule, and throughput estimates and plans are based on documented historical performance, and these estimates and plans are realistic. The expected results for cost, schedule, throughput, functionality, and quality of the products and services are usually achieved.

1. Material contained in Part III, Section 6 was adapted from [SEI-1997]

2. Definition: A *work unit* is a well-defined collection of people, managed as a single organizational unit, who work closely together on tasks specifically related to developing, maintaining, and delivering the organization's products and services or performing internal business functions. A work unit is an organizational unit whose manager is accountable for agreeing to requirements, making commitments, obtaining and removing resources, assigning responsibility, and tracking and ensuring performance.

3. Definition: A *workgroup* is a collection of people who work closely together on tasks that are highly interdependent, in order to achieve shared objectives. A workgroup may or may not be a permanent organizational component. Assignment to workgroups may be dynamic and individuals may participate in multiple workgroups. A workgroup may be a work unit, a support group, or a collection of people drawn from one or more work units and support groups.

10.2 Fundamental Process Concepts

There are a number of basic concepts that are used to describe mature organizations.

A process can be defined as a set of interrelated activities, methods, and practices that use a set of inputs to develop, deliver, and support a set of products and services. As an organization matures, the processes become better defined and more consistently implemented throughout the organization. The BPMMs focus on process as a way to empower the people doing the work.

The underlying premise of process management is that the quality of products and services is largely determined by the quality of the processes used to develop, deliver, and support them. An effective process set ties together people, tools, and methods into an integrated whole.

Process capability describes the range of expected results that can be achieved by following a process. The process capability of an organization provides one means of predicting the most likely outcomes to be expected from the next effort the organization undertakes. The process areas and maturity levels of the BPMM are indicators of process capability.

Process performance describes the actual results achieved by performing a process. Process performance focuses on the results achieved, while process capability focuses on results expected. Implementation and institutionalization of the BPMM process areas incrementally improve an organization's process performance.

Institutionalization is the building of infrastructure and culture that supports methods and practices so that they are the ongoing way of doing business. The result of institutionalization is the deployment and implementation of processes that are effective, usable, and consistently applied across the organization.

Process maturity is the extent to which processes are explicitly defined, managed, measured, controlled, and effective. Maturing processes implies a growth in capability and indicates both the richness of an organization's processes and the consistency with which they are applied throughout the organization. Process maturation implies that process capability is improved over time. Process improvement requires strong management support and a consistent long-term vision and strategy. As an organization matures, an infrastructure and culture is established that supports the methods, practices, and procedures of the organization so that they endure even after those who originally defined them have gone.

10.3 The Five Process Maturity Levels

Continuous process improvement is based on both small, evolutionary steps and process innovations. BPMM provides a reference model for organizing these evolutionary and innovative steps into five maturity levels that lay successive foundations for continuous process improvement. These five maturity levels (shown in Figure 10.1) define a scale for measuring the maturity of an organization's processes and for evaluating its process capability. The maturity levels also help an organization prioritize its improvement efforts.

A maturity level is a well-defined evolutionary plateau that serves as a steppingstone for achieving a mature process culture. Each maturity level comprises a set of process goals that, when satisfied, stabilizes a critical set of practices that build on the preceding maturity level and form the foundation for continued improvements. Achieving each maturity level of the BPMM establishes a different component in the processes, resulting in an increase in the process capability of the organization.

A maturity level is a defined evolutionary plateau of process improvement. Each maturity level stabilizes an important part of the organization's processes. There are five maturity levels, maturity levels 1 through 5.

Each maturity level, except maturity level 1, consists of a defined set of process areas. The maturity levels are measured by the achievement of the goals that are contained in the set of process areas.

Organizing the BPMM into the five maturity levels prioritizes improvement efforts for increasing process maturity.

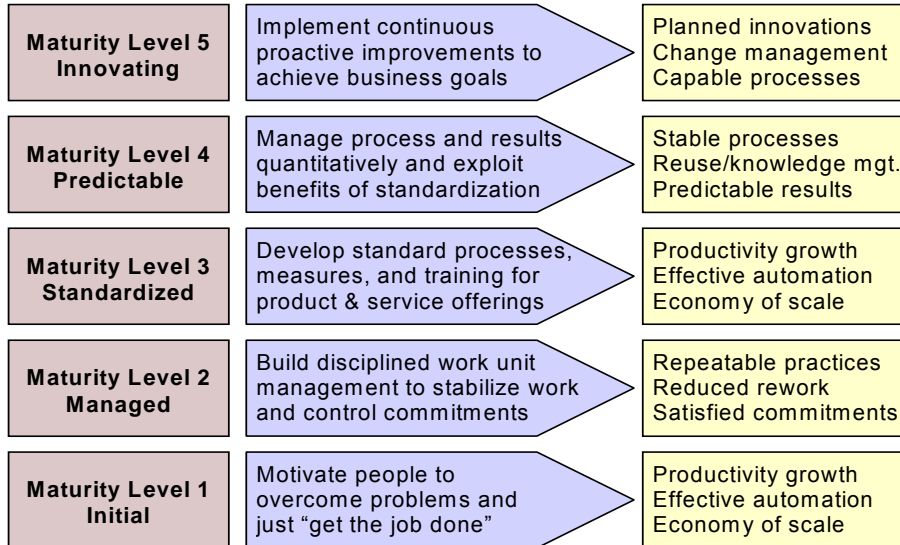


Figure 10.1 - The BPMM Maturity Levels - How They Work

The five maturity levels can be briefly described in terms of their management focus and primary objective:

1. Initial - "Fire-fighting management" - There are no specific objectives. Success in these organizations depends on the competence and heroics of the people in the organization and not on the use of proven processes.
2. Managed - "Work unit management" - The objective is to create a management foundation within each work unit or project.
3. Standardized - "Process management" - The objective is to establish and use a common organizational process infrastructure and associated process assets to achieve consistency in how work is performed to provide the organization's products and services.
4. Predictable - "Capability management" - The objective is to manage and exploit the capability of the organizational process infrastructure and associated process assets to achieve predictable results with controlled variation.
5. Innovating - "Change management" - The objective is to continuously improve the organization's processes and the resulting products and services through defect and problem prevention, continuous capability, and planned innovative improvements.

The maturity level of an organization provides a way to predict the future performance of the organization for a given domain or set of domains. Experience has shown that organizations do their best when they focus their process improvement efforts on a manageable number of process areas that require increasingly sophisticated practices as the organization improves.

These five maturity levels reflect the fact that BPMM is a model for improving the capability of organizations. The priorities in the BPMM, as expressed by these maturity levels, are not directed at individual work units and workgroups; the BPMM focuses on processes that are of value across the organization.

The following sections describe the characteristics of each maturity level.

10.3.1 Maturity Level 1 - The Initial Level

At maturity level 1, the practices and results of the processes are inconsistent. The processes are rarely defined or documented. Processes that are defined are rarely followed. The organization usually does not provide a stable environment for process implementation. Over-commitment is a characteristic of maturity level 1 organizations; such organizations frequently have difficulty establishing commitments that the work units can meet.

Although individuals are capable of performing their assignments, they do so through individualized methods. Success in these organizations depends on the competence and heroics of the people in the organization and not on the use of proven processes. Process capability is a characteristic of the individuals, not of the organization.

In spite of this inconsistent environment, maturity level 1 organizations often produce products and services that work; however, they frequently exceed the budget and schedule or fall short of their throughput requirements. Maturity level 1 organizations encounter great difficulty in trying to adapt to changes in requirements or business environment.

From a BPMM perspective at maturity level 1, an organization has not yet satisfied one or more goals of the process areas assigned to maturity level 2.⁴

10.3.2 Maturity Level 2 - The Managed Level

At maturity level 2, each work unit and project⁵ has established basic planning and management processes, has established management control of their requirements, and is performing all the essential activities to develop, prepare, deploy, operate, and support their products and services.

At maturity level 2, executive and middle management provides the sponsorship and coordination for process improvement. They also assign responsibilities to the work units and projects and monitors the workflow and dependencies among the work units and projects.

Realistic commitments are made, which are based on the results observed on previous work and on the work unit's requirements. The work unit managers track costs, schedules, and throughput, as well as problems in meeting their requirements and commitments. Supplier sourcing agreements are established and maintained, as needed, to support the work units.

At maturity level 2, the primary management concerns are cost, schedule, and throughput. There is an awareness of quality concerns, but management of quality goals is not a primary management concern.

Processes may differ among work units in a maturity level 2 organization. The organizational requirement for achieving Level 2 is that executive management sponsors the organization's process management and improvement activities and that there are organizational policies that guide the work units and workgroups in performing and managing their processes. The organizational environment must be stabilized to allow the work units and workgroups to consistently perform their processes.

The process discipline achieved by maturity level 2 organizations helps to ensure that existing practices are retained during times of stress. When these maturity level 2 practices are in place, the work units perform and are managed according to their documented plans, processes, and procedures. Work units in maturity level 2 organizations generally deliver their products and services within budget and on schedule and according to their throughput requirements.

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4. In some cases a goal or process area may be “not applicable.” In these cases, from a rating perspective, the goal or process area is considered to be “satisfied.”
 5. In this document, a project is considered to be a work unit that is a temporary endeavor undertaken to create a unique product or service. A work unit or project may be composed of other work units.

From a BPMM perspective at maturity level 2, an organization has satisfied all the goals of all the process areas assigned to maturity level 2, and has not yet satisfied one or more goals of the process areas assigned to maturity level 3.

10.3.3 Maturity Level 3 - The Standardized Level

At maturity level 3, the organization's standard processes for developing, preparing, deploying, operating, and supporting the products and services are documented for use across the organization. The organization's standard processes include the work processes, support processes, and management processes. These processes are defined at a level of abstraction such that they are applicable to a defined set of different work efforts in the organization (for example, different work units or different projects). They contain the definitions of the processes that enable consistent performance of work activities across the organization. When standardizing its processes, the organization exploits the best practices from throughout in the organization.

There is a typically a unit or workgroup that is responsible for coordinating the organization's process activities (for example, a process engineering group).

An organizational infrastructure is established to support organizational learning. Mechanisms are used to improve the organization's standard processes. Lessons learned from throughout the organization are collected, organized, and made available to units. The best of the process assets from the units are also collected, organized, and made available. Measures are collected, analyzed and used to understand the performance and other characteristics of the organization's processes and identify areas for improvements.

An organization-wide program is established to develop the skills and knowledge of the professional staff so that they can perform their assigned roles.

From a BPMM perspective, there is a shift of focus at maturity level 3 from the individual work units and workgroups to an integrated approach to developing, preparing, deploying, operating, and supporting complete set of related products and services.⁶ This set is referred to as a "product and service offering."

Defined processes for the various work efforts throughout the organization are established by tailoring the organization's standard processes. The tailoring accounts for the unique needs of the individual work efforts (for example, developing different products, providing different types of services, or adjusting for differences in size and complexity of applications). Defined processes are the processes followed in actually performing the work.

A defined process can be characterized as including entry criteria, inputs, standards and procedures, work activities, verification mechanisms, outputs, and exit criteria for the subprocesses. Because the process is well defined, management has good insight into work progress and relationships among work activities.

Defined processes⁷ are created for all work units and workgroups (for example, process and product assurance group, configuration management group, process engineering group, and training group). Within a discipline, the defined process contains a coherent, integrated set of well-defined subprocesses. Interfaces between the processes of different disciplines involved in the work for a set of products and services are well defined, documented, and verified to be consistent.

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6. This shift at maturity level 3 is a significant change from previous CMM such as the Software CMM and CMMI. In these models, the focus for developing and delivering products and services is the "project" at all maturity levels.
 7. Definition: A *defined process* is the complete operational definition of the process used by a workgroup, work unit, or project. It covers a well defined, bounded, meaningful set of related activities such as a process for delivering a service or a configuration management process. It is developed by tailoring the organization's standard processes.

At maturity level 2, the standards, process descriptions, and procedures may be quite different in each specific instance of the process. For example, two work units developing two different but similar IS applications may use different processes and procedures that are defined in different forms and formats. The same may be true for two work units in a financial organization that are processing payments for two different brands of credit cards.

At maturity level 3, the standards, process descriptions, and procedures for each end-to-end work effort (for example, developing, preparing, deploying, operating, supporting, and managing a complete product and service offering), and for the work of each work unit, and workgroup are tailored from the organization's standard processes to suit their particular characteristics. As a result, the processes that are performed across the organization are consistent except for the differences dictated by unique needs and as allowed by the tailoring guidelines. This consistency also supports effective organizational learning.

From a BPMM perspective at maturity level 3, an organization has satisfied all the goals of all the process areas assigned to maturity levels 2 and 3, and has not yet satisfied one or more goals of the process areas assigned to maturity level 4.

10.3.4 Maturity Level 4 - The Predictable Level

At maturity level 4, achievable quantitative goals for performance and quality results⁸ are established for end-to-end work efforts (for example, developing a product or providing a complete service), and are used as criteria in managing the work efforts. These quantitative goals are based on the needs of the customers, end users, and the organization. "Achievable goals" means that the defined processes and plans that will be followed have been analyzed quantitatively and determined to have the capability to achieve the goals.

Maturity level 4 is primarily concerned with (1) quantitatively understanding, reducing, and controlling the variation in how the work is performed; (2) statistically predicting the performance and quality results that will be achieved; and (3) performing in-process corrective actions to ultimately achieve the performance and quality goals.

The quantitative predictions are in the dimensions that relate directly to the quantitative goals for performance and quality. Work efforts that significantly contribute to overall performance and quality are selected for analysis and control. These selected work efforts are controlled using statistical and other quantitative techniques. The work units involved in an end-to-end work effort achieve control over their work efforts and results by narrowing the variation in their performance to fall within acceptable quantitative limits. Exceptional variation (that is, assignable cause variation) in their performance can be distinguished from random variation, particularly within established product lines or service lines of business.

The primary activities of maturity level 4 deal with

- establishing and managing the common assets of the organization
- integrating the processes of the different disciplines involved in developing, preparing, deploying, operating, and supporting the products and services⁹
- establishing the defined processes and plans that, if implemented, are capable of achieving the predefined and agreed-to performance and quality goals
- establishing and maintaining the organization's capability data to support the quantitative management of the work efforts involved in the products and services

8. The term "performance and quality results" is meant to cover any of the end results of the process that are deemed important — not just defects. For example, it might include ease of understanding and interpreting a report from the process.

9. At maturity level 3, the processes of the different disciplines are separate, but the interfaces between them are well defined, documented, and verified to be consistent.

- managing the performance and variation in the work efforts
- managing the achievement of the quantitative performance and quality goals for the products and services

Different methods and different measures are used to manage different aspects of the work efforts (for example, managing the variance of the number of defects introduced and removed by individual work efforts versus managing the variance in cost or throughput). In some cases control charts may be used, while in other cases regression analysis, histograms, run charts with thresholds, or other methods may be used.

The process capability of maturity level 4 organizations can be summarized as being controlled, quantified, and predictable because the performance is measured and operates within quantitative limits. This process capability supports the quantitative predictions of the performance and quality results within well-defined and reasonable quantitative limits. Because the performance is both measured and stable, when some exceptional variation occurs, the "assignable cause" of the variation can be identified and addressed. Similarly, when the quantitative predictions of quality results do not match the performance and quality goals, corrective actions can be performed. The performance and quality of the products and services are predictable.

From a BPMM perspective at maturity level 4, an organization has satisfied all the goals of all the process areas assigned to maturity levels 2, 3, and 4, and has not yet satisfied one or more goals of the process areas assigned to maturity level 5.

10.3.5 Maturity Level 5 - The Innovating Level

At maturity level 5, the organization understands its critical business issues or areas of concern (for example, a business issue might be "our competition consistently provides similar services at a lower cost"). It sets quantitative improvement goals to address these business issues. The organization's business issues, business goals, and business strategy determine the improvement goals. Improvements are pursued, identified, evaluated, piloted, and deployed to achieve the improvement goals.

At maturity level 4 the changes are made to the processes to reduce variation, produced stable performance, and achieve predictable results. At maturity level 5 process improvements are made to close the gap between current performance and results and desired performance and results.

Maturity level 5 addresses improvements at all levels in the organization (that is, the individual, work unit, workgroup, unit, and organization levels). There are three broad categories of improvements addressed at maturity level 5:

- defect and problem prevention improvements
- planned innovative improvements¹⁰
- continuous capability improvements¹¹

Work units and workgroups in maturity level 5 organizations analyze defects and problems to determine their causes. Corrective actions are identified and implemented to prevent known types of defects and problems from recurring, and lessons learned from the analyses are disseminated throughout the organization.

10. A *planned innovative improvement effort* is a work effort that is planned and performed to achieve specific quantitative improvement goals that are assigned to that work effort. The work effort is performed by an improvement workgroup that is charged with the responsibility of identifying, evaluating, and packaging a set of changes that, when deployed, will achieve these goals. These may be *break-through innovations*, or they may be significant evolutionary improvements.

11. In contrast to *planned innovative improvements*, *continuous capability improvements* are improvements that deal with any aspects of the processes, but do not necessarily relate directly to any of the stated improvement goals. These continuous capability improvements are more opportunistic.

All of the professional staff and managers of the organization focus on identifying continuous capability improvement. Identified candidate improvements are evaluated, prioritized, and deployed into the organization in a controlled manner.

Planned innovative improvements to address the organization's quantitative improvement goals are identified, evaluated, and deployed. Improvements are selected based on a quantitative understanding of their expected contribution to achieving the organization's improvement goals versus the cost and impact to the organization. Both the defined processes and the organization's standard processes are targets of planned innovative improvement activities. The effects of deployed improvements are measured and evaluated against the quantitative improvement goals.

The process capability of maturity level 5 organizations can be characterized as continuously improving because maturity level 5 organizations are continuously striving to improve their process capability, thereby improving the performance of their units.

From a BPMM perspective at maturity level 5, an organization has satisfied all the goals of all the process areas assigned to maturity levels 2, 3, 4, and 5.

10.4 Maturity Levels Versus Business Results

A frequent criticism of maturity models and the associated appraisal methods is that they do not include any direct consideration of business performance or results - that it is possible to move from one maturity level to the next without any demonstrable improvement in business performance or results.

It is true that satisfying the process areas of a maturity model and attaining the maturity levels represents a clear strategy for improving an organization's processes. This approach yields many benefits, as was described earlier. But measuring satisfaction of process areas and maturity levels is not a direct indicator of business performance or results.

Organizations should - first and foremost - focus on understanding and defining their business goals (for example, performance results, quality results, profit margins, and internal capabilities) and then measure their business results against these goals. Process improvement against a maturity model can enhance business performance, but there are other factors that can also improve business performance, for example workforce development and management, use of technology, and refinement of the organization's business strategy. These different factors are inter-dependent. However, without paying attention to measures of the overall business performance and results, it is likely that different parts of an organization will work at cross purposes and the organization will suffer.

BPMM addressed this issue (that is, the lack of concern about business performance and results) as follows: The Organizational Process Leadership (OPL) process area includes practices that ensure the organization plans, measures, and manages the process improvement program against organization's improvement goals and strategies. The Organizational Business Governance process area includes practices that ensure the organization manages and measures the product and service work and business results against the organization's business goals and strategies. In appraising an organization against these two process areas, the reasonableness of the implementation of the practices and the measures they use is considered and can affect the ratings of the process areas and maturity levels.

Although process improvement is not the only factor contributing to business performance and results, it often provides the framework for improving many of the other factors. In pursuing a BPMM improvement program, the measures of business performance and results need to be correlated to the maturity ratings and the measures of the BPMM improvements and other improvements. This helps ensure that the organization realizes a good return on investment for their improvement efforts.

11 Overview of the BPMM Process Areas

11.1 Relationship and BPMM and Domain Process Areas

There are 30 process areas in the BPMM: 9 at maturity level 2, 10 at maturity level 3, 5 at maturity level 4, and 6 at maturity level 5. In some cases the domain-specific process areas may be added to the Product and Service process areas.

The process areas that comprise the BPMM are shown in Table 11.1, and a summary of each of these process areas is provided in the next sub-section.

11.2 The BPMM Process Areas for Maturity Level 2

The nine process areas that create a Maturity Level 2 capability are shown in Figure 11.1 and summarized here.

Organizational Process Leadership deals with establishing the executive sponsorship and the management accountability for the performance of the organization’s process improvement activities.

Organizational Business Governance deals with establishing executive accountability for the management and performance of the organization’s work and results.

Work Unit Requirements Management deals with establishing and maintaining the documented and agreed-to requirements for the work that a work unit performs.

Work Unit Planning and Commitment deals with establishing and maintaining the plans and commitments for performing and managing the work required of a work unit.

Work Unit Monitoring and Control deals with regularly monitoring and adjusting the work assignments, resources, and other work factors for the individuals and workgroups in the work unit and keeping performance and results in line with the requirements and plans.

Work Unit Performance deals with having the individuals and workgroups within the work unit perform their assigned activities and produce the agreed-to results so that the aggregate efforts of individuals and workgroups satisfy the work unit’s overall requirements and plans.

Table 11.1 - The BPMM Process Areas by Maturity Level

Maturity Level	Focus	Process Areas
5 Innovating	Organization’s processes are continually improved	Organizational Improvement Planning Organizational Performance Alignment Defect and Problem Prevention Continuous Capability Improvement Organizational Innovative Improvement Organizational Improvement Deployment

Table 11.1 - The BPMM Process Areas by Maturity Level

<p style="text-align: center;">4 Predictable</p>	<p>Work processes are managed quantitatively to establish predictable results</p>	<p>Organizational Common Asset Management Organizational Capability and Performance Management Product and Service Process Integration Quantitative Product and Service Management Quantitative Process Management</p>
<p style="text-align: center;">3 Standardized</p>	<p>Organization establishes standard processes and assets for performing the product and service work</p>	<p>Organizational Process Management Organizational Competency Development Organizational Resource Management Organizational Configuration Management Product and Service Business Management Product and Service Work Management Product and Service Preparation Product and Service Deployment Product and Service Operations Product and Service Support</p>
<p style="text-align: center;">2 Managed</p>	<p>Managers establish a stable work environment in their work unit</p>	<p>Organizational Process Leadership Organizational Business Governance Work Unit Requirements Management Work Unit Planning and Commitment Work Unit Monitoring and Control Work Unit Performance Work Unit Configuration Management Sourcing Management Process and Product Assurance</p>
<p style="text-align: center;">1 Initial</p>	<p>Individual efforts with no explicit process or organizational support</p>	

NOTE: Process areas shown in regular (non-italicized) font are part of the BPMM core. For a Domain BPMM, the five Product and Service process areas shown in italics will either be replaced or supplemented with domain-specific process areas. Domain process areas are always at maturity level 3.

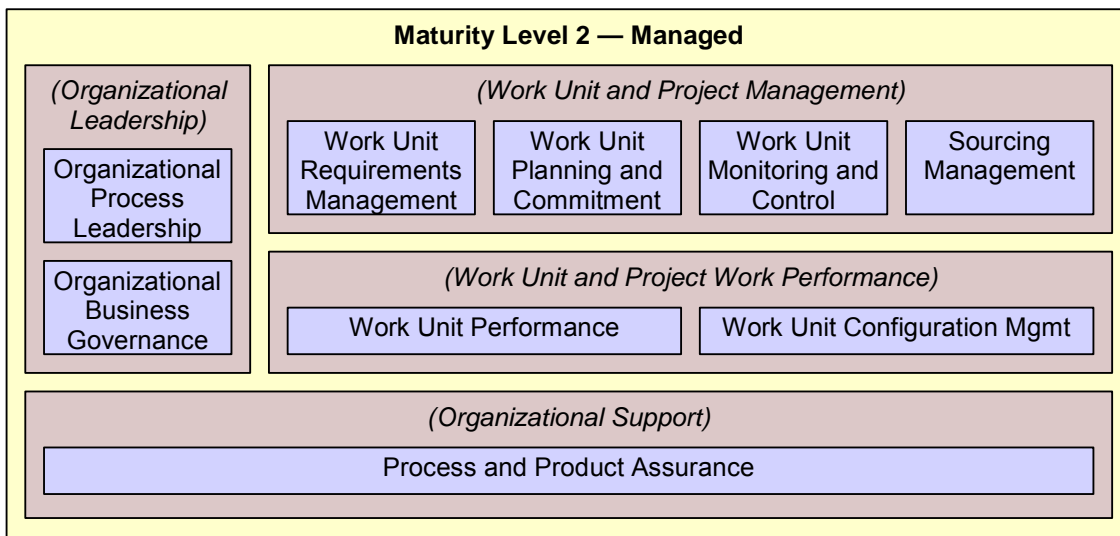


Figure 11.1 - The BPMM Maturity Level 2 Process Areas

Work Unit Change Management deals with managing and controlling the content and changes to product releases that are deployed for use internal and external to the organization.

Sourcing Management deals with managing the acquisition of products and services from suppliers external to the organization.

Process and Product Assurance deals with providing appropriate conformance guidance and objectively reviewing the activities and work products of work efforts within the organization to ensure they comply with applicable laws, regulations, standards, organizational policies, business rules, process descriptions, and work procedures.

11.3 The BPMM Process Areas for Maturity Level 3

The ten process areas that create a Maturity Level 3 capability are shown in Figure 11.2 and summarized here.

Organizational Process Management deals with developing usable standard processes and related process assets for the organization, deploying them for use, and improving them based on understanding their strengths and weaknesses.

Organizational Competency Development deals with developing the competencies within the organization’s workforce that are needed to develop, prepare, deploy, operate, and support its products and services using the organization’s standard processes.

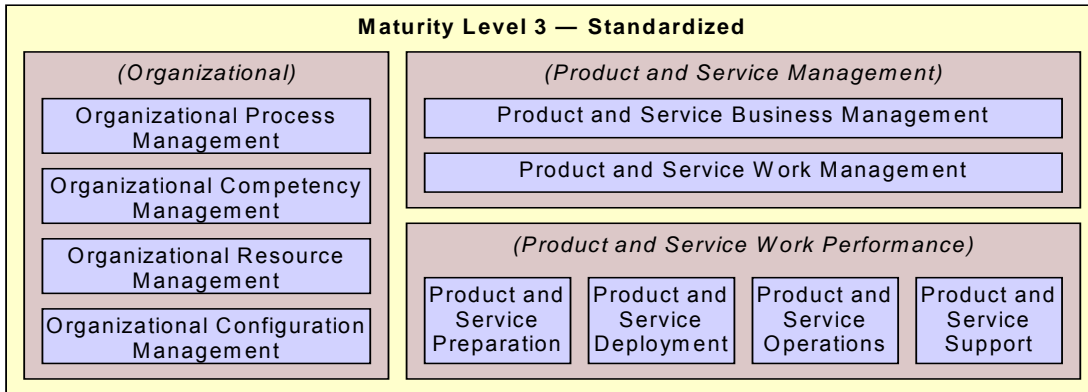


Figure 11.2 - The BPMM Maturity Level 3 Process Areas

Organizational Resource Management deals with planning and managing the acquisition, allocation, and reassignment of people, equipment, computing and communication infrastructure, supplies, and other resources, as needed, to develop, prepare, deploy, operate, and support the organization’s products and services.

Organizational Configuration Management deals with identifying, managing, and controlling the content and changes to the configuration management (CM) product baselines that are released for external use and that are used in performing and managing the work efforts in the organization.

Product and Service Business Management involves developing an understanding of the market for a product and service offering, defining the capabilities and features of the offering, establishing the overall business plans for the offering, and managing the business and financial aspects of the offering.

Product and Service Work Management involves planning and managing the work for a product and service offering using the organization’s process assets and defined processes that are tailored from the organization’s standard processes.

Product and Service Preparation involves establishing the requirements for a product and service offering and developing and preparing the offering so that it is ready for deployment and use.

Product and Service Deployment involves installing, modifying, replacing, or removing the people, equipment, computing and communication infrastructure, supplies, and other resources used in operating and supporting a product and service offering.

Product and Service Operations involves providing the customers of a product and service offering with the capabilities and features of the offering.

Product and Service Support involves maintaining the infrastructure, supplies, and other resources needed to sustain the operations and availability of a deployed product and service offering.

11.4 The BPMM Process Areas for Maturity Level 4

The five process areas that create a Maturity Level 4 capability are shown in Figure 11.3 and summarized here.

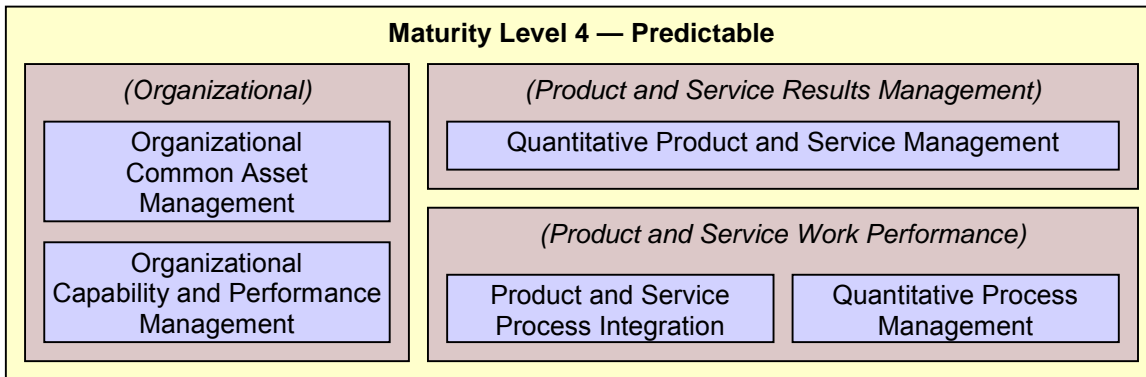


Figure 11.3 - The BPMM Maturity Level 4 Process Areas

Organizational Common Asset Management deals with determining the common characteristics of the organization’s current and future products and services and exploiting this commonality to improve the performance, quality, cycle time, throughput, and predictability of the organization’s processes.

Organizational Capability and Performance Management deals with quantitatively characterizing the capability of the organization’s standard processes, and developing and providing the capability data, baselines, and models to quantitatively manage the organization’s products and services and associated work efforts.

Product and Service Process Integration deals with improving the efficiency and effectiveness of interdependent work processes by integrating the processes of the different disciplines and functions involved in the work.

Quantitative Product and Service Management deals with planning and managing the work involved in a product or service so that the product or service achieves its quantitative performance and quality goals.

Quantitative Process Management deals with statistically managing the performance of a work effort that performs work for developing, preparing, deploying, operating or supporting a product or service so that the performance and quality goals assigned to that work effort are achieved.

11.5 The BPMM Process Areas for Maturity Level 5

The six process areas that create a Maturity Level 5 capability are shown in Figure 11.4 and summarized here.

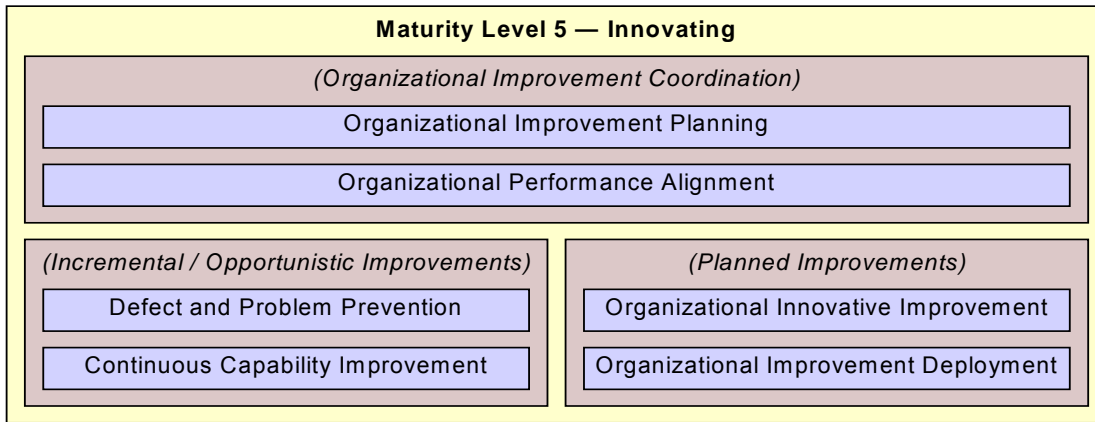


Figure 11.4 - Maturity Level 5 Process Areas

Organizational Improvement Planning deals with establishing the organization’s quantitative improvement goals (based on the organization’s business issues, goals, and strategies), establishing the infrastructure for systematically pursuing improvements, and defining the strategy for achieving the goals.

Organizational Performance Alignment deals with maintaining proper alignment of the quantitative improvement goals and the improvement strategies up and down the organizational levels and across the organization’s products and services.

Defect and Problem Prevention deals with identifying and addressing the causes of defects and other problems that are the primary obstacles to achieving a work unit’s or workgroup’s plans and quantitative improvement goals so that they do not recur.

Continuous Capability Improvement deals with continually and measurably improving the performance of the organization’s processes by identifying and deploying incremental improvements.

Organizational Innovative Improvement deals with formulating a complete improvement solution that, when deployed, will achieve specific quantitative improvement goals assigned to a planned improvement effort.

Organizational Improvement Deployment deals with continually and measurably improving the organization’s performance and quality by transitioning improvements into use in a systematic manner.

12 Structure of the BPMM

12.1 Design of the BPMM

The BPMM is based on the principles, architecture, and practices of the CMM for Software [Weber-1991] [Paulk-1995]. The CMM for Software and its successor, CMMI, have been extremely successful in transforming software and systems development organizations and improving their processes and their products and services.

In defining the BPMM process areas, goals, and practices, the common, essential practices that need to be implemented for the development, preparation, deployment, operations, and support of a product and service offering were identified, and the BPMM was constructed based on these practices. The BPMM describes what we would normally expect for organizations involved in this work, regardless of the products and services that are provided or how the processes are implemented.

12.2 Architectural Hierarchy of the BPMM Components

The BPMM is structured in a hierarchy of components to support different users and their needs. The hierarchy is summarized as follows:

- The top-level components of the BPMM are the five maturity levels: maturity levels 1 (Initial), 2 (Managed), 3 (Standardized), 4 (Predictable), and 5 (Innovating).
- Maturity levels 2, 3, 4, and 5 each contain two or more process areas. Maturity level 1 does not contain any process areas. (See Table 11.1).
- Each process area is structured and contains the components shown in the section, “Process Area Template.” The primary components of a process area are (1) process area purpose statement, (2) process area introductory notes, (3) process area specific goals, (4) process area institutionalization goal, (5) practice-to-goal relationship table, (6) specific practices, and (7) institutionalization practices. (See Figure 12.1).¹
- The specific practices and institutionalization practices typically (though not always) contain subpractices.
- In addition, supplementary information (as boxed text) can be included with any of the process area goals, practices, and subpractices.

1. The institutionalization practices are included by reference and are not repeated in each process area.

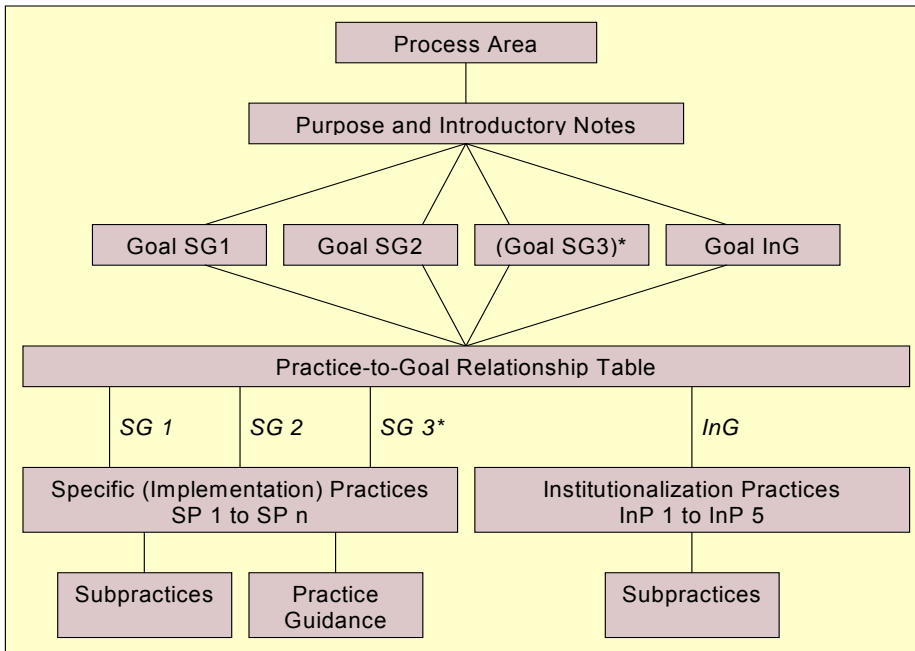


Figure 12.1 - The BPMM Process Area Components

* Note: Each process area has either two or three specific goals (SGs).

Note: The institutionalization practices are described in Part III, Chapter 13. These institutionalization practices are imposed on each process area by reference to Section 6 and are not repeated in each process area.

All these components are considered in appraising an organization and in planning process improvements. In an appraisal, the investigation and findings are against the practices, including consideration of the subpractices, supplementary information, and other relevant information (for example, purpose and introductory notes of the process areas).

The rating components in the BPMM are (1) process area goals, (2) process areas, and (3) maturity levels. The more detailed components — the practices, subpractices, and supplementary information — are informative components; they guide users of the BPMM in interpreting and applying the model.

Based on the findings against the practices, the goal to which the practices are mapped is rated (in simplified terms, either satisfied or not satisfied). The rating of the process areas and the maturity levels is a mechanical process of using the ratings of the component goals to rate the process areas, and using the ratings of the component process areas to rate the maturity levels.

12.3 Maturity Levels

A *maturity level* is a well-defined evolutionary plateau toward achieving a mature process. The five maturity levels provide the top-level structure of the BPMM.

Each maturity level indicates a level of process capability. Since process capability describes the range of expected results that can be achieved by following a process, the process capability of an organization provides one means of predicting the most likely outcomes to be expected from the next effort the organization undertakes. For instance, at maturity level 2 the process capability of an organization has been improved from undisciplined to disciplined by establishing sound work unit management practices.

12.4 Process Areas

Except for maturity level 1, each maturity level includes several process areas that indicate where an organization should focus to improve its processes (see Table 11.1). Process areas identify the issues that must be addressed to achieve a maturity level.

Each process area is structured as illustrated in Figure 12.1 and as elaborated in the section, “Process Area Template.”

Each *process area* identifies a cluster of related practices that, when performed collectively, achieve a set of goals considered important for enhancing process capability. The process areas have been defined to reside at a single maturity level as shown in Table 11.1. The path to achieving the goals of a process area may be different for different work units and workgroups based on differences in specific applications or environments. Nevertheless, all the goals of a process area must be achieved for the organization to satisfy that process area.

The process areas may be considered to be the requirements for achieving a maturity level. To achieve a maturity level, the process areas for that maturity level must be satisfied (or be not applicable) and the processes must be institutionalized.

The organization of the BPMM into process areas is fairly logical. Many organizations find that many of the BPMM process areas represent an appropriate structure for their process descriptions. However, the BPMM does not impose any restrictions on how an organization should structure its process descriptions. The relationship of an organization’s processes to the BPMM process areas can be considered to be a many-to-many relationship. Different organizations have different needs, different priorities, and need to emphasize different aspects of their processes. These considerations may influence their process structure more than the process area structure of the BPMM.

The BPMM does not explicitly describe all the processes that an organization needs to perform its work. Each organization may have to define and implement processes that are not covered in the BPMM. For example, an organization may have processes to prepare and submit certain reports to certain government agencies, or an organization may have processes dealing with reporting and handling incidences of fraud.

12.5 Process Area Threads

While each process area of the BPMM resides at a single maturity level, these process areas are linked across maturity levels as common areas of concern (referred to as “process area threads”). These process area threads depict how the practices at one maturity level are transformed into one or more process areas at higher maturity levels. For example, the Work Unit Performance process area is transformed into the process areas for developing, preparing, deploying, operating, and supporting the products and services of the domain at maturity level 3.

The five process area threads that are defined for the BPMM are the following:

1. *Organizational Process Management* — Practices that executive management, middle management, and organization-level units perform to initiate, sustain, and direct the organization’s process management and improvement programs.
2. *Organizational Business Management* — Practices that executive management, middle management, and

organization-level units perform to plan, provide resources, monitor, and direct the work performed by the organization's units.

3. *Domain Work Management* — Practices that manage the development, preparation, deployment, delivery, and support of the organization's products and services.
4. *Domain Work Performance* — Practices that perform the actual development, preparation, deployment, delivery, and support of the organization's products and services.
5. *Organizational Support* — Practices that are not directly involved in the development, preparation, deployment, delivery, and support of the organization's products and services, but that provide support to all the practices in all the process areas. These support practices help prepare people to do their work, assure conformance of the work, and maintain control of the work.

Table 12.1 shows the assignment of process areas to these five process area threads. From the perspective of an organization, each thread can be viewed as a major path of improvement that is the responsibility of and affects major organizational roles:

- The Organizational Management thread is primarily the responsibility of the executive managers
- The Domain Work Management thread is primarily the responsibility of the unit and product and service managers
- The Domain Work Performance thread is primarily the responsibility of the staff performing the work efforts of the units and workgroups
- The Organizational Support thread is primarily the responsibility of the organizational support workgroups

These threads illustrate how the processes for each of these roles need to evolve as the organization moves to higher maturity levels. With this understanding, the process improvements made at each maturity level are more likely to be a natural evolution of the processes at the lower maturity level, and rework of the processes can be avoided when the next maturity level is initiated.

12.6 Process Area Goals

The *goals* of each process area summarize its practices and can be used to determine whether an organization or unit has effectively implemented the process area. The goals signify the scope, boundaries, and intent of each process area. In adapting the practices of a process area to a specific situation, the goals can be used to determine whether the adaptation is a reasonable rendering of the practices. Similarly, when evaluating alternative ways of implementing a process area, the goals can be used to determine if the alternatives satisfy the intent of the process area.

Each goal consists of a single sentence and a single concept. In some case the concept is expressed using more than one object or verb, where the multiple objects or verbs are closely related and need to be addressed together (for example, Performance and results are tracked. "X" is defined and agreed to).

The goals are the fundamental rating components of the BPMM. To satisfy a process area, all of its goals must be satisfied (or be not applicable). To achieve a maturity level, all of the process areas for that maturity level and all lower maturity levels must be satisfied (or be not applicable).

In the BPMM, the goals are separated into two categories:

- *Specific goals* — There are two or three specific goals in each process area. These specific goals are associated with the specific practices.

- *Institutionalization goals* — The last goal in each process area is the institutionalization goal; it is associated with the institutionalization practices. The institutionalization goal is the same for all process areas at all maturity levels.

Table 12.1 - The BPMM Process Area Threads

Maturity Level	Organizational Process Management	Organizational Business Management	Domain Work Management	Domain Work Performance	Organizational Support
5 Innovating	Organizational Improvement Planning Organizational Innovative Improvement Organizational Improvement Deployment	Organizational Performance Alignment		Defect and Problem Prevention Continuous Capability Improvement	
4 Predictable		Organizational Capability and Performance Management	Quantitative Product and Service Management	Product and Service Process Integration Quantitative Process Management	Organizational Common Asset Management
3 Standardized	Organizational Process Management	Organizational Resource Management	Product and Service Business Management Product and Service Work Management	Product and Service Preparation Product and Service Deployment Product and Service Operations Product and Service Support	Organizational Competency Development Organizational Configuration Management
2 Managed	Organizational Process Leadership	Organizational Business Governance	Work Unit Requirements Management Work Unit Planning and Commitment Work Unit Monitoring and Control	Work Unit Performance Work Unit Configuration Management	Process and Product Assurance Sourcing Management

NOTE: Process areas shown in regular (non-italicized font) are part of the BPMM core.

For a Domain BPMM, the five Product and Service process areas shown at maturity level 3 will either be replaced or supplemented with domain-specific process areas. Domain process areas are always at maturity level 3.

12.7 Process Area Practices

Each process area is described in terms of *practices*. The practices describe the activities and infrastructure that contribute most to the effective implementation and institutionalization of the process area.

The actual practices that an organization or unit performs will evolve as it achieves higher levels of process maturity. For instance, many of the estimating practices described in the Work Unit Planning and Commitment process area at maturity level 2 must evolve to handle the additional work unit and product and service data available at maturity level 3, as described in the Product and Service Work Management process area.²

The practices in a process area should not be viewed as constituting the actual practices in a performed process — the BPMM practices are not necessarily the same as the practices in an organization's performed processes. The BPMM practices define characteristics of a process or processes. An organization's or unit's practices are usually more specific than the BPMM practices; they may cover multiple BPMM practices or only parts of several BPMM practices; and they may be performed in an order unrelated to the order BPMM practices are listed.

The process area practices describe "what" is to be done, but they should not be interpreted as mandating "how" the processes should be implemented. Alternative practices may also accomplish the goals of the process area. The practices of an organization or unit need to be interpreted rationally to judge whether the goals of the process area are achieved, even though alternative practices are implemented.

Each process area practice consists of a single sentence and a single concept. In some cases the concept is expressed using more than one object or verb, where the multiple objects or verbs are closely related and need to be addressed together (for example, Responsibility and authority are assigned. "X" is established and maintained). Immediately following the practice statement is a purpose statement. More detailed subpractices are typically (though not always) provided under the practice as guidance in interpreting an adequate implementation of the practice. Examples, definitions, elaborations, and cross-references to other practices are also provided (as supplementary information) when appropriate.

In the BPMM, the practices are separated into two categories:

- *Specific practices* — These practices are specific to each process area. They describe the activities that need to be implemented to achieve the purpose of the process area.
- *Institutionalization practices* — These five practices are generic and apply to all process areas. The same five institutionalization practices appear in all process areas.

The institutionalization practices describe the building and reinforcement of infrastructure and organizational culture to support methods, practices, and procedures as the ongoing way of doing business, even after those who originally defined them are gone. (Refer to Part III, Section 13 for more information on institutionalization practices.)

Since the same five institutionalization practices apply to each process area, the descriptions of these practices are located in just one place — Section 13 of this document. These institutionalization practices are listed in the Practice-to-Goal Relationship Table of each process area, and a note is included that references Section 13 for the details.

2. Each Domain BPMM will include a process area at maturity level 3 that address the overall management of the work of the domain. This includes establishing and maintaining the defined process for the work and planning and managing the work according to the defined process.

12.8 Subpractices

Subpractices are provided under the practice as guidance in interpreting an adequate implementation of the practice (that is, determine whether or not the practice is implemented satisfactorily). Not all practices have subpractices.

Subpractices are detailed descriptions that describe what one would expect to find implemented for the practice. Subpractices have to be read and interpreted in context of the practice and not as standalone statements. For example, if the subject of a practice is the work products of a work unit, the work products of a work unit are implicit in the subpractices.

12.9 Supplementary Information

Supplementary information is shown as boxed text. Supplementary information can be used to further explain a goal, practice, or subpractice. The supplementary information can include examples, elaborations, references to other process areas, and references to guidance topics (see the next sub-section below).

12.10 Guidance for Selected Practice Topics

For some specific practices, there exists commonly-accepted guidance on the approach for implementing the practice. For example, for measurement practices, the Goal-Question-Metric, Practical Software and System Measurement and ISO Standard 15939 (Software Engineering — Software Measurement Process) approaches are widely accepted and similar.

For specific practices where this commonly-accepted guidance exists and for which it would be useful, it is provided in *Annex A, Guidance for Selected Practice Topics*.

Guidance is provided for the following process topics:

- Guidelines for Measurement and Analysis (G-MA)
- Guidelines for Work Product Inspection (G-WPI)
- Guidelines for Problem and Decision Resolution (G-PDR)
- Guidelines for Risk Management (G-RM)
- Guidelines for Organizational Change Management (G-OCM)

Appropriate references from the specific practices to these guidance topics are provided as supplementary information under the practice. It is worded as follows:

Refer to the Guidelines for [*Topic*] in Annex A for guidance that may be useful in implementing this practice.

The information in Annex A is guidance and, from an improvement and appraisal perspective, it is considered to be optional for the specific practice.

12.11 Process Area Template

To assist in understanding and interpreting the process areas of the BPMM, a template was used to express the process areas. This template is shown on the following pages.

Start of the Process Area Template.

[pa_name] ([pa_abbreviation])

MATURITY LEVEL [2/3/4/5]

Purpose

The purpose of [pa_name] is

Introductory Notes

{provide an elaboration of the purpose, if needed}

The goals and practices of this process area are expressed in context of {describe application of the goals and practices — for example, work effort, work unit, project, organization, or product and service}.

The process area is primarily the responsibility of {describe the typical roles responsible — for example, work unit managers, work unit staff, or group responsible for organizational measurement}.

The following special terms are used in the goals and practices of this process area:

The term “[term]” is used to {explain the key terms used in the goals and practices}

[pa_name] involves

{provide a summary of the specific practices}

{provide additional explanatory notes for the process area as needed}

The reason for this process area at maturity level [n] is {explain how this process area is essential and how it supports the principles and criteria for that maturity level}.³

Specific and Institutionalization Goals

SG 1 **[goal_1_name]**

[goal_1_statement]

{supplementary information if/as needed}

SG 2 **[goal_2_name]**

[goal_2_statement]

{supplementary information if/as needed}

SG 3 **[goal_3_name] (if needed)**

3. Note: The ordering and wording of the above paragraphs can be modified to fit the needs of individual process areas.

[goal_2_statement] (If needed)

{supplementary information if/as needed}

InG Practices Are Institutionalized

The practices for [process_area_name] are institutionalized.

Institutionalization includes:

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

{supplementary information if/as needed}

Practice-to-Goal Relationship Table

Goal	Practice
SG 1 [goal_1_name]	{specific practice numbers and names related to this goal}
SG 2 [goal_2_name]	{specific practice numbers and names related to this goal}
SG 3 [goal_3_name] (If needed)	{specific practice numbers and names related to this goal} (If needed)
InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)

The five institutionalization practices, including subpractices and supplementary information, are contained in Part III, Chapter 13.

Specific Practices

SP 1 **[specific_practice_1_name]**

[specific_practice_1_statement]

This practice [practice purpose statement].

{subpractices and supplementary information if/as needed}

SP n **[specific_practice_n_name]**

[specific_practice_n_statement]

This practice [practice purpose statement].

{subpractices and supplementary information if/as needed}

End of the Process Area Template.

13 Institutionalization

13.1 Overview of Institutionalization

In implementing a BPMM process area, the primary focus is the set of specific practices (that is, practices that are specific or unique to the process area). They describe the activities that need to be implemented to achieve the purpose of the process area.

However in many organizations, these practices and the improvement they represent are very fragile. Once the pressures of the business are encountered, these practices are often compromised or neglected. If there is inadequate management, cultural, and infrastructure support, these practices are unlikely to survive or achieve their potential benefits.

Institutionalization is the building and reinforcement of an organization's culture and infrastructure that supports the methods, practices, and procedures so that they are the ongoing way of doing business, even after those who originally defined them are gone [SEI-1997]. Institutionalization is making the process ingrained in the way work is done in the organization. It is a critical aspect of implementing any process.

Institutionalization goals and practices are special features of maturity models and are not found in most other process models and standards. They are critical elements in changing an organization's process maturity and culture. The five institutionalization practices, which maps to the institutionalization goal, have been selected based on experience gained in applying maturity models.

As illustrated in Figure 13.1, the institutionalization practices provide critical support to the implementation of the specific practices. Performing these institutionalization practices helps ensure that the institutionalization goal for the process area, "The practices for the process area are institutionalized," is satisfied.

Institutionalization of a process includes

- performing the defined set of institutionalization practices for the process
- consistently performing the process such that it is persistent and recognized as the way the work is done

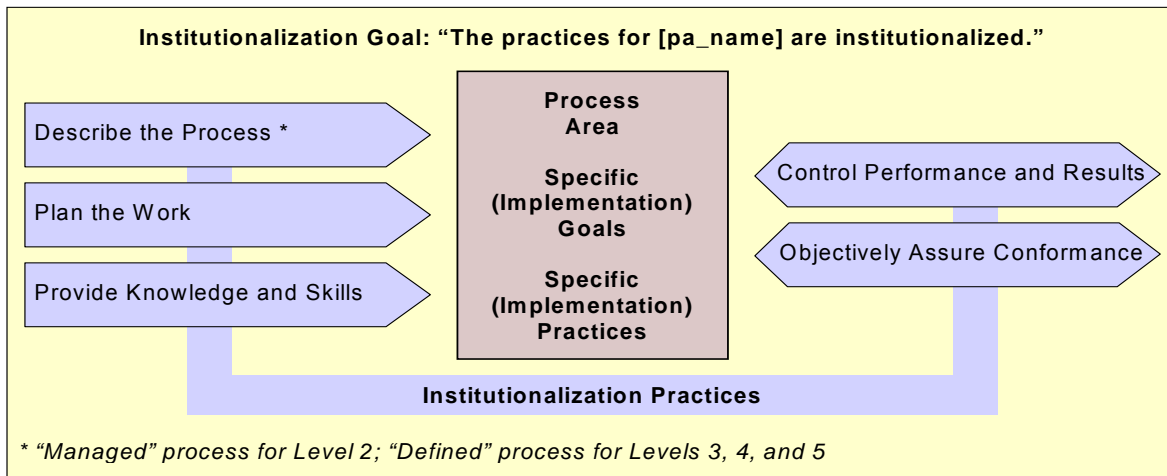


Figure 13.1 - BPMM Specific and Institutionalization Practices

One way arrows on the left signify inputs or preconditions for performing the process.

Two way arrows on the right signify receiving information from the performed process and providing feedback back into the performed process.

Refer to Chapter 13 for the details of the institutionalization goal and institutionalization practices.

Refer to the Glossary for the definitions of "managed process" and "defined process."

* For satisfying maturity level 2, the process descriptions must satisfy the characteristics of a "managed process." For satisfying maturity level 3, 4, and 5, the process descriptions (including those corresponding to the level 2 process areas) must satisfy the characteristics of a "defined process."

NOTE: It is not the BPMM process areas that are implemented by an organization, but rather the organization's processes. There is often not a one-to-one relationship between the BPMM process areas and the organization's processes. So although we typically refer to institutionalizing the BPMM process areas, it is not the process areas that are institutionalized, but rather the organization's own processes. When we refer to "institutionalizing a BPMM process area," what we mean is "institutionalizing a process that addresses the practices of a BPMM process area."

13.2 Institutionalization Goal

There is a single institutionalization goal (InG) that applies to all processes. It is included in each process area. It is stated simply as:

InG Practices Are Institutionalized

The practices for [process_area_name] are institutionalized.

13.3 Institutionalization Practices

Each process area contains the same set of five institutionalization practices, including the same subpractices. However, the implementation of these institutionalization practices evolves over the maturity levels. In addition, the specific interpretation and implementation of each institutionalization practice may differ from one process to another (or from one process area to another).

These five institutionalization practices must be adequately implemented for a process area in order for the institutionalization goal for that process area to be satisfied.

The five institutionalization practices are as follows:

InP 1 Describe the Process

A description of the process that is used in performing the practices for [process_area_name] is documented.

This practice ensures that the people who perform the work and other relevant stakeholders know how the work is to be performed so that the implemented process complies with applicable laws, regulations, organizational policies, and specifications and so that the work is performed consistently.

The process description may be included as part of the plan for the process or may be referenced by the plan.

The process description identifies the relevant specifications, the components of the process, the activities that need to be performed, and the work products that need to be produced.

For an organization that is implementing maturity level 2 (Managed), the process description is established for the local work unit. The process descriptions may be different from one work unit or workgroup to another, even when they perform essentially the same work. The process descriptions describe the “as is” processes, with significant gaps filled in. The process descriptions cover the work procedures for performing the crucial activities of the processes.

For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the process description must be tailored from the organization’s standard processes and satisfy the attributes of a defined process. A defined process specifies, in a complete, precise, verifiable manner, the requirements, design, behavior, or other characteristics of a process. Refer to the Organizational Process Management process area for practices that cover the organization’s standard processes and tailoring guidelines and criteria.

Subpractices

1. Determine the laws, regulations, organizational policies, specifications, and other requirements applicable to the process.
2. Define and document the process description for performing the work.
3. Review the process description with relevant stakeholders, and obtain their agreement.
4. Revise the process description as necessary.

InP 2 Plan the Work

The work involved in performing the practices for [process_area_name] is planned.

This practice ensures that reasonable plans exist for performing the work so that the people involved and affected know what work is to be performed and have the time and resources that are needed.

Planning for this process area may be performed along with the planning for other process areas. A separate plan is not expected for each process area.

Subpractices

1. Obtain appropriate management sponsorship for the process and work activities.
2. Identify, document, and obtain agreement on the requirements and constraints that determine the work that has to be planned and performed.

Examples of requirements and constraints include:

- functionality, capability, capacity, and other characteristics of the products and services
- applicable laws, regulations, and standards
- customer constraints
- organizational business requirements
- organizational business constraints
- organizational policies

3. Arrange for adequate funding and resources for performing the work.

Resources include adequate funding, appropriate physical facilities, skilled people, and appropriate tools.

Arranging for adequate funding and resources includes:

- allocating funding that covers all aspects of the process
- assigning people who possess or can readily obtain the appropriate skills and knowledge
- obtaining appropriate tools
- allocating appropriate time for performing the process and for related activities (for example, training time)
- adjusting funding and resources as appropriate

4. Assign responsibility and authority for performing the work.

Assigning responsibility and authority includes:

- assigning overall responsibility and authority for planning and managing the process activities
- assigning responsibility for performing the specific tasks of the process
- confirming that the people assigned understand and accept their responsibilities and authority
- changing assignments and responsibilities as appropriate

5. Plan the involvement of relevant stakeholders in the work.

6. Incorporate plan information in an approved plan document.

A documented plan typically covers identification of:

- processes and procedures that will be followed
- inputs
- needed resources
- responsibility and authority
- activities and the associated schedule
- dependencies
- outputs
- measures and analyses needed to obtain insight into the activities, progress, performance, and results

7. Revise the plans as necessary.

InP 3 Provide Knowledge and Skills

The people performing, supporting, or affected by the practices for [process_area_name] are provided with the needed knowledge and skills.

This practice ensures that the people have the knowledge and skills they need for their role in the process.

Appropriate training and skills development activities are provided to the people who perform the work. Overview training is provided to orient people who interact with those performing the work.

Subpractices

1. Determine the roles to be performed by the affected individuals.
2. Determine the knowledge and skills needed by the affected individuals.
3. Determine the knowledge and skills gaps for each affected individual.
4. Address the knowledge and skills gaps through appropriate activities such as training, seminars, conferences, coaching, mentoring, and on-the-job training.
5. Document and archive the results and other relevant records of the training and development activities.

InP 4 Control Performance and Results

The performance, activities, status, and results of [process_area_name] are measured and monitored, and appropriate corrective actions are performed to control the performance and results.

This practice ensures that management has appropriate visibility into the work performed and that, where possible and appropriate, corrective actions are performed to satisfy the plans and achieve the intended results.

Monitoring and control for the practices of a process area may be performed along with the monitoring and control performed for other process areas. A manager or management team often manages activities that address several process areas as a single work effort.

Subpractices

1. Review accomplishments, outlook, issues, results, and outputs for the implemented process against the applicable requirements, plans, and commitments.
2. Measure the appropriate attributes of the process and work products to obtain appropriate insight.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

3. Identify any significant issues from the reviews.
4. Determine the impacts on other affected work units and workgroups based on the results of the review.
5. Identify corrective actions as appropriate.
6. Perform the corrective actions and track to closure.

Corrective action may include:

- taking remedial actions for defective work products or services
- changing the planned process
- adjusting resources, including people, tools, and other resources
- negotiating changes to the established commitments
- securing change to the requirements and specifications that have to be satisfied

InP 5 Objectively Assure Conformance

The practices for [process_area_name] are objectively verified for conformance to applicable laws, regulations, standards, organizational policies, business rules, process descriptions, and work procedures; and non-conformances are addressed.

This practice provides management with credible assurance that the process is implemented as planned and that the process and results of the process conforms with applicable laws, regulations, specifications, organizational policies, business rules, process descriptions, and work procedures.

Objective verification of the practices of a process area is typically implemented by the practices of the Process and Product Assurance process area. However, other implementations of this practice may also be appropriate.

In the BPMM, the term “conformance” is used to refer to two concepts that are often considered to be separate and distinct: “conformance” and “compliance.” Many organizations distinguish between the two concepts, but there is not universal agreement on the distinction. Each organization must decide how to address the two concepts and the terminology to be used.

Subpractices

1. Objectively evaluate the process descriptions and work procedures against the applicable laws, regulations, specifications, organizational policies, and business rules.
2. Objectively evaluate the performed process against the applicable laws, regulations, specifications, organizational policies, business rules, process descriptions, and work procedures.

3. Objectively evaluate the designated work products and services against the applicable laws, regulations, specifications, organizational policies, business rules, process descriptions, and work procedures.
4. Review the results of the evaluations with the responsible staff and managers.
5. Resolve non-conformance issues with the responsible staff and managers.

Non-conformance issues are first addressed with the staff responsible for the work, where appropriate. Non-conformance issues not resolvable at that level are escalated to the appropriate level of management for resolution.

14 Process Areas

14.1 Maturity Level 2: Managed

The following section contains the process areas that belong to maturity level 2. The maturity level 2 process areas of the BPMM are as follows:

- Organizational Process Leadership (OPL)
- Organizational Business Governance (OBG)
- Work Unit Requirements Management (WURM)
- Work Unit Planning and Commitment (WUPC)
- Work Unit Monitoring and Control (WUMC)
- Work Unit Performance (WUP)
- Work Unit Configuration Management (WUCM)
- Sourcing Management (SM)
- Process and Product Assurance (PPA)

14.1.1 Organizational Process Leadership (OPL) Maturity Level 2

14.1.1.1 Purpose

Organizational Process Leadership establishes the executive sponsorship and accountability for the management and performance of the organization's process improvement activities.

14.1.1.2 Introductory Notes

The goals and practices of this process area are expressed in context of the organization.

The process area is primarily the responsibility of the executive and middle managers.

The following special terms are used in the goals and practices of this process area:

- The term "sponsor" is used to refer to a person who has the authority and provides the long-term commitment, funding, resources, and direction for an effort. Typically the sponsor of a change effort is the executive manager of the unit that is undergoing the change. Ideally sponsorship should cascade down through the middle managers and unit managers.

Organizational Process Leadership involves

- determining and communicating the business reasons for investing in process improvement
- defining the process improvement goals and strategies for the organization, and providing the resources to execute the strategies
- communicating and coordinating the organization's process improvement strategies with external customers and organizations

- aligning the units and managers in the organization with the process improvement goals and strategies
- adjusting the performance management and compensation systems so they appropriately support the goals and strategies for business performance and process improvement
- monitoring the organization’s process improvement activities and results, and performing corrective actions when necessary

The executive and middle managers have responsibility for both the success of the process improvement activities and the development and delivery of the organization’s products and services. This process area deals with the process improvement activities. The executive and middle managers involvement in the development and delivery of the organization’s products and services is addressed in the Organizational Business Governance process area.

Process improvement initiatives often fail or fall short of expectations because of mixed messages from the executive managers or because of misalignment of the executives’ messages with the actual commitment and support provided by the organization. Similarly, the organization’s products and services often fail or fall short of expectations because of lack of clear direction and management from the executive and middle managers — the managers who possess the broad, cross-unit understanding and control needed to run the business as a system.

The process improvement program of an organization is most effective when sponsorship and involvement of the executive and middle managers are strong. Their role is to represent the perspective of the customers and the organization in the products, services, and process improvement activities. They also have the role of balancing the short-term and long-term needs of the organization and setting the business operations and improvement priorities, goals, and strategies.

The executive managers understand and control the various systems and units in the organization and they are in a position to make the changes needed to effectively support their process improvement goals and strategies. They also possess the broad understanding of the business and understand the likely impact that major process changes would have on the business.

The reason for this process area at maturity level 2 is that without appropriate executive management sponsorship and engagement of all management levels, an organization’s process improvement program is likely to suffer.

14.1.1.3 Specific and Institutionalization Goals

SG 1 Process Improvement Is Sponsored

The organization’s process improvement activities are sponsored by executive management.

SG 2 Management Systems and Improvements Are Aligned

The organization’s management systems and activities are aligned with the organization’s process improvement goals and strategies.

InG Practices Are Institutionalized

The practices for Organizational Process Leadership are institutionalized.

Institutionalization includes:

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.1.1.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Process Improvement Is Sponsored)	SP 1 (Maintain Justification for Process Improvement) SP 2 (Maintain Improvement Goals and Strategies) SP 3 (Communicate Executive Process Expectations) SP 4 (Provide Process Improvement Resources) SP 5 (Review Process Improvement Plans) SP 6 (Coordinate Improvement Activities with External Stakeholders)
SG 2 (Management Systems and Improvements Are Aligned)	SP 7 (Maintain Definitions of Improvement Measures) SP 8 (Align Work and Process Improvement Responsibilities) SP 9 (Adjust Management Systems) SP 10 (Review Process Improvement Results) SP 11 (Communicate Process Improvement Information)
InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)

NOTE: The five institutionalization practices, including subpractices and supplementary information, are contained in Part III, Chapter 13.

14.1.1.5 Specific Practices

SP 1 Maintain Justification for Process Improvement

Business reasons justifying the organization's investment in process improvement are established and maintained by executive management.

This practice ensures that the organization's process improvement strategies and activities are directly tied to the business goals.

NOTE: Refer to the Guidelines for Organizational Change Management in Annex A for guidance that may be useful in implementing this practice. These guidelines apply to all the practices in this process area.

Subpractices

1. Identify performance-related issues that inhibit achievement of the organization's business goals and strategies.
2. Identify and prioritize the performance contributions needed from each major business unit to help the organization achieve its business goals and strategies.
3. Identify the business problems, challenges, and issues that must be addressed to improve performance against the improvement-related business goals.

Examples of business problems, challenges, or issues include:

- quality of products and services
- customer satisfaction and return business
- need for improved products and services
- time to get new products and services to market
- profitability of products and services
- cost and time to perform specific work (for example, complete a transaction)
- amount and cost of rework
- business agility
- capability or performance of competitors

4. Estimate the financial or other benefits that can be achieved through improvements for each of the major business units and compare these estimates to the estimates of the costs and other impacts of the improvement activities.
5. Establish and maintain the business reasons that justify investments in improving the processes in the organization.

The business reasons for improving the processes in the organization can be developed by comparing the cost for process improvement to factors such as:

- increased productivity or profitability of the products and services
- reduced cost of performing direct product and service tasks or overhead tasks
- reduced time to get products and services to market or into operations
- increased market share
- reduced costs for customer service, help desks, or other follow-on support functions
- increased customer loyalty and return business
- ability to enhance or expand the products and services or increase service volumes
- ability to achieve economies of scale

6. Establish and maintain business measures that will provide near-term and long-term criteria for evaluating the success of process improvement activities against the business goals.
7. Revise the business reasons for process improvement as necessary to reflect changing business conditions or goals.
8. Communicate the business reasons justifying the investment in process improvement throughout the organization.

SP 2 Maintain Improvement Goals and Strategies

The description of the process improvement goals and strategies for the organization are established and maintained by executive management.

This practice ensures a common understanding within the executive management team of the process improvement goals and strategies.

Subpractices

1. Identify and prioritize the process-related issues that, if improved, would enhance the organization's ability to achieve its business goals and strategies.
2. Solicit, collect, and analyze inputs regarding process issues and process improvement goals and strategies from the managers and staff in the organization.
3. Identify the critical issues that affect the selection of process improvement goals and strategies.

Examples of issues that may affect the selection of process improvement goals and strategies include:

- certification against specific industry standards
- requirements of product and service customers and business partners
- past experience with improvement initiatives and approaches
- costs of implementing the strategies and achieving the goals
- risks to process improvement programs, such as mergers, reorganizations, or executive turnover
- internal expertise or experience in process standards and improvement approaches
- organizational structure or culture
- investment strategies

4. Identify, prioritize, and document the organization's process improvement goals.

Example of process improvement goals include:

- dates by which industry standard certifications should be attained
- accomplishment of planned improvement activities
- adoption of practices and procedures
- changes in individual, work unit, or organizational behavior
- intermediate milestones on the path to long term achievements
- targets for performance or quality results
- progress toward meeting the near-term or long-term criteria for evaluating the success of process improvement activities

5. Define the process improvement strategies that are best suited to the organization and its products and services.

Examples of elements of the organization's process improvement strategies include:

- industry standards to be used for guiding improvements
- approaches to organizational change management
- pilot improvement programs within selected business areas or units
- identification of the units and workgroups responsible for coordinating and supporting process improvement
- use of measures to objectively determine results and benefits of process improvement
- use of external appraisers or consultants

6. Review the process improvement goals and strategies with the managers and with the units and workgroups that are responsible for coordinating the organization's process improvement activities, and obtain their agreement.

Example of work units and workgroups responsible for coordinating the organization's process improvement activities include:

- process engineering group
- management steering committee
- executive policy committee

7. Revise the organization's process improvement goals and strategies as needed.

SP 3 Communicate Executive Process Expectations

Executive management's expectations for process improvement are communicated to the organization by process improvement goals and strategies.

This practice ensures that the management and staff in the organization have a common understanding of organization's process improvement goals and strategies and of their improvement roles and responsibilities.

Subpractices

1. Communicate the process improvement goals and priorities and the business rationale for these goals to the managers and staff in the organization.

The organization's process improvement goals should be expressed quantitatively as executive management expectations against which the organization will be held accountable.

2. Communicate the process improvement strategies and the business rationale for selecting them to the managers and staff in the organization.
3. Provide regular restatement and updates, as appropriate, on the process improvement goals and priorities to the managers and staff in the organization.
4. Communicate expectations regarding the management of the process improvement activities to the managers and staff in the organization.

Examples of expectations regarding the management of the process improvement activities include:

- presenting plans with milestones for accomplishing improvement activities
- reporting on progress against process improvement plans
- coordinating process improvement with the other units and business activities

SP 4 Provide Process Improvement Resources

Funding and other resources needed to implement the organization's process improvement strategies are provided.

This practice ensures that the organization commits adequate funding and other resources to achieve its process improvement goals according to its improvement plans.

Subpractices

5. Determine the funding and other resources to be committed to process improvement based on the process improvement goals and strategies.

Examples of resources committed to process improvement include:

- full-time process improvement staff
- part-time involvement of work unit members to define improved practices
- time and resources for training in improved practices
- funding for external consultants
- software or equipment required to implement or support improvements

At maturity level 2, the staffing for process improvement may be established as a unit or workgroup in the organization or the staffing may be informally drawn from units that have other responsibilities.

6. Review the committed and planned process improvement funding and other resources with the units and workgroups that are responsible for coordinating the process improvement activities, and obtain their agreement.
7. Review the committed and planned process improvement funding and other resources with the managers in the organization, and obtain their agreement.
8. Provide the funding and other resources needed to implement the process improvement strategies and achieve the process improvement goals.
9. Establish provisions for future funding and other resources to sustain the process improvement and related activities over the long term.

SP 5 Review Process Improvement Plans

Executive management reviews and approves the plans for implementing the process improvement strategies.

This practice ensures that process improvement activities are planned and managed as a project and that they address the process improvement goals and strategies.

Subpractices

1. Provide guidelines for how process improvement activities are to be planned and how these plans will be reviewed and approved.
2. Establish accountability for process improvement planning and management.
3. Review and approve process improvement plans.

The factors against which process improvement plans can be reviewed include:

- adherence to process improvement strategy
- likelihood of achieving process improvement goals
- schedules and costs
- appropriate use of resources
- prioritization of process improvement objectives and actions

4. Require corrective planning when process improvement plans fail to meet management expectations or guidelines.
5. Provide authority to implement the plans.

SP 6 Coordinate Improvement Activities With External Stakeholders

Executive management coordinates with external customers and other relevant stakeholders external organizations to address effects the process improvement activities have on them.

This practice ensures that external customers and other relevant stakeholders external organizations understand, are appropriately informed and involved, and are aligned with the organization's process improvement activities.

Subpractices

6. Identify the external customers and other external organizations that may be affected by changes in practices and behaviors that result from the process improvement activities.
7. Orient affected external customers and other external organizations, as appropriate, to the process improvement plans, activities, and expected benefits.

Executive management must prepare external customers and other affected external organizations for the changes that will occur in how the organization operates and performs, and the organization's reasons for these changes in order to reset their expectations and avoid surprises.

8. Maintain regular communications with external customers and other external organizations regarding changes in practices or behaviors that may affect interfaces, other interactions, or results.
9. Identify and resolve issues resulting from changes in practices or behaviors that affect the external customers and other external organizations.
10. Involve external customers and other external organizations, as appropriate, in the process improvement activities.

Examples of process improvement activities in which customers may become involved include:

- defining some of a work unit's requirements
- procedures for establishing work unit commitments
- defining measures of product or service quality

SP 7 Maintain Definition of Improvement Measures

Definitions of the measures used to plan, manage, and evaluate results of the organization's process improvement program are established and maintained.

This practice ensures that the management of the organization's process improvement program is based on quantitative information and data.

Subpractices

1. Identify the measurement information needs for the process improvement program.

Examples of measurement information needs for the process improvement program include:

- progress against the plans for process improvement
- progress toward achieving the improvement-related goals
- cost of the progress improvement program compared to the savings and benefits attributable to the program
- changes in customer satisfaction

2. Select and define measures to address the measurement information needs.

Examples of process improvement measures include:

- actual versus planned cost for the process improvement work accomplished
- actual versus planned consumption of resources for the process improvement work accomplished
- actual versus planned completion of tasks and milestones for the process improvement work
- measures of completion and deployment of specific identified improvements (for example, practices or process areas of a reference model, such as the BPMM)
- return-on-investment for the process improvement program
- percent of customers that rate their satisfaction with the organization's products and services as satisfied or very satisfied

3. Define the procedures for collecting and storing the measures.
4. Specify how the measures will be analyzed and reported.
5. Review the measurement information needs, plans, and definitions of the measures with those affected, and obtain their agreement.

Many of the measures needed for the organization's process improvement program will have to be obtained from the units. The units need to understand the requirements for collection and reporting and how the measures will be used.

6. Place the definitions of measures under version control.
7. Revise the measurement information needs, plans, and definitions of the measures as needed.

SP 8 Align Work and Process Improvement Responsibilities

The responsibilities and commitments of the units and their managers are kept consistent with the process improvement goals and strategies.

This practice ensures that all the units of the organization are properly aligned with and support the organization's process improvement goals and activities so that the organization can successfully implement its improvement strategies and achieve its goals.

Subpractices

1. Allocate and translate the organization's process improvement goals into improvement goals for each unit at each level of management.
2. Incorporate process improvement activities into the units' plans as needed to address the organization's process improvement strategies and plans.
3. Identify conflicts between the organization's process improvement goals, strategies, and plans with the plans and commitments made for each unit at each level of management.

When the units' process improvement plans cannot be defined to achieve the improvement goals established by executive management, the process improvement goals, resources, or strategies should be adjusted so that achievable plans can be developed.

4. Resolve conflicts between the organization's process improvement goals, strategies, and plans and the plans and

commitments made for each unit at each level of management.

Executive management must accept responsibility for the risks that result from mismatches between process improvement goals and the capability and capacity available to achieve these goals.

5. Coordinate process improvement activities among the units, as appropriate.
6. Reinforce management accountability at all levels for accomplishing their agreed-to process improvement goals.
7. Perform corrective actions when the process improvement plans, actions, and results of the units are misaligned with the organization's process improvement goals, strategies, and plans.

SP 9 Adjust Management Systems

The performance management and compensation systems are adjusted as needed to recognize contributions to the organization's business performance and process improvement goals and strategies.

This practice ensures that the concerns and priorities of executive management regarding business performance and process improvement are reflected as tangible factors in the career opportunities and monetary rewards for the managers and staff in the organization.

The performance management and compensation systems need to address the different roles relative to process improvement. There are manager and staff roles whose primary responsibilities include the coordination and deployment of process improvements. There are other manager and staff roles whose primary responsibilities are to develop and deliver products and services utilizing the process assets and contributing to their improvement.

Subpractices

1. Establish appropriate role descriptions and performance goals for managers and staff whose primary role includes the coordination and deployment of process improvements.
2. Adjust the performance planning and review process for the managers and staff whose primary role includes the coordination and deployment of process improvements to appropriately address both business performance and process improvement.
3. Adjust the performance planning and review process for the managers and staff whose primary role is performing product and service work to include an appropriate emphasis on process improvement as well as on business performance.
4. Adjust the performance feedback and review process to ensure appropriate corrective actions are performed for those whose performance is unsatisfactory in supporting and implementing process improvements in their own work or in the units they manage.
5. Adjust the merit compensation and incentive awards processes, as appropriate, to include an appropriate emphasis on both business performance and process improvement participation and accomplishments.
6. Adjust the criteria for selecting among candidates for assignments or promotions to include an appropriate emphasis on both accomplishments in process improvement and accomplishments in business performance.

SP 10 Review Process Improvement Results

Progress in achieving the organization's process improvement goals is reviewed by executive

management on a periodic basis.

This practice ensures that executive management has visibility into progress against process improvement goals and plans, and ensure that corrective actions are performed when appropriate.

Subpractices

1. Periodically collect the status of the process improvement activities in the organization, and summarize the information relative to achieving the improvement goals, strategies, and plans.
2. Periodically collect and analyze measures of the process improvement activities and results to provide insights into progress and benefits.
3. Monitor the use of funds and other resources committed to process improvement.
4. Aggregate the status, measures, and other information regarding process improvement activities to provide an organizational summary of the current status and issues.
5. Review the status, issues, measures, other results, outlook, and risks for the process improvement activities with relevant stakeholders, including executive management.
6. Identify corrective actions, as needed, to address issues in the process improvement activities.
7. Perform or assign the identified corrective actions and track to closure.

SP 11 Communicate Process Improvement Information

The managers and staff are kept informed of the status and results of the process improvement activities and changes to the improvement goals and strategies.

This practice ensures that the managers and staff in the organization receive the information needed to perform their roles and sustain the momentum for process improvement.

Subpractices

1. Provide the organization's managers and staff with ready access to the descriptions of the organization's improvement goals and strategies.
2. Provide periodic executive reinforcement and updates concerning the process improvement goals and strategies to the managers and staff in the organization.
3. Communicate the status and results of process improvement activities to the managers and staff in the organization on a periodic and event driven basis.

14.1.2 Organizational Business Governance (OBG) Maturity Level 2

14.1.2.1 Purpose

Organizational Business Governance establishes executive accountability for the management and performance of the organization's work and results.

14.1.2.2 Introductory Notes

The goals and practices of this process area are expressed in context of the organization.

The process area is primarily the responsibility of the executive and middle managers.

The following special terms are used in the goals and practices of this process area:

- The term “organizational policy” is used to refer to a guiding principle typically established by executive management that establishes rules for an organization to guide actions and influence and determine decisions. Organizational policies are established to ensure that work is performed in ways that are consistent across the organization and acceptable to executive management.
- The term “business goal” is used to refer to a defined and measurable business result that executive management sets for the organization. Business goals should be decomposable into work performance goals at all levels of the organization.

Organizational Business Governance involves

- defining and communicating the business goals of the organization
- establishing the business workflows required to accomplish these goals
- defining measures of business goals and performance measures for the workflows established to accomplish them
- establishing and communicating organizational policies to guide actions and influence and determine decisions in how work is performed in the organization
- ensuring that the work responsibilities and activities of the units, in aggregate, appropriately address the requirements of the products and services and the business needs of the organization
- monitoring the work flow and dependencies among the units

The executive managers have responsibility for the development and delivery of the organization’s products and services. The organization’s products and services often fail or fall short of expectations because of lack of clear direction and management from executive managers — those who possess the broad, cross-unit understanding and control needed to run the business as a system.

The business operations of an organization are most effective when executive sponsorship and involvement is strong. Executives represent the perspective of the customers and the organization in the product and service activities. They must also balance the short-term and long-term needs of the organization and set the business priorities, goals, and strategies.

The reason for this process area at maturity level 2 is that without appropriate involvement of executive and middle management in directing the business operations there are likely to be problems with the organization’s products and services relative to satisfying customers and satisfying the organization’s business priorities, goals, and strategies.

14.1.2.3 Specific and Institutionalization Goals

SG 1 Business Activities Are Aligned

Executive management aligns the business activities involved in the organization’s product and service work with the organization’s business goals.

SG 2 Business Workflows Are Managed

Executive management approves, measures, and manages the business activities of the organization’s units.

InG Practices Are Institutionalized

The practices for Organizational Business Governance are institutionalized.

Institutionalization includes:

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.1.2.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Business Activities Are Aligned)	SP 1 (Establish Business Objectives) SP 2 (Define Business Measures) SP 3 (Maintain Descriptions of Business Workflows) SP 4 (Define Work Performance Objectives) SP 5 (Maintain Organizational Policies)
SG 2 (Business Workflows Are Managed)	SP 6 (Approve Work Commitments) SP 7 (Allocate Resources for Units) SP 8 (Maintain Definitions of Workflow Measures) SP 9 (Review Business Performance and Results)
InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)

The five institutionalization practices, including subpractices and supplementary information, are contained in Part III, Section 6.

14.1.2.5 Specific Practices

SP 1 Establish Business Objectives

Establish and maintain the organization's business goals.

This practice establishes the business context for performing the organization's business processes.

The creation of a full business strategy is a complex undertaking that is outside the scope of this model. This process area assumes that some form of business strategy has been created and that near-term and long-term business goals can be derived from it. Business goals provide a more defined foundation for guiding the implementation and evaluation of business processes. Business goals, and especially near-term goals, are the focus of interactions between business strategy and business processes.

Subpractices

1. Obtain and review the organization's business strategy.
2. Establish and maintain near-term and long-term business goals derived from the organization's business strategy.
3. Identify how near-term and long-term business goals serve to achieve the organization's business strategy.
4. Gain appropriate approvals for the organization's near-term and long-term business goals.
5. Periodically review the organization's near-term and long-term business goals and make adjustments as needed.
6. Communicate the organization's business strategy and goals throughout the organization.

SP 2 Define Business Measures

Definitions of the business outcome measures related to the organization's near-term and long-term business goals are established and maintained.

This practice establishes business measures that help clarify the criteria for evaluating business processes.

The business measures that are the subject of this practice are in many cases established at the organizational level. However, without standard business processes, standard organizational measures are difficult to define and collect. Measures implemented under this practice should be general enough to provide relevant business information and guidance in the absence of standard business processes.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Identify the primary business criteria by which the organization's accomplishment of its business goals will be measured.

Examples of business criteria include:

- Market share
- Total revenue and profit margin on products and services
- Customer satisfaction and retention
- Cost and productivity

2. Define business measures for quantifying the primary business criteria.

Examples of issues to address in defining business measures include:

- Operational definitions of the measures in the various circumstances under which they will be collected.
- How measures will be aggregated for analysis or reporting
- The frequency with which each measure should be collected
- How the measure should be interpreted

3. Clarify how these business measures relate to business activities and processes.

The relationship between business measures and business processes can be imprecise at maturity level 2 in the absence of standard business processes. Nevertheless these measures can provide guidance on the results the organization wants to achieve through its business processes.

4. Define methods for storing, analyzing, and reporting business measures.
5. Periodically review business measures to ensure they are supporting their intended purposes and take corrective actions as needed.

SP 3 Maintain Descriptions of Business Workflows

Descriptions of the business activities and workflows required to prepare, deploy, operate, and support the organization's products and services are established and maintained.

This practice ensures that all the business activities needed to prepare, deploy, operate, and support the organization's products and services are known so that their performance can be supported, evaluated, and improved.

For the purpose of this practice, the descriptions of business activities need only be described to the level of functions or business activities to be performed, and not to the level of detailed work procedures.

This practice is performed by each executive and middle manager for their unit, cascading down the levels of management.

Subpractices

1. Identify and document a list of the organization's products and services.

For the purpose of this practice the list of products and services need only be described to a level sufficient to specify the business activities required to prepare, deploy, operate, and support them. Descriptions to the level of families of similar products and services may be sufficient for this purpose.

2. Identify and document the critical business activities that must be performed to develop, prepare, deploy, operate, and support each of the products and services.

The identified critical business activities should be capable of producing, delivering, supporting, and maintaining all aspects of the products and services committed to customers. They should also satisfy the applicable statutory and organizational requirements related to providing the products and services.

3. Establish and maintain a business process that defines the phases or sequencing of business activities required to prepare, deploy, operate, and support the organization's products and services.

The business process at Level 2 need only be described to the level necessary to organize business activities into responsibilities that can be assigned to business units, to sequence the business activities, and to define workflows among business units based on these sequences Work units are treated as "black boxes" in the business process and their work procedures may not be standard across work units.

4. Establish and maintain a structure of units whose collective responsibilities are sufficient to prepare, deploy, operate, and support the organization's products and services.

Some activities within the business process may be performed or provided by arrangements with suppliers.

5. Assign appropriate responsibility and authority to the units to clarify their roles in the business process, the business activities they are expected to perform, and their accountability for developing, preparing, deploying, operating, and supporting the organization's products and services.

Components of these work activities may be performed by different units within the organization or may be provided by arrangements with suppliers.

6. Identify the work dependencies among business units based on the workflows in the business process and ensure they are appropriately addressed in the plans of the affected units.

SP 4 Define Work Performance Objectives

Executive management establishes and maintains performance goals for business workflows that are drawn from the organization's business strategy and goals.

This practice ensures that all of the organization's work activities ultimately contribute to achieving the organization's business strategy.

This practice assumes the existence of a business strategy documented in sufficient detail that implications, requirements, or goals for business processes can be determined.

Subpractices

1. Evaluate the business strategy to determine the results that must be obtained from business processes to meet strategic goals.

Examples of goals and requirements for business processes related to the business strategy include:

- time or cost to complete transactions
- cost of ownership or warranty expense
- customer experience or involvement in the business process
- order to delivery time
- agility in developing, preparing, or deploying competitive offerings

2. Prioritize and document the process goals believed to be most important for achieving strategic goals.

Process goals can be stated either in the form of product or service attributes such as quality levels, or as performance characteristics such as the number of transactions per hour or cost to perform a task.

SP 5 Maintain Organizational Policies

Executive management establishes and maintains the organizational policies that govern the performance of the business activities.

This practice ensures that work is performed in ways that are consistent across the organization and acceptable to executive management.

Organizational policies are one of the primary means whereby executive management exercises their responsibility for governance over the work.

Subpractices

1. Define the organizational requirements and expectations governing the behavior and constraints to be applied in performing the organization's business activities.

Examples of organizational requirements and expectations include:

- internal business needs
- needs of the organization's customers
- applicable laws and regulations
- organizational strategies and goals

2. Define and document organizational policies that define the requirements and expectations for the organization's business activities.

Organizational policies need to address all critical areas of the organization's processes, not just areas covered by the process areas of this model.

3. Define and document other organizational policies as necessary to meet the governance responsibilities of executive management.
4. Review the organizational policies with the executives and middle managers and obtain their agreement.
5. Distribute the organizational policies through media and vehicles that make them readily available to the managers and staff.
6. Regularly communicate to the managers and staff the organizational expectations documented in the policies.
7. Establish appropriate means for executive management to maintain awareness of conformance with the organizational policies.

Refer to the Product and Process Assurance process area for practices that cover providing executive management with assurance of conformance with organizational policy.

8. Revise the organizational policies as needed.

SP 6 Approve Work Commitments

Executives and middle managers review and approve work commitments the units make to external stakeholders.

This practice ensures that the work commitments the units make to external stakeholders are reasonable and consistent with the plans of the units.

This practice is performed by each executive and middle manager for their unit, cascading down the levels of management.

Subpractices

1. Identify the external work commitments for each unit at each organizational level.
2. Determine whether the plans and resources for the units are sufficient to satisfy the external work commitments.
3. Negotiate changes to the external work commitments and the plans and resources for the units so that the external work commitments can be satisfied.

SP 7 Allocate Resources for Units

Resources for the units are allocated based on what they need to perform their assigned work and satisfy their requirements, plans, and commitments.

This practice ensures that the resources that each unit is allocated is consistent with the work they have to do.

This practice is performed by each executive and middle manager for their unit, cascading down the levels of management.

Subpractices

1. Review the resource estimates and plans of each unit against the work assigned to the unit and the available resources.
2. Negotiate a balance of the resources and assigned work with each unit and obtain their agreement.
3. Establish the plans and commitments to provide the resources each unit needs.

SP 8 Maintain Definition of Workflow Measures

Definitions of the workflow measures used to monitor the performance of the units and business activities are established and maintained.

This practice ensures that the executive and middle managers have the data and quantitative information to monitor the performance of the business units, workflows among these units, and business activities for developing, preparing, deploying, operating, and supporting the organization's products and services.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Identify the workflow information needs of the executive and middle manager for monitoring the performance of the units and the workflow among units.

2. Select and define measures to address the business information needs.
3. Define the plans and procedures for collecting and storing the measures.
4. Specify how the measures will be analyzed and reported.
5. Review the workflow information needs, measurement plans and procedures, and definitions of the measures with those affected, and obtain their agreement.

Many of the measures needed for monitoring the performance of the units and the workflow among units will have to be obtained from the units. The units need to understand the requirements for collection and reporting and how the measures will be used. Refer to the Work Unit Planning and Commitment and the Work Unit Monitoring and Control process areas for practices regarding the definition of unit-level measures and data management.

6. Place the definitions of measures under version control.
7. Revise the workflow information needs, measurement plans and procedures, and definitions of the measures as needed.

SP 9 Review Business Performance and Results

Executives and middle managers review the performance, status, and results of the organization's business activities, and ensure appropriate corrective actions are performed when necessary.

This practice ensures that the executive and middle managers maintain appropriate visibility into the performance of business activities in order to manage the interactions and aggregate result of the units that report to them.

This practice is performed by the executive and middle managers for their unit.

Executive and middle management will generally not review all the details of the organization's work, but will review summaries of the work and address, on an exception basis, those aspects that relate to their management roles.

Subpractices

1. Periodically collect and analyze measures of the performance and results for the units and the workflow among units.
2. Periodically collect, summarize, and review the activities, status, and results of the units relative to their plans, internal and external commitments, and other performance criteria.

Examples of information reviewed for this practice include:

- business measures collected at the organizational level
- status reports from unit managers
- conformance reports from product and process assurance activities
- reports from staff functions supporting the units
- feedback from customers
- information from other internal and external stakeholders affected by the business activities

3. Periodically review the coordination of critical cross-unit dependencies and workflow among units involved in the development, preparation, deployment, operation, and support of each of the organization's products and services.

Examples of cross-unit critical dependencies and support include:

- product baselines that are provided by a unit for use by other units
- completion of a task that enables subsequent tasks in the workflow to be performed
- inputs required to perform work

4. Periodically review the resources consumed by each unit and take corrective actions or reallocate resources to address imbalances.

Examples of the resources consumed by units include:

- people (fulltime staff, contractors, temporary assignments, etc.)
- equipment and supplies
- space and facilities

5. Conduct business reviews of each product and service at important milestones or other logical times.

These reviews are often referred to as “gate reviews” or “phase-gate reviews.” The purposes of these reviews are to:

- understand and assess the business outlook and risks associated with the product or service
- determine if the product or service should be continued
- determine what changes should be made in the preparation, deployment, operation, and support of the product or service
- assess the current volumes of sales, service deliveries, or other forms of work, and projections of future business
- authorize the expenditures of resources to the preparation, deployment, operation, and support of the product or service

6. Identify corrective actions, as needed, to address issues in the performance and results of the units and the workflow among units.
7. Perform or assign responsibility for the identified corrective actions, and track the corrective actions to closure.
8. Periodically summarize and report the status, issues, measures, other results, outlook, and risks for the critical business activities to provide appropriate insight to higher levels of management.

Each executive and middle manager provides information for the higher levels of management. Managers at each of the higher levels need information summarized to a level needed to make informed decisions that are made at those levels.

14.1.3 Work Unit Requirements Management (WURM) Maturity Level 2

14.1.3.1 Purpose

Work Unit Requirements Management establishes and maintains the documented and agreed-to requirements for the work that a work unit or project performs.

14.1.3.2 Introductory Notes

The goals and practices of this process area are expressed in context of a single work unit or project. The process area applies to each work unit and project in the organization. For projects that are composed of sub-projects and work units, the process area applies to each project, sub-project, and work unit at each level within the project organization.

As described below and in Annex D-1, in this process area a project is considered to be a special instance of a work unit, and the term “work unit” will be used to refer to both project and work unit.

The process area is primarily the responsibility of the work unit manager, often assisted by staff skilled in managing requirements.

The following special terms are used in the goals and practices of this process area:

- The term “work unit” is used to refer to an organizational unit that is directly responsible for agreeing to requirements, planning, managing, and performing product and service work or internal business functions.
- The term “project” is used to refer to a temporary endeavor undertaken to create a unique product or service. A project may be composed of projects (that is, sub-projects). A project is a special instance of a work unit. A project may be composed of multiple sub-projects and work units.
- The term “requirement” is used to refer to a condition or capability that must be met or possessed by a product or service offering to solve a problem or achieve an objective, as specified in contract, standard, specification, or other formally imposed document.

Work Unit Requirements Management involves

- identifying proposed requirements and requirements changes for the work of a work unit
- developing an understanding of the proposed requirements and requirements changes
- resolving internal and external issues related to the proposed requirements and requirements changes so that a work unit can perform the work and satisfy the requirements
- establishing and maintaining the agreed-to baseline of the work unit’s requirements

A requirement is a condition or capability that must be met or possessed by a product or service offering. Satisfying the requirements is a condition for acceptance of the offering. Requirements come from explicitly identified requirements providers and are explicitly identified as requirements. Requirements usually have a financial or legal force to ensure that they are satisfied, though for requirements from within the organization other enforcement mechanisms are used.

Requirements for work units that perform the same continuous operations (for example, operating a computer system on an ongoing basis) typically have stable requirements that do not change much over time. Projects and other types of work units that perform project-type work have requirements that typically defined initially, change over time, are satisfied and delivered (that is, completed).

This process area covers both types of requirements.

For a work unit, there is an initial set of requirements that are established when the work unit is first established. This initial set changes over time:

- requirements are added and deleted
- details of agreed-to requirements change

- requirements that are defined at an abstract or summary level are refined and elaborated over time, resulting in derived requirements

This process area deals with the initial set of requirements and with changes to the requirements as they evolve and are revised.

Requirements come from various sources. The primary sources of requirements are the owners of the organization’s products and services (who may be external customers). Other sources include laws, regulations, and organizational policies. In some cases, internal workgroups and individuals represent external organizations in providing requirements to a work unit. For example, an internal audit group may be responsible for identifying applicable laws and regulations and ensuring that they are incorporated into a work unit requirement.

Requirements changes can also be identified as a result of reviewing a work unit’s agreed-to requirements against changed business needs and when inconsistencies are identified between the requirements and the scope of responsibility, capability, and capacity of the work unit.

Requirements should be viewed from the perspective of the requirements providers and the customers of the work unit’s products and services. Requirements are the condition or capability that must be met or possessed by a product or service (for example, functionality, security, accuracy, volumes, and throughput) to satisfy the requirements providers.

To address the ambiguity in the definition of a requirement, the work unit must explicitly identify their requirements providers and the scope of requirements that each requirements provider is authorized to provide. Requirements are those items received from requirements providers that are explicitly identified as “requirements.” The work unit must explicitly identify items that are the requirements, and document and manage them as requirements.

When a set of requirements or a set of requirements changes are proposed for a work unit, they are documented. The work unit develops a common understanding with the requirements providers on these proposed requirements. The work unit reviews the proposed requirements against its capability and capacity to do the work. Discrepancies between the proposed requirements and a work unit’s capability and capacity are resolved, either by negotiating changes to the requirements or changing the capability or capacity of the work unit.

The reason for this process area at maturity level 2 is that effective planning and management of a work unit depends on having well-defined, understood, controlled, and agreed-to baseline requirements at all times.

14.1.3.3 Specific and Institutionalization Goals

SG 1 Requirements Are Identified and Evaluated

The requirements and requirements changes for a work unit and the impact of these requirements on the work unit are identified and evaluated.

SG 2 Requirements Baseline Is Maintained

The requirements baseline for a work unit is documented, maintained, and agreed to by the work unit.

InG Practices Are Institutionalized

The practices for Work Unit Requirements Management are institutionalized.

Institutionalization includes:

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.1.3.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Requirements Are Identified and Evaluated)	SP 1 (Identify Proposed Requirements) SP 2 (Clarify Requirements) SP 3 (Evaluate Requirements for Implementation)
SG 2 (Requirements Baseline Is Maintained)	SP 4 (Negotiate Requirements) SP 5 (Maintain Agreed-To Requirements) SP 6 (Conduct Regular Requirements Review)
InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)

The five institutionalization practices, including subpractices and supplementary information, are contained in Part III, Chapter 13.

14.1.3.5 Specific Practices

SP 1 Identify Proposed Requirements

The requirements and requirements changes proposed for a work unit are identified.

This practice ensures that the full set of proposed requirements and requirements changes that the work unit is expected to satisfy is explicitly identified and documented.

These work unit's requirements include the work unit's initial requirements and the evolving requirements as they are added, deleted, and modified.

Subpractices

1. Identify all legitimate sources of requirements, the scope of requirements they are authorized to provide, and the responsible workgroup or individual for each requirements source.
2. Establish mechanisms for accepting proposed requirements and requirements changes from the legitimate sources.
3. Elicit proposed requirements and requirements changes and the supporting rationale from the requirements providers
4. Document the proposed requirements and requirements changes and the supporting rationale.
5. Review the proposed requirements and requirements changes with the requirements providers to ensure a common understanding.
6. Revise the documentation of the proposed requirements and requirements changes and the supporting rationale, as needed, to reflect clarifications.

SP 2 Clarify Requirements

The proposed requirements and requirements changes for a work unit are reviewed by the work unit to ensure they are understood, and clarifications are obtained where needed.

This practice ensures that the work unit adequately understands each proposed requirement and requirements change in sufficient detail so that the work unit can determine whether they can be implemented by the work unit.

Subpractices

1. Review each proposed requirement and requirements change to ensure it is understood.
2. Identify issues in understanding the proposed requirements and requirements changes.
3. Resolve issues in understanding the proposed requirements and requirements changes with the requirements providers.
4. Determine the priorities of the proposed requirements and requirements changes.

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

5. Revise the documentation of the proposed requirements and requirements changes, as needed, to reflect clarifications and resolutions of issues.

SP 3 Evaluate Requirements for Implementation

The proposed requirements and requirements changes for a work unit are evaluated by a work unit to ensure they can be implemented within the scope of responsibility, capability, and capacity of a work unit.

This practice ensures that the proposed requirements and requirements changes can be implemented within the scope of responsibility, capability, and capacity of the work unit.

Subpractices

1. Review each proposed requirement and requirements change to ensure they are valid, implementable requirements.

Examples of review criteria include:

- each proposed requirement and requirements change is uniquely identified
- each proposed requirement and requirements change is clearly and properly stated
- each proposed requirement and requirements change is complete
- each proposed requirement and requirements change is feasible
- the set of proposed requirements and requirements change are consistent with each other
- each requirement and requirements change can be verified

2. Identify and document inconsistencies between the proposed requirements and requirements changes and the scope of responsibility and capability of the work unit.
3. Identify and document changes needed in the plans, activities, and work products to make them consistent with the proposed requirements and requirements changes.
4. Derive and document quantitative estimates of the effort, schedule, and other planning parameters for incorporating the proposed requirements and requirements changes into the plans and activities.

Refer to the Work Unit Planning and Commitment process area for practices that cover the estimation of a work unit's planning parameters.

5. Determine if the scope of responsibilities and capabilities of the work unit can be adjusted to accommodate the needs of the proposed requirements and requirements changes.
6. Resolve issues with the requirements providers and others, as appropriate, so that the requirements and requirements changes can be implemented within the scope of responsibility, capability, and capacity of the work unit.
7. Revise the documentation of the proposed requirements and requirements changes, as needed, to reflect clarifications and resolutions of issues.

SP 4 Negotiate Requirements

The proposed requirements and requirements changes for a work unit are negotiated with the requirements providers and owners of affected products and services to ensure they are consistent with the scope of responsibility, capability, and capacity of the work unit.

This practice ensures that the work unit can perform the work that is needed to satisfy the proposed requirements and requirements changes.

Subpractices

1. Determine and document the impact of the proposed requirements and requirements changes on existing plans and commitments.

2. Negotiate changes to the work unit plans and commitments with relevant stakeholders to that the plans and commitments are consistent with the proposed requirements and requirements changes.
3. Negotiate changes to the proposed requirements and requirements changes with the requirements providers, to reconcile them with the plans and commitments.
4. Review the proposed requirements and requirements changes and the changes to the plans and commitments with relevant stakeholders, and obtain their agreement.
5. Document the agreed-to changes to the proposed requirements and requirements changes.
6. Document the agreed-to changes to the plans and commitments.

Refer to the Work Unit Planning and Commitment process area for practices that cover revising a work unit's plans and commitments.

SP 5 Maintain Agreed-to Requirements

The specification of the agreed-to baseline requirements for a work unit is established and maintained.

This practice ensures that a single source of agreed-to baseline requirements for the work unit is documented, is kept up to date, and is available to relevant stakeholders.

Subpractices

1. Inform relevant stakeholders on a regular basis about the status and disposition of the proposed and agreed-to requirements and requirements changes.
2. Integrate all agreed-to requirements and requirements changes into a documented requirements specification for the work unit.
3. Document the source of each requirement and requirements change.
4. Identify and document the methods that will be used to verify each requirement.

Examples of requirements verification methods include:

- review by peers or experts
- analysis
- testing
- independent audits or reviews

5. Review the requirements specification with relevant stakeholders, and obtain their agreement.
6. Place the requirements specification under configuration management.

Refer to the Work Unit Configuration Management process area for practices that cover change management.

7. Make the requirements specification available to relevant stakeholders.
8. Revise the requirements specification as necessary.

SP 6 Conduct Regular Requirements Review

A work unit's agreed-to requirements are reviewed on a periodic and event-driven basis, to identify requirements that are inconsistent with the business needs.

This practice ensures that a work unit's requirements can be changed to adjust for changing business circumstances.

A work unit's requirements are reviewed as part of any organizational or work unit re-planning activity. This might be an annual re-planning activity or re-planning due to significant changes in the business environment or strategy.

Subpractices

1. Review the agreed-to requirements against the business needs of the organization and work unit.
2. Identify work unit requirements that are inconsistent with the business needs of the organization and work unit.
3. Identify and document proposed changes to the requirements.
4. Define and document the rationale for each proposed requirements change.
5. Review the proposed requirements changes with the requirements providers and other relevant stakeholders, and obtain their agreement.

This review is only for the purpose of agreeing that the requirements changes are valid proposals to be considered.

6. Evaluate, negotiate, and document, as appropriate, the proposed requirements changes.
7. Document and archive the results and other relevant records of the requirements review.

14.1.4 Work Unit Planning and Commitment (WUPC)

Maturity Level 2

14.1.4.1 Purpose

Work Unit Planning and Commitment establishes and maintains the plans and commitments for performing and managing the work required of a work unit or project.

14.1.4.2 Introductory Notes

The goals and practices of this process area are expressed in context of a single work unit or project. The process area applies to each work unit and project in the organization. For projects that are composed of sub-projects and work units, the process area applies to each project, sub-project, and work unit at each level within the project organization.

As described below and in Annex B-1, in this process area a project is considered to be a special instance of a work unit, and the term "work unit" will be used to refer to both project and work unit.

This process area is primarily the responsibility of the work unit manager.

The following special terms are used in the goals and practices of this process area:

- The term "work unit" is used to refer to an organizational unit that is directly responsible for agreeing to requirements, planning, managing, and performing product and service work or internal business functions.

- The term “project” is used to refer to a temporary endeavor undertaken to create a unique product or service. A project may be composed of projects (that is, sub-projects). A project is a special instance of a work unit. A project may be composed of multiple sub-projects and work units.
- The term “planning parameters” is used to refer to the characteristics of work to be done, that enables the work unit, project, or workgroup to perform the necessary planning, organizing, staffing, directing, coordinating, reporting, and budgeting of their work.
- The term “work breakdown structure” is used to refer to a hierarchical representation of work to be performed, built by iteratively decomposing the work into manageable units. It is intended to reflect how the work is conceptualized, planned, and managed.

Work Unit Planning and Commitment involves:

- determining how to organize the work
- developing estimates to perform the work
- resolving conflicts between the work unit’s requirements and the resources, capability, and capacity to do the work
- establishing the commitments needed to do the work
- establishing the commitments needed to support related work units and workgroups in their work
- identifying and analyzing risks
- developing the plan to perform and manage the work

Planning for a work unit may be initiated because of new or changed requirements or when it is determined that the plans are inconsistent with the capability and capacity of the work unit. Planning may also be initiated as part of an organizational re-planning activity. This might be an annual re-planning activity or re-planning due to significant changes in the business environment or strategy.

In planning, the work is organized to establish the best fit of the requirements, characteristics of the organization and work unit, and goals and constraints applicable to the work unit.

The plans for a work unit provide the basis for performing the work, monitoring the work, performing corrective actions, and communicating with relevant stakeholders.

Estimating and planning is an iterative process. Deriving estimates, making commitments, obtaining resources, defining schedules, and assessing risks are all interrelated. As changes are considered in one of these dimensions, the changes to the other dimensions need to be considered.

The work unit’s plans are revised and maintained as the work is performed to address requirements changes, inaccurate estimates, commitment changes, and changes in capability and capacity.

Practices describing both planning and re-planning are contained in this process area.

The reason for this process area at maturity level 2 is that carefully constructed plans are essential for a work unit to consistently meet its requirements and commitments.

14.1.4.3 Specific and Institutionalization Goals

SG 1 Work Is Estimated

Quantitative estimates of the planning parameters are derived and documented to describe the magnitude of the work to be done by a work unit.

SG 2 Commitments and Agreements Are Approved

The commitments a work unit needs to perform its work are identified, planned, documented, and agreed to by relevant stakeholders.

SG 3 Plans Are Documented and Consistent

Plans that describe how a work unit will perform its work are documented and kept consistent with its requirements, its commitments, and related plans.

InG Practices Are Institutionalized

The practices for Work Unit Planning and Commitment are institutionalized.

Institutionalization includes:

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.1.4.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Work Is Estimated)	SP 1 (Involve Staff in Planning) SP 2 (Apply Lessons Learned) SP 4 (Maintain Work Breakdown Structure) SP 5 (Maintain Definitions of Measures) SP 6 (Maintain Estimates of Work Attributes) SP 7 (Maintain Estimates of Demand/Production Schedule) SP 8 (Maintain Estimates of Needed Resources)
SG 2 (Commitments and Agreements Are Approved)	SP 3 (Maintain Workflow Description) SP 9 (Maintain Commitment Agreements) SP 10 (Review Commitments with Staff) SP 11 (Maintain Schedule of Work) SP 12 (Resolve Requirements and Estimates Conflicts) SP 17 (Maintain Work Monitoring Mechanisms)

SG 3 (Plans Are Documented and Consistent)	SP 13 (Maintain Staffing Plans) SP 14 (Maintain Non-People Resource Plans) SP 15 (Maintain Data Management Plans) SP 16 (Maintain Risk Management Plans) SP 18 (Resolve Conflicts with Related Plans) SP 19 (Establish Consistent Work Unit Plans)
InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)

The five institutionalization practices, including subpractices and supplementary information, are contained in Part III, Chapter 13.

14.1.4.5 Specific Practices

SP 1 Involve Staff in Planning

Individuals and workgroups in a work unit participate or are appropriately represented in estimating and planning the work.

This practice ensures that the experiential knowledge of the people doing the work is gathered and used in the estimating and planning, and a sense of ownership and commitment to the plans are instilled in the people.

SP 2 Apply Lessons Learned

Lessons learned by a work unit are used in estimating and planning future work.

This practice ensures that a work unit learns from experience so that estimating and planning improves.

Refer to the Work Unit Monitoring and Control process area for practices that cover identifying and recording lessons.

Subpractices

1. Make lessons learned available to the work unit staff and managers.
2. Review and incorporate the documented lessons learned into the estimating and planning activities and artifacts.

SP 3 Maintain Workflow Description

A description of the workflow for the work unit is established and maintained.

This practice ensure that there is a common understanding within the work unit and with other stakeholders of how the work will flow into, within, and out of the work unit so that the work can be effectively managed.

For a project, a workflow is often referred to as a project life cycle.

Subpractices

1. Identify and document a list of the critical work activities that must be performed to accomplish the work unit's work.

2. Identify and document the critical inputs, outputs, interface, and dependencies among the work activities.
3. Identify and document the critical external inputs, outputs, interface, and dependencies for the work activities.
4. Define and document a description of the workflow for the work unit's work.
5. Review the description of the workflow for the work unit with relevant stakeholders, and obtain their agreement.
6. Place the description of the workflow for the work unit under version control.
7. Revise the description of the workflow for the work unit as needed.

SP 4 Maintain Work Breakdown Structure

A work breakdown structure that partitions work assigned to a work unit into activities is established and maintained.

This practice ensures that there is a complete documented list of the work activities and work products as a basis for estimating, planning, and managing.

Subpractices

1. Partition and decompose the work activities, work products, and services in sufficient detail to estimate, plan, and manage the work.
2. Identify the products and services that will be acquired from other internal and external sources.
3. Define and document the approach to doing the work.

The approach defines a top-level strategy for performing the work activities and producing and delivering the products and services. It includes decisions on attributes such as technology that will be applied, the general skill levels of the people, sourcing strategy, and workgroup structure of the work unit.

4. Document the work activities, work products, and services in a work breakdown structure.
5. Review the work breakdown structure with relevant stakeholders, and obtain their agreement.
6. Place the work breakdown structure under version control.
7. Revise the work breakdown structure as needed.

SP 5 Maintain Definitions of Measures

Definitions of the measures used to plan and manage a work unit are established and maintained.

This practice ensures that the quantitative information and data needed to effectively plan and manage a work unit's work are designed based on the work unit's requirements, work efforts, goals, and other needs.

Refer to the Work Unit Monitoring and Control process area for practices that cover the use of measures for managing a work unit.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Identify the measurement information needs for the work unit.

Examples of sources of measurement information needs includes:

- work unit requirements
- critical dependencies and commitments
- work breakdown structure
- executive and middle management information needs and measurement requirements
- work attributes
- work unit management concerns

2. Select and define measures to address the measurement information needs.
3. Define the procedures for collecting and storing the measures.
4. Specify how the measures will be analyzed and reported.
5. Review the measurement information needs, plans, and definitions of the measures with relevant stakeholders, and obtain their agreement.
6. Place the definitions of measures under version control.
7. Revise the measurement information needs, plans, and definitions of the measures as needed.

SP 6 Maintain Estimates of Work Attributes

Estimates are established and maintained for the base attributes of the work activities and work products for a work unit.

The purpose of this practice is to estimate the base attributes of work that a work unit needs to perform so that there is a basis for planning this work and similar work in the future.

A base attribute is a single property or characteristic of an entity that can be assigned a quantitative value. Base attributes can be combined to estimate effort, cost, schedule, throughput, demand production schedule, and other planning parameters.

Subpractices

1. Identify the base attributes the work activities and work products.

Examples of base attributes include:

- number of transactions, by type, that need to be performed
- cost and time per transaction, by type
- quality of transactions, by type
- number of requirements
- size and complexity of work requests
- number of function points or source lines of code for software, by type, complexity, etc.
- number of pages of process documentation, by type, complexity, etc.
- number of change requests to be addressed, by type, complexity, etc.

2. Define the work activities and work products to the granularity needed to achieve the needed estimating accuracy.
3. Estimate the identified base attributes of the work activities and work products.
4. Review the estimates of the identified base attributes with relevant stakeholders, and obtain their agreement.
5. Document and archive the results and other relevant records of the work attribute estimation activities.
6. Revise the estimates or the identified base attributes as needed.

SP 7 Maintain Estimates of Demand/Production Schedule

Estimates are established and maintained for the demand/production schedule the work unit needs to support.

This practice determines how the demand profile for a work unit is affected by outside factors and events (for example, different needs on different days of the week) so that resources can be appropriately planned to fit the varying needs.

A demand profile describes quantitatively how the demand for products and services changes over time (that is, quantities relative to a timeline) and due to seasonal or other cyclic conditions or due to other predictable conditions.

A demand/production schedule describes quantitatively the quantity of products and services that will be provided over time (that is, quantities relative to a timeline) to address a demand profile.

Examples of a demand profile include:

- the number of transactions or work requests that are received and processed relative to a timeline
- the number of problem reports that are expected to be received and handled on a day-by-day basis following the release of a product revision
- the utilization of an organization’s IT systems for each day of a typical week

The overall demand profile for the work unit may either be specified in the work unit’s requirements or derived from the requirements and other information.

Subpractices

1. Identify the requirements and goals that define the overall demand profile for the work unit’s primary activities.
2. Obtain forecasts that define how the overall demand profile for the work unit’s primary activities will change in the future.
3. Identify the factors and events that influence the demand for the work unit’s primary activities.

Examples of factors and events that affect demand include:

- time of the day
- days of the week
- days or weeks of the month
- months or seasons of the year
- changes in parameters that affect the work (for example, interest rate change)

4. Estimate the demand profile as determined by the influencing factors and events.
5. Define the demand/production schedule to address the estimated demand volume.

Examples of approaches to fit a demand/production schedule to address the estimated demand profile include:

- building inventory during low demand periods to support high demand periods
- continually adjusting capacity to match the demand profile
- implementing actions to shift and smooth the demand profile, for example through pricing and incentives
- accepting the resulting loss of not being able to satisfy peak demand

6. Review the estimated demand profile and demand/production schedule with relevant stakeholders, and obtain their agreement.
7. Place the estimated demand profile and demand/production schedule under version control.
8. Revise the estimated demand profile and demand/production schedule as needed.

SP 8 Maintain Estimates of Needed Resources

Estimates are established and maintained for the effort, budget, and other resources required to satisfy a work unit's requirements, demand/production schedule, and commitments.

This practice ensures that the estimated attributes of the work that needs to be performed are appropriately translated into measures of effort, budget, and other resources, so that a reasonable plan can be established.

Subpractices

1. Identify the categories of resources that need to be estimated to effectively plan the work.
2. Determine the quantitative relationships of the base attributes of the work activities and work products to the effort, cost, and other resources, as well as the quantitative relationships among these parameters.

An example of using a quantitative relationship is the use of standard values for the time and cost for performing transactions and the defined demand/production schedule to estimate effort.

3. Obtain and analyze available historical data and other inputs that are needed to derive estimates of effort, cost, and other resources.

The rationale for using the selected historical data or not using historical data should be documented.

4. Derive and document estimates of the overall effort and specific skills required to perform the work.

Estimates of overall effort need to include all the activities that need to be performed, including overhead tasks such as training, administrative activities, meetings, and assistance to other work units.

5. Derive and document estimates of the non-people resources required to perform the work.

Examples of non-people resources include:

- office facilities and meeting rooms
- special work areas
- computing and communication infrastructure
- equipment
- supplies
- travel expenses

6. Derive estimates of the overall cost required to perform the work.
7. Develop the capacity plans for cost, effort, and other resources to support the demand/production schedule.
8. Review the capacity plans and estimates of cost, effort, and other resources with relevant stakeholders, and obtain their agreement.
9. Document and archive the results and other relevant records of the resource estimation activities.
10. Revise, as needed, the capacity plans and estimates of cost, effort, and other resources.

SP 9 Maintain Commitment Agreements

Commitments to address critical dependencies are established and maintained between a work unit and other work units and other relevant stakeholders.

This practice ensures that the critical dependencies a work unit has on other work efforts and the dependencies other work efforts have on this work unit will be satisfied, so that the work can be performed according to the plans.

Subpractices

1. Identify and document the critical dependencies on other work units, workgroups, customers, and suppliers.

A critical dependency is a work product, action, information, etc. that must be provided by one unit, workgroup, or individual to another so that the receiver can perform planned work.

Examples of critical dependencies include”

- product baselines that are provided by another work unit
- product baselines that are provided by this work unit to other work units
- inputs required to perform work
- outputs needed by other work units

2. Identify and document the critical dependencies that other work units, workgroups, customers, and suppliers have on this work unit.

3. Negotiate and document commitments with those responsible for satisfying each critical dependency for the work unit.
4. Negotiate and document commitments with those who have critical dependencies on this work unit.
5. Review the descriptions of the critical dependencies and the documented commitments with those making the commitments and obtain their agreement.
6. Place the descriptions of the critical dependencies and the agreed-to commitments under version control.
7. Revise the descriptions of the work unit's critical dependencies and commitments as needed.

SP 10 Review Commitments with Staff

Commitments between a work unit and other work units, other workgroups, and other relevant stakeholders, and changes to the commitments are reviewed and agreed to by the individuals and workgroups within the work unit.

This practice ensures that the people doing the work agree that the work unit's commitments are reasonable so that they assume an appropriate share of owning the commitments and the plans built around these commitments.

Subpractices

1. Review the work unit's commitments with the individuals and workgroups within the work unit.
2. Identify and resolve any significant issues with the commitments.

Resolving commitment issues may result in changes to the work unit's requirements, plans or commitments.

3. Document any unresolved significant commitment issues as risks.

Refer to the Guidelines for Risk Management in Annex A for guidance that may be useful in implementing this practice.

SP 11 Maintain Schedule of Work

Schedules for a work unit are established and maintained to describe the milestones, activities, and application of resources that are needed to satisfy the requirements, commitments, and demand/production schedule.

This practice ensures that the management and staff of a work unit know what future work has to be performed and when it will be performed so they can adequately prepare and coordinate with others to do this work.

Subpractices

1. Obtain and verify the inputs needed to establish the schedule.

Examples of inputs needed to establish the work unit's schedule include:

- work breakdown structure
- estimates of demand/production schedule
- estimates of effort and non-people resources
- estimates of overall cost
- commitments

2. Identify and document the constraints, assumptions, and other factors that affect the schedule.
3. Define and document the schedule of activities and milestones to support accuracy in progress measurement and meeting commitments.

The schedule for the work unit includes the significant milestones, the work activities, their interdependencies, and the time phasing. The separation of milestones and duration of work activities reflected in the schedule need to support accuracy in measuring progress and managing the work.

Schedules for a work unit may be combined into a single document or there may be separate schedules that address different types of activities. For example, the detailed schedules of work requests and work streams may be separate from schedules for personnel activities such as recruitment and training, and these may be separate from schedules for managing facilities and equipment.

4. Review the schedule and associated constraints, assumptions, and other factors with relevant stakeholders, and obtain their agreement.
5. Place the schedule and descriptions of the associated constraints, assumptions, and other factors under version control.
6. Revise the schedule as needed.

SP 12 Resolve Requirements and Estimates Conflicts

The requirements, planning constraints, and the estimates of the planning parameters for a work unit are balanced with the available levels of resources, schedule, and budget.

This practice ensures that the plans for a work unit represent a reasonable approach for performing the work and delivering its products and services.

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Identify inconsistencies among the requirements, planning constraints, estimates, and available levels of resources, schedule, and budget.
2. Determine the relative priorities and amount of flexibility for the requirements, planning constraints, and available levels of resources, schedule, and budget.
3. Negotiate and document descriptions of the changes to the requirements needed to resolve inconsistencies.
4. Negotiate and document descriptions of the changes to the planning constraints needed to resolve inconsistencies.

Examples of ways to reconcile inconsistencies among the work unit's requirements and the various planning constraints include:

- eliminating, reducing, or deferring requirements
- obtaining more resources
- increasing productivity
- reducing quality enhancement activities
- sourcing
- adjusting the staff skill mix
- changing schedules
- changing commitments
- accepting increased risk

5. Negotiate and document changes to the quantity of resources, budget, and schedule needed to resolve inconsistencies.
6. Review the changes to the requirements, planning constraints, and available levels of resources, schedule, and budget with relevant stakeholders, and obtain their agreement.
7. Revise the specification of the requirements, as appropriate, to reflect the results of the estimate reconciliation.

Refer to the Work Unit Requirements Management process area for practices that cover the revision of the work unit's requirements specification.

8. Revise the estimates and plans, as appropriate, to reflect the results of the estimate reconciliation.
9. Document and archive the results and other relevant records of the estimate reconciliation activities.

SP 13 Maintain Staffing Plans

Plans are established and maintained for obtaining, assigning, and preparing the people to perform their roles in a work unit, and for reassigning people who are not needed.

This practice ensures that the people who are assigned and available to do the work assigned to a work unit, at any point in time, match the work that needs to be done.

Subpractices

1. Identify the number of people needed to perform the work, when they are needed, and the skills they must possess.
2. Assess the skills and available capacity of the people currently assigned, if any, against the needs.
3. Define and document the plan for obtaining the appropriate staff that is needed.

Examples of ways to obtain appropriate staff include:

- hiring staff
- removing staff
- transferring staff into or out of the work unit
- adding staff from external sources

4. Define and document the plan for how the skills gap will be addressed.

Examples of ways to address a skills gap include:

- obtaining staff who have the necessary skills
- training existing or new staff
- coaching or mentoring
- outsourcing

5. Review the staffing plans with relevant stakeholders, and obtain their agreement.
6. Place the staff assignment plans under version control.
7. Revise the staffing plans as needed.

SP 14 Maintain Non-People Resource Plans

Plans for acquiring and deploying the non-people resources needed to perform a work unit's work and reallocating these resources that are not needed are established and maintained.

This practice ensures that the types and quantity of non-people resources that a work unit has in place, at any point in time, match what is needed to do the work.

Subpractices

1. Identify the quantity of each of the non-people resources needed and when they are needed.
2. Assess the non-people resources currently available, if any, against the needs.
3. Define and document the plan for how the non-people resources gap will be addressed.

Examples of ways to address a non-people resource gap include:

- acquiring additional resources
- upgrading existing resources
- modify the sharing arrangements for shared resources
- batching the use of resources

4. Review the non-people resource plans with relevant stakeholders, and obtain their agreement.
5. Place the non-people resource deployment plans under version control.
6. Revise the plan for non-people resources as needed.

SP 15 Maintain Data Management Plans

Plans are established and maintained for the collection, storage, management, and disposal of the critical data and information for a work unit.

This practice ensures that the work unit is aware of its critical data and information and that plans are in place to collect, store, manage, and dispose the data and information in a manner that satisfies the applicable laws, regulations, organizational policies, and other operational needs.

Subpractices

1. Identify and document the data and information that needs to be collected, stored, and distributed, along with the applicable data management requirements for each type of data and information.

Examples of data and information to consider for data management include:

- work unit plans
- lists of risks
- configuration management records
- process and product assurance records
- specifications, reports, and manuals
- work logs
- important correspondence
- trade studies and analyses
- minutes of external meetings
- minutes of internal meetings
- lessons learned
- action item lists

2. Define and document the standards that apply to the management of the data and information.

Examples of standards that apply to the management of the data and information include:

- naming conventions
- filing schema
- version numbering
- labeling, for example for confidential classification

3. Define and document the mechanisms and procedures used to collect, store, access, distribute, and dispose each type of data and information.

Examples of mechanisms that may be used to store and manage data and information items include:

- work unit paper files
- IT system databases
- secure archive
- change management
- configuration management
- disaster recovery

4. Define and document the mechanisms and procedures used to appropriately limit access and protect each type of data and information.
5. Review the data management plans with relevant stakeholders, and obtain their agreement.
6. Place the data management plans under version control.
7. Revise the data management plans as needed

SP 16 Maintain Risk Management Plans

Risks that could jeopardize satisfying a work unit's requirements and commitments are identified and analyzed, and plans to manage them are established and maintained.

This practice ensures that the work unit maintains an awareness of risks so that these risks are appropriately considered in the work unit's planning and management activities.

A work unit may be concerned with two types of risks:

- business risks, which are associated with business losses or errors inherent in performing its business activities
- internal work risks, which are associated with the ability of a work unit to perform its work

Examples of business risks include

- risk of fraudulent use of credit cards
- risk of inaccurate or delayed posting of transactions

Examples of internal work risks include

- risk of losing key staff
- risk that commitments to the work unit will not be satisfied

Individual work units are primarily concerned with identifying and managing internal work risks. The identification and management of business risks are more likely to be the responsibility of the organization or the product and service owners, although some work units may have responsibility for business risks.

This specific practice covers both internal work risks and business risks that are the responsibility of the work unit.

Refer to the Guidelines for Risk Management in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Obtain and verify the inputs needed to identify and analyze the risks.
2. Identify risks along with associated contextual information.
3. Analyze the risks to determine potential impact, likelihood of occurrence, and the likely timeframe of occurrence.
4. Prioritize the risks.
5. Document the risks and the associated analysis, priorities, and contextual information.
6. Review the documented risks with relevant stakeholders, and obtain their agreement.
7. Place the documented risks under version control.
8. Revise the documented risks as needed.

Examples of when the documented risks may be revised include:

- when new risks are identified
- when risks become problems
- when risks are retired
- when the work unit circumstances change significantly

SP 17 Maintain Work Monitoring Mechanisms

Mechanisms to assign and regularly monitor the work performed by the individuals and workgroups in a work unit are established and maintained.

This practice ensures that the work unit manager is able to effectively manage the work activities.

Refer to the Work Unit Monitoring and Control process area for practices that cover the assignment and monitoring of the work performed by the individuals and workgroups.

Examples of mechanisms to assign and monitor work include:

- work reports
- use of on-line work queues to assign work tasks and track completion
- visual monitoring of the number of customers waiting to be served
- reports of measures of the work
- informally monitoring the work performed by the staff

SP 18 Resolve Conflicts with Related Plans

The plans and commitments for a work unit are reconciled with the plans and commitments of related work units and workgroups.

This practice ensures that no significant conflicts, inefficiencies, unresolved dependencies, or missing responsibilities exist among the plans and commitments of the related work units and workgroups.

Subpractices

1. Review plans and commitments of the work unit against those of the related work units and workgroups to identify areas that are in conflict or disagreement.
2. Identify and document significant conflicts, inefficiencies, unresolved dependencies, or missing responsibilities in plans and commitments of the work unit and the related work units and workgroups.
3. Negotiate with those responsible for the reviewed plans and document the changes that are needed in the plans and commitments to resolve any significant issues.
4. Review the plan and commitment changes with relevant stakeholders, and obtain their agreement.
5. Revise the work unit's plans and commitments to reflect the agreed-to changes.
6. Document and archive the results and other relevant records of the plan and commitment reconciliation activities.

SP 19 Establish Consistent Work Unit Plans

The component plans for a work unit are organized into a course of action for performing the work.

This practice ensures that all aspects of the plans for a work unit are consistent and aligned with each other so that

there is a common understanding and that the set of plans provide a course of action to perform the work and deliver the products and services.

Refer to the Work Unit Monitoring and Control process area for practices that cover the use of the work unit plans to monitor and control the work.

Subpractices

1. Obtain and verify the component plans and other inputs needed to integrate the work unit's plans.
2. Review the component plans to identify areas that are in conflict or disagreement.
3. Identify and document significant conflicts, inefficiencies, unresolved dependencies, or missing responsibilities in the plans.
4. Identify changes to the plans to resolve any significant issues.
5. Review the plan changes with relevant stakeholders, and obtain their agreement.
6. Incorporate the plan changes into the component plans and integrate the plans.
7. Document and archive the results and other relevant records of the plan integration activities.

14.1.5 Work Unit Monitoring and Control (WUMC) Maturity Level 2

14.1.5.1 Purpose

Work Unit Monitoring and Control measures, monitors, and adjusts the work assignments, resources, and other work factors for the individuals and workgroups in the work unit or project and keeps performance and results in line with the requirements and plans.

14.1.5.2 Introductory Notes

The goals and practices of this process area are expressed in context of a single work unit or project. The process area applies to each work unit and project in the organization. For work units and projects that are composed of sub-projects and work units, the process area applies to each project and work unit at each level within the hierarchy.

As described below and in Annex B-1, in this process area a project is considered to be a special instance of a work unit, and the term "work unit" will be used to refer to both project and work unit.

This process area is primarily the responsibility of the work unit manager.

The following special terms are used in the goals and practices of this process area:

- The term "work unit" is used to refer to an organizational unit that is directly responsible for agreeing to requirements, planning, managing, and performing product and service work or internal business functions.
- The term "project" is used to refer to a temporary endeavor undertaken to create a unique product or service. A project may be composed of projects (that is, sub-projects). A project is a special instance of a work unit. A project may be composed of multiple sub-projects and work units.

Work Unit Monitoring and Control involves

- monitoring the work performed by the work unit
- making adjustments to balance work loads and accomplish the work
- addressing significant deviations from the requirement, estimates, plans, and commitments that cannot be handled by simple internal adjustments to work assignments
- monitoring risks and addressing likely problems
- communicating accomplishments, issues, and risks to relevant stakeholders

A work unit is a unit within the organization that is directly responsible for agreeing to requirements, planning, managing, and performing product and service work or internal business functions. A project is a work unit that is a temporary endeavor undertaken to create a unique product or service. A work unit or project may be composed of other work units. (Refer to the Glossary of Terms for more explicit definitions of the terms “unit,” “work unit,” and “project.”)

A documented plan is the basis for monitoring and controlling the work unit’s activities. Work activities are monitored as they are performed so that simple adjustments can be made immediately without affecting the overall plans or commitments. These simple adjustments allow the work unit to effectively and efficiently accomplish the work within the scope and boundaries of the existing requirement, plans, and commitments.

When it is determined that the work unit’s requirement, plans, and commitments cannot be met with simple adjustments to the work assignments, corrective actions are performed, possibly involving changes to the requirement, plans, and commitments.

In addition to taking corrective actions to handle each significant deviation, the likely causes of the deviations are investigated and, if possible, addressed. For example, to address a long queue of people waiting to perform transactions, the immediate effect might be addressed by having a manager step in and help perform the transactions until the queue is reduced. An example of addressing the likely cause might be to determine that the queue is always longer on Friday afternoons and arrange for more staff on Friday afternoons

The reason for this process area at maturity level 2 is that without proper monitoring and control, the work unit will not be able to perform its work in a repeatable manner and will not be able to consistently meet its requirements, track to its plans, and satisfy its commitments.

14.1.5.3 Specific and Institutionalization Goals

SG 1 Work Assignments Are Managed

Work assignments and work activities for a work unit are managed against its requirements, estimates, plans, and commitments.

SG 2 Performance and Results Are Tracked

The actual performance and results of a work unit are monitored against its requirements, estimates, plans, and commitments.

SG 3 Corrective Actions Are Performed

Corrective actions are performed when the performance or results of a work unit deviate significantly from its requirements, plans, or commitments.

InG Practices Are Institutionalized

The practices for Work Unit Monitoring and Control are institutionalized.

Institutionalization includes:

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.1.5.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Work Assignments Are Managed)	SP 1 (Process Incoming Work Requests) SP 2 (Prepare Staff for Assignments) SP 3 (Deploy Non-People Resources) SP 4 (Assign Work)
SG 2 (Performance and Results Are Tracked)	SP 5 (Monitor Workflow) SP 6 (Monitor and Adjust Work Assignments) SP 7 (Analyze Measures) SP 8 (Review Performance and Status) SP 9 (Manage Data and Information) SP 10 (Manage Risks)
SG 3 (Corrective Actions Are Performed)	SP 11 (Address Significant Deviations) SP 12 (Address Deviation Causes) SP 13 (Communicate Progress) SP 14 (Revise Plans) SP 15 (Apply Lessons Learned)
InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)

The five institutionalization practices, including subpractices and supplementary information, are contained in Part III, Chapter 13..

14.1.5.5 Specific Practices

SP 1 Process Incoming Work Requests

Work requests received by a work unit are analyzed, prioritized, and planned into the work unit's activities.
manage the work requests received by a work unit so that work activities can be planned to maintain a balanced workload across the work unit.

For some work units, their work is primarily determined by work requests that must be planned into their work activities. For other work units, their work consists of ongoing responsibilities to perform certain defined activities without being scheduled as work requests. However, even the latter type of work units occasionally receive work requests whose impact on time or effort requires planning into their ongoing responsibilities.

Subpractices

1. Receive, acknowledge, and document each work request received by the work unit.
2. Obtain and verify the inputs needed to analyze, prioritize, and plan each work request.
3. Analyze each work request to understand the requirements for the work to be performed and the outputs that will satisfy the work request.
4. Evaluate the capability and capacity of the work unit to address each work request, and identify any capability and capacity issues.
5. Resolve any issues with the submitter of the work requests and other relevant stakeholders regarding the work unit's capability and capacity to address each work request.
6. Document the disposition and supporting rationale for each work request and communicate it to the submitter and other relevant stakeholders.
7. Plan each approved work request into the ongoing work activities of the work unit.

SP 2 Prepare Staff for Assignments

The people needed to perform the work unit's work are obtained, assigned, and prepared according to the plans and the needs of the work unit.

This practice ensures that the quantity and capability of the work unit's staff are adequate to perform the work.

Refer to the Work Unit Planning and Commitment process area for practices that cover staff assignment plans.

Subpractices

1. Compare the quantity and capabilities of the people currently assigned and available for assignment against the plans and needs.

Review of staffing should be performed when a work unit is first established, at points when the planned staffing levels change, and as part of the regular work unit monitoring and control.

2. Arrange for the appropriate addition or reassignment of people based on the plans and needs.
3. Arrange for appropriate skills development activities for the assigned people,

In some cases the skills development activities may be common for a group of individuals. In other cases the skills development activities may have to be based on the background, education, skills, and knowledge of each individual.

SP 3 Deploy Non-People Resources

The non-people resources needed to perform a work unit's work are acquired and deployed or reallocated, as appropriate, according to the plans and the needs of the work unit.

This practice ensures that the quantity and capability of the work unit's non-people resources are adequate to perform the work.

Refer to the Work Unit Planning and Commitment process area for practices that cover non-people resource plans.

Subpractices

1. Determine the non-people resources and the quantity of each needed to perform the work as planned and satisfy the other needs of the work unit.
2. Compare the quantity of each of the non-people resources current assigned and available for assignment against the plans and needs.

Review of the non-people resources should be performed when a work unit is first established, at points when the planned staffing levels change, and as part of the regular work unit monitoring and control.

3. Arrange for the appropriate addition or reallocation of the non-people resources based on the plans and needs.

SP 4 Assign Work

The assignment of work activities to individuals and workgroups within the work unit is established and maintained.

This practice ensures that all work activities needed to satisfy work requirements or complete work requests are assigned, that workloads are balanced among the members of a work unit, and that members of the work unit are accountable for their assignments.

Subpractices

1. Organize the work activities into roles and assignments according to a work unit's defined workflow.

Refer to the Work Unit Planning and Commitment process area for practices that cover establishing and maintaining the workflow description.

2. Organize the work activities into roles and assignments as needed to satisfy a work unit's requirements and to complete the work requests.

Refer to the Work Unit Requirements Management process area for practices that cover establishing and maintaining the work unit's requirements.

3. Evaluate the competency and capacity of individuals and workgroups to perform the various work activities.

4. Assign responsibility for the work activities to individuals and workgroups according to their competencies and availability.

Refer to the Work Unit Performance process area for practices that cover the work activities performed by individuals and workgroups within the work unit.

5. Review the assigned work activities with the responsible individuals and work groups to ensure they understand and can perform the assignments.
6. Establish commitments for performing the work activities with the responsible individuals and workgroups.
7. Incorporate assigned work activities into the performance goals of the individuals or workgroup, as appropriate.
8. Document and archive the results and other relevant records of the assignment of work.
9. Revise the work assignments as needed.

SP 5 Monitor Workflow

The overall workflow of a work unit is monitored against the defined workflow description.

This practice ensures that the individual work activities, in aggregate, achieve the overall results expected of a work unit.

Subpractices

1. Monitor the critical inputs and dependencies for the work activities to determine whether they are timely and satisfy the needs of the work activities.
2. Monitor the critical outputs of the work activities to determine whether they are timely and satisfy the needs of the work activities that use them.
3. Identify problems with the critical inputs and critical outputs.
4. Evaluate the actual or potential impact of the input and output issues.

SP 6 Monitor and Adjust Work Assignments

The work assigned to individuals and workgroups in a work unit is monitored on a regular basis, and adjustments are made as needed.

This practice ensures that the day-to-day work performance and results are understood and adjustments are made to keep the work unit's work on track and to ensure that the staff and other resources are used effectively and efficiently.

Refer to the Work Unit Planning and Commitment process area for practices that cover establishing mechanisms to monitor the work.

Subpractices

1. Obtain and verify the work status, measures, and other inputs needed to monitor the work assigned to the individuals and workgroups.

Refer to the Work Unit Performance process area for practices that cover providing the status and measures used to monitor the work.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

2. Identify any workload imbalance and other issues in how the work is being performed and in the work results.
3. Determine and make adjustments in the work assignments, resources, and other factors to address any workload imbalance and other issues.

Refer to the Work Unit Performance process area for practices that cover the incorporation of work assignments by the individuals and work groups.

SP 7 Analyze Measures

Measures defined in the plans for a work unit are collected, analyzed, and used in managing the work.

This practice ensures that objective, quantitative information is used to guide management decisions.

Subpractices

1. Collect the base measures as specified in the plans.

Refer to the Work Unit Planning and Commitment process area for practices that cover the definition, collection, analysis, storage, and reporting of measures.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

2. Derive the measures needed for analysis as specified in the plans.
3. Review the measures to ensure data integrity.

The measures should be reviewed to ensure their completeness, integrity, accuracy, and validity. The measures should be reviewed for missing data, out-of-bounds values, and unusual patterns and correlation across measures.

4. Analyze the measures to obtain the desired information as specified in the plans.
5. Review the measures and analysis results with relevant stakeholders, and obtain their agreement on the results and interpretations.
6. Store the measures and analysis results and make available, with appropriate restrictions, to relevant stakeholders.
7. Report the measures and analysis results as specified in the plans.

SP 8 Review Performance and Status

The performance and the status of the activities, work products, and services for a work unit are reviewed against its requirements, plans, and commitments on a regular basis.

This practice ensures that the manager of a work unit understands whether any problems exist relative to satisfying the work unit's requirements, plans, and commitments.

Subpractices

1. Obtain and verify the work status, measures, and other inputs needed to analyze the work unit's performance and the status.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

2. Review, on a regular basis, the actual status, performance, and results against the requirements, plans, and commitments.

Examples of sources of information for reviewing a work unit's status, performance, and results include:

- work unit's measures
- status information from the individuals and workgroups within the work unit
- information from managers and staff in other units
- information from customers and suppliers
- information informally gathered

3. Identify requirements that are not being satisfied or that are at risk of not being satisfied.
4. Identify plans that are not being satisfied or that are at risk of not being satisfied.
5. Review the work unit's commitments made to other work units, workgroups, and external organizations with them and identify any that are not being satisfied or that are at risk of not being satisfied.
6. Review the commitments to this work unit made by other work units, workgroups, and external organizations with them and identify any that are not being satisfied or that are at risk of not being satisfied.
7. Document and archive the results and other relevant records of the status review activities.

SP 9 Manage Data and Information

The critical data and information for a work unit are collected, stored, managed, and disposed according to the data management plans.

This practice ensures that the work unit and others have appropriate access to the work unit's critical data and information.

Refer to the Work Unit Planning and Commitment process area for practices that the plans for data management.

SP 10 Manage Risks

The identified risks for a work unit are managed.

This practice ensures that appropriate actions are taken for the work unit's risks to prevent a risk from becoming a problem or minimize the effects of the problem if it does occur.

Refer to the Guidelines for Risk Management in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Obtain and verify the inputs needed to monitor the work unit's risks.
2. Review the identified risks on a periodic basis.

Refer to the Work Unit Planning and Commitment process area for practices that cover identification and analysis of risks.

3. Review the work unit's requirements, plans, commitments, and activities to identify new risks, risks information that should be revised, and risks that can be removed from the actively-managed list.
4. Identify each risk that is likely to become a serious problem.
5. Identify preventive or mitigation actions to address each risk that is likely to become a serious problem.
6. Perform the identified preventive or mitigation actions, as appropriate, and track to closure.
7. Revise the documentation of the risks including description, status, evaluation, and priority, as needed.

Examples of when the documented risks may be revised include:

- when new risks are identified
- when risks become problems
- when risks are retired
- when the work unit circumstances change significantly

8. Review the revised risk documentation with relevant stakeholders, and obtain their agreement.
9. Document and archive the results and other relevant records of the risk monitoring activities.

SP 11 Address Significant Deviations

Significant deviations from a work unit's requirements, estimates, plans, and commitments are identified and addressed.

This practice ensures that significant deviations are recognized and addressed so that a work unit's requirements, estimates, plans, and commitments can be adjusted to reflect a reasonable plan forward.

A deviation is significant if, left unresolved, it would be likely to impact the work unit's ability to meet its requirements, plans, or commitments.

Subpractices

1. Analyze identified issues and risks to determine the actual or likely deviations from the work unit's requirements, estimates, plans, and commitments.

Refer to the Guidelines for Risk Management in Annex A for guidance that may be useful in implementing this practice.

2. Perform corrective actions to fix any existing critical problems caused by the deviation, where appropriate.

Examples of corrective actions to fix any immediate problems include:

- recalling and replacing defective work products
- undoing a transaction
- performing rework on defective work products or services
- providing work-around procedures to circumvent a problem

3. Document issues and risks which result or are likely to result in significant deviations and designate them for analysis and corrective action.
4. Determine and document corrective actions needed to address the identified deviations from the work unit's requirements, estimates, plans, and commitments.

Examples of corrective actions to address the identified deviations from the work unit's requirements, estimates, plans, and commitments include:

- renegotiating changes to the requirements
- revising estimates and plans
- renegotiating commitments
- arranging for actions that are beyond the work unit's responsibility and authority
- revising the work unit's risks
- taking no action

5. Review the planned corrective actions with relevant stakeholders, and obtain their agreement.
6. Perform the agreed-to corrective actions and track to completion.

Refer to the Work Unit Planning and Commitment process area for practices that cover estimating, planning, negotiating commitments, and identifying risks.

Refer to the Work Unit Requirements Management process area for practices that cover changing requirements.

7. Document and archive the results and other relevant records of addressing the significant deviations.

SP 12 Address Deviation Causes

The likely causes of significant deviations from a work unit's requirements, estimates, plans, and commitments and other significant work unit issues are identified and addressed.

This practice ensures that, where possible, significant deviations from a work unit's requirements, estimates, plans, and commitments of the type that occurred in the past do not recur.

Subpractices

1. Review significant deviations and other issues to determine which of these are likely to recur.
2. Analyze the significant deviations and other issues to determine their likely causes.
3. Document the likely causes of each identified significant deviation and issue so that corrective actions can be performed.

4. Determine and document preventive actions that are expected to prevent the future occurrence of identified problems and similar problems.
5. Review the proposed preventive actions with relevant stakeholders, and obtain their agreement.
6. Perform the agreed-to preventive actions and track to completion.
7. Document as risks any significant recurring problems that are not addressed with the preventive actions.

Refer to the Work Unit Planning and Commitment process area for practices that cover identifying and documenting risks.

Refer to the Guidelines for Risk Management in Annex A for guidance that may be useful in implementing this practice.

8. Document and archive the results and other relevant records of the analysis and preventive actions performed to address likely causes of problems.

SP 13 Communicate Progress

The work unit's status, accomplishments, issues, and risks for a work unit are reviewed with relevant stakeholders as needed.

This practice ensures that relevant stakeholders by the work unit's activities have a common, correct, and current understanding of the progress, accomplishments, issues, and risks so there are no surprises.

Refer to the Guidelines for Risk Management in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Obtain and verify the inputs needed to present the progress, accomplishments, issues, and risks with relevant stakeholders.
2. Conduct reviews at points in time that are meaningful to the work unit and the reviewers.

Examples of meaningful times to conduct reviews include at completion of a significant piece of work:

- at key milestones
- on a regular schedule (for example, monthly)
- when a reviewer has a specific need for the information

3. Identify and document action items and track them to closure.
4. Document issues and risks identified in the review.

SP 14 Revise Plans

The plans for a work unit are revised to reflect status, risk changes, commitment changes, and changes in the planning parameters.

This practice ensures that the work unit's plans reflect an accurate description of the current situation and what is planned for the future.

Refer to the Guidelines for Risk Management in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Obtain and verify the inputs needed to revise the plans.
2. Review the plans.
3. Adjust the planning parameters and estimates.

Refer to the Work Unit Planning and Commitment process area for practices that cover establishing and maintaining work unit plans.

4. Revise the plans to reflect accomplishments, progress, changes, corrective actions, and other changes as appropriate.
5. Document and archive the results and other relevant records of the plan revision activities.

SP 15 Apply Lessons Learned

Lessons learned in performing and managing the work for a work unit are recorded and used in establishing future requirements, estimates, plans, and commitments.

This practice ensures that the work unit learns from its experiences, and these lessons are applied.

Subpractices

1. Review the work unit's requirements, estimates, plans, commitments, and work activities periodically to identify lessons learned.
2. Review the analyses performed on significant deviations and actions performed to identify lessons learned.
3. Document and store the derived lessons learned.
4. Review the documented lessons learned with those who are relevant stakeholders and others who are knowledgeable.
5. Incorporate the documented lessons learned into the work unit's plans, processes, and procedures.
6. Make lessons learned available to the work unit staff and managers.

14.1.6 Work Unit Performance (WUP)

Maturity Level 2

14.1.6.1 Purpose

Work Unit Performance establishes work agreements for the individuals and workgroups with the work unit manager and performs the work to produce the agreed-to results.

14.1.6.2 Introductory Notes

The goals and practices of this process area are expressed in context of the individuals and workgroups within a single work unit, and are expressed from the perspective of a workgroup and the individuals within a workgroup. The process area applies to each work unit and project in the organization.

For work units and projects that are composed of other work units, the process area applies to each work unit at each level within the hierarchy.

The process area is primarily the responsibility of individuals and workgroups within a work unit.

The following special terms are used in the goals and practices of this process area:

- The term “work unit” is used to refer to an organizational unit that is directly responsible for agreeing to requirements, planning, managing, and performing product and service work or internal business functions.
- The term “workgroup” is used to refer to a collection of people who work closely together on tasks that are highly interdependent in order to achieve shared goals. A workgroup may be a single person or several people and a person may be a member of multiple workgroups.

Work Unit Performance deals with the work activities of the individuals and workgroups within a work unit and involves

- understanding and agreeing to perform their work assignments
- coordinating their work with other individuals and workgroups within the work unit
- preparing for and performing their work activities so that the work is accomplished efficiently, effectively, and in accordance with their work agreements and work procedures
- verifying the results of the work steps before they are submitted to subsequent work steps
- recording the results of the work steps and reporting status to the work unit manager and other relevant stakeholders
- measuring and improving their work activities

This process area deals with the practices performed by the individuals and workgroups within the work unit, whereas the Work Unit Monitoring and Control process area deal with the practices of managing the work performed by the individuals and workgroups.

At maturity level 3, this process area evolves into the defined processes for developing, preparing, deploying, operating and supporting the products and services of the domain. (Each domain PMM will include several process areas at maturity level 3 that addresses the practices for performing the work of the domain.)

The reason for this process area at maturity level 2 is that basic discipline in performing the actual work involved in developing, preparing, deploying, operating and supporting the work unit’s products and services is needed to be able to plan and manage the work unit and perform the work in a repeatable manner.

14.1.6.3 Specific and Institutionalization Goals

SG 1 Work Assignments Are Accepted

Individuals and workgroups within a work unit understand their work assignments and are provided with the resources needed to perform the work.

SG 2 Work Is Performed and Delivered

The work performed and work products and services delivered by the individuals and workgroups within a work unit satisfy their plans and commitments.

SG 3 Work Is Measured and Improved

Individuals and workgroups within a work unit measure and improve the performance of their work activities.

InG Practices Are Institutionalized

The practices for Work Unit Performance are institutionalized.

Institutionalization includes:

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.1.6.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Work Assignments Are Accepted)	SP 1 (Receive and Plan Work Assignments) SP 2 (Establish Work Commitments) SP 3 (Obtain Work Information and Resources) SP 4 (Prepare For Work Assignments)
SG 2 (Work Is Performed and Delivered)	SP 5 (Perform Assigned Work) SP 6 (Maintain Authenticity and Integrity of Data and Information) SP 7 (Provide Work Status Reports)
SG 3 (Work Is Measured and Improved)	SP 8 (Measure Work Performance) SP 9 (Improve Work Performance)
InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)

The five institutionalization practices, including subpractices and supplementary information, are contained in Part III, Chapter 13.

14.1.6.5 Specific Practices

SP 1 Receive and Plan Work Assignments

Work assignments are received by the individuals and workgroups and are analyzed, prioritized, and scheduled appropriately into their work activities.

This practice ensures that responsibility for the work unit's work is accepted by the individuals and workgroups as assigned by the manager.

Subpractices

1. Receive and acknowledge the work assignments from the work unit manager.

Refer to the Work Unit Monitoring and Control process area for practices that cover work assignments.

2. Analyze work assignments to understand the needed inputs, the work to be performed, the overall workflow, and the required outputs.

Refer to the Work Unit Planning and Commitment process area for practices that cover establishing and maintaining the workflow description.

3. Evaluate the capability and capacity of the individuals and workgroups against what is needed for the work assignments.
4. Identify any issues with the understanding of the work assignment and with the capability and capacity to perform the work.
5. Resolve any understanding, capability, or capacity issues with the work unit manager.
6. Determine if the work assignment, as defined, can be performed by the individuals and workgroups, and resolve the assignment with the work unit manager.
7. Plan the agreed-to work assignments into the individual's and workgroup's ongoing work activities as appropriate.

SP 2 Establish Work Commitments

The dependencies and interactions among the individuals and workgroups needed to perform the work assignments are defined, and commitments are agreed to by relevant stakeholders.

This practice ensures that individuals and workgroups establish the coordination necessary to complete their assigned work as agreed.

This practice addresses the dependencies and commitments that each work effort (individual or workgroup) has with other individuals and workgroup, either internal to the work unit or in other work units. In some cases, the individual and workgroup dependencies will be addressed at the work unit level. In these cases the individuals and workgroups need to ensure that these work unit commitments are appropriate for performing the work. Refer to the Work Unit Planning and Commitment process area for practices that cover dependencies made at the work unit level.

Subpractices

1. Analyze the assigned work activities to identify dependencies these activities have with the work activities assigned to other individuals and workgroups.
2. Identify and analyze the interactions needed with other individuals and workgroups to identify dependencies with their work activities.
3. Negotiate and document commitments with affected individuals and workgroups to ensure the dependencies are addressed.

Documentation of commitments will vary in formality depending on the criticality of the dependency and the affected individuals and workgroups.

4. Establish communication mechanisms to coordinate commitments with affected individuals and workgroups.
5. Review the work dependencies and commitments with affected individuals and workgroups periodically or as needed to identify issues.
6. Perform corrective actions as needed to ensure that commitments are in place and are satisfied, or are likely to be satisfied as planned.

SP 3 Obtain Work Information and Resources

The information and resources that individuals and workgroups within a work unit need to perform their work activities are obtained.

This practice ensures that individuals and workgroups are fully enabled to perform their assigned work activities and that they avoid delays caused by insufficient resources or incomplete information.

Examples of information or resources may include:

- computer hardware, software, or applications
- communication devices and networks
- status of transactions, work requests, or work activities
- forms
- files or other historical records
- reference data used in performing the work steps (for example, daily interest rates or exchange rates)
- materials used in performing the work steps (for example, money or other financial instruments)
- appropriate disposal devices (for example, secure receptacles, shredders, etc.)
- necessary workspace, furniture, or work area facilities
- appropriate aids for physically-challenged workers

Subpractices

1. Identify the information and resources needed to perform the work steps for the assigned work.
2. Obtain and allocate the needed resources to the work steps and the people performing the work steps.
3. Obtain appropriate access to the information needed to perform the work steps.

Access to information may have to be limited because of confidentiality and security concerns. Appropriate access rights and controls need to be in place to ensure the information is appropriately available and protected.

4. Identify issues with the availability of the information and resources needed to perform the work steps.
5. Perform corrective actions to resolve issues with the availability of the information and resources needed to perform the work steps.

SP 4 Prepare For Work Assignments

Individuals and work groups within a work unit prepare for their work assignments as defined in the relevant process descriptions and work procedures.

This practice helps reduce errors and rework by ensuring that individuals and workgroups are fully prepared when initiating their work assignments.

Subpractices

1. Review the work steps constituting the work assignments and the process descriptions or work procedures that are to be followed and identify any issues.

Examples of process or work procedure issues that may be encountered in preparing for a work assignment include:

- inadequate descriptions and explanations of changes to assignments, work steps, service protocols, or business rules
- inadequate instructions regarding workarounds or changes to information or communication systems
- lack of training for significant changes to the process descriptions or work procedures

2. Review the inputs for the work assignment to ensure that the inputs are available, complete, and correct, and identify any issues.
3. Review the resources provided and planned for the work assignment to ensure that they are adequate and available when needed, and identify any issues.
4. Perform corrective actions as needed to address any identified preparation issues.
5. Review any revised process descriptions or work procedures, provided and planned resources, and inputs to ensure they are sufficient to support performance of the work step.
6. Identify and document recurring problems with the process descriptions or work procedures, provided and planned resources, and inputs to work steps for local action, where possible, or communicate them to the work unit manager for action.

Refer to the Work Unit Monitoring and Control process area for practices that cover addressing the causes of deviations at the work unit level.

SP 5 Perform Assigned Work

The assigned work is performed by the individuals and workgroups within a work unit in accordance with work requirements, work procedures, and work agreements.

This practice ensures that work steps for the work assignments are performed in a consistent and correct manner and that relevant stakeholders can expect consistent and correct results.

Subpractices

1. Review identified work dependencies and work agreements to ensure they will be satisfied as needed.
2. Communicate and coordinate to ensure that interdependent work activities are performed in a way that satisfies the work requirements, work procedures, and work agreements.
3. Review the actions that will be taken in performing each work step to ensure they comply with the defined workflow, work agreements and work procedures before initiating the work step.
4. Review the inputs needed for each work to ensure they are available and in a state sufficient to support performance of the work step.
5. Identify any issues regarding the ability to perform the assigned work.
6. Perform corrective action, as appropriate, to address the issues regarding the ability to perform the assigned work.

Some corrective actions may require the approval of the work unit manager.

Examples of corrective actions that can be taken when work activities cannot be performed according to work agreements or work procedures include:

- assistance in identifying actions that comply with work agreements or work procedures
- resolution of conflicts between work agreements and work procedures
- approved workarounds until compliant work steps can be established
- waivers for varying from work procedures in ways that ensure work requirements will be satisfied
- elaborations or changes to work procedures

Examples of corrective actions that can be taken when interdependent work activities cannot be performed according to work procedures include:

- implementing compliant actions for performing work steps that incorporate the handling of work dependencies
- implementing approved workarounds until compliant actions can be established
- obtaining waivers for varying from work procedures in ways that ensure work requirements will be satisfied
- elaborating or changing work procedures that incorporate the handling of work dependencies

7. Perform the work steps for the work assignment in accordance with the work agreements and work procedures.
8. Identify exceptional conditions encountered in performing the work steps.
9. Define, obtain approval, and perform the actions that are appropriate for handling the identified exceptional conditions.
10. Store and provide to the relevant stakeholders the outputs of the work step as specified in the work requirements, work procedures, and work agreements.

SP 6 Maintain Authenticity and Integrity of Data and Information

The authenticity and integrity of the data and information that are input to, created by, and output from the work steps performed by the individuals and workgroups within a work unit are maintained.

This practice ensures that the users and recipients of the data and information associated with the work can be assured of its authenticity and integrity as the work is performed and the data and information are manipulated.

Authenticity means that the data and information come from an authorized source and are authentic, trustworthy, or genuine.
Integrity means that the data and information are complete, correct, and consistent with other data and information.

Examples of how data and information integrity can be lost include:

- required fields are not entered
- incorrect information (for example, a date) is entered
- a digit in a numeric field is dropped, added, or out of order
- two related pieces of time-dependent data are entered for different times
- data are entered in the wrong units of measure
- data are entered correctly without verifying the inputs
- data are changed when they should not be changed

Subpractices

1. Identify the critical data and information whose authenticity and integrity must be protected.
2. Define and document the rules and procedure for obtaining, accessing, manipulating, creating, storing, distributing, and revising the critical data and information in a manner that maintains their authenticity and integrity.

Examples of where data and information authenticity and integrity rules are specified include:

- laws and regulations
- requirements covering the work
- organizational policies
- business rules
- industry standards
- internal procedures
- service level agreements

3. Implement automated support, as appropriate, to enforce the rules and procedures for handling the critical data and information.
4. Handle the critical data and information according to established rules and procedures.
5. Trace the change activities for the critical data and information to the individual work steps.
6. Verify the work steps performed and work products produced for completeness and accuracy before submitting the results to subsequent work steps, and identify problems.
7. Conduct regular objective reviews of the critical data and information to ensure their authenticity and integrity, and identify problems.

8. Perform corrective actions to address identified problems and track to closure.
9. Identify and document recurring problems encountered in maintaining the authenticity and integrity of the data and information for local action, where possible, or communicate them to the work unit manager for action.

Refer to the Work Unit Monitoring and Control process area for practices that cover addressing the causes of deviations at the work unit level.

SP 7 Provide Work Status Reports

The individuals and workgroups performing the work provide status of the work to the work unit manager and other relevant stakeholders on a regular basis.

This practice ensures that the work unit manager and other relevant stakeholders have continuing awareness of the status of the assigned work so that the work can be managed.

Subpractices

1. Determine the need for work status information and frequency of reporting for the work unit manager and other relevant stakeholders.
2. Collect and provide the agreed status information to the work unit manager and other relevant stakeholders.

SP 8 Measure Work Performance

Measures of the work activities performed by the individuals and work groups within a work unit and the work products produced are collected and analyzed to understand the performance and results.

This practice ensures that the individuals and work groups within a work unit develop a quantitative understanding of their work that they can use to manage their work and identify and evaluate local improvements.

These work activity and work product measures are defined for the local work unit processes and are for the use of individuals and workgroups within the work unit for analyzing, understanding, and improving their local work activities. Since using work measures may be new for many work units, only a vital few measures should be defined, collected, and analyzed. To foster an appreciation for the value of work measurement, these vital few measures should be selected to provide immediate insight and benefit to the individuals and workgroups within a work unit. The analysis of work measures need not use sophisticated statistical methods, but should be sufficient to help individuals and workgroups understand the status, quality, and efficiency of their work activities.

Subpractices

1. Identify measures needed by the individuals and workgroups to understand and improve the performance and results of the work performed.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

2. Define the plan for collecting, storing, and analyzing each identified measure.
3. Collect the identified measures and store them appropriately.
4. Derive the measures needed to analyze the work performed.

5. Periodically and as needed, analyze the identified measures of work activities to understand the quantitative aspects of performing the work.
6. Periodically and as needed, analyze measures of work products to understand the quality and other attributes of these work products.
7. Report the measures, as appropriate to the work unit manager.

SP 9 Improve Work Performance

Improvements are identified and incorporated into the way individuals and workgroups within a work unit perform their work.

This practice initiates simple opportunistic improvements to work activities or work products within the work unit and provides a foundation for systematic improvement at higher maturity levels.

This specific practice is performed by the individuals and workgroups performing the work. The focus of this practice should be on easily identified and easily implemented improvements (that is, opportunistic improvements) that could provide immediate benefits to the efficiency of performing work steps or to the quality of the work products involved. These improvements can provide early benefits to work unit performance and lend credibility to the overall improvement program. The analysis of improvement opportunities or their results is not intended to require sophisticated methods or statistics, but rather to provide common sense indications of potential or actual benefits to the work unit. To the extent that the individuals and workgroups believe their improvements could benefit others, they are encouraged to share their results.

Subpractices

1. Periodically or as needed, analyze status information, measures, and other inputs to identify opportunities for the improvement.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

2. Review proposed improvements to work activities to ensure they comply with work procedures, commitments for coordinating work dependencies, and work unit requirements.
3. Implement selected improvements to work activities.
4. Evaluate the results of improvements to work activities using status information, work measures, and other inputs.
5. Perform corrective actions when improvements to work activities fail to achieve their intended results.
6. Record the results of improvements to work activities and share them with other individuals, workgroups, or work units that might benefit from these improvements.

14.1.7 Work Unit Configuration Management (WUCM) Maturity Level 2

14.1.7.1 Purpose

Work Unit Configuration Management identifies, manages, and controls the content and changes to a work unit's configuration management (CM) product baselines.

14.1.7.2 Introductory Notes

The goals and practices of this process area are expressed in context of a single work unit or a single project responsible for a distinct product release. The process area applies to each work unit and project in the organization, where configuration management is needed. This process area also applies to workgroups (including support groups such as process engineering group, training group, configuration management group, and process and product assurance group) where configuration management is needed. The work unit, project, or workgroup may be concerned with one or a set of related CM product baselines. In some cases a small number of closely-related work units will have responsibility for a single product release, and this process area would apply to the set of work units.

The goals and practices are written in context of a single work unit and should be interpreted for other situations.

This process area is primarily the responsibility of the work unit manager, often assisted by staff skilled in the configuration management discipline.

The following special terms are used in the goals and practices of this process area:

- The term “work unit” is used to refer to an organizational unit that is directly responsible for agreeing to requirements, planning, managing, and performing product and service work or internal business functions.
- The term “project” is used to refer to a temporary endeavor undertaken to create a unique product or service. A project may be composed of projects (that is, sub-projects). A project is a special instance of a work unit. A project may be composed of multiple sub-projects and work units.
- The term “CM product baseline” is used to refer to a set of related work products that are formally controlled together to ensure consistency and integrity of product releases. CM product baselines provide a mechanism for coordinating the work of teams within a work unit or project and for managing changes that the work unit makes to the critical work products.
- The term “configuration item” is used to refer to any work product designated as a component of a work unit’s CM product baseline. Configuration items are placed under configuration management and are formally controlled.
- The term “service pack” is used to refer to an update release for a product in which only the changed components are released rather than the entire product.

Work Unit Configuration Management involves:

- maintaining the work unit’s CM repositories
- identifying the work unit’s CM product baselines that will be controlled and the configuration items that make up these CM product baselines
- controlling changes to the work unit’s configuration items and CM product baselines
- building the work unit’s CM product baselines from the configuration items
- delivering the work unit’s CM product baselines for use
- maintaining the integrity of the work unit’s CM product baselines, their configuration items, and the associated records
- providing reports to relevant stakeholders on the work unit’s configuration management activities, and on the status and content of the work unit’s configuration items and CM product baselines

This process area covers the practices for performing configuration management for a work unit. The specific work products that might be placed under configuration management are identified in the process areas that address the development and maintenance of those work products.

The Work Unit Configuration Management process area evolves to the Organizational Configuration Management process area at maturity level 3. The key differences and similarities between Work Unit Configuration Management and Organizational Configuration Management are summarized in the section on “Work Unit Configuration Management versus Organizational Configuration Management” in Annex D-2.

The reason for this process area at maturity level 2 is that control of the content of a work unit’s configuration items (critical work products) and CM product baselines are essential to maintaining a stable work environment within the work units.

14.1.7.3 Specific and Institutionalization Goals

SG 1 Configurations Are Identified

A work unit’s CM product baselines and their configuration items are identified.

SG 2 Contents of Configurations Are Controlled

The content of a work unit’s CM product baselines and their configuration items are managed and controlled.

SG 3 Configuration Management Information Is Reported

Information that describes the content and status of a work unit’s CM product baselines and their configuration items is maintained and reported to relevant stakeholders.

InG Practices Are Institutionalized

The practices for Work Unit Configuration Management are institutionalized.

Institutionalization includes:

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.1.7.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Configurations Are Identified)	SP 1 (Maintain Configuration Management Repositories) SP 2 (Identify Configuration Items) SP 3 (Specify CM Product Baselines)
SG 2 (Contents of Configurations Are Controlled)	SP 4 (Manage Changes to Configurations) SP 5 (Build CM Product Baselines) SP 6 (Deliver CM Product Baselines)
SG 3 (Configuration Management Information Is Reported)	SP 7 (Maintain Configuration Management Records) SP 8 (Audit CM Product Baselines) SP 9 (Provide Configuration Management Reports)
InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)

The five institutionalization practices, including subpractices and supplementary information, are contained in Part III, Section 6.

14.1.7.5 Specific Practices

SP 1 Maintain Configuration Management Repositories

Configuration management repositories for a work unit are established and maintained.

This practice ensures that the repositories needed to store and manage the work unit's configuration items, CM product baselines, and associated data and records are adequate and appropriate.

Subpractices

1. Select and install configuration management repositories for storing the work unit's configuration items, CM product baselines, and associated records.

Different configuration management repositories may be needed for different types of configuration items such as software, hardware, documents, and CM records.

2. Select and install configuration management repositories for documenting, storing, and tracking problem reports and change requests against the work unit's configuration items and CM product baselines.
3. Establish the mechanisms and procedures to store, retrieve, and update the contents of the work unit's configuration management repositories.

4. Establish the mechanisms and procedures to appropriately control access to the contents of the work unit's configuration management repositories.
5. Establish the mechanisms and procedures to appropriately move the work unit's configuration items and CM product baselines between configuration management control levels.

Examples of configuration management control levels include:

- development control — configuration items that are being developed, prepared, or revised and that are under the control of the individuals performing the development, preparation, or revision
- internal master control — configuration items and CM product baselines that are under the work unit's configuration management control, but have not been delivered for use outside the work unit
- release control — configuration items and CM product baselines that are under the work unit's configuration management control and have been delivered for use outside the work unit
- archive control — configuration items and CM product baselines that were previously in use but are not now in use

6. Revise the work unit's configuration management repositories as necessary.

SP 2 Identify Configuration Items

A list of configuration items that will be controlled by a work unit is established and maintained.

This practice ensures that there is a shared understanding among relevant stakeholders as to which of the work unit's work products are maintained under configuration management, specific characteristics of these work products, and when each of these work products will be placed under configuration management.

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Identify the configuration items for the work unit based on documented criteria.

Examples of criteria for selecting configuration items include:

- it is one of a collection of work products which are highly interdependent
- it is a critical single point of failure for a work effort, system, or operation
- multiple versions or variants will exist
- more than one person or workgroup will use it for their development or other work
- it will be the basis for work products or work efforts in multiple units or organizations
- it will be reused in the future
- it will impact a work effort, system, or operation if a fault or failure is experienced
- it is a work product that when changed may affect the capacity and availability of an offering
- it is a work product that should be protected against theft or loss
- it is a work product for which information such as the serial number, purchase date, and supplier needs to be recorded and available

Individual work products created or modified as part of the transactions or operations of a product and service offering (for example, forms completed as part of the transactions, daily transaction logs, and individual letters to customers) are typically not designated as configuration items and are not placed under CM — however there are exceptions.

Examples of configuration items include:

- product or service requirements specifications
- system architecture descriptions
- product or service design documents
- hardware components
- hardware maintenance contracts
- developed software components
- commercial software packages
- software licenses
- system operating manuals
- process descriptions for performing work
- training materials
- forms and templates used in performing work
- critical records (that satisfy the above criteria for configuration items) resulting from performing work (for example, records from acceptance testing of a system)

2. Assign unique identifiers to each configuration items.
3. Describe the important characteristics of each configuration items.

Examples of important characteristics of configuration items include:

- owner responsible for the configuration item
- type of work product (for example, hardware, software, or document)
- CM product baselines in which it is used
- file type (if work product is stored electronically)
- creation tools (for example, specific programming language or word processor)
- location where the configuration item is stored
- access rights and restrictions
- related configuration items

4. Define when each configuration items will be placed under configuration management.
5. Review the list of configuration items with relevant stakeholders, and obtain their agreement.
6. Place the list of configuration items under version control.

Version control ensures that a work product is changed in a controlled manner and that the version of the work product in use at a given time (past or present) is known. If more control is needed, the work product can be placed under configuration management.

7. Revise the list of configuration items as necessary.

SP 3 Specify CM Product Baselines

Specifications of the CM product baselines that will be created by a work unit for use internal to the organization and for delivery to customers are established and maintained.

This practice ensures that there is a shared understanding among relevant stakeholders as to when the work unit's CM product baselines will be created, the configuration items that compose each CM product baseline, and how the CM product baselines will be used.

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

The specification of a CM product baseline is itself a configuration item and is managed as such.

Subpractices

1. Identify the work unit's CM product baselines that are essential for performing and managing the work efforts in the organization and that will be delivered to customers.

Examples of CM product baselines include:

- the hardware configuration that a desktop workstation installer needs to be controlled (for example, a standard-configured PC system unit, monitor, keyboard, mouse, and printer)
- the software configuration for a network server that needs to be controlled for acceptance testing and installation (for example, the requirements specification, design document, and software modules)
- the materials an invoicing person needs to be controlled to perform the work (for example, training materials, process descriptions, and related forms for preparing invoices)

2. Specify the configuration items that comprise each CM product baseline.
3. Assign unique identifiers to each CM product baseline.
4. Specify the build and release procedures for each CM product baseline.
5. Specify the intended users and uses of each CM product baseline.
6. Describe the important characteristics of each CM product baseline and each configuration item.

Examples of important characteristics of CM product baselines include:

- owner responsible for the CM product baseline
- component configuration items
- locations where the CM product baseline is stored
- access restrictions
- related CM product baselines

7. Review the specifications of the CM product baselines with relevant stakeholders, and obtain their agreement.
8. Place the specifications of the CM product baselines under configuration management.
9. Revise the specifications of the CM product baselines as necessary.

SP 4 Manage Changes to Configurations

Changes to a work unit's configuration items are managed.

This practice ensures that the work unit's configuration items are updated in a controlled manner so that their contents remain in a known authorized state.

Subpractices

1. Store the work unit's configuration items and the associated records in the configuration management repositories.
2. Record the problem reports and change requests that are written against the work unit's configuration items.
3. Identify changes to be made to the configuration items.
4. Obtain appropriate authorization for each revision to configuration items before the changes are made.

Examples of changes to configuration items include:

- correcting defects
- adding or removing functionality or features
- changing access rights and restrictions

5. Control the check in and check out of configuration items in a manner that maintains the correctness and integrity of the configuration management repositories and their contents.
6. Track the status of problem reports and change requests to closure.
7. Review and approve changes made to the configuration items prior to incorporating the configuration items in the configuration management repositories.

Examples of reviews that should be performed include:

- ensure that the authorized changes were made and no unauthorized changes were made
- ensure all the controlled work products are delivered and are the correct versions
- ensure the adequacy of the development and verification activities performed in making changes
- ensure delivery paperwork is completed and includes the appropriate approvals
- ensure problem reports and change requests are appropriately updated

8. Report the results of change activities for the configuration items to relevant stakeholders.

SP 5 Build CM Product Baselines

A work unit's CM product baselines or controlled service packs, as appropriate, are created for internal use and for delivery to customers.

This practice ensures that the work unit's CM product baselines or controlled service packs, as appropriate, contain the correct versions of the correct configuration items and that they are constructed as required.

In some cases, a change to a CM product baseline is most effectively handled by creating and releasing a subset of the CM product baseline (for example, a single configuration item). This is particularly useful when there is a need to release a small critical change to a large CM product baseline. These small releases are often referred to as "service packs" or "delta releases."

Subpractices

1. Obtained appropriate authorization before building a CM product baseline or service pack.

A release may be of three basic types:

- release of a full system or production environment
- release of one or more CM product baselines
- release of one or more service packs

2. Obtain and verify the inputs needed to create each CM product baseline.
3. Build each CM product baseline or service pack from the designated configuration items according to documented and approved build procedures.

4. Verify each CM product baseline or service pack build.

Examples of verifications that should be performed on a CM product baseline include:

- verifying that all approved changes, and only the approved changes, have been incorporated
- verifying that all configuration items and their correct versions are included
- verifying that the CM product baseline satisfies its requirements
- verifying that no regression in the CM product baseline has occurred
- verifying that the documentation of the CM product baseline matches the content

5. Document each build of a CM product baseline or service pack.
6. Place the documentation of each CM product baseline and service pack under version control.
7. Store each build of a CM product baseline or service pack that will be delivered in a controlled product release repository.

A controlled product release repository may be comprised of multiple physical repositories (for example, repositories for software, for hardware components, and for documentation). The repository contains the single authorized baseline version of a delivery.

8. Report the results of the CM product baseline or service pack build to relevant stakeholders.

SP 6 Deliver CM Product Baselines

A work unit's CM product baselines or controlled service packs, as appropriate, are delivered for their intended use.

This practice ensures that customers and internal users of a work unit's CM product baselines receive the appropriate baselines and updates to them.

Subpractices

1. Identify and document the work unit's CM product baselines and delta releases that will be delivered.

A release may be of three basic types:

- release of a full system or production environment
- release of one or more CM product baselines
- release of one or more delta releases

2. Identify and document the recipients and methods and channels for delivery of the CM product baselines and delta releases.
3. Review the list of CM product baselines and delta releases what will be delivered, the recipients, and the methods and channels for delivery with relevant stakeholders, and obtain their agreement.
4. Deliver the CM product baselines and delta releases.
5. Report the results of the CM product baseline and delta release activities to relevant stakeholders.

SP 7 Maintain Configuration Management Records

Records of a work unit's configuration items and CM product baselines are established and maintained.

This practice ensures that records are maintained and available that accurately describe the work unit's configuration management activities and the version and content of the work unit's configuration items and CM product baselines.

Subpractices

1. Record the configuration management actions so that the content, status, and revision of each of the work unit's configuration items and CM product baselines are known and previous versions can be recovered.
2. Document the differences between successive versions of each configuration items and successive versions of each CM product baselines.
3. Revise the work unit's configuration management records as needed.

SP 8 Audit CM Product Baselines

A work unit's CM product baselines, their component configuration items, and associated records are audited to ensure their integrity, and corrective actions are performed.

This practice ensures that the work unit's configuration management activities and results are complete, correct, and usable for their purposes.

The audits of a work unit's CM product baselines are typically performed internal to the work unit and may be supported by objective assurance reviews.

Subpractices

1. Review the contents of the configuration management repositories for correctness and completeness.
2. Compare the work unit's CM product baselines and their configuration items to ensure that they are correct and consistent with the configuration management records.

These audits ensure that:

- all the authorized changes are complete and correct
- no unauthorized changes are included
- all the intended configuration items, including supporting items like documentation, are included in the CM product baseline and are of the correct versions

3. Review the work unit's configuration management activities for conformance with applicable standards and work procedures.
4. Identify and document problems and issues with the configuration management repositories, the CM product baselines, their configuration items, and the associated records.
5. Define corrective actions for the identified problems and issues, review them with relevant stakeholders, and obtain their agreement.
6. Perform corrective actions and track to closure.
7. Report the results of the CM product baseline audits to relevant stakeholders.

SP 9 Provide Configuration Management Reports

Reports are provided to relevant stakeholders on the work unit's configuration management activities, and on the status and content of the configuration items and CM product baselines.

This practice ensures that relevant stakeholders for the work unit's configuration management activities are kept informed of the relevant configuration management information so they can fulfill the configuration management roles and responsibilities or appropriately use the CM product baselines.

Examples of information typically reported include:

- summaries of configuration management meetings
- summary and status of problem reports and change requests
- revision history and status of configuration items
- summary of CM product baselines
- results of configuration audits

14.1.8 Sourcing Management (SM) Maturity Level 2

14.1.8.1 Purpose

Sourcing Management manages the acquisition of products and services from suppliers external to the organization.

14.1.8.2 Introductory Notes

Products and services covered by this process area are the significant acquisitions that make up the infrastructure and processes that are used in performing a work unit's or project's work, those that are incorporated into the work unit's or project's products, those that are used in providing services, and those needed to coordinate work across work units, projects, and workgroups. Normal office supplies and other small purchases that are used internally and are not components in the organization's products and services are not covered by this process area.

As described below and in Annex B-1, in this process area a project is considered to be a special instance of a work unit, and the term "work unit" will be used to refer to both project and work unit.

The goals and practices of this process area are expressed in context of (1) a single sourcing agreement with a single supplier, and (2) a single work unit or a collection of work units that require the same or similar products and services from the supplier. This process area applies to each sourcing agreement and to each work unit in the organization. The sourcing activities may be performed by individual work units or they may be performed to collectively support multiple work units.

The process area is primarily the responsibility of the sourcing business functions such as contracts or supplier management, with involvement of financial and legal functions. The work units are involved or appropriately represented in establishing and executing the terms and conditions of the contracts or purchase agreements.

The following special terms are used in the goals and practices of this process area:

- The term "work unit" is used to refer to an organizational unit that is directly responsible for agreeing to requirements, planning, managing, and performing product and service work or internal business functions.
- The term "project" is used to refer to a temporary endeavor undertaken to create a unique product or service. A project may be composed of projects (that is, sub-projects). A project is a special instance of a work unit. A project may be composed of multiple sub-projects and work units.

- The term “sourcing” is used to refer to an arrangement in which an organization purchases products or services from an external organization.
- The term “sourcing agreement” is used to refer to a legally binding agreement for products and/or service between an organization and a supplier for products and/or services.
- The term “terms and conditions” is used to refer to specific promises made between parties in a contract, which the law will enforce. It can include identification of parties to the contract, dates of work involved, duties, responsibilities, legal jurisdiction, definitions, and other considerations.
- The term “work order” is used to refer to an agreement between an organization or unit and a supplier that authorizes the supplier to perform a specific, defined assigned piece of work, usually within a defined time. As used in this document, a work order is performed under the terms and conditions of an existing sourcing agreement.
- The term “requirement” is used to refer to a condition or capability that must be met or possessed by a product or service offering to solve a problem or achieve an objective, as specified in contract, standard, specification, or other formally imposed document.

Sourcing Management involves

- identifying products and services to be acquired
- identifying and selecting suppliers
- establishing agreements with suppliers
- managing relationships with suppliers
- monitoring the performance of the suppliers
- verifying and validating the acquired products and services
- addressing problems in the performance and results of the suppliers
- arranging for the maintenance and support of acquired products
- accepting delivery of acquired products and services

There are several approaches that may be used in selecting suppliers for products and services. Some of the more common approaches include the following:

- Open selection, in which proposals are accepted from any potential supplier that satisfies specified qualification criteria (for example, demonstrated capabilities in a certain domain).
- Selection from approved suppliers, in which proposals are solicited only from suppliers that satisfy specified qualification criteria (for example, demonstrated capabilities in a certain domain) and are on the acquiring organization’s list of approved suppliers.
- Sole-source supplier, in which proposals are solicited from a single supplier (because of unique capabilities or other factors).
- Addition to existing sourcing agreement, in which additional work orders are negotiated and added to the work assigned to a supplier.
- Master sourcing, in which the basic terms and conditions of sourcing agreements are established with a small number of suppliers (for example, 1 to 4) who can provide the same products and services. These sourcing agreements initially may not contain any specified work and are kept open whether or not the supplier is performing work for the

organization. As the need arises, one or more of the suppliers covered by master sourcing agreements are asked to bid on identified work orders, and one of the suppliers is selected. The sourcing agreements with the suppliers are revised as work orders are opened and closed, but the overall terms and conditions of the master sourcing agreement do not need to be negotiated with each work order. Suppliers may be added or dropped from master sourcing arrangements.

The products and services may be acquired from different sources, including

- suppliers of off-the-shelf products
- suppliers of specially-built products
- suppliers of services
- suppliers that provide people who are integrated into the organization's work units and workgroups
- other organizations within the business enterprise
- business partners
- organization customers

The reason for this process area at maturity level 2 is that effective sourcing management is needed to effectively manage a work unit since the suppliers contribute directly to the work unit being able to perform its work in a repeatable manner and being able to consistently meet its requirements and commitments.

14.1.8.3 Specific and Institutionalization Goals

SG 1 Sourcing Agreements Are Approved

Commitments with a qualified supplier to provide selected products and services for a work unit are agreed to by relevant stakeholders.

SG 2 Sourcing Agreements Are Satisfied

The sourcing agreements and work agreements between a work unit and supplier are satisfied by the supplier and work unit.

SG 3 Acquired Products and Services Are Incorporated

The acquired products and services are accepted and incorporated into a work unit's infrastructure, processes, products, and services.

InG Practices Are Institutionalized

The practices for Sourcing Management are institutionalized.

Institutionalization includes:

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.1.8.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Sourcing Agreements Are Approved)	SP 1 (Maintain Descriptions of Sourcing Needs) SP 2 (Maintain Sourcing Requirements) SP 3 (Select Off-the-Shelf Products) SP 4 (Select Supplier) SP 5 (Maintain Sourcing Agreement) SP 6 (Select Supplier to Perform Work Order) SP 7 (Maintain Supplier Work Orders)
SG 2 (Sourcing Agreements Are Satisfied)	SP 8 (Resolve Planning Conflicts) SP 9 (Satisfy Acquirer Responsibilities) SP 10 (Monitor Supplier) SP 11 (Manage Supplier Relationship) SP 18 (Close Out Sourcing Agreements)
SG 3 (Acquisitions Are Incorporated)	SP 12 (Evaluate Acquired Products and Services) SP 13 (Prepare to Transition Acquired Products) SP 14 (Transition Acquired Products) SP 15 (Address Significant Deviations) SP 16 (Address Deviation Causes) SP 17 (Close Out Supplier Work Orders)
InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)

The five institutionalization practices, including subpractices and supplementary information, are contained in Part III, Chapter 13..

14.1.8.5 Specific Practices

SP 1 Maintain Descriptions of Sourcing Needs

Descriptions of the sourcing needs of a work unit are established and maintained.

This practice helps identify the most appropriate products and services for a work unit to acquire from external sources.

Subpractices

1. Analyze the work unit's plans and requirements to identify products and services that will be acquired.
2. Document the description of each product and service that will be acquired.
3. Select the acquisition option for each product and services.

Examples acquisition options include:

- purchasing off-the-shelf products from commercial vendors
- contracting for specially designed and constructed products
- contracting for services
- obtaining products or services from another organization within the business enterprise
- obtaining products or services from a business partner
- obtaining products or services from customers of the organization

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

4. Review the descriptions of each product and service to be acquired and the selected acquisition option with relevant stakeholders, and obtain their agreement.
5. Revise the descriptions of each product and service to be acquired and the selected acquisition option as needed.

SP 2 Maintain Sourcing Requirements

The requirements for the products and services to be acquired for a work unit are established and maintained.

This practice establishes the basis for potential suppliers to propose and provide products and services that satisfy the work unit's needs and for evaluating and verifying acquired products and services.

Subpractices

1. Identify and document the requirements for each product and service to be acquired.

An acquisition may be concerned with a single product, a single service, or multiple products and services.

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

2. Define and document the organization's requirements for each product and service to be acquired.

Examples of organization requirements for acquired products and services include:

- organizational policies, standards, and processes that must be adhered to
- involvement in the organization's disaster recover and business continuity plans and activities

3. Define and document the support needed for the life of for each acquired product and service.
4. Identify potential suppliers for each product and service and the selection approach.

Refer to the Introductory Notes of this process area for examples of supplier selection approaches.

5. Review the requirements for each product and service and the list of potential suppliers with relevant stakeholders, and obtain their agreement.
6. Place the requirements for each product and service under configuration management.

Refer to the Work Unit Configuration Management process area for practices that cover change management.

7. Revise the requirements for each product and service as necessary.

SP 3 Select Off-the-Shelf Products

Off-the-shelf products are selected, as appropriate, that satisfy a work unit's sourcing needs and other established criteria.

This practice ensures that off-the-shelf products are used where it is advantageous and where these off-the-shelf products fit the needs of the work unit.

Subpractices

1. Develop criteria for evaluating off-the-shelf products.
2. Identify candidate off-the-shelf products to be evaluated.
3. Evaluate candidate off-the-shelf products against the associated requirements and criteria.

Examples of requirements considerations for off-the-shelf products include:

- functionality, performance, quality, reliability, etc., of the products
- impact of the products on the work unit's plans and commitments
- terms, conditions, and warranties for the products

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

4. Select the off-the-shelf products to be acquired.
5. Review the evaluation of the candidates and the selected off-the shelf products with relevant stakeholders, and obtain their agreement.
6. Revise the requirements for the acquired product as necessary to accommodate the selected off-the-shelf products.

Use of off-the-shelf products often requires compromising on the desired requirements to gain the cost and other advantages.

7. Revise the work unit's plans and commitments as necessary to accommodate the selected off-the-shelf products.
8. Identify risks associated with the selected off-the shelf product.

Refer to the Work Unit Planning and Commitment process area for practices that cover identifying risks.

Refer to the Guidelines for Risk Management in Annex A for guidance that may be useful in implementing this practice.

SP 4 Select Supplier

A supplier is selected based on its capability to satisfy the sourcing requirements and its ability to work with the work unit and organization.

This practice ensures that the selected supplier is the best fit for the needs of the work unit and organization.

For master sourcing, the basic terms and conditions of sourcing agreements are established with a small number of suppliers who can provide the same products and services. For these types of contracts, this practice applies to the selection of each of these suppliers.

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Establish and document criteria that will be used to evaluate potential suppliers.

Examples of criteria for evaluating suppliers include:

- prior experience in similar applications
- prior performance records on similar work, if available
- capabilities of their management and staff
- ability to work with and coordinate activities with the work unit
- compatibility of the supplier's products and services with the work unit's products, services, activities, and capabilities

2. Distribute the proposal solicitation material and requirements to the potential suppliers.
3. Evaluate the proposals submitted by the potential suppliers against applicable laws and regulations.
4. Evaluate the proposals submitted by the potential suppliers against the evaluation criteria.
5. Select the supplier.
6. Identify risks associated with the selected supplier.

Refer to the Work Unit Planning and Commitment process area for practices that cover identifying risks.

Refer to the Guidelines for Risk Management in Annex A for guidance that may be useful in implementing this practice.

7. Review the selected supplier and the associated risks with relevant stakeholders, and obtain their agreement.
8. Document and archive the results and other relevant records of the supplier selection.

SP 5 Maintain Sourcing Agreement

The sourcing agreement for a selected supplier are established and maintained.

This practice ensures that the supplier and acquirer share a common understanding of the legal requirements and responsibilities related to the products and services so that the sourcing agreement can be managed.

Depending on the source selection approach, the selection of a supplier to provide specific products and services may be performed when the supplier is first selected, or an existing supplier may be selected and the additional work added to their existing sourcing agreement.

Subpractices

1. Revise the sourcing requirements for the supplier to reflect negotiations.
2. Define and document what the work unit and organization will provide to the supplier in support of the sourcing agreement.

Examples of things the work unit and organization may provide to the supplier include:

- facilities
- equipment
- access to the work unit
- documentation
- support

3. Define and document the procedures, measures, and criteria used in monitoring the supplier.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

4. Define and document the sourcing agreement terms and conditions.

Terms and conditions are specific promises made between parties in a contract, which the law will enforce. They typically include identification of parties to the contract, dates of work involved, duties, responsibilities, legal jurisdiction, definitions, and other considerations.

Examples of terms and conditions to include in a sourcing agreement include:

- statement of work
- procedures for submitting invoices and making payments
- procedures for how requirements changes and changes are determined, communicated, and addressed
- identification of the individuals from the organization and the supplier who are responsible and authorized to make changes to the sourcing agreements
- plans, procedures, and criteria for monitoring supplier performance
- warranty, ownership, and usage rights for the products

Examples of additional items to include in sourcing agreements for off-the-shelf products include:

- discounts for large quantity purchases
- appropriate coverage of multiple users of the product, including business partners and customers, as appropriate
- agreements on future enhancements
- support that will be provided (for example, training, onsite support, and responses to queries and problem reports)
- maintenance support, including support after the product is withdrawn from general availability

5. Document the sourcing agreement.
6. Review the sourcing agreement with relevant stakeholders, including the supplier, and obtain their agreement.
7. Obtain the appropriate approval signatures on the sourcing agreement from the organization and supplier.
8. Revise the work unit's processes, work procedures, plans, and commitments as necessary to reflect the sourcing agreement.
9. Place the sourcing agreement under version control.
10. Revise the sourcing as necessary.

SP 6 Select Supplier to Perform Work Orders

A supplier is selected to perform each work order.

This practice ensures that the selected supplier is the best fit to perform the work specified in work orders.

Depending on the source selection approach, the selection of a supplier to perform a specific work order may occur when the supplier is first selected. In this case, this practice is not performed separately for each work order. For other source selection approaches, an existing supplier may be selected for each work order and the additional work is added to their existing sourcing agreement.

Refer to the Introductory Notes of this process area for examples of supplier selection approaches.

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Establish and document criteria that will be used to evaluate potential suppliers for each work order.

Examples of criteria for evaluating suppliers include:

- prior experience in similar applications
- prior performance records on similar work, if available
- management and staff capabilities
- availability of staff to perform the work
- availability of the facilities and resources need to perform the work
- ability to work with and coordinate activities with the work unit
- compatibility of the supplier's products and services with the work unit's activities and capabilities

2. Identify potential suppliers for each work order.

A work order may be concerned with a single product, a single service, or multiple products and services.

3. Distribute the proposal solicitation material and work order requirements to the potential suppliers.
4. Evaluate the proposals submitted by the potential suppliers against the work order requirements and evaluation criteria.
5. Select the supplier to perform each work order.
6. Identify risks associated with the selected supplier for each work order.

Refer to the Work Unit Planning and Commitment process area for practices that cover identifying risks.

7. Review the selected supplier for each work order with relevant stakeholders, and obtain their agreement.
8. Document and archive the results and other relevant records of the selection of the supplier to perform each work order.

SP 7 Maintain Supplier Work Orders

Work orders are established and maintained with a supplier to provide specified products and services.

This practice provides a common understanding of the products and services the supplier will provide and the responsibilities of the supplier and acquirer so that the sourcing agreement can be managed.

Subpractices

1. Revise the requirements for each product and service to reflect negotiations with the supplier for each work order.
2. Define and document what the work unit and organization will provide to the supplier in support of each work order.

Examples of things the work unit and organization may provide to the supplier include:

- facilities
- equipment
- access to the work unit
- documentation
- support

3. Define and document the procedures, measures, and criteria used in monitoring the supplier's performance and results for each work order.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

4. Document each work order.

Examples of items to include in a work order include:

- budget and schedule
- specification of the products and services that will be acquired
- applicable standards and procedures
- measures to be provided
- required levels of service
- acceptance procedures and criteria for the products and services
- plans, procedures, and criteria for monitoring supplier performance
- critical dependencies between the supplier and the work unit or organization

5. Review the product and service requirements and work orders with relevant stakeholders, including the supplier, and obtain their agreement.
6. Obtain the appropriate approvals for the work orders from the organization and supplier.
7. Revise the work unit's processes, work procedures, plans, and commitments as necessary to reflect the work orders .
8. Place the work orders under version control.
9. Revise the work orders as necessary.

SP 8 Resolve Planning Conflicts

A supplier's plans and commitments are balanced with a work unit's internal plans and commitments.

This practice ensures that the supplier's products, services, and associated activities are consistent with the work unit's needs.

Subpractices

1. Review and compare the supplier's plans and commitments with the relevant work orders and the work unit's plans and commitments.
2. Identify measures and analyses that need to be included in the supplier's plans to support the work unit's plans, commitments, and management activities.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

3. Identify areas in the supplier's plans and commitments that are in conflict or disagreement with the relevant work orders and the work unit's plans and commitments.
4. Negotiate changes to the supplier's plans and commitments and the work unit's plans and commitments.
5. Arrange for revisions to the supplier's plans and commitments as necessary to reflect negotiated changes.
6. Revise the work unit's plans and commitments as necessary to reflect negotiated changes.
7. Review the changes to the supplier's and the work unit's plan and commitment with relevant stakeholders, and obtain their agreement.

SP 9 Satisfy Acquirer Responsibilities

The specified responsibilities of the work units and other involved workgroups to support the supplier are satisfied.

This practice ensures that the supplier is provided with the facilities, access, and other support it needs from the work unit and other involved workgroups so that the supplier can perform its work and satisfy its requirements and commitments.

Subpractices

1. Provide the supplier with the facilities, equipment, documentation, supplies, access, and other support, as specified in the sourcing agreement and work orders, so the supplier can appropriately interact with the work unit and organization.
2. Review the status and outlook for the commitments to the supplier with the supplier.
3. Identify the commitments to the supplier that are not being satisfied or that are at risk of not being satisfied.
4. Identify corrective actions needed to satisfy the specified responsibilities of the work units and other involved workgroups.
5. Perform the corrective actions and track to closure.

SP 10 Monitor Supplier

A supplier's progress and performance in providing specified products and services are monitored against the sourcing agreement, work orders, plans, commitments, and needs of the work unit.

This practice ensures that the supplier performs its work as planned and agreed to, and that the needs of the work unit are satisfied.

Subpractices

1. Review the accomplishments, status, issues, results, and outlook of the supplier against the sourcing agreement, work orders, plans, commitments, and the needs of the work unit.
2. Review the supplier's conformance to standards and processes.

Conformance to standards and processes may be monitored indirectly by ensuring that the supplier has adequate process and product assurance processes in place and that these processes are appropriately implemented.

3. Conduct regular management and performance reviews with the supplier.

Examples of topics to address in supplier reviews include:

- the supplier's schedule and budget
- the supplier's interpretation and implementation of their requirements to verify consistency with the work unit's interpretation
- the supplier's activities
- critical dependencies between the acquirer and supplier
- supplier and acquirer commitments to ensure they are being met
- issues to ensure they are communicated and resolved in a timely manner
- risks involving the supplier
- the needs of the work unit and organization to validate they are being met
- information about the acquired products and service
- information and support that the supplier needs

4. Identify and document action items based on monitoring the supplier.
5. Track the identified action items to closure.
6. Prepare regular reports summarizing the supplier's status, performance, issues, results, and outlook, and distribute to relevant stakeholders.
7. Develop and document regular evaluations of the supplier's performance along with recommendations.

Evaluations of the supplier are used both to manage the current supplier relationship and as input for future supplier selection.

8. Review the evaluations and recommendations with the supplier.
9. Use the results of the supplier evaluations to provide awards or impose penalties as specified in the sourcing agreements.

SP 11 Manage Supplier Relationship

The overall relationship with a supplier is monitored and adjusted as needed to effectively and efficiently satisfy the sourcing agreement, work orders, plans, commitments, and needs of the work unit and organization.

This practice ensures that the business and working relationships with a supplier support the effective performance of the agreed-to work and, as appropriate, longer-term relationships.

Subpractices

1. Regularly evaluate the role, capabilities, and importance of the supplier relative to the needs and goals of the work unit and organization.

2. Determine the role of the supplier relative to the roles of other suppliers and potential future sourcing opportunities.
3. Communicate and collaborate with the supplier on a regular basis to improve the supplier relationship and effectively manage the development, preparation and delivery of the products and services.
4. Jointly with the supplier, determine ways to simplify and improve operations, reduce costs, and improve quality of the combined work of the supplier and acquirer.
5. Determine the strategy for continuing the sourcing relationship with the supplier.

As appropriate, the supplier may be involved in determining the approach for continuing the sourcing relationship.
Refer to the Introductory Notes of this process area for examples of supplier selection approaches.

6. Document and archive the results and other relevant records of the supplier relationship management activities.
7. Review the results of the supplier relationship management activities with relevant stakeholders, and obtain their agreement.
8. Make adjustments to the sourcing agreements for the supplier, as appropriate, to reflect the results of the supplier relationship management activities.

SP 12 Evaluate Acquired Products and Services

The products and services provided by a supplier are evaluated against their requirements and the needs of the work unit.

This practice ensures that the supplier's products and services satisfy their requirements and the needs of the work unit.

Subpractices

1. Define the evaluation criteria and procedures for the products and services received from the supplier.
2. Review the applicable evaluation criteria and procedures with the supplier and other relevant stakeholders, and obtain their agreement.
3. Evaluate the products and services received from the supplier against their requirements using the defined criteria and procedures.
4. Identify problems and defects in the product and service received from the supplier.
5. Document the results of the product and service evaluations.

Documentation of product and service evaluations are used both to manage the current supplier relationship and as input for future supplier selection.

SP 13 Prepare to Transition Acquired Products

The work unit's facilities, capability, and capacity are established and maintained to accept, incorporate, control, maintain, and support the acquired products.

This practice ensures that the work unit and organization can assume ownership and responsibility for the acquired products when they are delivered by the supplier.

Subpractices

1. Identify and document the facilities, the people, and the non-people resources needed to receive, store, maintain, and support the acquired products.
2. Identify and document the administrative and business issues that need to be addressed to receive, store, maintain, and support the acquired products.

Examples of administrative and business issues include:

- work hazards
- environmental hazards
- security
- business and product liability
- insurance

3. Review the documentation of the facilities, people, and non-people resources, and the administrative and business issues for the acquired products with relevant stakeholders, and obtain their agreement.
4. Define and document the plans and procedures for receiving, storing, supporting, maintaining, and making available the acquired products.
5. Plan and obtain, construct, or procure the appropriate facilities and non-people resources to receive, store, support and maintain the acquired products.

Refer to the Work Unit Planning and Commitment process area for practices that cover plans for acquiring and deploying non-people resources. Refer to the Work Unit Monitoring and Control process area for practices that cover the monitoring and control of these plans.

6. Plan, obtain, assign, and prepare the people who are needed to receive, store, maintain, and support the acquired products.

Refer to the Work Unit Planning and Commitment process area for practices that cover plans for obtaining, assigning, and preparing the people. Refer to the Work Unit Monitoring and Control process area for practices that cover the monitoring and control of these plans.

7. Identify and perform the actions to address the administrative and business issues related to receiving, storing, supporting, and maintaining the acquired products.
8. Revise the documentation of the facilities, the people, the non-people resources, and the administrative and business issues for the acquired products as needed.
9. Adjust, as needed, the facilities, the people, the non-people resources, and other factors that are in place to receive, store, maintain, and support the acquired products.

SP 14 Transition Acquired Products

The acquired products are transitioned into a work unit.

This practice ensures that the acquired products are available to the work unit and are usable for their intended purposes.

Subpractices

1. Receive and store the acquired products according to the established plans and procedures.
2. Receive and store the operating and support documentation for the acquired products according to the established plans and procedures.

Examples of product operating and support documentation include:

- final product preparation and delivery report
- warranties and guarantees
- operations and support manuals

3. Place the acquired products and operating and support documentation under configuration management.

Refer to the Work Unit Configuration Management process area for practices that cover change management.

4. Maintain the acquired products according to the established plans and procedures.
5. Make the acquired products available according to the established plans and procedures.

SP 15 Address Significant Deviations

Significant deviations from the sourcing agreement, work orders, performance results, and acceptability of the products and services are identified, and addressed by a supplier and the acquiring work unit as appropriate.

This practice ensures that significant deviations from the sourcing agreement, work orders, product and service requirements, plans, and commitments are recognized and addressed appropriately.

A deviation is significant if, left unresolved, it would be likely to impact the work unit's ability to meet its requirements, plans, or commitments.

Subpractices

1. Analyze identified issues and problems in the supplier's status, performance, and results to determine the actual or likely deviations from the sourcing agreement, work orders, product and service requirements, plans, and commitments.
2. Analyze identified issues and problems in the work unit's status and results that affect the supplier to determine the actual or likely deviations from the sourcing agreement, work orders, product and service requirements, plans, and commitments.
3. Review the identified issues, problems, and defects to determine which ones result, or are likely to result, in significant deviations from the sourcing agreement, work orders, product and service requirements, plans, and commitments.
4. Jointly with the supplier, perform corrective actions to fix any immediate critical problems caused by the significant deviations, where appropriate.

Examples of corrective actions to fix any immediate problems include:

- recalling defective work products
- performing rework on defective work products or services
- providing work-around procedures to circumvent a problem

5. Define, document, and obtain agreement with the supplier on corrective actions that will be performed to address the significant deviations.

Examples of corrective actions include:

- correcting defects in the products and services
- negotiating changes to the requirements
- revising estimates and plans
- renegotiating commitments
- revising the work unit's risks
- terminating the sourcing agreement
- taking no action

6. Perform the agreed-to corrective actions that are the responsibility of the work unit or organization and track to closure.

Corrective actions include actions to address the deviation and the likely causes.

7. Monitor the supplier's performance of the agreed-to corrective actions that are their responsibility and track to closure.

SP 16 Address Deviation Causes

The likely causes of significant deviations from the sourcing agreement, work orders, performance results, and acceptability of the products and services are identified, and addressed by a supplier and the acquiring work unit as appropriate.

This practice ensures that, where possible, significant deviations from a sourcing requirements, plans, and commitments of the type that occurred in the past do not recur.

Subpractices

1. Review significant deviations and other issues to determine which of these are likely to recur.
2. Analyze the significant deviations and other issues to determine the likely causes of the issue and significant deviation.
3. Document the likely causes of each identified significant deviation and issue so that corrective actions can be performed.
4. Determine and document preventive actions that are expected to prevent the future occurrence of identified problems and similar problems.
5. Review the proposed preventive actions with relevant stakeholders, and obtain their agreement.
6. Perform the agreed-to preventive actions and track to completion.

7. Document significant recurring problems that are not addressed with the preventive actions as risks.

Refer to the Work Unit Planning and Commitment process area for practices that cover identifying and documenting risks.

Refer to the Guidelines for Risk Management in Annex A for guidance that may be useful in implementing this practice.

8. Document and archive the results and other relevant records of the analysis and preventive actions performed to address likely causes of problems.

SP 17 Close Out Supplier Work Orders

Each work order in a sourcing agreement is closed when the work is completed and commitments are satisfied or when other termination conditions are realized.

This practice ensures that the conditions specified for a work order have been satisfied, that both the supplier and acquirer agree these conditions are satisfied, and that both the supplier and acquirer agree the work order is completed.

Subpractices

1. Determine whether the products and services specified for delivery in the work order have been delivered and accepted.
2. Identify corrective actions needed to resolve issues to do with delivery and acceptance of the products and services.
3. Review the identified corrective actions with relevant stakeholders, including the supplier, and obtain their agreement.
4. Perform the agreed-to corrective actions that are the responsibility of the work unit or organization and track to closure.
5. Monitor the supplier's performance of the agreed-to corrective actions that are their responsibility and track to closure.
6. Prepare final documentation for the work order certifying the delivery and acceptance of products and services.
7. Review the final documentation for the work order with relevant stakeholders, including the supplier, obtain their agreement, and obtain the appropriate approvals from the organization and supplier.
8. Provide the supplier with formal closeout notification for the work order.

SP 18 Close Out Sourcing Agreements

The sourcing relationship with a supplier is ended when the sourcing agreement and associated work orders are satisfied or when other termination conditions are realized.

This practice ensures that the conditions specified for a sourcing agreement have been satisfied, that both the supplier and acquirer agree these conditions are satisfied, and that both the supplier and acquirer agree the sourcing relationship is ended.

Subpractices

1. Determine whether all the work orders in the sourcing agreement have been completed and closed.

2. Determine whether administrative actions specified in the sourcing agreement have been performed.
3. Determine whether payments specified in the sourcing agreement have been made and all other claims relative to the sourcing agreement have been resolved.
4. Identify corrective actions needed to resolve issues to do with administrative actions, payments, and claims.
5. Review the identified corrective actions with relevant stakeholders, including the supplier, and obtain their agreement.
6. Perform the agreed-to corrective actions that are the responsibility of the work unit or organization and track to closure.
7. Monitor the supplier's performance of the agreed-to corrective actions that are their responsibility and track to closure.
8. Prepare final documentation for the sourcing relationship certifying the delivery and acceptance of products and services, completion of administrative actions, final and complete payments, and resolution of claims.
9. Review the final documentation for the sourcing relationship with relevant stakeholders, including the supplier, obtain their agreement, and obtain the appropriate approvals of the organization's and supplier's business functions.
10. Provide the supplier with formal closeout notification for the sourcing agreement.

14.1.9 Process and Product Assurance (PPA) Maturity Level 2

14.1.9.1 Purpose

Process and Product Assurance provides appropriate conformance guidance and objectively reviews the activities and work products of work efforts within the organization to ensure they conform with applicable laws, regulations, standards, organizational policies, business rules, process descriptions, and work procedures.

14.1.9.2 Introductory Notes

The goals and practices of this process area are expressed in context of a single work effort. This process area applies to each work effort in the organization. A work effort may be the effort of a single work unit, a single workgroup, or a collection of related work units and workgroups. This process area also applies to work efforts of support groups (for example, process engineering group, training group, and process and product assurance group).

This process area is typically the responsibility of an assurance or audit unit that is organizationally separate from the managers and staff responsible for the organization's product and service work. In some organizations, if proper precautions are taken, it may be appropriate to embed this assurance function into the work units and workgroups that are implementing the process — but this situation is more of an exception, rather than the rule. Factors to be considered in making this decision include the statutory requirements, the organizational culture (that is, an open, quality-oriented culture), the type of work that is performed, the experience and skills of the staff, the steps taken to ensure objectivity in the evaluations and reporting, and the risks associated with non-conformance.

The following special terms are used in the goals and practices of this process area:

- In the BPMM, the term “conformance” is used to refer to two concepts that are often considered to be separate and distinct: “conformance” and “compliance.” Many organizations distinguish between the two concepts, but there is not universal agreement on the distinction. Though the distinction between conformance and compliance is important to

organizations, the practices of this process area do not explicitly make this distinction. Each organization must decide how to address the two concepts and the terminology to be used.

- The term “work unit” is used to refer to an organizational unit that is directly responsible for agreeing to requirements, planning, managing, and performing product and service work or internal business functions.
- The term “workgroup” is used to refer to a collection of people who work closely together on tasks that are highly interdependent, in order to achieve shared goals. A workgroup may or may not be a permanent organizational component.
- The term “organizational policy” is used to refer to a guiding principle typically established by executive management that establishes rules for an organization to guide actions and influence and determine decisions. Organizational policies are established to ensure that work is performed in ways that are consistent across the organization and acceptable to executive management.
- The term “business rules” is used to refer to the obligations and constraints that guide how procedures or activities are performed. There are usually explicit enforcement mechanisms in place to ensure conformance.

Process and Product Assurance involves

- assisting the work units, workgroups, and staff in understanding and adhering to the applicable laws, regulations, standards, organizational policies, business rules, process descriptions, and work procedures
- objectively evaluating the work activities and work products against the applicable laws, regulations, standards, organizational policies, business rules, process descriptions, and work procedures
- identifying and documenting non-conformance issues
- ensuring that non-conformance issues are addressed

Objectivity is a key attribute of these evaluations, especially where statutory requirements are important factors in the work.

This process area covers the practices for performing the assurance evaluations. The practices identifying the specific activities and work products that are typically reviewed are contained in the Objective Assurance institutionalization practice in each process area.

The work units and workgroups doing their work and the assurance staff are partners in ensuring conformance. The assurance staff is involved with the work units and workgroups in establishing plans, processes, local standards, and work procedures that will add value to the work effort. They help ensure that these artifacts are compliant, they fit the needs of the work units and workgroups, and they will be usable in performing assurance evaluations. The activities and work products that will be evaluated by the assurance staff are defined and agreed to by the managers of the work units and workgroups. The selection of the activities and work products is based on sampling or on objective criteria that are consistent with organizational policies and the requirements and needs of the work units and workgroups.

The first priority of the assurance staff is to prevent non-conformance issues. When non-conformance issues occur and are identified, they are first addressed with the staff responsible for the work and resolved there if possible and appropriate. Non-conformance issues not resolvable at that level are escalated to an appropriate level of management for resolution.

The reason for this process area at maturity level 2 is that the organization’s management needs objective assurance that the applicable laws, regulations, standards, organizational policies, and process descriptions are not being violated, so they can effectively manage the work performed by their work units, workgroups, and staff.

14.1.9.3 Specific and Institutionalization Goals

SG 1 Activities and Results Are Objectively Evaluated

Activities and work products are objectively evaluated for conformance to the applicable laws, regulations, standards, organizational policies, business rules, process descriptions, and work procedures.

SG 2 Non-Conformance Issues Are Resolved

Non-conformance issues are tracked, communicated, and resolved.

InG Practices Are Institutionalized

The practices for Process and Product Assurance are institutionalized.

Institutionalization includes:

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.1.9.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Activities and Results Are Objectively Evaluated)	SP 1 (Provide Conformance Assistance) SP 2 (Evaluate Process Descriptions) SP 3 (Evaluate Process Descriptions) SP 4 (Evaluate Work Activities) SP 5 (Evaluate Process Results)
SG 2 (Non-Conformance Issues are Resolved)	SP 6 (Review Evaluation Results Locally) SP 7 (Resolve Non-Conformances at Local Level) SP 8 (Escalate Unresolved Non-Conformances) SP 9 (Address Non-Conformance Causes) SP 10 (Maintain Assurance Records)
InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)

The five institutionalization practices, including subpractices and supplementary information, are contained in Part III, Chapter 13..

14.1.9.5 Specific Practices

SP 1 Provide Conformance Assistance

Assistance is provided to the individuals, work units, and workgroups so they can understand and comply with the laws, regulations, organizational policies, business rules, and standards that are applicable to their work.

This practice consolidates the investigation of the potentially complex and large volume of applicable laws, regulations, organizational policies, business rules, and standards, so that each individual, work unit, and workgroup does not have to separately determine the applicable clauses and provisions with which they must comply.

Subpractices

1. Identify all legitimate sources of laws, regulations, organizational policies, business rules, and standards that apply to the work.
2. Establish mechanisms for obtaining the laws, regulations, organizational policies, business rules, and standards, and revisions to them, that apply to the work.
3. Determine and document which clauses and provisions of the laws, regulations, organizational policies, business rules, and standards apply to the various processes and how they apply.
4. Provide the information from the laws, regulations, organizational policies, business rules, and standards that the people doing the work need to understand.
5. Review the applicable clauses and provisions of the laws, regulations, organizational policies, business rules, and standards with relevant stakeholders to ensure they understand how they apply to their work.

SP 2 Facilitate Learning Across Work Efforts

Information and assets obtained from performing the process and product assurance reviews are provided to the management and staff of the work units so they can effectively plan, manage, and perform their work.

This practice ensures that information and assets uncovered in performing the process and product assurance reviews within the organization are propagated to add value to the ongoing work efforts.

Subpractices

1. Identify information and assets that could be useful to the organization's work efforts as part of the assurance reviews.
2. Review the results of past assurance activities for information and assets that could be useful to the organization's work efforts.
3. Review the plans, process descriptions, standards, work procedures, and work activities for the organization's work efforts and provide recommendations on how they could be improved.

Plans, process descriptions, standards and work procedures should be reviewed when they are developed and when significant changes are made.

Examples of areas for recommendations include:

- effective and efficient ways to satisfy laws, regulations, standards, organizational policies, and business rules
- deficiencies in training, methods, tools, and work environment
- ineffective or deficient measures
- sources of frequent defects, problems, and issues

4. Provide guidance to facilitate and improve the overall cross work flow between work units
5. Provide objective guidance on managing and performing the work.

Examples of guidance areas include:

- ensuring plans are reasonable and tasks and milestones are the appropriate granularity
- ensuring plans are followed and are updated as appropriate
- ensuring task entry and exit criteria are satisfied
- ensuring measurement data are clean
- determining when to perform corrective actions
- ensuring corrective and preventive actions are likely to achieve the desired effects.

SP 3 Evaluate Process Descriptions

The process descriptions and work procedures used in performing the work are objectively evaluated against the applicable laws, regulations, standards, organizational policies, and business rules.

This practice ensures that the applicable laws, regulations, standards, organizational policies, and business rules are reflected in the process descriptions and work procedures, so that in following the process descriptions and work procedures the people have confidence they are in conformance.

Subpractices

1. Periodically and as needed review, filter, and provide interpretation to relevant stakeholders of the applicable laws, regulations, standards, organizational policies, and business rules.
2. Provide guidance and review of the process descriptions and work procedures as they are developed and revised to ensure they reflect the applicable laws, regulations, standards, organizational policies, and business rules.
3. Verify that process descriptions and work procedures are in place and are usable as a basis to objectively evaluate the work activities and work products.
4. Evaluate the process descriptions and work procedures against the applicable laws, regulations, standards, organizational policies, and business rules.

Process descriptions and work procedures should be evaluated when they are developed or revised and when there are changes to the applicable laws, regulations, standards, organizational policies, and business rules.

5. Identify and document non-conformance issues for the process descriptions and work procedures.

Non-conformance issues are problems identified in evaluations that reflect a lack of conformance to applicable laws, regulations, standards, organizational policies, and business rules.

6. Identify lessons learned that could improve the future development and maintenance of process descriptions and work procedures within the organization.

SP 4 Evaluate Work Activities

The performance of selected work activities is objectively evaluated against the applicable laws, regulations, standards, organizational policies, business rules, process descriptions, and work procedures.

This practice objectively evaluates the performance of work activities, and identifies work activities that are not in conformance with the applicable laws, regulations, standards, organizational policies, business rules, process descriptions, and work procedures, so that corrective actions can be taken.

Subpractices

1. Select the work activities to be evaluated.

It may be appropriate to review a subset of the work activities. The selection may be based on sampling or other objective criteria that are consistent with organizational policies and with the needs and requirements of the work effort being evaluated.

2. Obtain and verify the inputs needed to evaluate the selected work activities.
3. Provide consultation and guidance to the people doing the work to help ensure they comply with the applicable laws, regulations, standards, and organizational policies, business rules, process descriptions, and work procedures.
4. Evaluate the work activities for conformance to the applicable laws, regulations, standards, organizational policies, business rules, process descriptions, and work procedures.
5. Identify and document non-conformance issues for the work activities.

Non-conformance issues are problems identified by the evaluations that reflect a lack of conformance to applicable laws, regulations, standards, organizational policies, business rules, process descriptions, and work procedures.

6. Document and archive the results and other relevant records of the work activity evaluations.
7. Identify lessons learned that could improve how work activities are performed in the organization.

SP 5 Evaluate Process Results

Selected work products and services that are outputs of the process are objectively evaluated against the applicable laws, regulations, standards, organizational policies, and business rules.

This practice identifies work products and services that are not in conformance with the applicable laws, regulations, standards, organizational policies, and business rules, so that corrective actions can be taken.

Subpractices

1. Select the work products and services that are outputs of the process for evaluation.

It may be appropriate to review a subset of the work products and services. The selection may be based on sampling or other objective criteria that are consistent with organizational policies and with the needs and requirements of the unit being evaluated.

2. Obtain and verify the inputs needed to evaluate the selected work products and services.
3. Provide consultation and guidance to the people responsible for developing, preparing and delivering the work products and services to help ensure they comply with the applicable laws, regulations, standards, organizational policies, and business rules.
4. Evaluate the work products and services for conformance to the applicable laws, regulations, standards, organizational policies, and business rules.

Evaluations of work products and services are performed both as they are developed and prepared and prior to delivery. Services are regularly evaluated as they are delivered.

5. Identify and document non-conformance issues for the work products and services.

Non-conformance issues are problems identified by the evaluations that reflect a lack of conformance to applicable laws, regulations, standards, organizational policies, and business rules.

6. Document and archive the results and other relevant records of the work product and service evaluations.
7. Identify lessons learned that could improve how work products and services are developed and delivered by the organization.

SP 6 Review Evaluation Results Locally

The results of the process and product assurance evaluations are reviewed with the responsible individuals, work units, workgroups, and managers on a regular basis.

This practice ensures that the individuals, work units, workgroups, and managers who are responsible for the work are kept informed of the results of the assurance evaluations so they understand all non-conformance issues and, where appropriate, they can take corrective actions and make appropriate adjustments in their future work.

Subpractices

1. Provide information to the responsible work units and workgroups on the assurance evaluations that have been performed as compared to the plan.
2. Describe the important results of the assurance evaluations.
3. Provide recommendations to the responsible work units and workgroups for changes to process descriptions, work procedures, and future work activities.
4. Describe changes to the assurance plans for the work unit or workgroup.

SP 7 Resolve Non-Conformances at Local Level

Potential and actual non-conformance issues are reviewed and resolved with the responsible individuals, work units, workgroups, and managers, if possible.

This practice ensures that the individuals, work units, workgroups, and managers who are responsible for the work have the opportunity to correct non-conformance issues before higher level management is involved.

Examples of ways to resolve non-conformance issues include the following:

- fixing the non-conformance (that is, bringing it into conformance)
- changing the process descriptions, standards, or work procedures to conform with the way the work was performed
- obtaining a waiver to allow the non-conformance

Subpractices

1. Document potential and actual non-conformance issues to be addressed.
2. Review and discuss the documented issues with the responsible individuals, work units, workgroups, and managers.
3. Define, document, and agree on actions to resolve the issue or escalation actions.
4. Periodically review the status of agreed-to actions with the work unit or workgroup manager.
5. Track issues to resolution.
6. Document and archive the results and other relevant records of the non-conformance discussions and actions.

SP 8 Escalate Unresolved Non-Conformances

Non-conformance issues not resolvable within the work unit or workgroup are escalated to designated higher level managers and tracked to closure.

This practice ensures that non-conformance issues that require arbitration or that are beyond the responsibility and authority of the work unit or workgroup are resolved by the appropriate level of management in the organization.

Examples of ways to resolve non-conformance issues include:

- changing the work product or process implementation so they are compliant
- changing the standards, organizational policies, business rules, process descriptions, or work procedures that were violated to reflect what was done
- obtaining a waiver to cover the non-conformance

Subpractices

1. Document non-conformance issues that are not resolved within the workgroup.
2. Escalate non-conformance issues that are not resolved within the work unit or workgroup to the appropriate level of management, up to and including the executive manager designated as the final conformance authority.
3. Periodically review each open non-conformance issue with the manager responsible for acting on that issue.
4. Track non-conformance issues to resolution.
5. Provide regular updates to relevant stakeholders on the status of the open non-conformance issues and the resolution.
6. Document and archive the results and other relevant records of the non-conformance escalation activities.

SP 9 Address Non-Conformance Causes

The likely causes of significant non-conformance issues are identified and addressed.

This practice ensures that, where possible, significant non-conformance issues that occurred in the past do not recur.

Subpractices

1. Review significant non-conformance issues to determine which of these are likely to recur.
2. Analyze the significant non-conformance issues to determine the likely causes.
3. Document the likely causes of each identified significant non-conformance issue so that corrective actions can be performed.
4. Determine and document preventive actions that are expected to prevent the future occurrence of identified non-conformance issue.
5. Review the proposed preventive actions with relevant stakeholders, and obtain their agreement.
6. Perform the agreed-to preventive actions and track to completion.
7. Document as risks any significant non-conformance issues that are not addressed with the preventive actions.

Refer to the Guidelines for Risk Management in Annex A for guidance that may be useful in implementing this practice.

SP 10 Maintain Assurance Records

Records of the process and product assurance activities and results are established, maintained, and made available.

This practice ensures that process and product assurance records needed to satisfy statutory and organizational requirements, to perform future assurance work, and to learn from past experiences are available for future reference.

Subpractices

1. Record the status and results of the assurance evaluations.
2. Analyze the non-conformance issues to determine quality trends and other relevant information that may require action.
3. Provide records on the status and results of the assurance evaluations and related analysis results to relevant stakeholders.
4. Revise the process and product assurance records as necessary.

14.2 Maturity Level 3: Standardized

The following section contains the process areas that belong to maturity level 3. The maturity level 3 process areas of the BPMM are as follows:

- Organizational Process Management (OPM)
- Organizational Competency Development (OCD)
- Organizational Resource Management (ORM)
- Organizational Configuration Management (OCM)
- Product and Service Business Management (PSBM)
- Product and Service Work Management (PSWM)

- Product and Service Preparation (PSP)
- Product and Service Deployment (PSD)
- Product and Service Operations (PSO)
- Product and Service Support (PSS)

14.2.1 Organizational Process Management (OPM) Maturity Level 3

14.2.1.1 Purpose

Organizational Process Management develops usable standard processes and related process assets for the organization, deploys them for use, and improves them based on understanding their strengths and weaknesses.

14.2.1.2 Introductory Notes

The organization's process assets include assets such as the following

- descriptions of the organization's standard processes
- organization's definitions of standard measures
- guidelines for tailoring the organization's standard processes and standard measures
- organization's process asset repositories
- defined processes that are tailored from the organization's standard processes¹

The goals and practices of this process area are expressed in context of the organization level process management activities. This process area primarily applies to the process assets used by organization's units whose primary roles are developing and delivering the organization's products and services, but it also applies to the process assets used by the support groups such as the process and product assurance group, training group, and process engineering group.

This process area may be addressed at multiple levels within an organization or enterprise. These activities at the various levels are related in a hierarchical manner. For example, the top-level process management activities may be performed at the enterprise level and establish requirements, standards, goals, and assets to align and support the process management activities of the individual organizations in the enterprise (for example, divisions or locations). The process management activities performed by each of the organizations establish requirements, standards, goals, and assets to align and support the process management activities and work performed within the organization. There may be additional organization levels (for example, strategic business areas). The goals and practices of this process area apply at each of these organizational levels that are managed by executives, although in some enterprises and organizations there may only be a single level.

The process area is primarily the responsibility of a unit or workgroup that is responsible for organizational process management.

Organizational Process Management involves:

- appraising the organization's processes, as defined and implemented, and the related process assets

1. Each domain PMM will include a process area at maturity level 3 that addresses the overall integrated management of the work of the domain. This includes establishing and maintaining the defined process for the work and planning and managing according to the defined process.

- identifying the high priority process improvements, based on business needs
- establishing and implementing action plans to improve the processes assets
- establishing and maintaining the organization’s process assets
- deploying the organization’s process assets
- analyzing organization-level measures and other information to obtain insight and guide improvements

The organization’s standard processes are the primary organizational process asset and are specifically emphasized in this process area. When the term, “organizational process asset” is used, this includes the organization’s standard processes. In some cases, the phrase, “organization’s standard processes and related process assets is used.

This process area is typically the responsibility of an organizational process group that is established to coordinate and facilitate the organization’s process management activities, though people throughout the organization participate in these activities.

The organization’s standard processes and the related process assets facilitate consistent process implementation across the organization and provide a mechanism to accumulate organizational learning for the long-term benefit of the organization.

The organization provides the long-term commitments and resources to coordinate the organization’s process management activities.

Recommendations for improving the organization’s process assets are obtained from various sources, including process appraisals, measures of the process implementation and results, lessons learned in performing the processes, and other informal and formal process management and improvement initiatives.

The reason for this process area at maturity level 3 is that the organization’s standard processes and related process assets provide the primary mechanisms for establishing the foundation for organization-wide process improvement and for accumulating organizational process learning.

14.2.1.3 Specific and Institutionalization Goals

SG 1 Appraisal-Based Improvements Are Incorporated

The strengths and weaknesses of the organization’s processes and process assets are understood and improvements are made.

SG 2 Process Assets Are Created and Deployed

The organization’s standard processes and process assets are established and made available for developing, preparing, deploying, operating, and supporting the organization’s products and services.

SG 3 Experience-Based Improvements Are Incorporated

The organization’s processes and process assets are analyzed and improved based on developing and using them.

InG Practices Are Institutionalized

The practices for Organizational Process Management are institutionalized.

Institutionalization includes:

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.2.1.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Appraisal-Based Improvements Are Incorporated)	SP 1 (Maintain Descriptions of Process Needs) SP 2 (Appraise Processes) SP 3 (Identify Process Improvements) SP 4 (Maintain Process Action Plans) SP 5 (Implement Process Action Plans)
SG 2 (Process Assets Are Created and Deployed)	SP 6 (Maintain Descriptions of Standard Processes) SP 7 (Maintain Definitions of Organizational Measures) SP 8 (Maintain Tailoring Guidelines) SP 9 (Maintain Process Repositories) SP 10 (Deploy Process Assets)
SG 3 (Experience-Based Improvements Are Incorporated)	SP 11 (Collect Process Assets) SP 12 (Analyze Process information) SP 13 (Provide Information on Process Management)

InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)
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The five institutionalization practices, including subpractices and supplementary information, are contained in Part III, Chapter 13.

14.2.1.5 Specific Practices

SP 1 Maintain Descriptions of Process Needs

The descriptions of the process needs, goals, and standards for the organization are established and maintained.

This practice ensures that the organization's process needs, goals, and standards are understood and documented so the organization's processes and process assets are properly aligned with the needs of the organization and the work that will be performed.

Subpractices

1. Review the laws, regulations, standards, organizational policies, and business rules that are applicable to the organization's work.
2. Identify and document the process needs of the organization.

Process needs cover the features, capabilities, and constraints that must be addressed in the process descriptions. Example of factors that determine these process needs include

- characteristics of the organization's products and services
- characteristics of the customers of the organization's products and services
- structure of the organization
- characteristics of the work efforts
- organizational tools and support environment that are used by the work efforts
- skills and knowledge of the organization's managers and staff

3. Identify and document the organization's process performance and quality goals.

Where possible, process performance and quality goals should be expressed in quantitative terms.

4. Identify, define, and document the organization's process standards.
5. Review the organization's process needs, goals, and standards with relevant stakeholders, and obtain their agreement.
6. Revise the organization's process needs, goals, and standards as needed.

SP 2 Appraise Processes

The processes and process assets of the organization are appraised periodically and as needed to maintain an understanding of their strengths and weaknesses.

This practice develops an objective understanding of the strengths and weaknesses of the processes and process assets that are used in the organization, and provides a basis for identifying improvements.

Subpractices

1. Define the scope of the process appraisals.
2. Obtain executive management sponsorship for the process appraisals and follow-on improvement activities.
3. Plan the process appraisals.
4. Prepare for the process appraisals.
5. Perform the process appraisals.
6. Document the findings and results of the process appraisals.
7. Review the findings and results of the process appraisals with the appraisal sponsors and others designated by the sponsors.

SP 3 Identify Process Improvements

Improvements to the organization's processes and process assets are identified and prioritized.

This practice ensures that the improvements that are to be implemented are those that provide the most business value to the organization.

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Determine candidate process improvements.

Candidate process improvements are obtained from various sources including:

- measuring and analyzing the processes
- reviewing the lessons learned from implementing the processes
- reviewing process improvement proposals submitted by the organization's managers and staff
- soliciting inputs on process improvements from the senior management and leaders in the organization
- reviewing results of process appraisals
- reviewing relevant results of other organization improvement initiatives

2. Prioritize the candidate process improvements.

Prioritizing candidate process improvements includes:

- considering the estimated cost and effort to implement the process improvements
- evaluating the expected improvement against the organization's improvement goals and priorities
- determining the potential barriers to the process improvements and strategies for overcoming these barriers

3. Identify and document the process improvements that will be implemented.
4. Review and obtain agreement on the process improvements that will be implemented with relevant stakeholders.
5. Revise the list of candidate and selected process improvements as necessary.

SP 4 Maintain Process Action Plans

Process action plans that address selected improvements to the organization's processes and process assets are established and maintained.

This practice ensures that the process improvements that the organization selects are thoroughly planned so they can be implemented in a controlled manner to achieve the expected results.

Refer to the Guidelines for Organizational Change Management in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Identify actions to address the identified process improvements.
2. Assign responsibility and authority to implement the actions.
3. Review and obtain agreement on the process action plans with relevant stakeholders.
4. Place the process action plans under version control.
5. Revise the process action plans as necessary.

SP 5 Implement Process Action Plans

The organization's process action plans are implemented.

This practice ensures that the process improvements selected and defined by the organization are implemented and coordinated according to the plans and that relevant stakeholders are appropriately aware of and involved in the implementation activities.

Refer to the Guidelines for Organizational Change Management in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Review the process action plans with the individuals and workgroups responsible for implementing the process action plans and obtain their agreement.
2. Negotiate and document commitments among the process action teams and other relevant stakeholders.

3. Obtain the information and resources required to perform the work associated with implementing the process action plans.
4. Implement the process improvements according to the process action plans.
5. Conduct regular reviews of the progress of the process actions with relevant stakeholders.
6. Evaluate the results of the implemented process improvements.
7. Identify significant deviations from the process action plans and other issues related to the implementation and results of the process improvements, and perform appropriate corrective actions.
8. Measure and analyze the process improvement work activities and results.
9. Inform relevant stakeholders of the plans, status, activities, and results related to the implementation of the process action plans.

SP 6 Maintain Descriptions of Standard Processes

Descriptions of the organization's standard processes are established and maintained.

This practice makes available a set of organization standard processes to guide the establishment and implementation of appropriately consistent defined processes across the organization.

The organization's standard processes covers all the activities involved in performing a work effort or set of related work efforts (for example, developing and preparing a product, delivering a service, or performing a support function). The standard processes cover:

- work processes
- management processes
- support processes

A standard process covers a well defined, bounded, meaningful set of related activities. The boundary of a standard process is largely determined by how the work is planned and managed. A standard process, when tailored and implemented, is the scope of responsibility of a single manager or management team. Other considerations include intellectual understandability and the coupling among related standard processes. Examples of the scope of a standard process include:

- configuration management process
- process for developing and preparing a product (from requirements analysis to acceptance)
- process for preparing a service (from requirements analysis to acceptance)
- process for managing the delivery of a service (development, deployment, delivery, maintenance, and support)

Standard processes are synthesized from the most successful practices that the organization is currently using for performing its work as well as best practices from external sources.

Multiple standard processes may be needed to address the needs of different customer sets, different product or service lines, and different process goals.

Subpractices

1. Identify the process-related standards, requirements, organizational policies, and goals for the organization.
2. Specify the life cycle models for the organization's standard processes.

Life cycle models partition the process activities into phases or major steps. Life cycle models guide the individuals and workgroups through the major steps of identifying customer needs, planning, defining and designing the products and services, developing and preparing the products and services, delivering the products and services, and retiring the products and services.

Life cycle models exist at different levels in a process.
An example of a high level life cycle model for a service might include phases such as concept definition, requirements, design, construction, deployment, delivery, and retirement.
Within the delivery phase of an account service, an example of a lower level life cycle model might include phases such as acquisition, opening, servicing, and termination.
For the software development phase of a system life cycle, the software phases might include software requirements, high-level design, low-level design, code, unit test, and software integration.

3. Identify the constituent standard process elements that make up the standard processes.
4. Specify the critical properties of each standard process element.

Each standard process element covers a bounded and closely related set of activities. The descriptions of the standard process elements may be templates to be filled in, fragments to be completed, abstracts to be refined, or complete descriptions to be tailored or used unmodified. These standard process elements are described in sufficient detail such that the process, when fully defined, can be consistently performed by appropriately trained and skilled people.

Examples of critical properties of standard process elements include:

- purpose of the process
- process roles
- applicable process and product standards
- applicable procedures, methods, tools, and resources
- entry criteria
- inputs
- work products that undergo a work product inspection or verification
- product and process measures to be collected and used
- decision points
- verification points
- outputs
- exit criteria

5. Specify the relationships among process elements of each standard process and the relationship to related standard processes.

The description of the relationships among process elements is referred to as a “process architecture.” The process architecture describes the:

- ordering of the process elements
- interfaces among the process elements
- interfaces with external processes
- interdependencies among internal and external process elements

A process architecture covers the relationships for a complete standard process, including relationships internal to the standard process and relationships with other standard processes.

6. Verify the descriptions of the organization’s standard processes against the applicable standards, requirements, organizational policies, and goals.
7. Conduct work product inspections of the descriptions of the organization’s standard processes.

Refer to the Guidelines for Work Product Inspection in Annex A for guidance that may be useful in implementing this practice.

8. Place the descriptions of the organization’s standard processes under configuration management.

Refer to the Organizational Configuration Management process area.

9. Revise the descriptions of the organization’s standard processes as necessary.

SP 7 Maintain Definitions of Organizational Measures

Definitions of measures are established and maintained to characterize the organization’s standard processes and process assets.

This practice ensures that measures are available to understand the performance and other characteristics of the organization’s processes and plan and measure improvements.

The organization’s measures are typically different from one standard process to another. Within a standard process, different standard measures may be defined for different business contexts or other circumstances, or, alternatively, the tailoring guidelines and criteria may specify how to tailor the measures for the different business contexts or circumstances.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Identify and prioritize the organization’s measurement information needs and goals.
2. Identify the organization’s standard measures associated with the organization’s standard processes.

The organization’s standard measures are measures that are collected by the implementers of the tailored standard processes and reported for organizational analysis and storage for future use.

Once the organization establishes standard processes, it has the capability to establish standard measures based on them. Measures at maturity level 2 are primarily defined at the work unit level to help the manager plan and monitor the work. Measures at maturity level 3 are primarily defined at the level of processes and process elements to provide insight into process performance and how it affects the work unit performance. At maturity level 3 the work unit manager can draw on insights from measures at two different levels of granularity (work unit and process levels) to support their management activities. Establishing standard measures allows the organization to begin comparing performance results from different work units, and it lays the foundation for quantitative process management at Level 4.

3. Identify additional measures needed to characterize the organization's standard processes and process assets.
4. Define and document the base measures and derived measures to address the measurement information needs and goals.
5. Define and document how the measures will be obtained, collected, and stored.
6. Define and document how the measures will be analyzed, reported, and used.
7. Conduct work product inspections of the measurement specifications.

Refer to the Guidelines for Work Product Inspection in Annex A for guidance that may be useful in implementing this practice.

8. Review the measurement specifications with relevant stakeholders, and obtain their agreement
9. Place the measurement specifications under configuration management.

Refer to the Organizational Configuration Management process area.

10. Revise the measurement specifications as necessary.

SP 8 Maintain Tailoring Guidelines

Guidelines and criteria for tailoring the organization's standard processes are established and maintained.

This practice ensures that the tailored defined processes are appropriately consistent across the organization and also fit the specific needs of the work to be performed.

The tailoring guidelines and criteria specify:

- how the organization standard processes and related process assets are used to create defined processes
- procedures that must be followed in performing the tailoring
- requirements that must be satisfied by the tailoring and the resulting defined processes and measures
- options that can be exercised in tailoring
- criteria for selecting process elements from the organization's standard processes
- criteria for other allowable tailoring options

Examples of tailoring actions include:

- modifying the ordering or other relationships of the process elements
- deleting, modifying, or replacing process elements or standard measures
- modifying how the organization's process assets are used
- modifying how process assets are collected and provided to the organization

For some processes, where only one instance of a process is performed, or for a standard process that must be performed identically throughout the organization, no tailoring is performed and the standard process is typically the defined process.

Subpractices

1. Define and document the guidelines, criteria, and procedures for tailoring the organization's standard processes.
2. Define and document the standards for documenting the defined processes.
3. Define and document the procedures for submitting and obtaining approval of waivers from the requirements of the organization's standard processes and tailoring guidelines and criteria.
4. Conduct work product inspections of the organization's tailoring guidelines, criteria, and procedures.

Refer to the Guidelines for Work Product Inspection in Annex A for guidance that may be useful in implementing this practice.

5. Place the organization's tailoring guidelines, criteria, and procedures under configuration management.

Refer to the Organizational Configuration Management process area.

6. Revise the organization's tailoring guidelines, criteria, and procedures as necessary.

SP 9 Maintain Process Repositories

Repositories for storing and making available the organization's process descriptions and measures and information on their use are established and maintained.

This practice ensures that the organization's process assets and other useful information are stored and made available to support the planning, management, and performance of the organization's work efforts.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Determine the organization's needs for storing and retrieving process assets and process-related information.

2. Design the organization's repositories for storing and retrieving process assets and process-related information, including the repository structure, support environment, and procedures.
3. Construct or acquire and deploy the organization's repositories for storing and retrieving process assets and process-related information, including the repository structure, support environment, and procedures.
4. Conduct work product inspections of the design and established organization's process repositories.

Refer to the Guidelines for Work Product Inspection in Annex A for guidance that may be useful in implementing this practice.

5. Place the organizational repositories under configuration management.

Refer to the Organizational Configuration Management process area.

6. Revise the organization's repositories as needed.

SP 10 Deploy Process Assets

The organization's process assets and changes to them are deployed across the organization.

This practice ensures that the deployment of process assets and asset changes into the organization is performed, managed, and coordinated so that they are deployed appropriately, in an orderly manner and that they achieve the expected results.

Refer to the Guidelines for Organizational Change Management in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Determine which process assets and process asset changes are appropriate for each area of the organization and the timeframe for deploying them.
2. Plan the deployment of each process asset and process asset change.
3. Review the plans for the deployments with relevant stakeholders, and obtain their agreement.
4. Arrange for the associated support needed to successfully transition the organizational process assets, associated methods and tools, and changes to them.
5. Deploy the organizational process assets and associated methods and tools according to the deployment plans.
6. Provide guidance and consultation on the use of the deployed organizational process assets.
7. Evaluate the results of each deployment.
8. Identify significant deviations from the deployment plans and other issues related to the implementation and results of the deployments.
9. Identify and perform appropriate corrective actions to address identified significant deviations from the deployment plans and other issues.

SP 11 Collect Process Assets

Process-related work products, measures, and improvement information derived from performing the organization's processes are collected, packaged, and maintained in the organizational repositories.

This practice ensures that the best of the organization's process artifacts are captured and readily available to current and future work units and workgroups to support their learning and improvement.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Establish and maintain the criteria and procedures for obtaining, storing and retrieving process assets and process-related information.

Examples of process assets and process-related information include:

- defined process descriptions
- work procedures for example
- workgroup plans
- process and product assurance plans
- training materials
- process aids (for example, checklists)
- process and product measures
- lessons learned reports
- information on candidate process improvements

2. Obtain candidate process assets and process-related information from the units in the organization.
3. Evaluate and select the process assets and process-related information that will be incorporated into the organizational repositories.
4. Enter, update, and replace, as appropriate, the selected process assets and process-related information in the repositories for easy reference and retrieval.
5. Maintain the process assets and process-related information under version control.
6. Periodically review the process assets and process-related information entered into the repositories to ensure the completeness, integrity, accuracy, currency, and usefulness of the items.
7. Revise the process assets and process-related information as necessary, including adding or deleting assets.

SP 12 Analyze Process information

Information, work products, and measures derived from performing the organization's processes are analyzed to provide insight into and improve the organization's standard processes and related process assets.

This practice maintains an understanding of the use and value of the organization's process assets so that this information can be used to support organizational process improvement.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Obtain feedback on the use of the organization's standard processes and related process assets from relevant stakeholders.
2. Collect and analyze the organizational measures.
3. Conduct periodic reviews of the effectiveness and suitability of the organization's standard processes and related process assets relative to the organization's business needs and goals.
4. Conduct periodic reviews of the effectiveness, suitability, and usability of the organization's standard processes and related process assets relative to the needs and goals of those who tailor and implement the tailored processes.
5. Determine the extent of conformance with the requirements of the organization's standard processes and the tailoring guidelines and criteria.
6. Evaluate the processes, methods, and tools in limited use in the organization for use in other areas of the organization and coordinate the migration to these new areas.
7. Define and document improvement recommendations for problem areas and improvement opportunities in the organization's standard processes and related process assets.
8. Handle improvement proposals for the organization's standard processes and related process assets.

Handling improvement proposals includes:

- obtaining improvement proposals from people in the organization
- reviewing the improvement proposals.
- selecting the process improvement proposals that will be implemented
- implementing the improvement proposals
- tracking the implementation of the improvement proposals
- providing status of the improvement proposals to those who submitted the proposals and other relevant stakeholders

9. Derive and make available lessons learned from defining, piloting, implementing, and deploying the organization's standard processes and related process assets.

SP 13 Provide Information on Process Management

Status and results of the organization's process management activities are provided to relevant stakeholders.

This practice ensures that the people in the organization have an appropriate understanding of the organization's process management activities and process artifacts to help them in developing, preparing, deploying, operating, supporting, and improving the organization's products and services.

Subpractices

1. Maintain records of the organization's process management activities and process assets.

2. Provide feedback to the people in the organization on the status and results of the process management activities.

Examples of mechanisms to provide feedback include:

- process advisory and steering groups
- process working groups
- electronic bulletin boards
- electronic mail
- informational meetings
- informal discussions

14.2.2 Organizational Competency Development (OCD)

Maturity Level 3

14.2.2.1 Purpose

Organizational Competency Development develops the competencies within the organization's workforce that are needed to perform the organization's work using the organization's standard processes.

14.2.2.2 Introductory Notes

The goals and practices of this process area are expressed in context of the organization-level competency development activities. This process area is concerned with a workforce-wide perspective on the competencies required to support the organization's standard processes. It builds on the skills development activities performed by the individual work units to develop the skills needed by the managers and staff to perform their current assignments.

This process area may be addressed at multiple levels within an organization or enterprise. These activities at the various levels are related in a hierarchical manner. For example, at the enterprise level competency development may be concerned with the strategies and goals of the enterprise. The competency development of each of the organizations within the enterprise may be concerned with the strategies and goals of that organization, including strategies and goals that are derived from the enterprise. There may be additional organization levels (for example, strategic business areas). The goals and practices of this process area apply at each of these organizational levels that are managed by executives, although in some enterprises and organizations there may only be a single level.

The process area is primarily the responsibility of executive management. Typically the responsibility for performing or coordinating these competency development practices is assigned to a separate unit, such as a Human Resource Management unit or Training unit.

The following special term is used in the goals and practices of this process area:

- The term "workforce competency" is used to refer to a cluster of knowledge, skills, and process abilities that an individual should possess to be able to perform a particular type of work in the organization. A workforce competency is stated at a very abstract level, such as a need for competency in software engineering, financial accounting, or technical writing. It can also be decomposed to more granular abilities.
- The term "competency" is used to refer to a specific underlying characteristic of an individual that is causally related to effective and/or superior performance, as determined by measurable, objective criteria, in a job or situation.
- The term "skill" refers to a combination of the knowledge, abilities, personal work-related characteristics, process knowledge, and other attributes that an individual needs to perform specific tasks in their area of expertise.

- The term “role” is used to refer to a defined set of work tasks, dependencies, and responsibilities that can be assigned to an individual as a work effort. A role describes a collection of tasks that constitute one component of a process, and would normally be performed by an individual.

Organizational Competency Development involves:

- identifying the competency development needs of the organization
- planning the competency development activities
- maintaining the ability to provide the competency development needs
- providing the competency development opportunities to address the needs
- maintaining records of the competency development activities and results
- evaluating effectiveness of the competency development activities and performing corrective actions

At maturity level 2, the primary objective is to ensure that individuals are capable of performing the work assigned to them. At maturity level 3, there is an additional objective of ensuring that the individuals and the organization as a whole develop the competencies needed to perform a range of assignments within their specialty and using the organization’s standard processes. The greater the capability of individuals within their area of competence, the greater the ease with which they can transition between assignments. As their competency grows, they are able to successfully undertake tasks of increasing complexity or demand. The operational performance results that an organization achieves are heavily determined by a combination of the capability of its standard processes and the ability of the workforce to perform these processes.

The identification of competency development needs at maturity level 3 is primarily focused on supporting the organization’s strategic business goals and its standard processes. The organization is responsible for ensuring it has a workforce capable of performing its standard processes and mastering the challenges posed by future changes in the business.

The specific skills that were identified as needed to perform assigned work within the work units are important inputs in determining the organizational workforce competencies. The work units still retain primary responsibility for identifying and addressing the specific skills needed to perform the current work. However, the organization has the responsibility for identifying and developing the capabilities needed by individuals in each of the workforce competencies that are collectively needed to perform the organization’s standard processes and support the business goals. When the knowledge, skills, and process abilities underlying each of these workforce competencies have been identified and documented, work unit managers are able to draw on these descriptions to determine the specific skills needed within their work units.

The capabilities needed within each workforce competency consist primarily of three types

- technical capabilities to be able to perform the organization’s work, including skills to perform the processes and use the tools, materials, and information to perform the work
- personal work management capabilities, including time management, interpersonal communication, work coordination, teamwork, and self-management skills
- general organizational effectiveness capabilities, including the ability to be effective within the context of the organization’s structure, culture, and organizational policies, and the ability to work effectively within the operating procedures of the organization and unit to which the person belongs

The reason for this process area at maturity level 3 is that common workforce competencies driven by the organization’s business needs and standard processes is critical to establishing a learning organization and ensuring that the organization’s standard processes are performed consistently across all work units.

14.2.2.3 Specific and Institutionalization Goals

SG 1 Competency Development Is Planned

The development of the workforce competencies needed to perform the organization’s standard processes and support the organization’s strategic goals is planned.

SG 2 Workforce Competencies Are Developed

Individuals develop the knowledge, skills, and process abilities needed to perform their roles in the organization’s standard processes

InG Practices Are Institutionalized

The practices for Organizational Competency Development are institutionalized.

Institutionalization includes:

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.2.2.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Competency Development Is Planned)	SP 1 (Maintain Descriptions of Workforce Competencies) SP 2 (Identify Development Opportunities) SP 3 (Determine Competency Development Needs) SP 4 (Maintain Competency Development Plans)
SG 2 (Workforce Competencies Are Developed)	SP 5 (Maintain Competency Development Materials) SP 6 (Perform Competency Development Activities) SP 7 (Participate in Competency Development) SP 8 (Monitor Competency Development Activities) SP 9 (Measure Competency Development Effectiveness) SP 10 (Correct Competency Development Problems) SP 11 (Maintain Competency Development Records)
InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)

The five institutionalization practices, including subpractices and supplementary information, are contained in Part III, Chapter 13.

14.2.2.5 Specific Practices

SP 1 Maintain Descriptions of Workforce Competencies

Descriptions of the workforce competencies required to perform the various roles in the organization's standard processes and to support the organization's strategic goals are established and maintained.

This practice ensures that there is an understanding of the clusters of knowledge, skills, and process abilities that are needed for performing the organization's standard processes and supporting the organization's strategic goals.

Subpractices

1. Analyze the organization's strategies, critical business activities, and the organization's standard processes to identify the needed workforce competencies.

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

2. Analyze changes in the organization's products, services, processes, or technology, as needed, to determine when the workforce competencies need to be updated.
3. Document the descriptions of the graduated knowledge, skills, and process abilities underlying each of the workforce competencies required to perform the organization's standard processes.

Descriptions of the knowledge, skills, and process abilities underlying each workforce competency should be organized to represent graduated levels of capability in order to guide the identification of competency development activities that are appropriate for different levels of capability.

Examples of graduated levels of capability within a workforce competency include:

- beginner
- apprentice
- journeyman
- senior specialist
- master

4. Review descriptions of the workforce competencies with subject matter experts in each workforce competency and other relevant stakeholders.
5. Place the descriptions of the workforce competencies under version control.
6. Provide the descriptions of the workforce competencies to relevant stakeholders.

Examples of how the descriptions of the workforce competencies can be used include:

- identifying the skills needed to perform an assignment
- designing graduated career opportunities and career paths
- designing or tailoring workforce practices
- performing work activities
- planning individual development opportunities
- providing guidance on requirements and criteria for promotion
- assessing the overall capability of the workforce in different specialties

7. Revise the descriptions of the workforce competencies as needed.

SP 2 Identify Competency Development Opportunities

Descriptions of graduated development opportunities that support growth in the organization's workforce competencies are established and maintained.

This practice ensures that the organization identifies graduated development activities that support growth through increasing levels of capability in the organizations workforce competencies, and that the availability of these activities is communicated to the managers and staff.

Subpractices

1. Identify and document a set of graduated learning activities that develop the knowledge, skills, and process abilities appropriate to the various levels of capability in each workforce competency.
2. Identify and document the delivery vehicles and delivery timeframes for each of the competency development activities.

Some skills are effectively and efficiently imparted through informal vehicles, while other skills need to be based on more formal training vehicles. Examples of skills development vehicles that may effectively impart skills and abilities include:

- classroom training
- professional certification programs
- college extension courses
- computer-aided instruction
- guided self-study
- formal apprenticeship and mentoring programs
- facilitated videos
- chalk talks
- brown-bag lunch seminars
- structured on-the-job training

The competency development vehicles employed for each situation should be based on an evaluation of the knowledge, skills, and process abilities to be developed and the specifics of the situation.

3. Identify and document the relationships among the competency development activities and delivery vehicles for each workforce competency.

Examples of relationships among the competency development activities include:

- approved sequence of activities
- demonstrated proficiencies as prerequisites for participating in an activity
- relationships of the competency development activities to work assignments
- relationship of competency development activities to promotions and other career development opportunities

4. Review the descriptions of the competency development activities with subject matter experts and other relevant stakeholders and obtain their agreement.
5. Place the descriptions of the competency development activities for each workforce competency under version control.
6. Provide the descriptions of the competency development activities for each workforce competency to relevant stakeholders.
7. Revise the descriptions of the competency development activities for each workforce competency as needed.

SP 3 Determine Competency Development Needs

Identify the competency development needs for each of the organization's workforce competencies.

This practice ensures that the magnitude of the organization's competency development needs is understood, and the identification of these needs can be used as a basis for planning the organization's competency development activities.

Subpractices

1. Evaluate the current capability of the individuals performing the organization's standard processes against the competency description for their area of responsibility.
2. Identify the overall staff capabilities that are needed in each of the workforce competencies to perform the organization's standard processes.

Example measures of an organization's capability within a specific workforce competency include:

- the number of people at each graduated level of capability of the competency
- the number of people capable of performing each of the component skills of the competency

3. Identify the new component skills or areas of competence that will be need to be developed to support the organization's business strategies.

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

4. Determine the rate at which capability must be developed in each of the affected workforce competencies to support the organization's business strategies.
5. Determine the portion of capability development in each workforce competency that will be pursued through competency development activities.

Examples of ways that might be used to develop capabilities in an organization, in addition to competency development activities, include:

- hiring new staff
- developing an alliance partner
- outsourcing work

6. Document the capability requirements in each affected workforce competency to be addressed through the organization's competency development activities.

SP 4 Maintain Competency Development Plans

Plans for developing capabilities in each of the organization's workforce competencies are established and maintained.

This practice ensures that the competency development activities required to support the competency development needs of the organization are planned in order that the required capabilities are available when needed.

Subpractices

1. Assign responsibility and authority for coordinating, managing, and implementing each of the competency development activities.
2. Identify the participants who will participate in each of the competency development activities.

The participants may be identified as specific individuals or classes of individuals (for example, specific roles).

3. Identify the specific schedule for each of the competency development activities.
4. Identify the resources needed to perform each of the competency development activities.
5. Resolve conflicts among the schedule for the competency development activities and the estimated and available resources.
6. Document the organization's competency development plan.
7. Place the organization's competency development under version control.
8. Review the organization's competency development plan with relevant stakeholders, and obtain their agreement.
9. Revise the organization's competency development plan as needed.

SP 5 Maintain Competency Development Materials

Materials needed to perform the organization's competency development activities are established and maintained.

This practice ensures that the materials used in the organization's competency development activities satisfy their learning and development goals.

Subpractices

1. Document the description of each competency development activity.

Examples of the information provided in the competency development descriptions include:

- topics covered in the competency development activity
- intended audience
- prerequisites and preparation for participating
- competency development goals
- length of the skills development activity
- criteria for determining the students' satisfactory completion

2. Determine whether to develop the competency development materials internally or acquire them externally.

Refer to the Sourcing Management process area for practices that may be useful for acquiring skills development materials.

Examples of external sources of skills development materials include:

- customer-provided training
- commercially available training courses
- academic programs
- professional conferences
- seminars

3. Develop or obtain the competency development materials.

The following should be considered, as appropriate, in obtaining competency development materials:

- requirements for the material
- applicable design standards
- acceptance criteria for the materials
- need to pilot the skills development activity
- availability of methods to test mastery of material covered
- evaluation of the material
- maintenance of the materials

4. Review and approve the competency development materials.
5. Pilot the competency development materials and take corrective actions as appropriate for portions of the materials that do not serve their intended learning goals.
6. Place the competency development materials under version control.
7. Provide the descriptions of the competency development activities to relevant stakeholders.
8. Make the competency development materials for available to those who need them.
9. Revise the competency development materials as needed.

SP 6 Perform Competency Development Activities

Competency development activities are performed as defined in the organization's competency development plans.

This practice ensures that the organization's managers and staff are provided with the opportunities to acquire the knowledge, skills, and process abilities that are identified as needed to perform the organization's standard processes and support the organization's strategic goals.

Subpractices

1. Schedule the competency development activities.
2. Arrange for the facilities and resources needed to perform each of the competency development activities.
3. Identify the people who will participate in each of the competency development activities.
4. Confirm with each person that they will participate in their planned competency development activities.
5. Confirm that each of the participants in a competency development activity has the prerequisite skills and knowledge to participate in the activity.
6. Conduct each of the competency development activities.
7. Provide appropriate coordination, mentoring, and assistance to the participants of the competency development activities to maximize their learning experiences.
8. Determine whether each participant has achieved the learning necessary to receive credit for participating in the competency development activity.
9. Track the delivery of the competency development activities against the plans.

SP 7 Participate in Competency Development

Individuals participate in competency development activities as defined in the organizational competency development plans.

This practice ensures that the organization's managers and staff acquire the knowledge, skills, and process abilities needed to increase their capability for performing their roles in the organization's standard processes.

Subpractices

1. Identify which competency development activities each individual in an affected workforce competency should participate in based on their level of capability in their competency.
2. Schedule competency development activities for each of the individuals in an affected workforce competency to provide timely improvement in their capability for performing their role in the organization's standard processes.
3. Motivate and assist units in arranging their business activities so that affected individuals are able to participate in their planned competency development activities.
4. Provide appropriate encouragement and incentives for individuals so that they actively participate in the competency development activities.
5. Record the participation and completion information for each individual who participates in the competency development activities.

SP 8 Monitor Competency Development Activities

Status and performance in meeting the organization's competency development plans are monitored, and significant deviations are identified.

This practice ensures that the managers responsible for the organization's competency development plans and activities understand whether problems exist relative to satisfying the plans, and whether any corrective actions are needed.

Subpractices

1. Review, on a regular basis, the actual status, performance, and results against the competency development plans.
2. Collect and analyze measures of the actual status, performance, and results of the competency development activities

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

3. Identify significant issues in plans that are not being satisfied or that are at risk of not being satisfied.

SP 9 Measure Competency Development Effectiveness

The effectiveness of the organization's competency development activities is measured and evaluated, and significant deficiencies are identified.

This practice ensures that those responsible for managing the organization's competency development activities understand whether any problems exist relative to the effectiveness of these activities and whether any corrective actions are needed.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Obtain evaluations of the competency development activities from the participants, their managers or team leaders, and the staff conducting the skills development activities.
2. Obtain data on the effectiveness of participants in retaining their learning and translating it into work performance.
3. Establish quantitative evaluations and other feedback mechanisms on the effectiveness of the various competency development activities.

Examples of methods to assess the effectiveness of competency development activities include:

- evaluation mechanisms included as part of the competency development activities
- testing or evaluating the knowledge and skills of the students as part of the competency development activities
- follow-up surveys of participants to determine their satisfaction with the results of the competency development activities
- follow-up surveys of managers to determine their satisfaction with the results of the competency development activities for their staff
- follow-up evaluations of the ability of individuals to retain their learning and translate it into improved capability in performing their work
- independent evaluations of the competency development materials and activities for consistency with, and relevance to, the organization's needs and professional standards
- evaluations of the business impact of competency development activities at the individual, unit, or organizational levels

4. Collect analyze measures of the effectiveness of the competency development activities
5. Review the evaluations and measures to determine how well the needs of the participants and their managers were met.
6. Analyze measures of the effectiveness of the competency development activities to determine their impact on increasing the capability of individuals to perform their work and on improving the organization's business performance.
7. Identify significant deficiencies in the effectiveness of the competency development activities.
8. Periodically report on the effectiveness of the organization's competency development activities to relevant stakeholders.

SP 10 Correct Competency Development Problems

Corrective actions are performed to address significant deviations from the organization's competency development plans and significant deficiencies in the effectiveness of the competency development activities.

This practice ensures that significant problems in the organization's competency development plans and activities are addressed.

Subpractices

1. Analyze identified significant deviations from the organization's competency development plans to determine the causes and corrective actions to be performed.
2. Analyze identified significant deficiencies in the effectiveness of the organization's competency development activities to determine the causes and corrective actions to be performed.
3. Review the planned corrective actions for the identified competency development problems with relevant stakeholders, and obtain their agreement.
4. Perform the agreed-to corrective actions and track to closure.

Examples of corrective actions include:

- revising the skills development materials and activities
- providing remedial skills development to previous participants
- changing the skills development delivery method
- improving individual and unit planning for the handling the impact of competency development activities
- delivering the skills development activities closer to the time that the participants use the skills

5. Evaluate the effects of the corrective actions and make adjustments as needed.

SP 11 Maintain Competency Development Records

Records of the organization's competency development activities are established and maintained.

This practice ensures that records are available that accurately describe the capabilities of individuals for consideration in work assignments or as input to other workforce practices such as promotions or adjustments to compensation.

Examples of corrective actions include:

- evaluation of timeliness, effectiveness, or coverage of competency development activities
- evaluation of workforce capability and preparedness
- evaluation of individual capability for making assignments
- evaluation of individual capability for promotion or other career action
- record of accomplishing development activities as part of personal performance goals
- input for determining adjustments to compensation

Subpractices

1. Establish appropriate levels of security are provided to protect the confidentiality of competency development records.
2. Maintain records of all individuals who successfully complete each competency development activity as well as participants who are not successful.
3. Maintain records of all staff that have been waived from specific competency development activities.

The rationale for granting a waiver should be documented, and both the manager responsible for the competency development activity and the manager of the individual who is granted the waiver should approve the waiver.

4. Maintain records for each individual of the competency development activities they have completed or have been waived through.
5. Make the competency development records for each individual available to the managers who are responsible for their development and assignments.
6. Use the competency development records for each individual as input to workforce practices for which they provide relevant input or evidence.

14.2.3 Organizational Resource Management (ORM) Maturity Level 3

14.2.3.1 Purpose

Organizational Resource Management plans and manages the acquisition, allocation, and reassignment of people and other resources needed to develop, prepare, deploy, operate, and support the organization's products and services.

14.2.3.2 Introductory Notes

The goals and practices of this process area are expressed in context of the resource management that is performed at the organization level.

This process area may be addressed at multiple levels within an organization or enterprise. These activities at the various levels are related in a hierarchical manner. For example, the executive management of an enterprise may plan and manage the overall resources for the enterprise and establish resource allocations or guidelines for the individual organizations in the enterprise (for example divisions or locations). The executive management of each of the organizations may plan and manage the overall resources for the organization needed for the work performed within the organization. There may be additional organization levels (for example, strategic business areas). The goals and practices of this process area apply at each of these organizational levels that are managed by executives, although in some enterprises and organizations there may only be a single level.

The process area is primarily the responsibility of the organization's executive and middle managers.

The following special terms are used in the goals and practices of this process area:

- The term "product and service offering" is used to refer to a set of closely related products and services that are targeted to a specific customer or customer segment. A product and service offering may include a product as the main component with supporting services, a service as the main component with supporting products, a set of products that are used together, a set of products and services that form a business offering, or a single product or service.

A product and service offering may be for use internal or external to the organization.

- The term "product and service work" is used as an abbreviated form for the work an organization performs in developing, preparing, deploying, operating, and supporting, a product and service offering, as well as managing these activities.
- The term "operation" and "operating," when used in reference to a product and service offering, refers to
 - providing the offering customers appropriate access to the offering products, supplies, and other offering resources
 - operating the equipment that is part of the offering
 - delivering the offering services to customers
 - performing the transactions of the offering
- The term "resources" is used to refer to the quantities of each of the specific types of people, facilities, equipment, computing and communication infrastructure, supplies, and other resources the organization applies to the product and service work.
- The term "capability" is used to refer to characteristic of possessing the skills, knowledge, proficiency, and resources to accomplish a specific purpose or to be used for a specific purpose.

Organizational Resource Management involves

- identifying the product and service offerings that constitute the organization’s portfolio
- setting the budgets to cover the product and service work and other support for these offerings
- establishing and maintaining a quantitative understanding of the current and projected resources needed to perform the product and service work for the offerings
- evaluating, on a regular basis, the balance between the organization’s portfolio of products and services and the resources that can be acquired and allocated, and reconciling the differences
- establishing and maintaining plans to adjust the organization’s resources to account for the current and projected capacity needs
- obtaining or releasing the resources to fit the needs
- allocating the available resources to the units and workgroups, as needed, to maintain an appropriate balance of capacity and work

Practices in this process area are performed within the context of the organization’s portfolio of products and services. Strategic decisions regarding the product and service portfolio are outside the scope of, but are input to, this process area. This process area contains the practices required to maintain equilibrium between capacity planned for the products and services in the organization’s portfolio and the resources required to develop, prepare, deploy, operate, and support the portfolio.

In determining the plans for resources, several competing and possibly conflicting factors are considered. These include:

- organization’s strategic and tactical goals
- planned and expected changes to the organization’s product and service offerings (for example, maintenance and support existing offerings, evolving existing offering, removing existing offerings, and adding new offerings)
- characteristics and attributes of each product and service offering, such as capabilities and features
- capacity plans for the product and service offerings
- business and financial aspects of the offering
- historical resource utilization data and past experiences for similar offerings
- current capacity of the organization
- current resources in the organization

Organizational resource management should be viewed as a supply chain management activity. The “suppliers” of the resources may be external suppliers or vendors, or they may be internal business functions such as human resource management or the information services group, depending on the type of resources. The “client” is the organizational resource management work effort. The “customers” are the managers of the units performing the product and service work.

The reason for this process area at maturity level 3 is that, from an organizational perspective, executive and middle management have the responsibility for the success of the organization’s products and services. One of the key aspects of this management responsibility is to ensure that the organization’s units have the resources they need to perform their product and service work.

14.2.3.3 Specific and Institutionalization Goals

SG 1 Organization Resources Are Aligned With the Portfolio

The organization's available resources are aligned with the resources needed for the organization's product and service portfolio.

SG 2 Resources Are Balanced With Capacity Plans

The resources provided for the product and service offerings are sustained and balanced with the capacity plans of the offerings.

InG Process Is Institutionalized

The practices for Organizational Resource Management are institutionalized.

Institutionalization includes:

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.2.3.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Organizational Resources Are Aligned With the Portfolio)	SP 1 (Maintain Portfolio Description) SP 2 (Maintain Budgets for Organizational Resources) SP 3 (Maintain Estimates of Resources) SP 4 (Resolve Imbalance between Portfolio and Resources) SP 5 (Maintain Organizational Resource Plans)
SG 2 (Resources Are Kept in Balance With Capacity Plans)	SP 6 (Integrate Resource Management Into Standard Processes) SP 7 (Allocate Organization's Resources to Units) SP 8 (Integrate Suppliers of Resources) SP 9 (Monitor Use of Organization's Resources) SP10 (Model Consumption of Organization's Resources) SP 11 (Correct Organizational Resource Imbalances)
InG (Process Is Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)

The five institutionalization practices, including subpractices and supplementary information, are contained in Part III, Chapter 13.

14.2.3.5 Specific Practices

SP 1 Maintain Portfolio Description

A description of the organization's portfolio of products and services is established and maintained.

This practice ensures that there is a clear understanding of the organization's portfolio of product and service offerings so that the organization's managers can determine the work that needs to be performed and the capacity needed.

Determining the product and service offerings that make up the organization's portfolio and making changes to the portfolio are strategic business decisions that are outside the scope of this process area and maturity model. These decisions are made through a strategic business process, and information from these decisions is available to perform this practice. This practice deals with collecting and organizing the portfolio information into a form that can be used for planning and managing the organizational resources required to support the portfolio.

Subpractices

1. Organize the information about the organization's current product and service offerings and planned changes so that all the product and service work can be determined.
2. Determine and document the characteristics and features of each offering that affect the resources necessary for performing the product and service work.

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

3. Document the description of the portfolio.
4. Place the description of the portfolio under version control.
5. Make the description of the portfolio available to relevant stakeholders.
6. Monitor the changes that are made to the organization's portfolio to determine if changes to the portfolio description are needed.

Examples of portfolio changes include:

- adding an offering to the portfolio
- retiring an offering from the portfolio
- making significant changes to the characteristics and attributes of an offering that affect the product and service work

7. Revise the description of the portfolio as needed.

SP2 Maintain Budgets for Organizational Resources

Organizational budgets are established and maintained for the products and services in the organization's portfolio

This practice ensures that the organization establishes the financial constraints as a basis to balance the portfolio of products and services with the resources that can be applied to perform the product and service work.

The budgets referred to in this practice are typically allocated at the organizational level to entities (for example, buildings and facilities, human resources, information technology, and operational management) responsible for the affected organizational resources. Budgets may be further subdivided and allocated as needed. The objective is to ensure that the organization makes clear the budget that has been allocated for each type of resource.

Subpractices

1. Review the existing budgets and actual expenditures for the product and service offerings to aid in establishing the budget to cover the organization's portfolio of products and services.
2. Establish budgets for each of the organizational resources needed to support the organization's product and services portfolio.

The strategic and business planning processes that lead to the formation of one or more budgets for organizational resources are not a part of this practice. This practice uses the outcome of those strategic activities to create a budget that can be used for managing organizational resources. Once established, the budgets are maintained and updated according to organizational and financial guidelines.

3. Allocate and document the budgets for the different product and service offerings, types of resources, and units responsible for the product and service work.
4. Allocate and document the budgets for the different organizational shared resources, types of resources, and units responsible for the shared resources.

Examples of organizational shared resources include:

- disaster recovery and business continuity facilities and support
- information services
- suppliers providing shared services
- support functions such as finance and human resources

5. Place the budgets for organizational resources under version control.
6. Periodically review the organization's portfolio of products and services and relevant business and organizational conditions to determine if adjustments need to be made to any of the budgets.

The budgets can be reviewed at the organizational level or they can be reviewed separately for each unit to which it has been allocated for managing product and service offerings in the organization's portfolio. Examples of business and organizational conditions that might affect the budget include:

- changes in the market, customer base, or economy
- changes in product and service offerings by competitors
- significant organizational events such as reorganizations, divestitures, mergers, or changes in strategic direction that affects product and service offerings
- organizational business performance
- changes in the organization's business strategies
- progress and performance within specific product and service offerings

7. Revise the organizational resources budgets and allocations as needed.

SP 3 Maintain Estimates of Resources

Estimates are established and maintained for each of the organizational resources that are needed to support the product and service portfolio.

This practice ensures that the organization has an accurate estimate of the total resources of each type required to support all the product and service offerings in its portfolio.

Some organizations allocate resource budgets and then estimate how much work can be accomplished within the budgets. Other organizations estimate the required work independently of budget allocations and then aggregate the estimates across the product and services portfolio to determine how much budget would have to be allocated to support all the proposed work. Either approach or a hybrid such as an iterative estimating and budgeting process may be used. Ultimately, the organization must generate numbers for both the resources budget and the estimated organizational resources needed so that the portfolio of product and service offerings can be brought into balance with the budgeted resources for supporting it.

Subpractices

1. Identify the categories of resources that need to be estimated.
2. Obtain and analyze available historical data and other inputs that are needed to derive estimates of the resources.

Examples of historical data that might be used includes:

- Trends in volumes for the product and service offerings and the expected variations in the volumes
- Expected changes in volumes over the life cycle of the product and service offerings

The rationale for using the selected historical data or not using historical data should be documented.

3. Derive and document estimates of the overall effort and specific skills required to support each of the product and service offerings in the organization's portfolio.

Estimates of overall effort need to include all the activities that need to be performed, including overhead tasks such as training, administrative activities, meetings, and assistance to other work units.

Examples of people resources that might be estimated include:

- full time equivalent employees
- temporary or part time employees
- contractors
- staff from suppliers, partners, or customers
- outsourced work

4. Derive and document estimates of the non-people resources required to support each of the product and service offerings in the organization's portfolio.

Examples of non-people resources include:

- facilities resources such as buildings and offices, storage areas, and furniture
- equipment resources such as machinery, vehicles, and tools
- computing and communication resources such as computing and communication equipment, telephony and internet services, software and applications, data centers, information repositories, and disaster recovery capabilities
- supplies such as materials incorporated into products or services, consumable office items (paper, pens, etc.), items consumed by customers during product or service operations, and cash to support transactions
- travel expenses

5. Resolve overlaps and opportunities to share organizational resources across the product and service offerings in the portfolio.
6. Aggregate the estimates, by resource type, for the product and service offerings into an overall organizational estimate for the entire portfolio.
7. Revise the estimates of the organizational resources that are needed to support the product and service portfolio as needed.

SP 4 Resolve Imbalance between Portfolio and Resources

The budgeted resources that are available and planned to support the organization's portfolio of products and services are reconciled with the capacity plans.

This practice ensures that the organization can effectively support the portfolio of product and service offerings.

Subpractices

1. Identify the categories of resources that need to be budgeted.
2. Obtain estimates of the resources needed for each offering.
3. Compare the total resources required to support the product and service portfolio to the relevant budgets to identify imbalances.
4. Make appropriate adjustments to balance the quantity of each resource with the products and services in the portfolio.

Examples of methods to balance capacity with the portfolio include:

- adjusting the budget and capacity of the affected organizational resources
- adjusting the number of product and service offerings in the portfolio
- improving the efficiency of resource utilization or sharing
- reducing the cost of organizational resources

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

5. Periodically monitored trends and projections of the actual consumption of each resource are to identify imbalances between the resource capacity and the products and services in the portfolio.
6. Identify and perform appropriate corrective actions to avoid or minimize imbalances between the product and service portfolio and the resources required to support them.

SP 5 Maintain Organizational Resource Plans

Plans are established and maintained to provide the units with the resources they need to perform the product and service work for the organization's portfolio of products and services.

This practice ensures, within the constraints of budget and other planning parameters, that plans exist to provide sufficient organizational resources when needed to support the products and services portfolio.

Subpractices

1. Establish and maintained the plans for monitoring the resource utilization and projections for the product and service work and reporting the information to executive and middle management.
2. Establish and maintained the plans for the addition, reassignment, or reduction of people for performing the product and service work.
3. Establish and maintained the plans for acquiring, deploying, maintaining, and retiring the resources needed to support the product and services portfolio.

Examples of elements that might be included in the plan for each organizational resource include:

- the schedule for acquiring, deploying, and retiring the resource
- the rate at which the resource should be acquired, deployed, consumed, and replaced
- the rate or expenditure of the effort and budget associated with the resource
- how suppliers of the resource will be selected and managed
- how supplier activities will be integrated into the affected standard product and service processes
- how the resource requests will be evaluated and approved
- the risks associated with acquiring and deploying the resource and how they can be mitigated
- how the resource utilization and consumption will be monitored and adjustments made if necessary
- how any necessary transition will be managed when a resource is retired

4. Review the plan and commitment changes with relevant stakeholders, and obtain their agreement.

5. Place the organizational resource plans under version control.
6. Revise the organizational resource plans as needed.

SP 6 Integrate Resource Management into Standard Processes

The organization's resource management activities are integrated into the organization's standard processes and other organizational process assets for the product and service work.

This practice ensures that the organization exploits the benefits of its standard processes for effectively managing the organization's resources so that the product and service work is performed effectively and efficiently.

Organizational process assets typically include:

- standard processes
- definitions of standard measures
- guidelines and criteria for tailoring the standard processes and definitions of standard measures
- repositories for storing and making available process descriptions, measures, and other information

The resource management activities that should be included in the product and service work include:

- estimating the resource needs
- requesting the needed resources
- obtaining the resources
- preparing the resources for use
- deploying the resources
- monitoring and reporting the utilization of the resources
- releasing unneeded resources for reallocation or release

Refer to the Organizational Process Management process area for practices that cover the establishment and maintenance of the organizational process assets.

Subpractices

1. Define needed changes to the organization's standard processes and other organizational process assets that are needed to incorporate the resource management activities into the product and service work.
2. Document the needed changes to the organization's standard processes and other organizational process assets.
3. Negotiate the needed changes with those responsible for the organization's process assets.
4. Document the agreed-to changes to the organization's standard processes and other organizational process assets.
5. Revise the descriptions of needed changes to the organization's standard processes and other organizational process assets as needed.

SP 7 Allocate Organization's Resources to Units

The organization's available and planned resources to support the portfolio are allocated to the units based on what they need to perform their assigned product and service work.

This practice ensures that the organizational resources are equitably allocated to the units based on the work they have to do.

Refer to the Organizational Process Leadership process area for practices that cover allocating resources to the units, monitoring the usage and needs, and adjusting the resource allocation.

Refer to the Product and Service Work Management process area for practices that cover the planning and management of the resources for a product and service offering.

SP 8 Integrate Suppliers of Resources

The sources and suppliers of organizational resources needed for the product and service work are integrated into the organizational resource management process and the processes for performing the product and service work.

This practice ensures that suppliers are effectively integrated into the organizations defined processes for performing product and services work in order to improve the efficiency with which organizational resources are deployed for use.

Refer to the Sourcing Management process area for practices that cover the selection and management of suppliers.

The integration of supplying, managing, deploying, and utilizing resources can be viewed as a supply chain management.

Subpractices

1. Select suppliers and sources of resources.

Examples of criteria that can be used to select suppliers and sources of resources include:

- their ability to obtain and provide the needed resources in the amounts needed and in the timeframe needed
- their ability to integrate their supply processes into the organization's processes for managing resources performing the product and service work
- their ability to integrate their supply processes into the units' processes for performing the product and service work
- prior performance records

2. Establish sourcing agreements and supplier management practices to appropriately integrate their resource supply activities with organizational resource management activities and the product and service work processes.
3. Track the performance of suppliers and identify problems and issues.
4. Take corrective action when problems and issues are identified in the performance of the suppliers of resources.

SP 9 Monitor Use of Organization's Resources

The quantity of each organizational resource consumed in supporting the organization's product and services portfolio is monitored, and problems are identified.

This practice ensures that the organization has accurate data from which to more accurately estimate, plan, and manage the quantity of each organizational resource required to support the product and services portfolio.

Subpractices

1. The utilization of each type of organizational resource is tracked at appropriate points in the defined processes for each product and service offering.
2. The quantity consumed of each type of resource is aggregated across all offerings in the product and services portfolio to characterize trends in the use of organizational resources.
3. Actual utilization for each type of resource is compared to capacity plans at both the organizational and offering levels to monitor status, identify trends, and detect significant deviations from plan.
4. Reports concerning the utilization of each type of organizational resource are provided to relevant stakeholders.
5. Trends in the utilization of organizational resources are compared to budgets for the resources and reports on trends are made available to relevant stakeholders.

SP 10 Model Consumption of Organization's Resources

Trends and predictions of the acquisition, allocation, and utilization of organizational resources are used to adjust the organizational resource estimates, budgets, and plans.

This practice ensures that the organization learns from monitoring the resource acquisition, allocation, and utilization activities and results, and makes appropriate adjustments.

Subpractices

1. Develop models of trends in resource acquisition, allocation, and utilization observed in the data gathered in monitoring the consumption of organizational resources.

At Level 3, models of trends in resource acquisition, allocation, and utilization should describe observed trends in resource consumption. They can be used for calibrating future resource estimates and plans for various product offerings or for evaluating risks in the current rate of consumption. These models are not necessarily developed to the level of the statistically predictive models that would be characteristic at Level 4. Consequently they are not yet rigorous enough to be used for the quantitative process control of resource consumption. However, they represent the first step toward such statistical models. Models of trends in resource acquisition, allocation, and utilization can be developed for each type of resource at the portfolio, product and service line, or product and service offering levels.

2. Integrate models of trends in resource acquisition, allocation, and utilization into the procedures used in estimating and planning the organizational resource requirements for each product and service offering.
3. Use models of trends in resource acquisition, allocation, and utilization in monitoring the consumption of organizational resources by each product and service offering to aid in determining the need for corrective action.
4. Evaluate and adjust models of trends in resource acquisition, allocation, and utilization as changes occur in the technology, standard or defined processes, or content of the product and services portfolio that affect the resource requirements for supporting product and service offerings.

5. Maintain models of trends in resource acquisition, allocation, and utilization under appropriate levels of configuration control.

SP 11 Correct Organizational Resource Imbalances

The organization's resources of each type are reallocated to the units and product and service offerings, as needed, to maintain appropriate balance of capacity and plans.

This practice ensures that adjustments are made as needed to best balance the availability and consumption of organizational resources.

Subpractices

1. Take corrective actions as needed to mitigate significant deviations between actual and planned utilization of specific organizational resources within a product and service offering.
2. Reallocate the organization's resource across work units or product and service offerings to mitigate imbalances in allocation or utilization.
3. Reallocate organizational resources in response to changes in the organization's product and services portfolio.
4. Involve sources, suppliers, and other relevant stakeholders in corrective actions or reallocations that affect their business processes or agreements.
5. Identify and eliminate, to the extent possible, causes of significant imbalances in organizational resources.

14.2.4 Organizational Configuration Management (OCM) Maturity Level 3

14.2.4.1 Purpose

Organizational Configuration Management identifies, manages, and controls the content and changes to the organization's configuration management (CM) product baselines that compose and support the organization's product and service offerings.

14.2.4.2 Introductory Notes

The goals and practices of this process area are expressed in context of the organization's overall configuration management efforts.

This process area is typically the responsibility of organizational work units and workgroups that are responsible for performing configuration management for all the organization's product and service offerings.

The following special terms are used in the goals and practices of this process area:

- The term "work unit" is used to refer to an organizational unit that is directly responsible for agreeing to requirements, planning, managing, and performing product and service work or internal business functions.
- The term "project" is used to refer to a temporary endeavor undertaken to create a unique product or service. A project may be composed of projects (that is, sub-projects). A project is a special instance of a work unit. A project may be composed of multiple sub-projects and work units.
- The term "CM product baseline" is used to refer to a set of related work products that are formally controlled together to ensure consistency and integrity of product releases. CM product baselines provide a mechanism for coordinating work of teams and managing changes to the critical work products over the whole life cycle.

- The term “configuration item” is used to refer to any work product designated as a component of a CM product baseline. Configuration items are placed under configuration management and are formally controlled.
- The term “service pack” is used to refer to an update release for a product in which only the changed components are released rather than the entire product.

Organizational Configuration Management involves:

- identifying the organization’s CM product baselines that compose the organization’s product and service offerings
- identifying the configuration items that compose the organization’s CM product baselines
- defining points in time that the organization’s CM product baselines will be established
- controlling changes to the configuration items that make up the organization’s CM product baselines (these controlled work products are referred to as “configuration items”)
- building the organization’s CM product baselines from the configuration items
- providing the organization’s CM product baselines for use
- maintaining the integrity of the organization’s CM product baselines, their configuration items, and the associated records
- providing reports to relevant stakeholders on the organization’s configuration management activities, and on the status and content of the organization’s configuration items and CM product baselines

This process area covers the practices for performing configuration management. The specific work products that might be placed under configuration management are identified in the process areas that describe the development and maintenance of those work products.

Work products that comprise a CM product baseline may be all from a single work unit or workgroup or they may come from multiple work units and workgroups.

The Organizational Configuration Management process area is an evolution of the Work Unit Configuration Management process area at maturity level 2. The key differences and similarities between Work Unit Configuration Management and Organizational Configuration Management are summarized in the section on “Work Unit Configuration Management versus Organizational Configuration Management” in Annex B.

The reason for this process area at maturity level 3 is that control of the content of configuration items (critical work products) and CM product baselines are essential to support the end-to-end development, preparation, deployment, operation, supporting, and management of the organization’s products and services.

14.2.4.3 Specific and Institutionalization Goals

SG 1 Configurations Are Identified

The organization’s CM product baselines and their configuration items that will be controlled are identified.

SG 2 Contents of Configurations Are Controlled

The content of the organization’s CM product baselines and their configuration items are managed and controlled.

SG 3 Configuration Management Information Is Reported

Information that describes the content and status of the organization’s CM product baselines and their configuration items is maintained and reported to relevant stakeholders.

InG Practices Are Institutionalized

The practices for Organizational Configuration Management are institutionalized.

Institutionalization includes:

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.2.4.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Configurations Are Identified)	SP 1 (Maintain Configuration Management Strategy) SP 2 (Maintain Configuration Management Repositories) SP 3 (Identify Configuration Items) SP 4 (Specify CM Product Baselines) SP 5 (Maintain Description of Configuration Architecture)
SG 2 (Contents of Configurations Are Controlled)	SP 6 (Manage Changes to Configurations) SP 7 (Build CM Product Baselines) SP 8 (Deliver CM Product Baselines)
SG 3 (Configuration Management Information Is Reported)	SP 9 (Maintain Configuration Management Records) SP 10 (Audit Configuration Management Operations) SP 11 (Audit CM Product Baselines) SP 12 (Provide Configuration Management Reports)
InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)

The five institutionalization practices, including subpractices and supplementary information, are contained in Part III, Chapter 13.

14.2.4.5 Specific Practices

SP 1 Maintain Configuration Management Strategy

The strategy for performing and coordinating configuration management for the organization is established and maintained.

This practice ensures that the people involved in developing, maintaining, controlling, and using the organization's configuration items and CM product baselines understand how configuration management will be performed.

Subpractices

1. Determine the overall scope of configuration management for the organization.

Examples of dimensions to consider in determining the overall scope of configuration management includes:

- parts of the business that will be covered (for example, IT operations, marketing, human resource management, and engineering)
- product and service offerings that will be covered
- infrastructure components that will be covered (for example, network components, mainframe computers, fax machines, and telephones)

2. Determine how the overall scope of configuration management will be divided into areas of responsibility.

Examples of ways to divide the overall scope of configuration management includes:

- a single configuration management effort for the organization
- configuration management areas organized in a hierarchy
- a federation of configuration management areas
- independent configuration management areas

Organizations typically evolve from largely independent configuration management efforts through intermediate stages of integration to their desired state over a period of time.

3. Define the organizational structure of work units, workgroups, and individual roles that will be responsible for configuration management.

Examples of configuration management roles and functions includes:

- change managers who are responsible for collecting proposed changes, filtering the changes, and organizing them for action
- configuration control boards (also called change control boards) that are responsible for evaluating proposed configuration changes, approving and disapproving changes, establishing change plans, and monitoring the implementation of plans
- emergency change committees that are responsible for making configuration management decisions in emergency circumstances when the full configuration control board cannot be convened
- configuration management work units that are responsible for planning and perform the actual configuration management activities as directed by the configuration control boards and emergency change committees

4. Define how the organization's configuration management efforts and systems will be integrated and coordinated.

Examples of mechanisms that can support the integration and coordination of configuration management efforts and systems includes:

- standardized naming and numbering of configuration items and CM product baselines
- use of standard processes and work procedures for configuration management
- use of standard or centralized configuration management database and support tools
- coordination meetings involving representative of the different configuration management efforts
- sharing of reports across configuration management efforts

5. Define how the configuration management activities and repositories of suppliers and customers will be integrated with those of the organization.
6. Define how the relevant stakeholders will be represented in the organization's configuration management decisions.
7. Document the organization's configuration management strategy.
8. Review the organization's configuration management strategy with relevant stakeholders, and obtain their agreement.
9. Place the organization's configuration management strategy under version control.

Version control ensures that a work product is changed in a controlled manner and that the version of the work product in use at a given time (past or present) is known. If more control is needed, the work product can be placed under configuration management.

10. Revise the organization's configuration management strategy as necessary.

SP 2 Maintain Configuration Management Repositories

Configuration management repositories for the organization are established and maintained.

This practice ensures that the repositories needed to store and manage the work unit's configuration items, CM product baselines, and associated data and records are adequate and appropriate.

The configuration management repositories are themselves configuration items and managed as such.

Subpractices

1. Select and install configuration management repositories for storing the organization's configuration items, CM product baselines, and associated records.

Different configuration management repositories may be needed for different types of configuration items such as software, hardware, documents, and CM records.

2. Select and install configuration management repositories for documenting, storing, and tracking problem reports and change requests against the organization's configuration items and CM product baselines.
3. Establish the mechanisms and procedures to store, retrieve, and update the contents of the organization's configuration management repositories.
4. Establish the mechanisms and procedures to appropriately control access to the contents of the organization's configuration management repositories.
5. Establish the mechanisms and procedures to appropriately move the organization's configuration items and CM product baselines between configuration management control levels.

Examples of configuration management control levels include:

- development control — configuration items that are being developed, prepared, or revised and that are under the control of the individuals performing the development, preparation, or revision
- internal master control — configuration items and CM product baselines that are under the work unit's configuration management control, but have not been delivered for use outside the work unit
- release control — configuration items and CM product baselines that are under the work unit's configuration management control and have been delivered for use outside the work unit
- archive control — configuration items and CM product baselines that were previously in use but are not now in use

6. Revise the organization's configuration management repositories as necessary.

SP 3 Identify Configuration Items

A list of configuration items that will be controlled by the organization is established and maintained.

This practice ensures there is a shared understanding among relevant stakeholders as to which of the organization's work products are maintained under configuration management, specific characteristics of these work products, and when each of these work products will be placed under configuration management.

The list of configuration items and their descriptions are themselves configuration items and are managed as such.

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Identify the configuration items for the organization that will be controlled based on documented criteria.

Examples of criteria for selecting configuration items include:

- it is one of a collection of work products which are highly interdependent
- it is a critical single point of failure for a work effort, system, or operation
- multiple versions or variants will exist
- more than one person or workgroup will use it for their development or other work
- it will be the basis for work products or work efforts in multiple units or organizations
- it will be reused in the future
- it will impact a work effort, system, or operation if a fault or failure is experienced
- it is a work product that when changed may affect the capacity and availability of an offering
- it is a work product that should be protected against theft or loss
- it is a work product for which information such as the serial number, purchase date, and supplier needs to be recorded and available

Individual work products created or modified as part of the transactions or operations of a product and service offering (for example, forms completed as part of the transactions, daily transaction logs, and individual letters to customers) are typically not designated as configuration items and are not placed under CM — however there are exceptions.

Examples of configuration items include:

- product or service requirements specifications
- system architecture descriptions
- product or service design documents
- hardware components
- hardware maintenance contracts
- developed software components
- commercial software packages
- software licenses
- system operating manuals
- process descriptions for performing work
- training materials
- forms and templates used in performing work
- critical records (that satisfy the above criteria for configuration items) resulting from performing work (for example, records from acceptance testing of a system)

2. Assign unique identifiers to each configuration items.
3. Describe the important characteristics of each configuration items.

Examples of important characteristics of controlled work product include:

- owner responsible for the configuration item
- type of work product (for example, hardware, software, or document)
- CM product baselines in which it is used
- file type (if work product is stored electronically)
- creation tools (for example, specific programming language or word processor)
- location where the configuration item is stored
- access restrictions
- related configuration items

4. Define when each configuration items will be placed under configuration management.
5. Review the list of configuration items with relevant stakeholders, and obtain their agreement.
6. Place the list of configuration items under configuration management.
7. Revise the list of configuration items as necessary.

SP 4 Specify CM Product Baselines

Specifications of the organization's CM product baselines that compose the organization's product and service offerings and support their use are established and maintained. that.

This practice ensure that there is a shared understanding among relevant stakeholders as to when the organization's CM product baselines will be created, the configuration items that compose each CM product baseline, and how the CM product baselines will be used.

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

The specification of a CM product baseline is itself a configuration item and managed as such.

Subpractices

1. Identify the organization's CM product baselines that compose and support the organization's product and service offerings.

Examples of CM product baselines include:

- IT desktop workstation baseline that includes the product requirements, product design, and deployed hardware (e.g., a standard-configured PC system unit, monitor, keyboard, mouse, and printer), software (e.g., standard off-the-shelf programs, software licenses, and requirements specification, design document, and modules for developed programs), and user manuals.
- the hardware, software, communications infrastructure (including the product requirements, product design, deployed components, and associated manuals), process descriptions, training materials, forms, etc needed for a business offering such as operating a customer service desk.

2. Specify the configuration items that comprise each CM product baseline.

3. Assign unique identifiers to each CM product baseline.
4. Specify the build and release procedures for each CM product baseline.
5. Specify the intended users and uses of each CM product baseline.
6. Describe the important characteristics of each CM product baseline and each configuration item.

Examples of important characteristics of CM product baselines include:

- owner responsible for the CM product baseline
- component configuration items
- locations where the CM product baseline is stored
- access rights and restrictions
- related product baselines

7. Review the specifications of the CM product baselines with relevant stakeholders, and obtain their agreement.
8. Place the specifications of the CM product baselines under configuration management.
9. Revise the specifications of the CM product baselines as necessary.

SP 5 Maintain Description of Configuration Architecture

The description of the organizational configuration architecture is established and maintained.

This practice ensures that the interdependencies and relationships of the organization's configuration items and CM product baselines are understood and this knowledge is used to manage the organization's configurations.

A "configuration architecture" describes the relationships among the various configuration components (that is, configuration items and CM product baselines) and their relationships to their installation and use environment. Examples of what a configuration architecture might describe include:

- the configuration items that compose each CM product baselines
- the inclusion of CM product baselines in other CM product baselines and the parent/child and peer relationships
- the interdependencies and relationships among the configuration items
- the interdependencies and relationships among the CM product baselines
- the interdependencies and relationships of each CM product baseline with other components that are not under the organizational configuration management (for example, installation sites components and organizational components that are not under configuration management)
- the CM product baselines required for running various applications and providing various services
- derivational relationships (for example, a configuration item that is a modification of another configuration item)

The description of the organizational configuration architecture is itself a configuration item and managed as such.

Subpractices

1. Obtain and analyze the available information on the organization's configuration items and CM product baselines and their uses.
2. Determine the types of relationships that need to be covered in the description of the organizational configuration architecture.
3. Define and document the organizational configuration architecture.

This practice is directly related to the practices on identifying and specifying the configuration items and CM product baselines. If the decomposition into configuration items and CM product baselines is either too detailed or not detailed enough, the effort and complications in managing the configurations will be excessive.

4. Conduct work product inspections of the description of the organizational configuration architecture.

Refer to the Guidelines for Work Product Inspection in Annex A for guidance that may be useful in implementing this practice.

5. Review the description of the organizational configuration architecture with relevant stakeholders, and obtain their agreement.
6. Place the description of the organizational configuration architecture under configuration management.
7. Revise the description of the organizational configuration architecture as necessary.

SP 6 Manage Changes to Configurations

Changes to the organization's configuration items are managed.

This practice ensures that the configuration items and the descriptions of the CM product baselines are updated in a controlled manner so that their contents remain in a known authorized state.

Subpractices

1. Store the configuration items and the associated records in the configuration management repositories.
2. Record the problem reports and change requests.
3. Identify changes to be made to the configuration items.
4. Obtain appropriate authorization for each revision to configuration items before the changes are made.

Examples of changes to configuration items include:

- correcting defects
- adding or removing functionality or features
- changing access rights and restrictions

5. Control the check in and check out of configuration items in a manner that maintains the correctness and integrity of the configuration management repositories and its contents.
6. Track the status of problem reports and change requests to closure.

7. Review and approve the changes made to configuration items prior to incorporating the configuration items in the configuration management repositories.

Examples of reviews that should be performed include:

- ensure that the authorized changes were made and no unauthorized changes were made
- ensure all the controlled work products are delivered and are the correct versions
- ensure the adequacy of the development and verification activities performed in making changes
- ensure delivery paperwork is completed and includes the appropriate approvals
- ensure problem reports and change requests are appropriately updated

8. Report the results of change activities for the configuration items to relevant stakeholders.

SP 7 Build CM Product Baselines

The organization's CM product baselines or controlled service packs, as appropriate, are created for internal use and for delivery to customers.

This practice ensures that the organization's CM product baselines or controlled service packs, as appropriate, contain the correct versions of the correct configuration items and that they are constructed as required.

In some cases, a change to a CM product baseline is most effectively handled by creating and releasing a subset of the CM product baseline (for example, a single configuration item). This is particularly useful when there is a need to release a small critical change to a large CM product baseline. These small releases are often referred to as "service packs" or "delta releases."

Subpractices

1. Obtain appropriate authorization before building a CM product baseline or service pack for the organization.
2. Obtain and verify the inputs needed to create each CM product baseline.
3. Build each CM product baseline or service pack from the designated configuration items according to documented and approved build procedures.
4. Verify each CM product baseline or service pack build.

Examples of verifications that should be performed on a CM product baseline include:

- verifying that all approved changes, and only the approved changes, have been incorporated
- verifying that all configuration items and their correct versions are included
- verifying that the CM product baseline satisfies its requirements
- verifying that no regression in the CM product baseline has occurred
- verifying that the documentation of the CM product baseline matches the content

5. Document each build of a CM product baseline or service pack.
6. Place the documentation of each CM product baseline and service pack under version control.
7. Store each build of a CM product baseline or service pack in a controlled product release repository.

A controlled product release repository is a logical repository that may be comprised of multiple physical repositories (for example, repositories for software, for hardware components, and for documentation). The repository contains the single authorized baseline version of a delivery.

8. Report the results of each CM product baseline or service pack build to relevant stakeholders.

SP 8 Deliver CM Product Baselines

The organization's CM product baselines or service packs, as appropriate, are delivered for their intended use.

This practice ensures that customers and internal users of the CM product baselines that compose or support the organization's product and service offerings receive the appropriate baselines and updates to them.

Subpractices

1. Identify and document the organization's CM product baselines and service packs that will be delivered.

A release may be of three basic types:

- release of a full system or production environment
- release of one or more CM product baselines
- release of one or more service packs

2. Identify and document the recipients and methods and channels for delivery of the CM product baselines and service packs.
3. Review the list of CM product baselines and service packs what will be delivered, the recipients, and the methods and channels for delivery with relevant stakeholders, and obtain their agreement.
4. Deliver the CM product baselines and service packs.
5. Report the results of the CM product baseline and service pack activities to relevant stakeholders.

SP 9 Maintain Configuration Management Records

Records of the organization's configuration items and CM product baselines are established and maintained.

This practice ensures that records are maintained and available that accurately describe the organization's configuration management activities and the version and content of the organization's configuration items and CM product baselines.

Subpractices

1. Record the configuration management actions so that the content, status, and revision of each of the organization's configuration items and CM product baselines are known and previous versions can be recovered.
2. Document the differences between successive versions of each configuration items and successive versions of each CM product baselines.
3. Revise the organization's configuration management records as needed.

SP 10 Audit Configuration Management Operations

The organization's configuration management activities, the configuration management repositories, and the associated records are audited, periodically and as needed, to ensure their integrity, and corrective actions are performed.

This practice ensures that the organization's configuration management efforts are under control and can effectively manage the organization's configuration items and CM product baselines.

The audits of the organization's configuration management operations are typically performed by an objective group, such as a process and product assurance group.

Subpractices

1. Review the structure and facilities of the organization's configuration management repositories to determine if they are appropriate for the configuration management needs.
2. Review the organization's configuration management activities and record for conformance with applicable configuration management standards and procedures.
3. Review the contents of the configuration management repositories for completeness and correctness.
4. Review the organization's configuration management records for completeness and correctness.
5. Identify deficiencies in the organization's configuration management activities, configuration management repositories, and associated records.
6. Define corrective actions for the identified deficiencies, review them with relevant stakeholders, and obtain their agreement.
7. Perform corrective actions and track to closure.
8. Document and archive the results and other relevant records of the audits.
9. Report the results of the audits to relevant stakeholders.

SP 11 Audit CM Product Baselines

The organization's CM product baselines, service packs, their component configuration items, and associated records are audited to ensure they are ready for use, and corrective actions are performed.

This practice ensures that the organization's CM product baselines and service packs that are created and delivered are complete, correct, and usable for their purposes.

The audits of the organization's CM product baselines and service packs are typically performed by an objective group, such as a process and product assurance group.

Depending on the stability and maturity of the organization and the stability of the CM product baselines (for example, small changes being made to a large CM product baseline), CM baseline audits may use a targeted or sampling audit strategy rather than auditing the entire baselines.

Subpractices

1. Define and document the purpose of the audit and the plan the audit.

Examples of reasons for auditing CM product baselines include:

- establishing an intermediate baseline for continuing development
- releasing the baseline for formal verification and testing
- releasing the baseline for acceptance test and verification by a customer or owner
- releasing the baseline for manufacture or production
- releasing the baseline for deployment within or outside the organization
- releasing the baseline to customers

2. Review the development records and the organization's configuration management records associated with the organization's CM product baselines, service packs, and their component configuration items to ensure that the development and changes are correct and were appropriately made.

Audits that deal with ensuring that the changes are correct and were appropriately made are often referred to as "functional configuration audits." These audits ensure that:

- the appropriate functionality is incorporated
- all the authorized changes are complete and correct
- no unauthorized functionality or changes are included
- the associated operational and support documentation is complete and correct
- the applicable processes, work procedures, and standards are satisfied
- the applicable requirements are satisfied

3. Review the CM product baselines and service packs that make up a release to ensure that all intended configuration items are included in the CM product baselines and are of the correct versions, as specified in the build authorization.

Audits that deal with ensuring that all the intended configuration items, including supporting items like documentation, are included in the CM product baseline and are of the correct versions are often referred to as "physical configuration audits."

4. Identify problems in the CM product baselines, service packs, their component configuration items, and associated records.
5. Define corrective actions for the identified problems, review them with relevant stakeholders, and obtain their agreement.
6. Perform corrective actions and track to closure.
7. Document and archive the results and other relevant records of the CM product baseline audits.
8. Report the results of the CM baseline audits to relevant stakeholders.

SP 12 Provide Configuration Management Reports

Reports are provided to relevant stakeholders on the organization's configuration management activities, and on the status and content of the configuration items and CM product baselines.

This practice ensures that relevant stakeholders for the organization's configuration management activities are kept informed of the relevant configuration management information so they can fulfill the configuration management roles and responsibilities or appropriately use the CM product baselines.

Examples of information typically reported include:

- summaries of configuration control meetings
- summary and status of problem reports and change requests
- revision history and status of configuration items
- summary of CM product baselines
- results of configuration status accounting audits

14.2.5 Product and Service Business Management (PSBM)

Maturity Level 3

14.2.5.1 Purpose

Product and Service Business Management plans and manages the business and financial aspects of a product and service offering.

14.2.5.2 Introductory Notes

Product and service business management involves

- determining the customer requirements and changes to those requirements for a product and service offering
- evaluating the business and competitive situation for the offering and predicting likely changes
- determining the capabilities and features of the offering that address the customer and business requirements and changes to those requirements
- estimating the financial data for the offering
- establishing the overall business plans for the offering
- managing the business aspects of the offering

The following special terms are used in the goals and practices of this process area:

- The term “product and service offering” is used to refer to a set of closely related products and services that are targeted to a specific customer or customer segment. A product and service offering may include a product as the main component with supporting services, a service as the main component with supporting products, a set of products that are used together, a set of products and services that form a business offering, or a single product or service.
- The term “product and service work” is used as an abbreviated form for the work an organization performs in developing, preparing, deploying, operating, and supporting, a product and service offering, as well as managing these activities.
- The term “operation” and “operating,” when used in reference to a product and service offering, refers to
 - providing the offering customers appropriate access to the offering products, supplies, and other offering resources
 - operating the equipment that is part of the offering
 - delivering the offering services to customers
 - performing the transactions of the offering
- The term “capacity” is used to refer to the quantities of people, equipment, computing and communication

infrastructure, supplies, and other resources the organization applies to the product and service work.

- The term “offering capability” is used to refer to the goals or specifications that are assigned, usually expressed quantitatively, that the offering is expected to achieve; the range of expected results that the offering should achieve.

The goals and practices of this process area are expressed in context of a single product and service offering. This process area applies to each product and service offering in the organization’s portfolio.

In the goals and practices of this process area, where there are references to the requirements, plans, commitments, measures, etc. for a product and service offering, by implication, the phrases also include these items for the units and workgroups involved in the product and service work.

14.2.5.3 Specific and Institutionalization Goals

SG 1 Offering Features and Strategy Are Defined

Capabilities and features of a product and service offering are defined based on the needs of the customers and its positioning in the market.

SG 2 Offering Business Case Is Available

The business case for including a product and service offering in the organization’s portfolio is available for making business and management decisions.

SG 3 Offering Business Aspects Are Managed

The business and financial aspects of a product and service offering are managed.

InG Process Is Institutionalized

The practices for Product and Service Business Management Are Institutionalized.

Institutionalization includes:

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.2.5.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Offering Strategy and Features Are Defined)	SP 1 (Evaluate the Market Situation and Trends) SP 2 (Evaluate the Competitive Situation) SP 3 (Maintain Descriptions of Customer Needs) SP 4 (Maintain Business Goals) SP 5 (Maintain Descriptions of Business Requirements) SP 6 (Identify Laws, Regulations, and Standards)
SG 2 (Offering Business Plans Are Defined)	SP 7 (Maintain Estimates of Sales and Consumption) SP 8 (Maintain Estimates of Costs) SP 9 (Maintain Offering Pricing Structure) SP 10 (Maintain Estimates of Financial Return) SP 11 (Evaluate the Ability of the Organization) SP 12 (Maintain Justification for Offering)
SG 3 (Offering Business Aspects Are Managed)	SP 13 (Maintain Offering Business Plans) SP 14 (Maintain Business Risk Management Plans) SP 15 (Track Offering Business Results) SP 16 (Manage Offering Business Risks) SP 17 (Address Significant Deviations) SP 18 (Communicate Offering Business Results)
InG (Process Is Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Process) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Adherence)

The five institutionalization practices, including subpractices and supplementary information, are contained in Part III, Chapter 13.

14.2.5.5 Specific Practices

SP 1 Evaluate the Market Situation and Trends

The current market situation and trends related to a product and service offering are regularly evaluated to identify their effects on customer needs and on their likely buying decisions.

This practice develops an understanding of the various factors, such as economic, political, technological, demographic, social, and cultural factors, that impact the market situation for a product and service offering.

Subpractices

1. Identify the factors that need to be evaluated with regard to their impact on the market situation for a new or existing product and service offering.

Examples of factors that need to be evaluated include:

- comparable cost and pricing changes as a result of interest rate, exchange rate, or commodity price changes (changing economic situation)
- availability of new or alternative technologies or components
- expectations on system response times, inter-connectivity, functionality as a result of changing technologies
- current and total market size in different demographics and regions
- market segments and the characteristics (profile) of the customer set that makes up each market segment
- changes to existing user and customer education, habits and expectations
- increasing demand from new or different customer groups (for example, age, culture, income, and geography) with different habits and expectations

2. Obtain forecasts that predict how the selected factors are anticipated to change in the future.

Examples of forecasts include:

- economic outlook (short and long term, high and low confidence)
- technology roadmaps
- political stability and the anticipated future changes in government, regulation and infrastructural spend and roll-out
- industry movement with regard to the branching and consolidation of industry sectors
- environmental pressures and concerns
- natural resources and their control, availability and accessibility for future exploitation
- socio-economic factors and their impact on different demographic segments

3. Evaluate the predicted changes for each factor, their likely effect on the product and service offering requirements and the likely changes or consequences.
4. Document the evaluations and forecasts of the different factors.
5. Review the evaluations and forecasts of the different factors with relevant stakeholders for accuracy and assess the impact of the likely changes.
6. Place the evaluations and forecasts of the different factors under version control.
7. Revise the evaluations and forecasts of the different factors as needed.

SP 2 Evaluate the Competitive Situation

The current competitive situation for a product and service offering and likely changes in the competitive situation are regularly evaluated.

This practice ensures that competitive information for a product and service offering is formulated into intelligence that can be used for developing strategies for a product and service offering and for making related business decisions.

Subpractices

1. Identify information on the competitors' offerings that can be used in specifying and developing new or existing product and service offerings and the strategy and plans for the offerings.

Examples of information on competitor's product or service offerings include:

- the accessibility of an offering (for example, the channels, localities, means by which the offering can be accessed)
- the availability of the offering (for example, the time that an offering is open for use, or the stock on hand)
- the capacity and capability of the offering at any place and time
- the mix of offerings at any place and time
- pricing and packaging of the offering
- complementary customer service, support, and follow-up for the offering
- technologies employed in the offering

2. Determine the best available and acceptable sources of information on the competitors' offerings.
3. Obtain the information from the selected sources and compile or update the descriptions of the competitor product or service offerings.
4. Review the information with relevant stakeholders for completeness, adequacy, and accuracy.
5. Analyze and assess the competitors' offerings.
6. Compare and contrast the competitors' offerings to current and future planned offerings
7. Place the descriptions and analysis of the competitors' offerings under version control.
8. Revise the descriptions and analysis of the competitors' offerings as needed.

SP 3 Maintain Descriptions of Customer Needs

Descriptions of the customer needs for a product and service offering are established and maintained.

This practice ensures that the information on customer needs is available for the organization to use for making decisions about a product and service offering or changes to the product and service offering requirements.

Customer needs are statements of the customer's demands expectations, and constraints. They are stated from the perspective of the customers and end users. They are intended to achieve a shared understanding between the customer and the provider of the product and service offering.

Subpractices

1. Establish profiles of the market segments (relevant characteristics of the customer set) to which the product or service offering is made available.
2. Identify the information on customer demands, expectations, and constraints that is required in the definition of the new or existing product and service offering needs for each market segment.

Examples of customer needs information include:

- ideas for new or enhanced products and services
- the availability of an existing product or service
- the capacity and capability of a service required at any place and time
- the mix of product required at any place and time
- the degree or rate of change anticipated of any of the above within the next planning period

3. Identify the best available and acceptable sources of the information for each market segment.

Depending on the offering context (for example, an offering for an internal customer, for a specific external customer, or for the commercial market), the term "customer" may have to be interpreted. The requirements may come from the actual purchasers and users of the offering or they may come from a representative of the purchasers and users.

4. Establish mechanisms for accepting information on customer demands, expectations, and constraints from the selected sources.
5. Elicit the information on customer demands, expectations, and constraints from the selected sources.
6. Document the customer demands, expectations, and constraints for each market segment.
7. Consolidate the customer demands, expectations, and constraints for the different market segment into a customer needs document for the offering.
8. Review the customer needs document for the offering with relevant stakeholders for completeness and adequacy and obtain their agreement.
9. Place the descriptions of the customer needs document for the offering under version control.
10. Revise the descriptions of the customer needs document for the offering as needed.

SP 4 Maintain Business Goals

Business goals covering quality, market share, financial returns, and other business and technical factors for a product and service offering are established and maintained.

This practice establishes the business goals as the basis for making business decisions and defining the business strategies and plans for a product and service offering.

The business goals for a product and service offering clearly describe the strategic intent, direction and targets, and as such specify the future anticipated business results. They are derived from both, the organizational level goals and strategies, and from the offering level analyses of the market and competitive situations and customer needs.

Subpractices

1. Review the appropriate forecasts, analyses, strategies, plans and estimates for the offering.

Examples of forecasts, analyses, strategies, plans and estimates include:

- all information collected and reviewed in the definition and description of product and service offering business requirements (market, competitor, and customer)
- the organization's strategic goals
- the current or existing product and service offering strategy

2. Select the business goals and the associated target values necessary to meet those goals.
3. Determine the supporting business requirements that need to be in place to meet the business goals.
4. Review and agree the proposed business goals with relevant stakeholders both for feasibility and alignment and support of the organizational goals.
5. Place the documented business goals under version control.
6. Revise the documented business goals as required.

SP 5 Maintain Descriptions of Business Requirements

Descriptions of the business requirements, including the capabilities and features, for a product and service offering are established and maintained to address the business goals.

This practice determines the business requirements for a product or service offering for current and future periods and determines additional capabilities and features for a product and service offering that will be passed on for planning and development.

The business requirements for a product and service offering describe what the organization requires (for example, the capabilities, features, functions, performance, quality, and constraints). Business requirements are specified at a level of detail sufficient to demonstrate how the business goals and strategies will be met, but not in such a way as to unnecessarily constrain how the offering will be designed, planned, and constructed. Refer to the Product and Service Preparation process area for practices that cover the specification of these more detailed requirements.

Subpractices

1. Review the market and competitive situation, customer needs analyses, and business requirements identified and proposed to support the business goals or organization goals.

Depending on the organizational structure, business requirements may come from specific executive and middle managers or from specific business managers for the product and service offerings. They may also come from established organizational policies and standards.

2. Establish mechanisms for accepting proposed business requirements and requirements changes for the offering from the legitimate sources
3. Determine the desired changes to the business requirements of the offering for the current and future planning periods.

Examples of changes to the business requirements of existing product or service offerings include:

- capabilities or features (new or additional features, new or additional functions, new links or interfaces, the packaging)
- the availability
- the product mix at different places and times
- the pricing

4. Determine the business requirements of any new offering that needs to be developed within current and future planning periods.
5. Document all the desired changes or new business requirements in the descriptions of the offering requirements, capabilities and features.
6. Review the desired changes or new business requirements with relevant stakeholders, and obtain their agreement on priority and importance.

Refer to the Product and Service Work Management process area for practices that cover changes to the business requirements of a product and service offering that can be planned and committed to without further construction and demonstration.

Refer to the Product and Service Preparation process area for practices that cover changes to the business requirements that do require construction and demonstration.

7. Place the updated or new business requirements for the product and service offerings under version control.
8. Revise the business requirements for the product and service offerings as needed.

SP 6 Identify Laws, Regulations, and Standards

Laws, regulations, and standards that are applicable to a product and service offering are identified.

This practice ensures that the laws, regulations, and standards applicable to the product and service offering are understood so that they are adhered to.

Subpractices

1. Identify all legitimate sources of laws, regulations, and standards that apply to the work.
2. Establish mechanisms for obtaining the applicable laws, regulations, and standards, and revisions to them.
3. Determine and document which clauses and provisions of the laws, regulations, and standards are applicable to the offering and how they apply.
4. Review the applicable clauses and provisions of the laws, regulations, and standards with relevant stakeholders and obtain their agreement that they are the correct set applicable to the work.
5. Provide the people responsible for planning and doing the work with the information about the applicable laws, regulations, organizational policies, and standards that they need to be able to adhere to them.
6. Place the documentation of the applicable clauses and provisions of the laws, regulations, and standards under version control.
7. Provide the people responsible for the work with the information about the applicable laws, regulations, organizational policies, and standards that they need to be able to adhere to them.

Refer to the Process and Product Assurance process area.

8. Revise the documentation of the applicable clauses and provisions of the laws, regulations, and standards as necessary.

SP 7 Maintain Estimates of Sales and Consumption

Estimates of the potential sales and consumption of a product and service offering are established and maintained.

This practice obtains the quantitative revenue and volume data for a product and service offering that can be used as a basis for defining business goals and strategies.

Subpractices

1. Identify or confirm the information types or needs that are required to be estimated in order to size the demand of the product and service offering.

Information types or needs may include average demand, seasonal peaks and lows, maximum and minimum demand, and the differential pricing associated with the changes in demand.

2. Determine or confirm the best available and acceptable sources of the information types or needs, where they exist.
3. Assemble the information from the selected historical or other sources and determine or update the estimates of the sales and consumption.
4. Review the estimates with relevant stakeholders for confidence and accuracy.
5. Revise the estimates of the potential sales or consumption as required.

SP 8 Maintain Estimates of Costs

Estimates of the organization's costs for a product and service offering are established and maintained.

This practice ensures that the organization's costs associated with a product and service offering data are available to assess the business case for the offering, including the costs for development, manufacturing, sourcing, production, marketing, sales, distribution, deployment, operations, support, maintenance, and disposal of the offering.

Subpractices

1. Review the component parts of the complete product and service offering, and the costs associated with each part.

Examples of component parts of a product and service offering include:

- the hardware, software, and infrastructure necessary to deliver a service
- the pre-assembly component pieces of a product

2. Construct a cost model in which all known costs can be recorded and allocated by activity or other category.
3. Assemble and apportion the cost data for the component parts into the cost model for the current and future projected consumption or demand.
4. Review the planned changes to any of the component parts and the additional or changed costs for those parts of the product and service offering.

5. Review the cost breakdowns and projections with relevant stakeholders for completeness and accuracy.
6. Place the cost breakdown and projections of the product and service offering under version control.
7. Revise the cost breakdown and projections of the product and service offering as needed.

SP 9 Maintain Offering Pricing Structure

The pricing structure and pricing strategy for a product and service offering are established and maintained.

This practice ensures that a product and service offering and the selectable capability and feature options are priced to achieve the business goals.

Subpractices

1. Determine the pricing goals and strategies for the product and service offering.

Pricing goals can vary depending on whether the product service is offered internally or externally and the levels of control in the internal or external markets.

Examples of pricing methods to support specific goals include:

- cost
- cost-plus
- going rate market price
- fixed price

2. Develop a pricing model for the offering.

The pricing model should be based on the goals and strategies for the offering, the outputs of the costing model, the outputs of the sales and consumption estimations, and the business goals for the offering.

Examples of how the pricing model may be used, include:

- modifying customer demand patterns through the establishment of rewards, incentives, or premiums to counteract rapidly or severely changing demand patterns (hourly, daily, seasonal etc.)
- reducing customer switching where customers have choices and switching costs are low

3. Review the pricing model outputs with relevant stakeholders for completeness and adequacy.
4. Place the pricing model and its outputs under configuration management.

Refer to the Organizational Configuration Management process area.

5. Revise the pricing model and its outputs as needed.

SP 10 Maintain Estimates of Financial Return

Estimates of the financial return, revenue/profit timeline, and other impacts and benefits of a product and service offering are established and maintained.

This practice ensures that management understands the financial business case for a product and service offering.

Subpractices

1. Consolidate the appropriate estimates of the sales and consumption, costs, and pricing of the product and service offering.
2. Calculate the estimated total and cumulative financial return over the current and future planning periods, including the revenue and profit streams.
3. Ascertain any other associated impacts or benefits made apparent as a result of the financial analysis.
4. Review the financial analysis with relevant stakeholders for completeness and accuracy and obtain their agreement.
5. Revise the financial analysis as needed.

SP 11 Evaluate the Ability of the Organization

The characteristics, financial position, core competencies, and capacity of the organization are evaluated against what is needed for the product and service offering.

This practice determines the information about the organization that is needed to decide whether the organization should include a product and service offering in its portfolio and to plan the work.

Subpractices

1. Identify what information on capacity and capability in the organization (for the component parts of the complete product or service offering) is needed to evaluate the ability of the organization to provide the product and service offering.

Examples of capacity and capability information for a product or service include:

- staff, equipment, infrastructure, hardware, budget
- competencies, skills, experience
- supporting functions

2. Determine the best available and acceptable sources of the information.
3. Obtain the information from the selected sources and compile or update an analysis of the organizational ability.
4. Review the analysis with relevant stakeholders for completeness and adequacy.
5. Review the analysis for alignment to the organizational strategy and plans.
6. Revise the analysis and reviews as needed.

SP 12 Maintain Justification for Offering

The business justification for including a product and service offering in the organization's portfolio is established and maintained.

This practice ensures that the business case for a product and service offering is readily available so that accurate and timely business and management decisions can be made.

The business case should include direct and indirect, quantitative and qualitative benefits, from both an offering and organizational strategic perspective. The business justification may range from direct and immediate quantifiable returns to longer term qualitative benefits in support of new business ventures or risk mitigation strategies.

Subpractices

1. Consolidate the analysis of capacity and capability, the cost breakdown, the estimates of financial return, and the business goals and strategy.
2. Develop the product and service offering business case, detailing long and short term business and other benefits, reflected against current and future financial projections, and the current and future organization goals and requirements.
3. Develop estimates for outsourcing all or some of the offering components, particularly those representing the largest gaps in organizational ability.
4. Develop an appended risk analysis detailing the risks of providing the complete offering, the risks of not providing the offering, and the risks of outsourcing components of the offering.
5. Review the offering business case with relevant stakeholders for completeness and adequacy and obtain their agreement.
6. Place the offering business case under version control.
7. Revise the offering business case as needed.

SP 13 Maintain Offering Business Plans

Business strategies and plans for a product and service offering are established and maintained.

This practice ensures that all aspects of the product and service work for an offering are planned, including plans for development, manufacturing, sourcing, production, marketing, sales, distribution, deployment, operations, support, maintenance, and disposal.

Subpractices

1. Obtain and verify the inputs and the component plans needed to establish the business plan.

Examples of inputs needed to establish the product and service offering business plan include:

- product and service business goals
- product and service business requirements
- product and service components
- estimates of overall consumption or demand
- estimates of effort and non-people resources
- estimates of overall cost and financial return
- business and supporting commitments
- business and other related organization strategies (IT, marketing etc.)

2. Define and document the product and service offering business strategy.

3. Identify and document the constraints, assumptions, and other factors that affect the business plan (to support the strategy).
4. Define and document the plan of activities and milestones to support accuracy in progress measurement and the meeting of business targets and commitments.

The business plan for the product and service offering includes the significant milestones, and work activities, their interdependencies, and the time phasing. The separation of milestones and duration of work activities reflected in the plan need to support accuracy in measuring progress and managing the achievement of the business targets and commitments.

5. Review the existing component plans to identify areas that are in conflict or disagreement.
6. Identify and document significant conflicts, inefficiencies, unresolved dependencies, or missing responsibilities in the component plans.
7. Identify changes to the component plans and resolve any significant issues.
8. Review the strategy, business plan and associated constraints, assumptions, and other factors with relevant stakeholders, and obtain their agreement.
9. Place the strategy, business plan, descriptions of the associated constraints, assumptions, and other factors, and the component plans under version control.
10. Revise the strategy and business plan as needed.

SP 14 Maintain Business Risk Management Plans

Business risks inherent in a product and service offering are determined, and plans to manage them are established and maintained.

This practice ensures that there is an awareness of the business risks that could jeopardize the product and service offering or the organization so that these risks are appropriately considered in the planning and management of the business activities.

Business risks are risks that are associated with business losses or problems inherent in providing the offering and performing the business activities.

Examples of business risks include:

- risk of fraudulent use of credit cards
- risk of inaccurate or delayed posting of transactions
- risk of legal liabilities

Refer to the Guidelines for Risk Management in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Identify the business risks for the offering along with associated contextual information.

2. Analyze the business risks for the offering to determine potential impact, likelihood of occurrence, circumstances that are likely to manifest the occurrence.
3. Document the business risks for the offering and the associated analysis, priorities, and contextual information.
4. Prioritize the business risks for the offering.
5. Identify the business risks that will be addressed in the design, construction, and documentation of the offering, and coordinate to ensure they are addressed.

Refer to the Product and Service Preparation process area.

6. Review the documented business risks with relevant stakeholders and obtain their agreement.
7. Place the documented business risks under version control.
8. Revise the documented business risks for the offering as needed.

SP 15 Track Offering Business Results

Business performance and financial results achieved for a product and service offering are tracked against the business plans.

This practice determines whether the business plans for a product and service offering are being satisfied so that immediate corrective actions can be taken to keep them on track with commitments and plans.

Subpractices

1. Obtain and verify measures of status and delivery, as well as any other inputs needed to monitor progress, performance and results, relative to the business plan, business commitments, and other business or financial performance criteria.
2. Review the measures and inputs against the business plans, business commitments, and other business or financial performance criteria.
3. Identify issues or risks affecting or likely to affect the achievement of the business or financial targets and commitments.

Refer to the Product and Service Work Management process area for practices that cover providing the status and measures used to monitor the work within the product and service components.

Refer to the Product and Service Work Management process area for practices that cover the incorporation of work assignments by the workgroups, work units and projects.

SP 16 Manage Offering Business Risks

Business risks inherent in a product and service offering are managed.

This practice ensures that appropriate actions are taken for the business risks that could jeopardize the product and service offering.

Refer to the Guidelines for Risk Management in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Review the identified risks on a periodic basis.
2. Review the product and service work, business activities, and business environment and situation to identify new risks, risks information that should be revised, and risks that can be removed from the actively-managed list.
3. Identify each risk that is likely to become a serious problem.
4. Identify preventive or mitigation actions to address each risk that is likely to become a serious problem.
5. Perform the identified preventive or mitigation actions, as appropriate, and track to closure.
6. Revise the documentation of the risks including description, status, evaluation, and priority, as needed.

Examples of when the documented risks may be revised include:

- when new risks are identified
- when risks become problems
- when risks are retired
- when the circumstances surrounding a risk change significantly

7. Review the revised risk documentation with relevant stakeholders, and obtain their agreement.
8. Place the revised documentation of risks under version control.

SP 17 Address Significant Deviations

Significant deviations from the business plans and financial estimates and plans for a product and service offering are identified and addressed.

This practice ensures that significant deviations are recognized and addressed so that the business plans and financial estimates and plans for a product and service offering are achieved or adjusted to reflect a reasonable plan forward.

Subpractices

1. Analyze identified issues and risks to determine the actual or likely deviations from the product and service offering's business plans and commitments.
2. Perform corrective actions to fix any existing critical problems caused by the deviation, where appropriate.
3. Document issues and risks which result or are likely to result in significant deviations and designate them for analysis and corrective action.
4. Determine and document corrective actions needed to address the identified deviations from the product and service offering's requirements, estimates, plans, and commitments.
5. Review the planned corrective actions with relevant stakeholders, and obtain their agreement.
6. Perform the agreed-to corrective actions and track to completion.

Refer to the Product and Service Work Management process area for practices that cover estimating, planning, negotiating commitments, and identifying risks.

7. Document and archive the results and other relevant records of addressing the significant deviations.

SP 18 Communicate Offering Business Results

Progress, accomplishments, issues, and risks related to the business plans and financial estimates for a product and service offering are reviewed with relevant stakeholders as needed.

This practice ensures that those concerned with and affected by the business and financial results for a product and service offering have a common, correct, and current understanding of the progress, accomplishments, issues, and risks so there are no surprises.

Subpractices

1. Identify the information on progress, accomplishments, issues, and risks for a product and service offering that is related to the business plans and financial estimates.

Examples of the information used to track the business plans and financial estimates include:

- the current of cumulative financial contribution in relation to the anticipated financial returns
- the growth in demand or consumption in relation to the business targets set
- the deployment to new sites or geographic areas in relation to the business expansion plans
- delays in the development of new functionality

2. Obtain the information from the selected sources and compile or update in the formats required by the business or other relevant stakeholders.
3. Conduct reviews at points in time that are required by the business and financial reporting plan and that are meaningful to relevant stakeholders.
4. Identify and document action items and track them to closure.
5. Document issues and risks identified in the review.

14.2.6 Product and Service Work Management (PSWM)

Maturity Level 3

14.2.6.1 Purpose

Product and Service Work Management plans and manages the work and results for a product and service offering using the organization's process assets and defined processes that are tailored from the organization's standard processes.

14.2.6.2 Introductory Notes

The goals and practices of this process area are expressed in context of a single product and service offering. This process area applies to each product and service offering in the organization's portfolio.

The process area is primarily the responsibility of the manager or management team that is assigned overall responsibility for managing the product and service work for an offering.

The following special terms are used in the goals and practices of this process area:

- The term "product and service offering" is used to refer to a set of closely related products and services that are targeted to a specific customer or customer segment. A product and service offering may include a product as the main component with supporting services, a service as the main component with supporting products, a set of products that are used together, a set of products and services that form a business offering, or a single product or service.

- The term “product and service work” is used as an abbreviated form for the work an organization performs in developing, preparing, deploying, operating, and supporting a product and service offering, as well as the work of managing these activities.
- The term “operation” and “operating,” when used in reference to a product and service offering, refers to
 - providing the offering customers appropriate access to the offering products, supplies, and other offering resources
 - operating the equipment that is part of the offering
 - delivering the offering services to customers
 - performing the transactions of the offering
- The term “work unit” is used to refer to an organizational unit that is directly responsible for agreeing to requirements, planning, managing, and performing product and service work or internal business functions.
- The term “project” is used to refer to a temporary endeavor undertaken to create a unique product or service. A project may be composed of projects (that is, sub-projects). A project is a special instance of a work unit. A project may be composed of multiple sub-projects and work units.

As described above and in Annex B-1, in this process area a project is considered to be a special instance of a work unit, and the term “work unit” will be used to refer to both project and work unit.

Product and service integrated management involves

- establishing the defined processes for the product and service work
- using the defined processes to plan and manage the product and service work and results for an offering
- using organizational process assets in the product and service work and contributing assets created in doing this work
- assigning responsibilities for all of the product and service work to the units and workgroups that are involved in the work
- integrating the plans of the units and workgroups involved in the product and service work
- monitoring the product and service work and results against the defined processes, plans, and requirements, and ensuring corrective actions are performed as appropriate
- proactively managing the risks associated with the product and service work
- communicating accomplishments, issues, and risks for the product and service work to relevant stakeholders

There are two significant differences in the management scope and approach from maturity level 2 (as described in the Work Unit Planning and Commitment and Work Unit Monitoring and Control process areas) to maturity level 3 (as described in this process area):

- At maturity level 2 the management scope is a single work unit or project and the individual work units and projects are brought together through the monitoring activities of the executive and middle managers. At maturity level 2 work units operate within their own work silos.

At maturity level 3 the management scope is the end-to-end work for a product and service offering, from requirements elicitation and definition through development, preparation, deployment, operations, support, and retirement. At maturity level 3 work units have a good understanding of the overall workflow for the product and service and of the upstream and downstream work interrelationships. The work units understand how they fit into the product and service work.

- At maturity level 2, management is based primarily of monitoring actual results against plans and commitments. Problems in meeting plans and commitments are identified when they arise and corrective actions are performed. These actions often involve changing the plans and commitments.

At maturity level 3 the defined processes are described in more detail and there is a better understanding of the interrelationships of the process activities (for example, inputs/outputs, measures, and leading indicators). Managers use this additional understanding to anticipate problems and are more likely to perform corrective actions to contain problems within the existing plans and commitments.

In the goals and practices of this process area, where there are references to the requirements, plans, commitments, measures, etc. for a product and service offering, by implication, the phrases also include these items for the units and workgroups involved in the product and service work.

The plans for the product and service work are based on the defined processes. These plans are typically integrated into a single plan or set of plans that cover all the product and service work. Support activities may be covered in other plans, such as a process and product assurance plan and configuration management plan.

The product and service work is managed using these plans and the defined processes.

Since the defined processes for the product and service work are tailored from the organization’s set of standard processes, variability among similar work efforts is typically reduced and these work efforts can more easily share process assets, data, and lessons learned.

Risk management is an intrinsic part of managing the product and service work and is not a separable and distinct task. The product and service work is typically performed in a dynamic environment with rapidly changing customer needs, technologies, and competitive concerns. Risk management involves identifying risks, analyzing their likelihood and potential impact, determining and evaluating risk mitigation strategies, monitoring risks, and proactively managing the risks.

The reason for this process area at maturity level 3 is that defined processes and integrated plans, both of which cover all of the product and service work, are needed to plan, perform, and manage the product and service work in a manner that makes most effective use of organizational assets and that supports organizational learning.

14.2.6.3 Specific and Institutionalization Goals

SG 1 Product and Service Work Is Planned

The product and service work for an offering is estimated and planned using defined processes and organizational process assets.

A defined process is developed by tailoring the organization’s standard processes to fit the specific characteristics of the product and service work.

A defined process is a well-characterized and understood process, described in terms of standards, procedures, tools, and methods. It specifies, in a complete, precise, verifiable manner, the entry criteria, inputs, standards and procedures, work activities, verification mechanisms, outputs, exit criteria and other characteristics of a process and its component subprocesses.

SG 2 Product and Service Work Is Monitored

The actual work activities, performance, and results for a product and service offering are monitored against the defined processes, plans, and commitments.

SG 3 Product and Service Work Corrections Are Made

Corrective actions are performed when the work activities, performance, or results for a product and service offering deviate significantly from the requirements, plans, and commitments.

InG Practices Are Institutionalized

The practices for Product and Service Work Management are institutionalized.

Institutionalization includes:

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.2.6.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Product and Service Work Is Planned)	SP 1 (Maintain Defined Processes) SP 2 (Maintain Master Schedule) SP 3 (Maintain Master Operations and Support Plans) SP 4 (Maintain Definitions of Measures) SP 5 (Maintain Assignment of Work Responsibilities) SP 6 (Maintain Commitment Agreements) SP 7 (Maintain Risk Management Plans) SP 8 (Maintain Integrated Work Plans)
SG 2 (Product and Service Work Is Monitored)	SP 9 (Manage Product and Service Work) SP 10 (Manage Risks) SP 11 (Report Utilization of Organization’s Resources) SP 12 (Contribute to Organization’s Process Assets)
SG 3 (Product and Service Corrective Actions Are Performed)	SP 13 (Address Significant Deviations) SP 14 (Address Deviation Causes) SP 15 (Communicate Progress) SP 16 (Revise Plans) SP 17 (Apply Lessons Learned)

InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)
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The five institutionalization practices, including subpractices and supplementary information, are contained in Part III, Chapter 13.

14.2.6.5 Specific Practices

SP 1 Maintain Defined Processes

The defined processes covering the product and service work for an offering are established and maintained.

This practice ensures that all activities for the product and service work are well-defined, organized, and integrated across all the work efforts involved in a product and service offering.

A defined process is developed by tailoring the organization's standard processes to fit the characteristics of the specific product and service work.

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Select the organization's standard processes that best fit the characteristics of the product and service work.
2. Review and select other organizational process assets that are applicable to the preparation of the defined processes.

Examples of other organizational process assets that are applicable to the defined processes includes:

- lessons-learned
- templates
- example documents
- measures

3. Tailor the selected standard processes and other organizational process assets according to the tailoring guidelines to produce the defined processes.
4. Document the descriptions of the defined processes.

The defined processes cover all the activities of developing, preparing, deploying, operating, and supporting a product and service offering, as well as the work of managing these activities.

5. Verify the descriptions of the defined processes against the applicable standards, requirements, organizational policies, and goals.

6. Conduct peer reviews of the descriptions of the defined processes.
7. Review the descriptions of the defined process with the relevant stakeholders, and obtain their agreement
8. Place the descriptions of the defined processes under configuration management.

Refer to the Work Unit Configuration Management process area for practices that cover change management.

9. Revise the descriptions of the defined processes as needed.

SP 2 Maintain Master Schedule

The master schedule for producing products and providing services for a product and service offering are established and maintained.

This practice ensures that there is a shared understanding of the demand for the product and service offering and the capacity that will be established to meet the demand.

Subpractices

1. Determine the anticipated demand profile for the offering.

A demand profile describes quantitatively how the demand for products and services changes over time (that is, quantities relative to a timeline) and due to seasonal or other cyclic conditions or due to other predictable conditions. A demand profile is based on historical data and forecasts of how the overall demand for the offering will change in the future.

2. Determine the performance and availability requirements and goals for the offering.
3. Estimate the fault profile for the offering.

A fault profile describes quantitatively the number of faults likely to be encountered in the components of the offering during operations and their impact on the operations, performance, and availability of the offering.

4. Define the demand/production plan to address the anticipated demand profile.

A demand/production plan describes quantitatively the quantity of products and services that will be provided to address a demand profile.

Examples of demand/production plan include:

- the number of transactions or work requests that are received and processed relative to a timeline
- the number of incident reports or problem reports that are expected to be received and handled on a day-by-day or week-by-week basis following the release of a product revision
- the deployment activities relative to a timeline following the release of a new product and service offering
- planned imposition of changes to laws, regulations, and business rules
- the utilization of an organization's IT systems for each day of a typical week

Examples of factors and events that affect a demand/production plan include:

- time of the day
- days of the week
- days or weeks of the month
- months or seasons of the year
- holidays
- significant political or economic events
- changes in parameters that affect the work (for example, interest rate change)
- internal business plans (for example, announcement and release of a new product and service offering)

Examples of approaches to fit a demand/production plan to address the estimated demand profile include:

- building inventory during low demand periods to support high demand periods
- continually adjusting capacity to match the demand profile
- implementing actions to shift and smooth the demand profile, for example through pricing and incentives
- accepting the resulting loss of not being able to satisfy peak demand

5. Establish the capacity that is needed to support the offering demand/production plan.

Capacity requirements may be established by modeling data such as the availability requirements and goals, performance requirements and goals, fault profiles, demand/production plans and demand profiles. It involves investigating various "what if" scenarios in order to determine the best cost/value design and implementation of the offering.

Examples of techniques to model the capacity of an offering include:

- trend analysis
- simulation
- analytical modeling
- baseline calculations using prototypes

6. Define and document the capacity plan for the offering.

The capacity plan aims to meet customer demand using capacity resources. It establishes, measures, and adjusts capacity limits or levels. The plan is governed by the capacity strategy which may vary from demand chase to level capacity.

Examples of topics addressed by a capacity plan include:

- summary of the offering being planned
- offering scenarios that are covered by the capacity plan
- capacity analysis, assumptions, and results
- planned capacity provided by the offering for the scenarios
- offering design and implementation needs and constraints to support the capacity plans
- resources and budget needed to support the plan
- nominal and peak loading on the offering components for the scenarios
- strategy for increasing or decreasing capacity based on future projections
- measures and monitoring activities to evaluate the availability and performance against the plan

7. Consolidate the demand/production plans, capacity plans, resource plans, and budgets into the master schedule for the offering.

A master schedule is the plan that specifies the quantity of each end item (product and/or service) that will be or is expected to be produced and provided in each time period (for example, each day or each week) in a planning horizon. The master schedule is the overall plan that guides the overall business operations planning and forecasting for an offering. It is a statement of what the organization or business unit plans to produce and provide, by item or service, by period, and by defined groups of products and services.

8. Review the master schedule for the offering with relevant stakeholders, and obtain their agreement.
9. Place the master schedule for the offering under version control.
10. Revise the master schedule for the offering as needed.

SP 3 Maintain Master Operations and Support Plans

The master plans for satisfying the operations and support requirements for a product and service offering are established and maintained.

This practice ensures that the operations and support requirements for the product and service offering are understood and appropriately addressed.

Examples of operations and support characteristics include:

- availability
- continuity
- capacity
- performance
- security
- data management
- customer support
- handling of problems and incidents

Refer to the *Control Objectives for Information and Related Technology* [COBIT-2000] and the *Information Technology Infrastructure Library* [ITIL-2002] for detailed practices that cover the planning and management of operations and support characteristics for IT operations. Many of these IT practices are also applicable to other non-IT product and service offerings.

Subpractices

1. Determine the operations and support requirements for the offering.

Refer to the Product and Service Business Management process area for practices that cover the establishment and maintenance of the operations and support requirements.

2. Determine how the operations and support requirements will be satisfied.

Examples of ways the operations and support requirements might be satisfied include:

- development and preparation of the offering including derived requirements, design, construction, and verification
- deployment tools, procedures, methods, and skills
- operations tools, procedures, methods, and skills
- support tools, procedures, methods, and skills
- management of the product and service work
- customer management

Refer to the Product and Service Preparation, Product and Service Deployment, Product and Service Operations, and Product and Service Support process areas for practices that cover the product and service work.

3. Define and document the master plans for satisfying the operations and support requirements.
4. Verify the master operations and support plans against the requirements.
5. Conduct peer reviews of the master operations and support plans.
6. Review the master operations and support plans with the relevant stakeholders, and obtain their agreement
7. Place the master operations and support plans under version control.
8. Revise the master operations and support plans as needed.

SP 4 Maintain Definitions of Measures

Definitions of the measures used to plan and manage the product and service work for an offering and to satisfy organizational measurement requirements are established and maintained.

This practice ensures that the quantitative information and data needed to guide management decisions for a product and service offering and to support organizational requirements are available when needed.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Identify the measurement information needs for the product and service work.

Examples of measurement information needs include:

- volatility of requirements
- status of satisfying commitments
- status of the work performed by the individual units
- the effort spent on rework

2. Identify the measurement information needs for monitoring the operations and support activities, results, and projections against the requirements and plans.

Examples of measurement information needs include:

- availability versus required availability
- current and expected demand versus the capacity
- current performance versus required performance
- security exposures
- effectiveness of customer support
- effectiveness of handling of problems and incidents

3. Determine the organizational measurement requirements.

The organizational measurement information needs are typically defined by a group that is responsible for the organizational process management or organizational measurement activities. Refer to the Organizational Process Management process area.

4. Select and define measures to address the measurement information needs and requirements.
5. Define the procedures and methods for collecting, deriving, analyzing, and storing the measures.
6. Review the measurement information needs, requirements, plans, and definitions of the measures with relevant stakeholders, and obtain their agreement.
7. Place the definitions of measures under version control.
8. Revise the measurement information needs, requirements, plans, and definitions of the measures as needed.

SP 5 Maintain Assignment of Work Responsibilities

Assignment of work responsibilities are established and maintained for each unit and workgroup involved in the product and service work for an offering.

This practice ensures that all responsibilities for the product and service work are appropriately assigned to the units and workgroups involved in the work and are integrated to address the overall workflow for the offering.

Subpractices

1. Allocate the offering requirements and organize the work responsibilities for the offering to be consistent with the units and workgroups involved in the product and service work.

2. Negotiate the offering requirements and work responsibilities with the units and workgroup involved in the product and service work.

Refer to the Work Unit Planning and Commitment process area for practices that cover work unit plans and commitments.

3. Negotiate commitments for performing the work activities with the responsible units and workgroup.
4. Review the work responsibilities of the units and workgroup involved in the product and service work to determine and resolve conflicts and synergies with other responsibilities of the units and workgroup.

Units and workgroups may perform work for multiple offerings, and there may be a many-to-many relationship of offerings to units and workgroups. A mapping of responsibilities of offerings to units and workgroups may be needed to determine conflicts and synergies. With this understanding, conflicts can be resolved and synergies and similarities in work can be exploited.

5. Document the description of the workflow among the units and workgroups involved in the product and service work, including the critical inputs, outputs, and dependencies.
6. Place the documentation of work responsibilities and workflow under version control.
7. Revise the work responsibilities and workflow description as needed.

SP 6 Maintain Commitment Agreements

Commitments to address critical dependencies for the product and service work for an offering are established and maintained.

This practice ensures that the critical dependencies affecting the product and service work and the dependencies other work efforts and stakeholders have on the product and service work will be satisfied, so that the work can be performed according to the plans.

Subpractices

1. Identify and document the critical dependencies the product and service work has on other work efforts and stakeholders.

A critical dependency is a work product, action, information, etc. that must be provided by one unit, workgroup, or individual to another so that the receiver can perform planned work.

Examples of critical dependencies include:

- interrelationship across offerings and organizational activities (for example, in designing and constructing synergistic offerings or an upgrade to a set of related offerings)
- product baselines that are provided by another work unit
- product baselines that are provided by this work unit to other work units
- inputs required to perform work
- outputs needed by other work units

2. Identify and document the critical dependencies that other work efforts and stakeholders have on the product and service work effort.

3. Negotiate and document commitments with those responsible for satisfying each critical dependency.
4. Negotiate and document commitments with those who have critical dependencies on the product and service work effort.
5. Review the descriptions of the critical dependencies and the documented commitments with those making the commitments and obtain their agreement.
6. Place the descriptions of the critical dependencies and the agreed-to commitments under version control.
7. Revise the descriptions of the work unit's critical dependencies and commitments as needed.

SP 7 Maintain Risk Management Plans

Risks that could jeopardize the product and service work for an offering are determined, and plans to manage them are established and maintained.

This practice ensures that there is an awareness of the risks that could jeopardize the product and service work for an offering so that these risks are appropriately considered in the planning and management activities.

There are two types of risks of concerns related to product and service work:

- business risks, which are associated with business losses or errors inherent in performing the business activities
- internal work risks, which are associated with the ability to perform the product and service work

Examples of business risks include:

- risk of fraudulent use of credit cards
- risk of inaccurate or delayed posting of transactions

Examples of internal work risks include:

- risk of losing key staff
- risk that commitments needed to accomplish the work will not be satisfied

This specific practice covers both internal work risks and business risks that are the responsibility of the managers of the offering.

Refer to the Guidelines for Risk Management in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Identify risks along with associated contextual information.
2. Analyze the risks to determine potential impact, likelihood of occurrence, and the likely timeframe of occurrence.
3. Prioritize the risks.
4. Document the risks and the associated analysis, priorities, and contextual information.
5. Review the documented risks with relevant stakeholders, and obtain their agreement.
6. Place the documented risks under version control.
7. Revise the documented risks as needed.

Examples of when the documented risks may be revised include:

- when new risks are identified
- when risks become problems
- when risks are retired
- when the work unit circumstances change significantly

SP 8 Maintain Integrated Work Plans

Integrated work plans for the product and service offering, including plans for the participating units and workgroups, are established and maintained.

This practice ensures that all aspects of the plans for the product and service work are consistent and aligned with each other so that the set of plans provides a complete and appropriate course of action.

Subpractices

1. Identify and document significant conflicts, disagreements, inefficiencies, unresolved dependencies, or missing responsibilities in the plans and commitments of the units and workgroups involved in the product and service work.

Refer to the Work Unit Planning and Commitment process area for practices that cover work unit plans.

2. Schedule the work activities in a sequence that accounts for critical factors and risks of the product and service work.

Examples of factors considered in scheduling include the following:

- size and complexity of the tasks
- needs of the customer and end users
- availability of critical resources
- availability of key personnel

Refer to the Guidelines for Risk Management in Annex A for guidance that may be useful in implementing this practice.

3. Establish an integrated work plan to align the work plans, commitments, and activities of the units and workgroups involved in the product and service work.
4. Establish objective criteria for the review and approval of critical inputs, outputs, and commitments between units and workgroups.
5. Review the work plans and commitments for the offering against the plans, commitments and activities of related offerings to identify conflicts or other issues.
6. Negotiate changes to the work plans and commitments with relevant stakeholders to resolve any significant issues.
7. Revise the work plans to incorporate the negotiated changes.
8. Review the negotiated work plans and commitments with relevant stakeholders, and obtain their agreement.
9. Place the work plans for the offering under version control.

10. Revise the work plans for the offering as needed.

SP 9 Manage Product and Service Work

The product and service work for an offering is managed using the integrated plans and the defined processes.

This practice ensures that the day-to-day performance and results of the product and service work are understood so that corrective actions can be performed to keep performance and results in line with the requirements plans, and commitments.

Subpractices

1. Obtain the work status inputs from the units and workgroups involved in the product and service work.
2. Monitor the critical inputs, outputs, commitments, and workflow between units and workgroups involved in the product and service work to identify any issues that may jeopardize achieving the requirements and plans.
3. Obtain inputs from customers and other relevant stakeholders regarding the performance and results of the offering and the product and service work.
4. Collect and analyze measures and other information to understand the operations and support activities and results.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

5. Collect and analyze measures and other information to understand the status of the product and service work.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

6. Identify requirements for the offering and allocated requirements that are not being satisfied or that are at risk of not being satisfied.
7. Identify plans and commitments that are not being satisfied or that are at risk of not being satisfied.
8. Adjust plans, work assignments, and activities to resolve any identified issues and risks.

Examples of actions that achieve alignment include the following:

- accelerating the work, with appropriate adjustments to the components plans and risks
- adjusting work assignments

SP 10 Manage Risks

Risks that could jeopardize the product and service work for an offering are managed.

This practice ensures that appropriate actions are taken for the risks that could jeopardize the product and service work.

Refer to the Guidelines for Risk Management in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Review the identified risks on a periodic basis.
2. Review the work requirements, plans, commitments, and activities to identify new risks, risks information that should be revised, and risks that can be removed from the actively-managed list.
3. Identify each risk that is likely to become a serious problem.
4. Identify preventive or mitigation actions to address each risk that is likely to become a serious problem.
5. Perform the identified preventive or mitigation actions, as appropriate, and track to closure.
6. Revise the documentation of the risks including description, status, evaluation, and priority, as needed.

Examples of when the documented risks may be revised include:

- when new risks are identified
- when risks become problems
- when risks are retired
- when the circumstances surrounding a risk change significantly

7. Review the revised risk documentation with relevant stakeholders, and obtain their agreement.
8. Place the revised documentation of risks under version control.

SP 11 Report Utilization of Organization's Resources

The amount of each type of resource needed to perform the product and service work for an offering is determined and reported to executive management for use in managing the organizational resources.

This practice ensures that executive management has accurate resource utilization data so that they are able to maintain an appropriate allocation and assignment of the organization's resources needed to develop, prepare, deploy, operate, and support the organization's products and services.

Subpractices

1. Measure, on a regular basis, the amount of each type of resource consumed in performing the product and service work for an offering.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

The measures of the resources may be individually collected, analyzed, and reported by the units involved in the product and service work for the offering or they may be aggregated and reported for the offering.

2. Compare the amount of each type of resource consumed against the plans for the product and service work.
3. Revise the estimates of future needs for amount of each type of resource.
4. Document the measures of actual consumption and estimates of future needs for each type of resource along with the associated analysis.
5. Report the results of the resource review to executive management.

Refer to the Organizational Resource Management process areas for practices that cover the organization-level planning, acquisition, allocation, and reassignment of resources.

6. Revise the measures of actual consumption, the estimates of future needs for each type of resource, and the associated analysis as needed.

SP 12 Contribute to Organization's Process Assets

Work products, measures, documented experiences, and improvements from the product and service work for an offering are contributed to the organization's process assets.

This practice ensures that the organization's process assets improve through their use in the product and service work.

Refer to the Organizational Process Management process area for practices that cover the collection and use of organizational data and information.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Propose changes to the organization's standard processes and tailoring guidelines, criteria, and procedures based on their use in establishing and maintaining, and implementing the defined processes.
2. Propose improvements to the organizational process assets.
3. Store appropriate process and product measures in the organization's measurement repository.

The measures stored in the organization's measurement repository are typically those measures that defined by the group that is responsible for the organizational process management or organizational measurement activities.

4. Submit documentation for possible inclusion in the organization's process asset library.

Examples of documentation include the following:

- exemplary process descriptions
- training modules
- exemplary plans
- checklists

5. Document lessons learned from the project for inclusion in the organization's process asset library.

SP 13 Address Significant Deviations

Significant deviations from the requirements, estimates, plans, and commitments for the product and service offering results and work are identified and addressed.

This practice ensures that significant deviations from the requirements, estimates, plans, and commitments for the product and service offering and work are recognized and addressed so that adjustments are made to reflect a reasonable plan forward.

A deviation is significant if, left unresolved, it would significantly impact the ability to meet the requirements, plans, or commitments for the product and service work.

Subpractices

1. Analyze identified issues and risks to determine the actual or likely deviations from the offering requirements, estimates, plans, and commitments.

Refer to the Guidelines for Risk Management in Annex A for guidance that may be useful in implementing this practice.

2. Perform corrective actions to fix any existing critical problems caused by the deviation, where appropriate.

Examples of corrective actions to fix any immediate problems include:

- recalling and replacing defective work products
- undoing a transaction
- performing rework on defective work products or services
- providing work-around procedures to circumvent a problem

3. Document issues and risks which result or are likely to result in significant deviations and designate them for analysis and corrective action.
4. Determine and document corrective actions needed to address the identified deviations from the offering requirements, estimates, plans, and commitments.

Examples of corrective actions to address the identified deviations include:

- renegotiating changes to the requirements
- revising estimates and plans
- renegotiating commitments
- arranging for actions that are beyond the scope of responsibility and authority for the offering
- revising the risks for the offering
- taking no action

5. Review the planned corrective actions with relevant stakeholders, and obtain their agreement.
6. Perform the agreed-to corrective actions and track to completion.

SP 14 Address Deviation Causes

The likely causes of significant deviations from the requirements, estimates, plans, and commitments for the product and service offering results and work for an offering and other significant issues are identified and addressed.

This practice ensures that, where possible, actions are taken so that significant deviations from the product and service requirements, estimates, plans, and commitments and other issues, of the type that occurred in the past, do not recur.

Subpractices

1. Review significant deviations and other issues to determine which of these are likely to recur.
2. Analyze the significant deviations and other issues to determine their likely causes.
3. Document the likely causes of each identified significant deviation and issue so that corrective actions can be performed.
4. Determine and document preventive actions that are expected to prevent the future occurrence of identified problems and similar problems.
5. Review the proposed preventive actions with relevant stakeholders, and obtain their agreement.
6. Perform the agreed-to preventive actions and track to completion.
7. Document as risks any significant recurring problems that are not addressed with preventive actions.

SP 15 Communicate Progress

Progress, accomplishments, and issues related to the product and service work for an offering are reviewed with relevant stakeholders as needed.

This practice ensures that relevant stakeholders by the product and service work activities and results have a common, correct, and current understanding of the progress, accomplishments, issues, and risks so there are no surprises.

Subpractices

1. Obtain and verify the inputs needed to present the progress, accomplishments, issues, and risks with relevant stakeholders.

Refer to the Guidelines for Risk Management in Annex A for guidance that may be useful in implementing this practice.

2. Conduct reviews at points in time that are meaningful to the product and service work and to relevant stakeholders.

Examples of meaningful times to conduct reviews include:

- at completion of a significant piece of work
- at key milestones
- on a regular schedule (for example, monthly)
- when there is a specific need for information

3. Identify and document action items and track them to closure.
4. Document issues and risks identified in the review.

SP 16 Revise Plans

The estimates, commitments, and plans related to the product and service work for an offering are revised to reflect accomplishments, progress, risk changes, corrective actions, and plan changes.

This practice ensures that the product and service work plans reflect an accurate description of the current situation and that all elements of the plan are kept consistent with each other.

Refer to the Guidelines for Risk Management in Annex A for guidance that may be useful in implementing this practice.

SP 17 Apply Lessons Learned

Lessons learned in planning, performing, and managing the product and service work for an offering are recorded and used in establishing future requirements, estimates, plans, and commitments.

This practice ensures that the people performing the product and service work learn from their experiences, and apply these lessons.

Subpractices

1. Review the product and service offering requirements, estimates, plans, commitments, and work activities periodically to identify lessons learned.
2. Review the analyses performed on significant deviations and actions performed to identify lessons learned.
3. Document and store the derived lessons learned.
4. Review the documented lessons learned with those who are knowledgeable and relevant stakeholders.
5. Incorporate the documented lessons learned into the offering plans, processes, and procedures.
6. Make lessons learned available to the managers and staff involved in the product and service work.

14.2.7 Product and Service Preparation (PSP)

Maturity Level 3

14.2.7.1 Purpose

Product and Service Preparation establishes the requirements for a product and service offering and develops and prepares the offering so that it is ready for deployment and use.

14.2.7.2 Introductory Notes

This process area covers the development and preparation (including the preparation for deployment) of a complete product and service offering as well as maintenance and enhancement releases of the offering. This includes not only the offering components, capabilities, and features for the customers and users, but it also includes the components, capabilities, and features that are needed to be able to deploy, operate, and support the offering.

The goals and practices of this process area are expressed in context of a single product and service offering. This process area applies to each product and service offering in the organization's portfolio, including those offerings that are used internal to the organization. Where there are references to the requirements, plans, commitments, measures, etc. for a product and service offering, by implication the phrases also include these items for the units, workgroups, and suppliers involved in the product and service work.

This process area is primarily the responsibility of an engineering or development unit within the organization. The following special terms are used in the goals and practices of this process area:

- The term "product and service offering" is used to refer to a set of closely related products and services that are targeted to a specific customer or customer segment. A product and service offering may include a product as the main component with supporting services, a service as the main component with supporting products, a set of products that are used together, a set of products and services that form a business offering, or a single product or service.

- The term “product and service work” is used as an abbreviated form for the work an organization performs in developing, preparing, deploying, operating, and supporting, a product and service offering, as well as managing these activities.
- The term “operation” and “operating,” when used in reference to a product and service offering, refers to
 - providing the offering customers appropriate access to the offering products, supplies, and other offering resources
 - operating the equipment that is part of the offering
 - delivering the offering services to customers
 - performing the transactions of the offering

Product and service preparation involves

- establishing the requirements for a product and service offering
- designing, developing, and constructing the products and services that make up the offering and the supporting components
- preparing the supporting documentation for the offering
- integrating and packaging the offering
- demonstrating that the offering is ready for deployment and use

Requirements for a product and service offering come primarily from the customer, but requirements also come from the organization and from laws and regulations.

The product and service preparation work is performed in accordance with the defined process. The work may be performed by multiple units both inside and outside the organization. Interactions among units involved in the developing and preparing the products and services and in the other product and service work are handled in a disciplined manner by the people doing the work, and when needed by management. Interactions with suppliers involved in the work may be handled in the same way as internal interactions (that is, within the defined process) or they be handled as a separate coordinated sourcing management activity.

The practices in this process area are not process steps. They should not be interpreted to imply a sequential process, moving from one practice to the next. The actual process used in the development and preparation of a product and service offering may involve methods and steps that address these practices in an incremental, iterative, agile, or strictly sequential way.

The work products that are developed by one task for use in other tasks (for example, the requirements specifications which are used in the design tasks) are developed and inspected by peers of the developers and by the recipients of the work products to ensure that the results produced are appropriate for the subsequent tasks. When changes to a work product are approved and incorporated, affected activities and work products are also revised to reflect the approved changes. Bi-directional traceability between the requirements for a product and service offering and the associated plans and work products is maintained throughout the life cycle of the offering.

The reason for this process area at maturity level 3 is that a well-define process for developing and preparing a product and service offering, integrated with the other product and service work, is a critical characteristic of maturity level 3.

14.2.7.3 Specific and Institutionalization Goals

SG 1 Offering Requirements Are Specified

The requirements for a product and service offering are defined and documented.

SG 2 Offering Is Constructed

A product and service offering is designed, developed, constructed, and documented to satisfy its requirements.

SG 3 Offering Is Demonstrated

A product and service offering is demonstrated to be ready to be deployed, operated, and supported.

InG Practices Are Institutionalized

The practices for Product and Service Preparation are institutionalized.

Institutionalization includes:

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.2.7.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Offering Requirements Are Specified)	SP 1 (Maintain Offering Requirements Specification) SP 2 (Validate Offering Requirements) SP 3 (Maintain Allocation of Offering Requirements) SP 4 (Maintain Requirements Traceability)
SG 2 (Offering Is Constructed)	SP 5 (Maintain Offering Capacity Models) SP 6 (Address Offering Business Risks) SP 7 (Maintain Offering Design) SP 8 (Maintain Designs of Offering Components) SP 9 (Maintain Offering Changes for Organization Assets) SP 10 (Construct Offering Components) SP 11 (Maintain Offering Documentation)

SG 3 (Offering Is Demonstrated)	SP 12 (Monitor Preparation of Offering) SP 13 (Integrate Offering Components) SP 14 (Verify Offering) SP 15 (Validate Offering) SP 16 (Accept Offering) SP 17 (Assemble Offering Deployment Package)
InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)

The five institutionalization practices, including subpractices and supplementary information are contained in Part III, Chapter 13.

14.2.7.5 Specific Practices

SP 1 Maintain Offering Requirements Specification

The requirements specification for a product and service offering is established and maintained.

This practice ensures that a single source of agreed-to baseline requirements for a product and service offering is documented and serves as the basis for construction of the offering and for future evolution and changes to the offering.

The requirements specification for a product and service offering clearly and precisely describes each requirement (that is, the capabilities, features, functions, performance, quality, and constraints). Each requirement is specified in such a way that the offering can be designed, planned, and objectively evaluated to determine if the requirements are satisfied.

Product and service requirements cover not only the offering components, capabilities, and features for the customers and users, but it also includes the components, capabilities, and features that are needed to be able to deploy, operate, and support the offering. Examples of additional aspects that the requirements need to address include:

- training material and training events
- processes and materials used in deploying, operating, and supporting the offering
- marketing and sales materials, if applicable

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Review the customer requirements, business requirements, laws, regulations, and standards for the offering to ensure that issues affecting the requirements specification are identified and resolved.

Refer to the Product and Service Business Management process area.

2. Document the requirements specification for the offering to address the applicable customer requirements, business requirements, laws, regulations, and standards.

The requirements specification needs to address the various categories of requirements including:

- functional requirements for an offering, such as capabilities, features, throughput, and volumes
- quality attributes, such as reliability, usability, maintainability, and flexibility
- technical constraints on the offering, such as performance requirements and design constraints
- non-technical constraints related to development, preparation, deployment, operations, and support of the offering, such as cost and schedule

3. Identify and document derived requirements and changes to previously derived requirements for the offering.

Derived requirements are requirements that are not explicitly stated in the source requirements for the offering, but that are needed to design and construct the offering.

4. Document the source of each requirement and the associated critical decisions and rationale for each requirement.
5. Identify and document the methods that will be used to verify and validate each requirement.

Examples of requirements verification and validation methods include:

- review by customers and their representatives
- review by peers or experts
- independent audits or reviews
- analysis
- testing
- simulations
- prototypes

6. Review the requirements specification with relevant stakeholders, and obtain their agreement.
7. Conduct work product inspections of the requirements specification.

Examples of factors to address in the work product inspections include:

- completeness
- correctness
- consistency with other requirements
- ease of construction
- verifiability
- conformance with standards

Refer to the Guidelines for Work Product Inspection in Annex A for guidance that may be useful in implementing this practice.

8. Place the requirements specification under configuration management.

Refer to the Organizational Configuration Management process area.

9. Revise the requirements specification as necessary.

SP 2 Validate Offering Requirements

The requirements for a product and service offering are validated.

This practice ensures that the requirements accurately and completely specify a product and service offering that will satisfy the needs of the customers and users.

Requirements validation is the process of determining whether, or to what extent, the specified product and service offering will fulfill the needs of the customers and users. Validation typically involves performing analyses, simulations, or prototypes to ensure that requirements will satisfy the needs and expectations of the customers and users.

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Identify the requirements that will be validated and the methods that will be used to validate each requirement.

In addition to validating individual requirements and sets of requirements, the complete set of requirements should be validated to ensure that:

- the requirements are consistent with each other.
- the requirements specify a functional and useful offering
- the requirements specify an offering that can be developed, prepared, deployed, operated, and supported as expected

Examples of requirements validation methods include:

- review by customers and their representatives
- review by peers or experts
- independent audits or reviews
- analysis
- testing
- simulations
- prototypes

2. Establish and maintain the requirements validation plans, descriptions of validation activities, and validation procedures.

3. Place the requirements validation plans, descriptions of validation activities, and validation procedures under version control.
4. Perform the requirements validation activities according to the defined validation plans, validation scenarios, and procedures.
5. Identify and document requirements validation issues and proposed corrective actions.
6. Review the requirements validation issues and proposed corrective actions with the customers, users, and other relevant stakeholders, and obtain their agreement on the corrective actions.
7. Perform the agreed-to corrective actions and track to closure.

Corrective actions typically involve changing the requirements for the offering.

8. Revise the requirements validation plans, descriptions of validation activities, and validation procedures, and perform re-validation as needed.

SP 3 Maintain Allocation of Offering Requirements

The allocation of the requirements for a product and service offering to the components of the offering is established and maintained.

This practice ensures that the components of a product and service offering, in aggregate, will satisfy the overall requirements of the offering.

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Analyze the requirements and requirements changes to determine how they should be allocated to the components of the offering.

A requirement may be allocated to a single component or it may be partitioned and assigned to multiple components.

Examples of the types of components to which offering requirements can be allocated include:

- hardware components
- software components
- process components
- training components
- document components
- forms components
- people components

2. Identify and document derived requirements and changes to previously derived requirements that result from the requirements allocation.

Derived requirements are requirements that are not explicitly stated in the requirements specification for the offering, but that are needed to construct the offering from the offering components. Derived requirements are often a result of the design solution selected for the offering.

Examples of sources of derived requirements include:

- interrelationship across offerings that constitute a set of synergistic offerings or coordinated shared components
- interfaces and functions needed to support testing of the components or system
- interfaces and functions needed to perform the offering support activities (for example, operational logs)

3. Identify and document the external interface requirements for the offering and changes to these requirements.
4. Identify and document the internal interface requirements among offering components and changes to these requirements.
5. Define and document the allocation of the requirements and requirements changes for each offering component.
6. Conduct work product inspections of the requirements allocation.

Examples of factors to address in the work product inspections include:

- completeness of derived requirements
- completeness of interface requirements
- reasonableness of allocation
- completeness and correctness of allocation

Refer to the Guidelines for Work Product Inspection in Annex A for guidance that may be useful in implementing this practice.

7. Place the requirements allocation under configuration management.

Refer to the Organizational Configuration Management process area.

8. Revise the requirements allocation as necessary.

SP 4 Maintain Requirements Traceability

Bi-directional traceability is established and maintained between the requirements for a product and service offering and the associated plans and work products.

This practice ensures that all the requirements for the product and service offering are appropriately addressed and that no superfluous capabilities, features, or functions are included in the offering.

Requirements for a product and service offering include:

- customer requirements
- organization business requirements
- laws and regulations
- imposed standards
- overall offering requirements
- allocated requirements for the offering components

Subpractices

1. Define the traceability that is needed among work products for the offering.

The traceability that is needed depends on the characteristics of the offering, the organization of the work, the work environment, and the relationships among the units involved in the product and service work.

2. Document the bi-directional traceability between the various levels of offering requirements.

Requirements for a product and service offering include:

- customer requirements
- organization business requirements
- laws and regulations
- imposed standards
- overall offering requirements
- allocated requirements for the offering components

3. Document the bi-directional traceability for the offering requirements to the associated plans and work products.

Examples of plans and work product for which the offering requirements are traced include:

- design documentation for the offering
- design documentation for the offering components
- work plans and work breakdown structures
- constructed offering components
- verification activities (for example, test cases)
- validation scenarios and events

4. Review the traceability documentation with relevant stakeholders and obtain their agreement.
5. Place the traceability documentation under configuration management.

Refer to the Organizational Configuration Management process area.

6. Revise the traceability documentation as needed.

Examples of when the documentation of the traceability is revised include:

- when lower level components are developed
- when the requirements change
- when the requirements are refined to more detailed or derived requirements
- when a defect in the documentation of the traceability is identified

SP 5 Maintain Offering Capacity Models

Capacity models for the product and service offering are established and maintained.

This practice ensures that the expected demand/production schedule for a deployed product and service offering is understood and modeled so that the offering can support the expected demand and satisfy the throughput processing requirements and goals.

Subpractices

1. Define and document descriptions of the user transactions that will be performed, the functions that the offering will provide, and the processing flow for the offering.
2. Determine the relationships among the major activities of the processing flow for the offering.

Examples of relationships among activities include:
contention for resources
data dependencies
processing order dependencies

3. Identify the requirements and goals, along with the priorities, that define the overall demand/production schedule for the offering.

A demand/production schedule describes quantitatively how the workload changes due to seasonal or other cyclic conditions or due to other predictable conditions.

Examples of demand/production schedules include:

- the number of transactions or work requests that are received and processed relative to a timeline
- the number of problem reports that are expected on a day-by-day basis following the release of a product revision
- the utilization of an organization's IT systems for each day of a typical week

The overall demand/production schedule for the offering may either be specified in the offering requirements or it may be derived from the requirements and other information.

4. Obtain forecasts that define how the overall demand/production schedule for the offering will change in the future.
5. Identify the factors and events that influence the demand/production schedule for the primary activities.

Examples of factors and events that affect demand/production schedule include:

- time of the day
- days of the week
- days or weeks of the month
- months or seasons of the year
- changes in parameters that affect the work (for example, interest rate change)

6. Construct the capacity model for the offering.
7. Verify and validate the capacity model.
8. Place the capacity model under version control.
9. Perform corrective actions to address the problems in the capacity model and track to closure
10. Revise the capacity model and the supporting analyses as needed.

SP 6 Address Offering Business Risks

Business risks inherent in a product and service offering are identified, and support to manage the risks is included in the design, construction, and documentation of the product and service offering.

This practice ensures that appropriate provisions are built into a product and service offering to manage inherent business risks.

Business risks are risks that are associated with business losses or problems inherent in providing the offering and performing the business activities.

Examples of business risks include:

- risk of fraudulent use of credit cards
- risk of inaccurate or delayed posting of transactions
- risk of legal liabilities

Refer to the Guidelines for Risk Management in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Identify the business risks for the offering along with associated contextual information.
2. Analyze the business risks for the offering to determine potential impact, likelihood of occurrence, circumstances that are likely to manifest the occurrence.
3. Document the business risks for the offering and the associated analysis, priorities, and contextual information.
4. Prioritize the business risks for the offering.
5. Select the business risks that will be addressed in the design, construction, and documentation of the offering.
6. Review the documented business risks with relevant stakeholders and obtain their agreement.

7. Identify requirements, design, construction, and documentation provisions that can reduce the likelihood or impact of the selected business risks and arrange for the incorporation of these provisions.
8. Place the documented business risks under version control.
9. Revise the documented business risks for the offering as needed.

SP 7 Maintain Offering Design

The overall design of a product and service offering is established and maintained.

This practice ensures that the components that are constructed satisfy their requirements and will assemble to produce the specified product and service offering.

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Identify and document alternative design solutions that satisfy the offering requirements.
2. Define and document the criteria that will be used to evaluate the alternative design solutions for the offering.

Examples of evaluate criteria for the offering design include:

- completeness
- conformance with design standards
- modularity
- maintainability
- portability
- reliability
- security
- scalability
- usability

3. Select the design solution for the offering that provides the best fit to the evaluation criteria.
4. Define and document that data model for the offering.

A data model is a depiction of the data entities of an offering and the relationships among these data entities.

5. Document the design solution, including the data model, for the offering along with the critical design decisions and associate rationale.
6. Review the offering design solution with relevant stakeholders and obtain their agreement.
7. Conduct work product inspections of the offering design solution.

Examples of factors to address in the work product inspections include:

- completeness
- correctness
- conformance with standards
- rules of constructions

Refer to the Guidelines for Work Product Inspection in Annex A for guidance that may be useful in implementing this practice.

8. Place the offering design solution under configuration management.

Refer to the Organizational Configuration Management process area.

9. Revise the offering design solution as necessary.

SP 8 Maintain Designs of Offering Components

The designs of the components that comprise a product and service offering are established and maintained.

This practice ensures that the components that are constructed satisfy their requirements and will assemble to produce the specified product and service offering.

Component design may be done at different levels of abstraction — at the subsystem level, component level, and at various levels of sub-components.

Subpractices

1. Identify and document alternative design solutions that satisfy the requirements for each component.
2. Define and document the criteria that will be used to evaluate the alternative design solutions for each component.
3. Select the set of design solutions that define the design of each component.
4. Document the design for each component along with the critical design decisions and associate rationale.
5. Review the design for each component with relevant stakeholders and obtain their agreement.
6. Conduct work product inspections of the design for each component.

Examples of factors to address in the work product inspections include:

- completeness
- correctness
- conformance with standards
- rules of constructions

Refer to the Guidelines for Work Product Inspection in Annex A for guidance that may be useful in implementing this practice.

7. Place the design for each component under configuration management.

Refer to the Organizational Configuration Management process area.

8. Revise the design for each component as necessary.

SP 9 Maintain Offering Changes for Organization Assets

Descriptions of additions and revisions to the organization's standard processes and other organizational process assets that are needed for the product and service work are established and maintained.

This practice ensures that the process needs for developing, preparing, deploying, operating, supporting a product and service offering are in place when needed.

Organizational process assets typically include:

- standard processes
- definitions of standard measures
- guidelines and criteria for tailoring the standard processes and definitions of standard measures
- repositories for storing and making available process descriptions, measures, and other information

The work associated with a product and service offering includes the activities for:

- development
- preparation
- deployment
- operation
- support
- management

Refer to the Organizational Process Management process area for practices that cover the establishment and maintenance of the organizational process assets.

Subpractices

1. Review the offering requirements and designs to identify needed changes to the organization's standard processes and other organizational process assets that are needed for the product and service work.
2. Document the needed changes to the organization's standard processes and other organizational process assets.
3. Negotiate the needed changes with those responsible for the organization's process assets.
4. Document the agreed-to changes to the organization's standard processes and other organizational process assets.
5. Revise the descriptions of needed changes to the organization's standard processes and other organizational process assets as needed.

SP 10 Construct Offering Components

The hardware, software, supplies, and other components that comprise a product and service offering and that are needed to deploy, operate, and support the offering are developed or acquired.

This practice ensures that all the components that are needed for the product and service offering are ready to be integrated and verified.

Subpractices

1. Review the requirements and design for each offering component to ensure that issues affecting the construction of the component are identified and resolved.
2. Determine which of the offering components will be developed, obtained as a reused component, or acquired from a supplier.

Examples of factors that affect the decisions of developing, reusing, or acquiring a component include:

- functions, capabilities, and features the component needs to provide
- resources and skills available within the organization that can perform the work within the timeframe needed
- availability of the component from external sources
- costs of acquiring versus developing internally
- strategic business alliances
- impact on core competencies
- licenses, warranties, and limitations associated with components that might be acquired externally

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

3. Make arrangements to acquire the selected offering components from external sources.

Refer to the Sourcing Management process area for practices covering the acquisition of products and services from suppliers external to the organization

4. Obtain and modify the selected reused components, as appropriate, to satisfy the component requirements.
5. Construct the selected offering components to satisfy the component requirements.
6. Perform unit verification of the offering components as appropriate.
7. Conduct work product inspections of the offering components.

Examples of factors to address in the work product inspections include:

- completeness
- correctness
- conformance with standards
- rules of constructions

Refer to the Guidelines for Work Product Inspection in Annex A for guidance that may be useful in implementing this practice.

8. Place the offering components under configuration management.

Refer to the Organizational Configuration Management process area.

9. Revise the offering components as necessary.

SP 11 Maintain Offering Documentation

Documentation needed for deploying, operating, and supporting a product and service offering and for training those who perform these activities is established and maintained.

This practice ensures that the essential information that is needed by the people who deploy, operate, and support the product and service offering is available when needed.

Subpractices

1. Review the offering requirements, design, and construction to determine if any problems exist that affect the deployment, operation, and support documentation.
2. Define, document, and obtain agreement with those responsible for the requirements, design, and construction of the offering on corrective actions that will be performed to fix problems affecting the documentation, and track to closure.
3. Develop preliminary versions of the deployment, operation, and support documentation during the early phases of the offering development and preparation for review by the customer and other relevant stakeholders.
4. Conduct work product inspections of the deployment, operation, and support documentation.

Examples of factors to address in the work product inspections include:

- completeness
- correctness
- consistency with the final version of the offering
- conformance with standards
- rules of constructions

Refer to the Guidelines for Work Product Inspection in Annex A for guidance that may be useful in implementing this practice.

5. Verify the final version of the deployment, operation, maintenance, and support documentation against the final version of the offering.
6. Perform corrective actions to address problems identified in the deployment, operation, and support documentation.
7. Place the deployment, operation, and support documentation under configuration management.

Refer to the Organizational Configuration Management process area.

8. Revise the deployment, operation, and support documentation as necessary.

SP 12 Monitor Preparation of Offering

The design and construction of the components of a product and service offering are reviewed on a regular

basis to determine if they satisfy their requirements, and corrective actions are performed.

This practice ensures that immediate corrective actions can be performed when problems are identified in the design, development, and construction of a product and service components.

Subpractices

1. Perform regular reviews with representative of the units, workgroups, and suppliers involved in the design and construction of the components for the offering to coordinate and monitor these activities and resolve issues.

Refer to the Product and Service Work Management process area for practices that cover establishing and maintaining the defined process for the offering.

2. Identify critical dependencies among the units, workgroups, and suppliers involved in the design and construction of the components for the offering, and negotiate commitments for these dependencies.
3. Track the commitments of the units, workgroups, and suppliers involved in the design and construction of the components for the offering.
4. Perform reviews of critical work products produced by a unit, workgroup, or supplier as input to another unit or workgroup.

Depending on the characteristics and criticality of the work product, the review may be performed by representative of the receiving unit or workgroup only or it may be reviewed by others.

5. Identify any issues regarding the commitments of the units, workgroups, and suppliers and any other issues with the design and construction of the offering components.
6. Perform corrective action for any identified issues related to the design and construction of the offering components.

SP 13 Integrate Offering Components

The components that comprise a product and service offering are integrated.

This practice ensures that all the components of the product and service offering assemble, integrate, and interface with each other correctly.

The components that are integrated include not only the offering components, capabilities, and features for the customers and users, but it also includes the components, capabilities, and features that are needed to be able to deploy, operate, and support the offering.

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Identify the offering components to be integrated and the integration sequence.

The integration sequence is based on the design of offering and offering components. The assembly of components is typically an incremental build up of the offering so that each increment provides a stable foundation for the addition of additional components as they are assembled.

2. Establish and maintain the integration plans, integration exercises, and integration procedures.

Examples of integration exercises include:

- integration test cases
- audits
- reviews

3. Conduct work product inspections of the integration plans, integration exercises, and integration procedures.

Refer to the Guidelines for Work Product Inspection in Annex A for guidance that may be useful in implementing this practice.

4. Place the integration plans, integration exercises, and integration procedures under version control.
5. Confirm that each offering component is available and ready prior to assembling and integrating it.

Examples of criteria used to determine if an offering component is ready to be assembled and integrated include:

- the correct component and correct version was delivered
- evidence that the component satisfies the entry criteria for integration
- the appropriate documentation for delivery to integration is complete and correct

6. Integrate the offering components according to the defined integration sequence, plans, and procedures.
7. Evaluate the assembled product components according to the defined integration plans, integration exercises, and integration procedures.
8. Identify and document integration problems.

Integration problems are typically documented and managed using a problem reporting mechanism.

Refer to the Organizational Configuration Management process area for practices that cover problem reporting.

9. Perform corrective actions to address the identified problems and track to closure
10. Perform regression evaluations, as appropriate, whenever the components being integrated or the integration environment changes.
11. Revise the integration plans, integration exercises, and integration procedures, and perform re-integration as needed.

SP 14 Verify Offering

A product and service offering is verified against the applicable requirements.

This practice ensures that the components of the product and service offering, individually and collectively integrated, satisfy their requirements.

The components that are verified include not only the offering components, capabilities, and features for the customers and users, but it also includes the components, capabilities, and features that are needed to be able to deploy, operate, and support the offering.

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Identify the requirements to be verified for each verification exercise.
2. Establish and maintain the verification plans, verification exercises, verification procedures, and verification criteria.

Examples of verification methods include:

- review by customers and their representatives
- review by peers or experts
- independent audits or reviews
- analysis
- testing
- simulations
- prototypes
- audits

Verification criteria for continuous parameters, such as time or distance, may be expressed as a range of acceptable values or as a target value with acceptable tolerance.

3. Conduct work product inspections of the verification plans, verification plans, verification exercises, verification procedures, and verification criteria.

Refer to the Guidelines for Work Product Inspection in Annex A for guidance that may be useful in implementing this practice.

4. Place the verification plans, verification plans, verification exercises, verification procedures, and verification criteria under version control.
5. Confirm that the offering component to be verified are properly assembled and integrated as planned prior to performing the verification.
6. Verify the assembled and integrated components against their requirements according to the defined verification plans, verification exercises, verification procedures, and verification criteria.
7. Identify and document verification problems.

Integration problems are typically documented and managed using a problem reporting mechanism.

Refer to the Organizational Configuration Management process area for practices that cover problem reporting.

8. Perform corrective actions to address the identified problems and track to closure.

9. Revise the verification plans, verification exercises, verification procedures, and verification criteria, and perform re-verification as needed.

SP 15 Validate Offering

A product and service offering is validated for use.

This practice ensures that the product and service offering satisfies the needs of the customers and users.

The offering components that are candidates for validation include not only the offering components, capabilities, and features for the customers and users, but also include the components, capabilities, and features that are needed to be able to deploy, operate, and support the offering.

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Select the functions, capabilities, and features of an offering that will be validated.

Offering functions, capabilities, and features are selected for validation based on their relationship to user needs and desires.

2. Establish and maintain the validation plans, validation exercises, validation procedures, and validation criteria for the offering.

Validation methods are selected based on their ability to determine whether the user needs and desires are satisfied.

Examples of validation methods include:

- review by customers and their representatives
- review by peers or experts
- independent audits or reviews
- analysis
- testing
- simulations
- prototypes
- audits

3. Review the validation plans, validation exercises, validation procedures, and validation criteria for the offering with the customers and other relevant stakeholders.
4. Conduct work product inspections of the validation plans, validation exercises, validation procedures, and validation criteria.

Refer to the Guidelines for Work Product Inspection in Annex A for guidance that may be useful in implementing this practice.

5. Place the validation plans, validation exercises, validation procedures, and validation criteria under version control.

6. Confirm that the offering configuration to be validated and the validation environment are set up as planned prior to performing the validation.
7. Perform validation on the selected functions, capabilities, and features of an offering according to the defined validation plans, validation exercises, validation procedures, and validation criteria.
8. Identify and document validation problems.

Validation problems are typically documented and managed using a problem reporting mechanism.

Refer to the Organizational Configuration Management process area for practices that cover problem reporting.

9. Perform corrective actions to address the identified problems and track to closure
10. Revise the validation plans, validation exercises, validation procedures, and validation criteria, and perform re-validation as needed.

SP 16 Accept Offering

A product and service offering is approved and accepted by the owner of the offering as ready for deployment and operations.

This practice ensures that the (internal or external) owner of the product and service offering concurs that the offering satisfies its requirements and is ready for deployment and operations.

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Establish and maintain the acceptance plans, acceptance exercises, acceptance procedures, and acceptance criteria for the offering.

Examples of acceptance methods include:

- review by customers and their representatives
- review by peers or experts
- independent audits or reviews
- analysis
- testing
- simulations
- prototypes
- audits

Acceptance criteria for continuous parameters, such as time or distance, may be expressed as a range of acceptable values or as a target value with acceptable tolerance.

2. Review the acceptance plans, acceptance exercises, acceptance procedures, and acceptance criteria with the customer and obtain their agreement.

3. Conduct work product inspections of the acceptance plans, acceptance exercises, acceptance procedures, and acceptance criteria.

Refer to the Guidelines for Work Product Inspection in Annex A for guidance that may be useful in implementing this practice.

4. Place the acceptance plans, acceptance exercises, acceptance procedures, and acceptance criteria under version control.
5. Confirm that the offering configuration is properly assembled, integrated, and verified as planned, prior to performing the acceptance.
6. Perform the acceptance exercises according to the defined acceptance plans, acceptance exercises, acceptance procedures, and acceptance criteria.
7. Identify and document acceptance problems.

Acceptance problems are typically documented and managed using a problem reporting mechanism.

Refer to the Organizational Configuration Management process area for practices that cover problem reporting.

8. Perform corrective actions to address the identified problems and track to closure.
9. Revise the acceptance plans, acceptance exercises, acceptance procedures, and acceptance criteria, and repeat the acceptance exercises as needed.

SP 17 Assemble Offering Deployment Package

The components for a product and service offering are assembled into a package for delivery and deployment.

This practice ensures that a complete and correct delivery and deployment package for a product and service offering is assembled.

The product and service offering components includes those that are needed and used for:

- deployment
- operation
- support

The delivery and deployment package is typical prepared and delivered as a configuration management (CM) product baseline.

Refer to the Organizational Configuration Management for practices that cover the creation and delivery of CM product baselines.

Subpractices

1. Obtained appropriate authorization before assembling the delivery and deployment package.

2. Obtain and verify the offering components needed for the delivery and deployment package.
3. Assemble the delivery and deployment package.
4. Verify the delivery and deployment package.

Examples of verifications that should be performed on a delivery and deployment package include:

- verifying that the correct components are included
- the components are assembled in the correct sequence
- the delivery and deployment package satisfies applicable standards and requirements
- licensing and copyright provisions have been properly addressed
- the package satisfies the applicable security requirements
- the package can be installed and operated in its intended environment

5. Document the delivery and deployment package.
6. Place the delivery and deployment package and the documentation of the package under configuration management.

Refer to the Organizational Configuration Management process area.

14.2.8 Product and Service Deployment (PSD) Maturity Level 3

14.2.8.1 Purpose

Product and Service Deployment installs, modifies, replaces, and removes the people, equipment, computing and communication infrastructure, supplies, and other resources used in operating and supporting a product and service offering.

14.2.8.2 Introductory Notes

This process area covers the deployment of products and services that make up a single offering, deployment of changes to the offering, removal of offering components, and the removal of the offering. It includes the deployment of components needed to operate and support the offering.

The goals and practices of this process area are expressed in context of a single product and service offering. This process area applies to each offering in the organization's portfolio, including those offering that used internal to the organization.

This process area is primarily the responsibility of an engineering or field support unit within the organization. Depending on the size, complexity, and characteristics of a product and service offering, the deployment may be performed by a unit specializing in deployment or it may be performed by a unit that has additional responsibilities such as offering development, preparation and support.

The following special terms are used in the goals and practices of this process area:

- The term "product and service offering" is used to refer to a set of closely related products and services that are targeted to a specific customer or customer segment. A product and service offering may include a product as the main component with supporting services, a service as the main component with supporting products, a set of products that are used together, a set of products and services that form a business offering, or a single product or service.
- The term "deployment" is used to refer to the installation of a new product and service offering, the modification of an

offering, replacement of an offering, or the removal of an offering.

- The term “product and service work” is used as an abbreviated form for the work an organization performs in developing, preparing, deploying, operating, and supporting, a product and service offering, as well as managing these activities.
- The term “operation” and “operating,” when used in reference to a product and service offering, refers to
 - providing the offering customers appropriate access to the offering products, supplies, and other offering resources
 - operating the equipment that is part of the offering
 - delivering the offering services to customers
 - performing the transactions of the offering

Product and service deployment involves:

- planning the deployment of a product and service offering
- coordinating the deployment of an offering with related plans and ongoing activities
- installing, modifying, replacing, or removing components and documentation for an offering
- adjusting the capacity, skills, and processes, as needed, when installing, modifying, replacing, or removing an offering
- ensuring a smooth transition and migration of offering customer and the people performing the product and service work during and following the installation, modification, replacement, or removal of an offering.

In deploying a new product and service offering, deploying changes to an offering, or removing an offering, other product and service offerings may be affected. For example, verifying the deployment of a product and service offering often includes verifying that other offerings are not affected in unexpected ways. In addition, deployment of a change to an offering for a specific installation site may affect the capacity and activities required at other related installation sites. When deploying an offering at a site, the effects on other offerings and other installation sites must be considered.

In the goals and practices of this process area, where there are references to the requirements, plans, commitments, measures, etc. for a product and service offering, by implication, the phrases also include these items for the units and workgroups involved in the product and service work.

The reason for this process area at maturity level 3 is that a well-defined process for deploying a product and service offering, integrated with the other product and service work, is a critical characteristic of maturity level 3.

14.2.8.3 Specific and Institutionalization Goals

SG 1 Offering Deployment Is Planned

The plans for deploying a product and service offering are defined, documented, and agreed to.

SG 2 Offering Is Deployed

A product and service offering is deployed to support the needed capacity.

SG 3 Deployed Offering Is Demonstrated

When a product and service offering is deployed, that offering and the other affected offerings are demonstrated to be ready for operations.

InG Practices Are Institutionalized

The practices for Product and Service Deployment are institutionalized.

Institutionalization includes:

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.2.8.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Offering Deployment Is Planned)	SP 1 (Estimate Changes to Capacity) SP 2 (Define Offering Deployment Approach) SP 3 (Maintain Offering Deployment Plan) SP 4 (Maintain Offering Migration Plan) SP 5 (Coordinate Offering Deployment Plans)
SG 2 (Offering Is Deployed)	SP 6 (Deploy Offering) SP 7 (Adjust Capacity) SP 8 (Deploy Offering Documentation Changes) SP 9 (Deploy Offering Process Changes) SP 10 (Maintain Offering Transition Support) SP 11 (Adjust Staffing and Skills)
SG 3 (Deployed Offering Is Demonstrated)	SP 12 (Verify Offering Deployment) SP 13 (Accept Offering Deployment) SP 14 (Migrate Customers and Staff) SP 15 (Support Parallel Operations)
InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)

The five institutionalization practices, including subpractices and supplementary information are contained in Part III, Chapter 13.

14.2.8.5 Specific Practices

SP 1 Estimate Changes to Capacity

Estimates of the changes in capacity needed for the deployment of a product and service offering are determined.

This practice ensures that the effects of the product and service offering deployment on capacity needs are understood so that appropriate adjustments to the capacity can be made.

Subpractices

1. Determine the current capacity in place for the existing product and service offerings.
2. Estimate and document the change in capacity needed to operate and support the offering after the planned deployment.
3. Review the capacity estimates with relevant stakeholders and obtain their agreement.

SP 2 Define Offering Deployment Approach

The approach for deploying a product and service offering is defined.

This practice ensures that an approach for the deployment of a product and service offering is defined, and that relevant stakeholders understand and agree to the planned approach.

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Identify the critical characteristics of the deployment and the installation sites that affect the deployment approach or plans.
2. Review reports from previous deployments to identify and incorporate applicable lessons learned.
3. Define and document the overall approach for the deployment.
4. Review the deployment approach with relevant stakeholders and obtain their agreement.

SP 3 Maintain Offering Deployment Plans

Plans for deploying a product and service offering are established and maintained.

This practice ensures that the deployment plans for the product and service offering exist, contain the necessary details, and are agreed to so that the deployment can be performed appropriately.

Subpractices

1. Identify the resources needed for performing the deployment.
2. Identify the specific components and the version of each component that will be deployed.
3. Assign responsibility and authority for the deployment activities.
4. Define the deployment activities and the schedule for the deployment activities.

The deployment plan needs to include, as appropriate, steps that will be taken to ensure that the operations and performance of product and service offerings will continue with no unplanned interruptions during the deployment.

5. Define the communications that need to be made concerning the deployment, including the information that will be communicated, who needs to be informed, when the communications will occur, and the media that will be used.
6. Document the plan for the deployment.
7. Review the deployment plan with relevant stakeholders and obtain their agreement.
8. Place the deployment plan under version control.
9. Revise the deployment plan as needed.

SP 4 Maintain Offering Migration Plan

Plans are established and maintained for migrating customers and the people performing the operations and support work following the deployment of a product and service offering.

This practice ensures that migration plans exist for the deployment of a product and service offering, that they contain the necessary details, and that they are agreed to so that the migration can be accomplished with minimal disruption.

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Determine who will be affected by the deployment and how they will be affected.
2. Identify the migration support that needs to be provided to relevant stakeholders.
3. Define the activities and the associated capacity required to support the migration of relevant stakeholders.
4. Define the schedule, responsibility, and authority for the migration activities.
5. Define the communications that need to be made concerning the migration, including the information that will be communicated, who needs to be informed, when the communications will occur, and the media that will be used.
6. Document the migration plan.
7. Review the migration plan with relevant stakeholders and obtain their agreement.
8. Place the migration plan under version control.
9. Revise the migration plan as needed.

SP 5 Coordinate Offering Deployment Plans

Plans for deploying a product and service offering and for migrating the customers and the people performing the product and service work are reconciled and coordinated with related plans and ongoing activities.

This practice ensures that the plans for the deployment of a product and service offering, the associated migration plans, and other plans and activities that are related and could affect one another are adjusted so that the deployment and migration can proceed according to the plans.

Subpractices

1. Identify the plans and ongoing activities that are related to the deployment and migration of the offering.

Examples of related plans and activities are those that include the same workgroups, installation sites, customers, or use common resources and facilities.

2. Review the related plans and ongoing activities to determine the interactions and effects on each other.
3. Resolve conflicts among the deployment and migration plans and the related plans and ongoing activities.
4. Monitor the implementation of the deployment and migration plans and the related plans and ongoing activities to identify any plan changes that are needed.
5. Document the changes to the deployment and migration plans and the related plans that are needed to resolve conflicts.
6. Review the changes to the deployment and migration plans and the related plans and ongoing activities with relevant stakeholders and obtain their agreement.
7. Revise the deployment and migration plans and the related plans as needed.

SP 6 Deploy Offering

A product and service offering is deployed according to the plans.

This practice ensures that the product and service offering deployment activities are performed as defined in the agreed-to plans.

Subpractices

1. Obtain the correct version of each of the components that are needed for the deployment.
2. Perform the deployment as planned.
3. Monitor the deployment against the plans.
4. Identify any significant deviations from the deployment plans and other issues.
5. Perform corrective actions to address significant deviations from the deployment plans and other issues.
6. Provide regular reports of deployment status and results to relevant stakeholders.
7. Record lessons learned from the deployment.

SP 7 Adjust Capacity

Changes to the capacity are made, as needed, when deploying a product and service offering.

This practice ensures that the capacity is adjusted (either increased or decreased) to reflect the product and service offering deployment.

Capacity includes adjusting the quantities of:

- people
- equipment
- computing and communication infrastructure
- supplies
- other resources needed to operate and support the offering

Subpractices

1. Determine the changes in capacity required at each of the affected installation sites.
2. Obtain additional resources that are needed.
3. Deploy the additional capacity and remove the surplus capacity at each affected installation site as appropriate.
4. Evaluate and monitor the effects of the change in capacity to ensure the capacity is appropriate, and make adjustments if necessary.

SP 8 Deploy Offering Documentation Changes

When a product and service offering is deployed, the appropriate documentation or documentation changes needed to operate and support the offering are deployed.

This practice ensures that the customers and the people performing the product and service work have the up-to-date documentation.

Subpractices

1. Determine the documentation and documentation changes that are needed at each of the affected installation sites.
2. Determine the form, format, and number of copies of the documentation and documentation changes that are needed at each of the affected installation sites.
3. Obtain the needed documentation and documentation changes.
4. Distribute or make the documentation and documentation changes available to relevant stakeholders.
5. Review the documentation and documentation changes with relevant stakeholders to ensure they understand the content and how it affects them.
6. Remove the obsolete documentation.

SP 9 Deploy Offering Process Changes

Processes and process changes needed to operate and support a product and service offering are deployed as needed when the offering is deployed.

This practice ensures that the process documentation for all product and service offerings remains up-to-date when an offering is deployed, and that the people performing the product and service work have the up-to-date documentation.

The process documentation for a product and service offering that needs to be provided includes documentation for:

- performing the services associated with the offering
- supporting the offering
- migrating customers from the offering
- migrating to the changed offering

Subpractices

1. Determine the process documentation and documentation changes that are needed at each of the affected installation sites.

Refer to the Product and Service Work Management process area for practices that cover the establishment and maintenance of the defined processes for the product and service work.

2. Determine the form, format, and number of copies of the documentation and documentation changes that are needed at each of the affected installation sites.
3. Obtain the needed process documentation and documentation changes.
4. Distribute or make the process documentation and documentation changes available to relevant stakeholders.
5. Review the process documentation and documentation changes with relevant stakeholders to ensure they understand the content and how it affects them.
6. Remove the obsolete process documentation.

SP 10 Maintain Offering Transition Support

The support activities needed to accomplish a smooth transition during and following the deployment of a product and service offering are established and maintained.

This practice ensures that the appropriate additional support is provided during the transition associated with the deployment of a product and service offering.

Subpractices

1. Determine the nature and amount of support required during the transition.
2. Obtain the support resources and skills needed for the transition.
3. Provide the transition support needed to relevant stakeholders.
4. Evaluate and monitor the transition support provided to ensure it is adequate and effective, and make adjustments if necessary.

SP 11 Adjust Staffing and Skills

Staffing skills are adjusted and additional skills are obtained, as needed, when deploying a product and service offering.

This practice ensures that the people performing the product and service operations and support work are provided with any additional skills they will need after the deployment of an offering.

Subpractices

1. Identify skills gaps and additional training and development needs for the people performing the work.
2. Remove and reassign staff based on the match of available skills to the skills needed to perform the work.
3. Provide the additional training and development opportunities.
4. Monitor and evaluate the people performing the work to determine if they obtained the additional needed skills, and make adjustments if necessary.

SP 12 Verify Offering Deployment

The changes deployed for a product and service offering are verified against the requirements for the offering and the service-level agreements.

This practice ensures that a deployed product and service offering meets all the specified requirements and agreements.

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Establish and maintain the deployment verification plans, verification exercises, verification procedures, and verification criteria.
2. Conduct work product inspections of the deployment verification plans, verification plans, verification exercises, verification procedures, and verification criteria.

Refer to the Guidelines for Work Product Inspection in Annex A for guidance that may be useful in implementing this practice.

3. Place the deployment verification plans, verification plans, verification exercises, verification procedures, and verification criteria under version control.
4. Verify the deployed changes and the overall offering according to the deployment verification plans, verification exercises, verification procedures, and verification criteria.
5. Verify that the changes have not affected other offerings in ways that are not acceptable.
6. Identify deployment verification problems.
7. Perform corrective actions to address the identified problems and track to closure.
8. Revise the deployment verification plans, verification exercises, verification procedures, and verification criteria, and perform re-verification as needed.

SP 13 Accept Deployed Offering

Each deployment of a product and service offering is approved and accepted by the owner for that offering, owners of related offerings, and other relevant stakeholders.

This practice ensures that the owners of the product and service offerings and other relevant stakeholders are satisfied with the offering as deployed before switch-over to the deployed offering.

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Identify the owners of affect offerings and others who will approve the deployment.
2. Establish and maintain the deployment acceptance plans, acceptance exercises, acceptance procedures, and acceptance criteria for the offering.
3. Review and obtain agreement with relevant stakeholders on the deployment acceptance plans, acceptance exercises, acceptance procedures, and acceptance criteria.
4. Perform the deployment acceptance exercises according to the acceptance plans, acceptance exercises, acceptance procedures, and acceptance criteria.
5. Identify and document deployment acceptance problems.
6. Perform corrective actions to address the identified problems and track to closure.
7. Document the results of the acceptance demonstration.
8. Revise the deployment acceptance plans, acceptance exercises, acceptance procedures, and acceptance criteria, and repeat the acceptance exercises as needed.

SP 14 Migrate Customers and Staff

Customers and the people performing the product and service operations, maintenance, and support work for an offering that is being terminated are migrated in accordance with the migration plans.

This practice ensures that relevant stakeholders by the termination of a product and service offering are properly supported as they migrate from the terminated offering.

Subpractices

1. Provide migration and transition support information to the customers, users, and people performing the product and service work.
2. Solicit and document concerns about the migration and transition that are identified by the customers, users, and people performing the product and service work.
3. Define corrective actions to address concerns about the migration and transition as appropriate.
4. Review the defined corrective actions with relevant stakeholders and obtain their agreement.
5. Perform the agreed-to corrective actions to address concerns about the migration and transition and tracked to closure.
6. Notify relevant stakeholders when the migration begins and at important stages in the migration.
7. Provide migration support to relevant stakeholders as planned.
8. Monitor the migration progress and identify issues.
9. Perform corrective actions to address issues in the migration and track to closure.

SP 15 Support Parallel Operations

Each terminated or replaced product and service offering is continued as needed to allow the customers and users to transition off the terminated or replaced offering.

This practice ensures that a terminated or replaced product and service offering will continue to operate for as long as necessary to allow customers and users to migrate or until a business decision is made to discontinue the offering.

Subpractices

1. Estimate the capacity needed and associated timeframe for transitioning off the terminated or replaced offering.
2. Define the plan for continuing support for the terminated or replaced offering.
3. Review the plan for continuing support for the terminated or replaced offering with relevant stakeholders and obtain their agreement.
4. Provide the parallel support for the terminated or replaced offering as needed.
5. Monitor and measure the deployed offering and related offerings following deployment to identify latent problems with the deployment.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

6. Monitor the transition off the terminated or replaced offering and adjust or update the plans for continuing parallel operations.
7. Terminate the parallel operations when the customers have transitioned off the terminated or replaced offering or when the owner of the deployed offering determines the parallel operations should be terminated.

14.2.9 Product and Service Operations (PSO) Maturity Level 3

14.2.9.1 Purpose

Product and Service Operations provides the customers of a product and service offering with the capabilities and features of the offering.

14.2.9.2 Introductory Notes

The goals and practices of this process area are expressed in context of a single product and service offering. This process area applies to each offering in the organization's portfolio, including those offering that used internal to the organization.

The process area may be the responsibility of a unit within the organization, it may be responsibility of the customer of the offering, it may be the responsibility of a third party, or it may be a combination of these. Depending on the size, complexity, and characteristics of a product and service offering, the operations work may be performed by a unit specializing in operating the offering, it may be performed by a unit that has additional responsibilities such as offering development, preparation and support, or the work may be distributed across multiple work units.

The following special terms are used in the goals and practices of this process area:

- The term "product and service offering" is used to refer to a set of closely related products and services that are targeted to a specific customer or customer segment. A product and service offering may include a product as the main

component with supporting services, a service as the main component with supporting products, a set of products that are used together, a set of products and services that form a business offering, or a single product or service.

- The term “product and service work” is used as an abbreviated form for the work an organization performs in developing, preparing, deploying, operating, and supporting, a product and service offering, as well as managing these activities.
- The term “operation” and “operating,” when used in reference to a product and service offering, refers to:
 - providing the offering customers appropriate access to the offering products, supplies, and other offering resources
 - operating the equipment that is part of the offering
 - delivering the offering services to customers
 - performing the transactions of the offering
- The term “capability” is used to refer to characteristic of possessing the skills, knowledge, proficiency, and resources to accomplish a specific purpose or to be used for a specific purpose.
- The term “transaction” is used to refer to a unit of work performed by a product and service offering that provides a tangible result of value to a customer or user of a product and service offering. A transaction may be performed in response to a request from the user, it may be a transaction built into the offering and performed automatically, or it may be initiated by some other stimulus. It has a recognizable beginning point and unambiguous conclusion.

Product and service operations involves:

- Providing customers of a product and service offering with the information and resources they need to understand offering and to perform their role in its transactions
- Providing customers of a product and service offering with assistance to address problems they encounter with the offering
- Performing the transactions of a product and service offering in a way that ensures the results are correct
- Identifying exceptional conditions that occur in performing each transaction of a product and service offering and handling them in an approved manner
- Maintaining intermediate and final permanent records resulting from performing the transaction of a product and service offering
- Proving appropriate information on the operations of a product and service offering and the transactions performed to the customers and other relevant stakeholders

The reason for this process area at maturity level 3 is that a well-define process for operating a product and service offering, integrated with the other product and service work, is a critical characteristic of maturity level 3.

14.2.9.3 Specific and Institutionalization Goals

SG 1 Offering Resources and Information Are Provided

Resources, information, and support for a product and service offering are provided, as needed, to the customers.

SG 2 Offering Transactions Are Performed

The transactions for a product and service offering are performed and intermediate and final results are verified and communicated to relevant stakeholders.

SG 3 Results of Offering Transactions Are Finalized

Results of the transactions for a product and service offering are assembled, verified, stored, and communicated to relevant stakeholders.

InG Practices Are Institutionalized

The practices for Product and Service Operations are institutionalized.

Institutionalization includes:

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.2.9.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Offering Resources and Information Are Provided)	SP 1 (Provide Offering Information to Customers) SP 2 (Provide Offering Resources to Customers) SP 3 (Establish Customer Point of Contact) SP 4 (Provide Customer Assistance)
SG 2 (Offering Transactions Are Performed)	SP 5 (Verify Inputs for Transactions) SP 6 (Perform Transaction Work Steps) SP 7 (Identify Transaction Exceptional Conditions) SP 8 (Address Transaction Exceptional Conditions) SP 9 (Provide Intermediate Results to Customers)
SG 3 (Results of Offering Transactions Are Finalized)	SP 10 (Provide Transaction Results to Customers) SP 11 (Communicate Transaction Information) SP 12 (Store Permanent Transaction Data)
InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objective Assure Conformance)

The five institutionalization practices, including subpractices and supplementary information, are contained in Part III, Chapter 13.

14.2.9.5 Specific Practices

SP 1 Provide Offering Information to Customers

The customers of a product and service offering are provided with the information they need to understand the nature of a product and service offering and its transactions.

This practice ensures that the customers understand the overall product and service offering, the capabilities and features, the transactions that can be performed, and how they can participate in initiating and performing each transaction.

Subpractices

1. Provide each customer with a standard package of information on the product and service offering.
2. Provide each customer with the standard statement of agreements and commitments for the product and service offering.

These agreements and commitments cover those that the organization makes to the customers and those that the customers make when agreeing to the product and service offering.

3. Obtain customer feedback on the availability, usefulness, appropriateness, completeness, accuracy, and quality of the information provided and on the media or mechanisms used.
4. Perform corrective actions to address individual customer problems in the information provided.
5. Revise the standard package of information as needed.

SP 2 Provide Offering Resources to Customers

The customers of a product and service offering are provided with the equipment, computing and communication infrastructure, supplies, and other resources they need to perform their roles in the product and service offering.

This practice ensures that the facilities, supplies, and resources provided to the customers as part of a product and service offering are adequate and readily available to them when and where they are needed.

Subpractices

1. Determine the functions, features, and capabilities that are authorized for each customer.
2. Make available the facilities, supplies, and resources that customers need to perform their role in the offering.
3. Monitor the availability and adequacy of the facilities, supplies, and resources against the utilization on a regular basis.
4. Identify actual or likely problems in the availability and adequacy of the facilities, supplies, and resources.
5. Perform corrective actions to address problems in the availability and adequacy of the facilities, supplies, and resources.
6. Document, as problem reports, chronic shortfalls in the availability of the facilities, supplies, and resources.

Refer to the Product and Service Support process area for practices that cover the handlings of problem reports or change requests.

SP 3 Establish Customer Point of Contact

The customers of a product and service offering are provided with a point of contact for asking questions, getting information, and resolving issues regarding any aspect of the product and service offering.

This practice ensures that the customers are provided with easily locatable and accessible points of contact where they can obtain assistance they need to understand the product and service offering and perform their role in the transactions.

Subpractices

1. Establish points of contact that are needed to resolve customer questions, information needs, and issues.
2. Provide the customers with information on how to access the points of contact and the types of questions, information needs, and issues they can address.
3. Measure, monitor, and evaluate the support provided by the points of contact and the customer usage.
4. Identify any actual or likely problems in the capability of the points of contact to handle the customer questions, information needs, and issues.
5. Perform corrective actions to address any actual or likely problems in the capability of the points of contact to handle the customer questions, information needs, and issues.
6. Document, as problem reports, chronic problems in the capability of the established points of contact to handle the customer questions, information needs, and issues.

Refer to the Product and Service Support process area for practices that cover the handlings of problem reports or change requests.

SP 4 Provide Customer Assistance

Assistance is provided, as needed, to the customers of a product and service offering to address problems in understanding and using any component of the offering.

This practice ensures that appropriate assistance that customers may need is easily and readily accessible so that problems can be prevented or resolved before any serious difficulties are encountered.

Subpractices

1. Identify the types of problems that customers are expected to encounter and the expected level of support needed.
2. Provide assistance, as needed, to customers to address problems they encounter in understanding and using the offering and its transactions.
3. Measure and evaluate the critical parameters of the assistance provided.
4. Regularly review the responsiveness of assistance provided to the customers.

Examples of customer responsiveness include:

- the time it takes for a customer to make contact
- the time it takes for a customer to make log the request, problem, or question
- the time it takes for completing the response to a customer request, problem, or question

5. Regularly review the correctness and completeness of the assistance provided to the customers.

6. Regularly review the customer satisfaction with the assistance provided.
7. Identify any actual or likely problems in the capability, ability, and performance for providing assistance to the customers.
8. Perform corrective actions to address any actual or likely problems in the capability, ability, and performance for providing assistance to the customers.
9. Document, as problem reports, chronic problems in the capability, ability, and performance for providing assistance to the customers.

Refer to the Product and Service Support process area for practices that cover the handlings of problem reports or change requests.

SP 5 Verify Inputs for Transactions

The information and resources needed to perform each transaction of a product and service offering are obtained and verified, as appropriate.

This practice ensures that all the inputs required to perform a transaction are obtained, authenticated to confirm the acceptability of the source, and verified to confirm that they are adequate for performing the transaction.

Subpractices

1. Obtain the transaction request from the customer.
2. Verify that the customer is authorized to perform the requested transaction.
3. Perform corrective actions to address any issues regarding customers attempting to perform unauthorized transactions.
4. Identify the inputs to the transaction and the states they must be in to support performance of the transaction.
5. Review the inputs before performing the transaction to ensure that the inputs are available and in a state sufficient to support performance of the transaction.
6. Identify any issues regarding the inputs for a transaction being unavailable or insufficient to support performance of the transaction.
7. Perform corrective actions to address any issues regarding the inputs being unavailable or insufficient to support the performance of the transaction.
8. Review any resubmitted inputs to a transaction to ensure they are sufficient to support performance of the transaction.
9. Identify and document recurring problems with inputs to transaction for local action, where possible, or communicate them to management for action.

Refer to the Product and Service Work Management process area for practices that cover addressing the causes of deviations in the product and service work.

SP 6 Perform Transaction Work Steps

The requested transactions for a product and service offering are performed.

This practice ensures that the work steps that need to be carried out for a transaction are performed.

Some transactions may involve simple self-contained work steps performed by a single individual or by hardware or software. Other transactions may involve multiple individuals and work units, with parallel and sequential work steps. Depending on the complexity of a transaction, the work steps may have to be coordinated — this may be automated or manual.

The transactions are performed in a way that ensures the integrity of the work activities and the data they operate on. This includes:

- performing the work activities in a way that does not inappropriately interfere with other transactions (i.e., a transaction should transform the system from one consistent state to another consistent state)
- performing each work step in a way that leaves the permanent data in a consistent state (e.g., transfer from one account to another must show an equal debit and credit)
- restoring the system, the work steps, and the permanent data to a well-defined and valid state in cases where a transaction is aborted prematurely (e.g., effects of all operations that make up the transaction are undone, and data are rolled back to its previous state)
- confirming that the results of all work steps are brought into a consistent state after a transaction is completed or terminated

Subpractices

1. Assign responsibility for the work steps of each transaction to the work unit, workgroup, or individual responsible for each work step.
2. Review the actions that will be performed for each transaction to ensure they comply with work agreements and work procedures before initiating the work step.
3. Ensure that the work steps for each transaction are performed in accordance with the work agreements and work procedures.

Refer to the Work Unit Planning and Commitment and Work Unit Monitoring and Control process areas for practices that cover the planning, assignment, monitoring, and control of the assigned work steps.

Refer to the Work Unit Performance process area for practices that cover the actual performance of the assigned work steps.

4. Monitor the work flow for each transaction as the work steps are performed, and perform corrective actions as needed.

Examples of concerns to be monitored include:

- status of the work steps
- dependencies between work units
- correctness and completeness of the work steps

5. Verify the results of each transaction for completeness and accuracy.
6. Collect and store the outputs and other records of each transaction as specified in the work agreements and work procedures.

The types of transaction outputs and records that are maintain include those needed to enable the reconstruction, timely review, and examination of the processing for each transaction of a product and service offering. They can be used to recreate the situations for any critical point in the work steps.

SP 7 Identify Transaction Exceptional Conditions

Exceptional conditions in performing each transaction of a product and service offering are identified.

This practice ensures that any significant conditions that occur that are not addressed in the process descriptions for a transaction are identified, recorded, and understood so they can be properly addressed.

Subpractices

1. Identify and document observed exceptional conditions encountered when performing transactions.
2. Document the state of the transaction at which the exceptional condition occurred to facilitate recovery and completion of the transaction.
3. Restore the transaction to a defined consistent state.

SP 8 Address Transaction Exceptional Conditions

Actions for handling exceptional conditions encountered in performing each transaction of a product and service offering are defined, approved, and performed.

This practice ensures that any significant conditions that occur that are not addressed in the process descriptions for a transaction are addressed in an approved manner.

Subpractices

1. Identify specific actions for handling each exceptional condition that has been identified.
2. Review the identified actions for the exceptional condition with those authorized to approve the actions and obtain their agreement.
3. Perform the approved actions for the exceptional condition.
4. Verify that the implemented actions appropriately address the exceptional condition.
5. Inform relevant stakeholders of the exceptional condition, the actions taken, and the results of the actions.
6. Complete the transaction for which the exceptional condition was encountered.
7. Document, as problem reports, apparent problems in the product and service offering that might contribute to the exceptional condition occurring.

Refer to the Product and Service Support process area for practices that cover the handlings of problem reports or change requests.

SP 9 Provide Intermediate Results to Customers

The customers of a product and service offering are provided with intermediate status and other intermediate information they need to perform their role in the transactions.

This practice ensures that customers are kept informed of the progress and status of the transactions in which they are participating, as well as other information, prompts, or choices they need to be made aware of in order to perform the transactions.

SP 10 Provide Transaction Results to Customers

The results of each transaction of a product and service offering are provided to the affected customers.

This practice ensures that the customers are provided with documented records of the transactions they have requested or performed.

SP 11 Communicate Transaction Information

Information on the results of the transactions for a product and service offering is conveyed to relevant stakeholders.

This practice ensures that information on the results of the transactions performed for a product and service offering is made available to all relevant stakeholders, including the customers and other relevant stakeholders who are internal to the organization.

SP 12 Store Permanent Transaction Data

The final permanent information and data for each completed transaction are assembled, verified, and stored in accordance with applicable laws, regulations, organizational policies, and service level agreements.

This practice ensures that a complete record of each completed transactions is stored, such that the records are available to satisfy any statutory and organizational requirements and to support appropriate future needs of the customers and the organization.

Examples of the final permanent information and data that are stored include:

- those that must be retained to satisfy laws, regulations, organizational policies, and business rules
- those needed to understand how the transaction was performed
- those needed to enable the reconstruction, timely review, and examination of the processing for each transaction of a product and service offering.
- those needed to recreate the situations for any critical point in the work steps

Subpractices

1. Identify the requirements for storing the permanent records for the completed transaction.
2. Assemble all the information necessary to provide a permanent record of the completed transaction.
3. Verify that the assembled information meets the requirements for the permanent records of the completed transaction.
4. Place the permanent records for the completed transaction under version control.
5. Store the permanent records for the completed transaction in accordance with the applicable laws, regulations, and organizational policies.

14.2.10 Product and Service Support (PSS)
Maturity Level 3

14.2.10.1 Purpose

Product and Service Support maintains the infrastructure, supplies, and other resources needed to sustain the operations and availability of a deployed product and service offering.

14.2.10.2 Introductory Notes

The goals and practices of this process area are expressed in context of a single product and service offering. This process area applies to each offering in the organization's portfolio, including those offering that used internal to the organization.

The process area may be the responsibility of a unit within the organization, it may be responsibility of the customer of the offering, it may be the responsibility of a third party, or it may be a combination of these. Depending on the size, complexity, and characteristics of a product and service offering, the support may be performed by a unit specializing in product and service support for the offering or it may be performed by a unit that has additional responsibilities such as offering development, preparation, and operations.

The following special terms are used in the goals and practices of this process area:

- The term “product and service offering” is used to refer to a set of closely related products and services that are targeted to a specific customer or customer segment. A product and service offering may include a product as the main component with supporting services, a service as the main component with supporting products, a set of products that are used together, a set of products and services that form a business offering, or a single product or service.
- The term “product and service work” is used as an abbreviated form for the work an organization performs in developing, preparing, deploying, operating, and supporting, a product and service offering, as well as managing these activities.
- The term “offering infrastructure” is used to refer to the buildings, computing hardware and software, communication hardware and software, and other equipment and facilities needed to operate and support a product and service offering.
- The terms “operation” and “operating,” when used in reference to a product and service offering, refer to
 - providing the offering customers appropriate access to the offering products, supplies, and other offering resources
 - operating the equipment that is part of the offering
 - delivering the offering services to customers
 - performing the transactions of the offering

Product and Service Support involves:

- maintaining the offering infrastructure and consumables needed to operate and support a product and service offering
- ensuring the availability of the offering infrastructure used in the operations and support of an offering
- planning and managing the ability to recover from disasters and other disruptive events and to continue operations of an offering during and following these events
- providing assistance to the people deploying, operating, and supporting an offering
- managing problem reports and change requests that affect an offering
- preparing and deploying change packages for an offering

The reason for this process area at maturity level 3 is that a well-define process for supporting a product and service offering, integrated with the other product and service work, is a critical characteristic of maturity level 3.

14.2.10.3 Specific and Institutionalization Goals

SG 1 Offering Components Are Maintained

The offering infrastructure, supplies, and other resources needed to operate and support a product and service offering are maintained over the life of the offering.

SG 2 Offering Disruptions Are Managed

The offering infrastructure, supplies, resources, mechanisms, data, and information are managed to be able to operate a product and service offering during and following disruptive events.

SG 3 Offering Support Is Provided

Problems and issues identified in deploying, operating, and supporting a product and service offering are resolved.

InG Practices Are Institutionalized

The practices for Product and Service Support are institutionalized.

Institutionalization includes:

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.2.10.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Offering Components Are Maintained)	SP 1 (Maintain Supply of Consumables) SP 2 (Update Built-In Offering Data) SP 3 (Maintain Offering Infrastructure) SP 4 (Maintain System Availability)
SG 2 (Offering Disruptions Are Managed)	SP 5 (Maintain Business Continuity Plans) SP 6 (Maintain Disaster Recovery Facilities) SP 7 (Back Up Offering Data) SP 8 (Restore Offering Data)

SG 3 (Offering Support Is Provided)	SP 9 (Provide Assistance for Product and Service Work) SP 10 (Manage Offering Change Requests) SP 11 (Plan Offering Change Requests) SP 12 (Prepare Offering Change Package) SP 13 (Accept Offering Change Package) SP 14 (Deploy Offering Change Package) SP 15 (Communicate Offering Information)
InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)

The five institutionalization practices, including subpractices and supplementary information are contained in Part III, Chapter 13..

14.2.10.5 Specific Practices

SP 1 Maintain Supply of Consumables

The supply of consumables needed to support the operations of a product and service offering is established and maintained.

This practice ensures that there is always an adequate supply of consumables available at all installation sites and in all stages of operations of a product and service offering.

Examples of consumables includes:

- paper application forms
- paper receipts
- cleaning supplies
- magnetic and optical storage devices for permanent storage

Subpractices

1. Determine the rate of usage for all consumables.
2. Determine the replenishment lead time and replenishment procedures for each of the consumables.

Refer to the Sourcing Management process area for practices that cover the acquisition of supplies from external suppliers.

3. Monitor the available supply of each consumable on a regular basis.
4. Replenish the consumables as needed to maintain an adequate supply.

SP 2 Update Built-In Offering Data

Data, rules, and other information that are subject to change and that are built into the product and service offering and used to perform the transactions are updated as required.

This practice ensures that controlled parameters of the product and service offering that have to be changed on a periodic or event-driven basis are appropriately and correctly updated and are correctly reflected when performing the transactions.

Subpractices

1. Identify the data, rules, and information parameters that have to be updated, when they have to be updated, and the source of the updates.
2. Obtain and prepare the current updated data, rules, and information parameters.
3. Place the data, rules, and other information that are updated under version control.
4. Update the built-in parameters of the offering as required.
5. Verify that the updates of the built-in parameters were performed correctly.
6. Inform relevant stakeholders when updates of the built-in parameters are completed.

SP 3 Maintain Offering Infrastructure

Periodic and event-driven maintenance is performed on the offering infrastructure.

This practice ensures that the offering infrastructure for a product and service offering are operational and available for use.

Subpractices

1. Establish and maintain plans and schedules for periodic maintenance on the offering infrastructure.

Maintenance covers the hardware and software components, including maintenance such as reloading software on a regular basis and cleaning and de-fragmenting storage.

2. Perform periodic maintenance on the offering infrastructure as planned.
3. Monitor the offering infrastructure on a regular basis to determine the need for unplanned maintenance needs.
4. Perform unplanned maintenance on the offering infrastructure as necessary.
5. Verify that the offering infrastructure has been restored to full operational capability following any maintenance activities.
6. Maintain records of the periodic and unplanned maintenance activities.
7. Inform relevant stakeholders on a regular basis about the maintenance activities and operational status of the offering infrastructure.
8. Document, as problem reports or change requests, any components or functions of the offering infrastructure that are significant sources of maintainability or operational problems.

SP 4 Maintain System Availability

The operations and availability of the offering infrastructure are monitored continually, and adjustments are made to address problems and maintain the service-level agreements.

This practice identifies, as quickly as possible, problems in the operations and availability of the offering infrastructure and ensures that the downtime and performance degradations are minimized.

Subpractices

1. Monitor the offering infrastructure for availability and operational integrity problems.
2. Measure and evaluate the availability and operational integrity of the offering infrastructure to identify availability and performance problems.
3. Identify corrective actions to address the immediate effects of the identified significant availability or operational integrity problems of the offering infrastructure and to enable quick recovery or provide alternative means of operations.
4. Review the identified corrective actions with relevant stakeholders and obtain their approval.
5. Perform the agreed-to corrective actions and track to closure.
6. Verify that the implemented corrective actions accomplish the desired effects and that no undesired effects result.
7. Inform relevant stakeholders, throughout the repair activities, about the status and outlook for restoring the availability and operational integrity of the offering infrastructure.
8. Document, as problem reports or change requests, any significant availability or operational integrity problems.

SP 5 Maintain Business Continuity Plans

Plans are established and maintained to prepare for and recover from disasters and other disruptive events and to continue operations of a product and service offering during and following these events.

This practice ensures that plans and mechanisms exist for maintaining appropriate operations of the product and service offering during and following disruptive events so that the customers and the people operating the offering can perform their activities.

Business continuity plans need to cover not only the internal data and activities but also the relevant data and activities of customers and suppliers.

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Determine the requirements for continuous operations of the offering.
2. Identify and classify the business functions and assets that are critical to performing the offering.
3. Define the facilities needed to maintain disaster recovery capabilities.
4. Define the mechanisms and procedures needed to maintain planned disaster recovery capabilities and be able to respond to emergencies.
5. Define teams and assign responsibility and authority for responding to emergencies.
6. Document the business continuity plans for the offering.
7. Review the business continuity plans with relevant stakeholders and obtain their agreement.
8. Place the business continuity plans under version control.

9. Revise the business continuity plans as necessary.

SP 6 Maintain Disaster Recovery Facilities

The infrastructure, supplies, and other resources that comprise the disaster recovery facilities are established and maintained.

This practice ensures that the plans, procedures, infrastructure, supplies, and other resources are in place and up to date so that the organization can maintain planned disaster recovery capabilities and be able to recover from disasters and continue to perform the product and service offerings with minimal disruption to the organization and to the customers.

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Identify and document the requirements for the organization's disaster recovery facilities.
2. Develop and document the plans and procedures for preparing for and recovering from disasters.
3. Review the requirements for the disaster recovery facilities and the disaster recovery plans and procedures with relevant stakeholders and obtain their agreement.
4. Develop or acquire the disaster recovery infrastructure, supplies, and other resources that comprise the disaster recovery facilities.
5. Verify the disaster recovery facilities, plans, and procedures to ensure they satisfy their requirements and support the disaster recovery needs.

Examples of when verification is performed include:

- when the facilities, plans, and procedures are established
- when changes are made to the facilities, plans, and procedures
- periodically to ensure that the facilities, plans, and procedures adequately support the disaster recovery needs

6. Place the disaster recovery plans, procedures, infrastructure, and supplies under configuration management.

Refer to the Organizational Configuration Management process area.

7. Review the disaster recovery facilities, plans, and procedures on a regular basis to identify any significant deficiencies in supporting the disaster recovery needs.
8. Verify the disaster recovery stored information on a regular basis for completeness, integrity, recoverability, and to ensure there are no significant deficiencies in supporting the disaster recovery needs.
9. Revise the disaster recovery plans, procedures, infrastructure, supplies, and other resources as needed.

SP 7 Back Up Offering Data

The data and information needed for a product and service offering are backed-up on a regular basis to support both disaster recovery and other operational recovery needs.

This practice ensures that the data and information needed to recover from disasters and smaller incidents is appropriately collected and maintained so that they are readily recoverable should the need arise.

The backed-up offering data and information includes what is needed to perform the product and service work and what is created by the offering.

Subpractices

1. Identify the data and information that is needed to recover from disasters and smaller incidents so that an offering can be provided with minimal impact.
2. Document the data and information that must be backed up and the schedule.
3. Review and obtain agreement with relevant stakeholders on the data and information and schedule for back up.
4. Collect and store the backup data and information according to the plans.
5. Place the specification of the backup data and information and the actual backup data and information under version control.
6. Verify the stored data and information on a regular basis for completeness, integrity, and recoverability.
7. Revise the definition of data and information that will be backed up and the back-up schedule as needed.

SP 8 Restore Offering Data

The backed-up product and service offering data and information are restored as needed to support both disaster recovery and incidental operational recovery needs.

This practice ensures that data and information is restored to a consistent known state when the need for restoring backed-up data and information arises, either as part of a broad recovery effort or to support a specific recovery need.

Subpractices

1. Determine the specific need for restoring data and information.
2. Determine the version of backed-up data and information that is most appropriate to the need.
3. Restore the backed-up data and information.
4. Verify that the restoration of the data and information was completed successfully
5. Verify that the restoration of the data and information is compatible with the other data and information that are used.
6. Inform relevant stakeholders when the restoration of the data and information is successfully completed.

SP 9 Provide Assistance for Product and Service Work

Assistance is provided, as needed, to the people performing the product and service work, to address problems in using any component of the offering.

This practice ensures that actual and likely problems in understanding and performing the product and service work for an offering are recognized and addressed quickly so that the people performing the work are not unnecessarily impacted or slowed down in their work.

Subpractices

1. Establish mechanisms to identify problems and seek assistance in solving them for the people involved in the product and service work.

2. Collect and maintain documentation on each reported problem, and track each reported problem to final resolution.
3. Provide appropriate assistance to address the reported problems.
4. Inform relevant stakeholders by each reported problem of the resolution.
5. Identify common and similar problems that are encountered.
6. Define, package, and make available to relevant stakeholders information and assistance that address each of the common and similar problems.
7. Monitor the effects of the assistance provided, the steps performed in providing the assistance, the responsiveness to the problems, and the satisfaction of relevant stakeholders to ensure the assistance accomplished the intended purpose.
8. Take corrective action, including escalation as appropriate, when significant issue are identified in the assistance provided, the responsiveness to problems, and the satisfaction of relevant stakeholders.
9. Document, as problem reports or change requests, any significant or recurring problems that people are experiencing in deploying, delivering, and supporting a product and service offering.

SP 10 Manage Offering Change Requests

Problem reports and change requests against any component used in the product and service work are documented, collected, and tracked.

This practice ensures that problems and the need for additional functions and capabilities are captured and maintained in a form that ensures they will be acted on.

Refer to the Organizational Configuration Management process area for practices that cover problem reports and change requests.

SP 11 Plan Offering Change Requests

Each product and service offering problem report and change request is analyzed to determine its priority, and the plans for making and deploying any needed changes are defined.

This practice ensures that the product and service offering problem reports and change requests are fully understood in terms of the size and complexity of the changes required, the impact to the users (if not implemented and if implemented), and the plans for making the changes.

Refer to the Guidelines for Problem and Decision Resolution in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Analyze each problem report and change request by itself and in relationship to other related problem reports and change requests, and document the analysis.
2. Replicate or verify identified problems.
3. Prioritize the changes based on the size and complexity of the changes and the impact to the users.
4. Group related changes into product and service offering change packages.
5. Define and document a plan for implementing and deploying the product and service offering change packages.

A plan includes identifying which documentation, hardware components, software components, processes, and other components need to be modified.

6. Define and document the procedure and criteria for verifying and validating the changes and related components that were not changed to ensure they were affected in ways that were not expected.
7. Review the plan for implementing, verifying, validating, and deploying the product and service offering change packages with relevant stakeholders and obtain their agreement.
8. Revise the analysis and priority of the changes and the plan for implementing, verifying, validating, and deploying the product and service offering change packages as needed.
9. Establish, maintain, and make available to relevant stakeholders complete records on all problem reports and change requests, their status, and associated analysis and information.

SP 12 Prepare Offering Change Package

Each change package for a product and service offering, consisting of changes for a set of problem reports and change requests, is approved, implemented, verified, and validated.

This practice ensures that the change package for a product and service offering, when deployed, will accomplish what is intended and needed, and that it will not unduly disrupt the ongoing operations involved in providing the product and service offerings.

Subpractices

1. Obtain approval for the changes that are included in an offering change package from relevant stakeholders.

Refer to the Organizational Configuration Management process area for practices that cover the approval of changes to CM product baselines and configuration items.

2. Implement the approved changes.
3. Verify that the changes were made correctly.
4. Validate that the changes made appropriately resolve the problem reports and change requests.
5. Obtain approval for deploying the product and service offering change package according to the implementation and deployment plan.

SP 13 Accept Offering Change Package

Each change package for a product and service offering, consisting of changes for a set of problem reports and change requests, is approved and accepted for use by the owner for that offering, the owners of other affected offerings, and other relevant stakeholders.

This practice ensures that the offering owners and other relevant stakeholders approve the deployment of an offering change package before it is deployed.

Refer to the Product and Service Deployment process area for practices that cover the acceptance of a product and service offering deployment.

SP 14 Deploy Offering Change Package

Each change package for a product and service offering, consisting of approved changes for a set of problem reports and change requests, is deployed to affected locations.

This practice ensures that the latest approved version of all the components of a product and service offering are deployed and that all the components are at the appropriate consistent level of revision.

Refer to the Product and Service Deployment process area for practices that cover the deployment of changes to product and service offerings.

SP 15 Communicate Offering Information

The owner of a product and service offering, the people performing the product and service work, and other relevant stakeholders are provided with information on the operational and performance status and change plans for the equipment and computing and communication infrastructure.

This practice ensures that the users of the equipment and computing and communication infrastructure for a product and service offering are provided with information they need to plan and do their work.

14.3 Maturity Level 4: Predictable

The following section contains the process areas that belong to maturity level 4. The maturity level 4 process areas of the BPMM are as follows:

- Organizational Common Asset Management (OCAM)
- Organizational Capability and Performance Management (OCPM)
- Product and Service Process Integration (PSPI)
- Quantitative Product and Service Management (QPSM)
- Quantitative Process Management (QPM)

14.3.1 Organizational Common Asset Management (OCAM) Maturity Level 4

14.3.1.1 Purpose

Organizational Common Asset Management determines the common characteristics of the organization's current and future products and services and exploits this commonality to improve the performance, quality, cycle time, throughput, and predictability of the organization's processes.

14.3.1.2 Introductory Notes

Organizational Common Asset Management involves:

- identifying common assets
- establishing, maintaining, and making available the common assets
- adjusting the way work is performed to support the development, improvement, and use of common assets

This is an organization-level process area. Organizations often establish groups that are specifically responsible for these activities.

A common asset is a bundle of information or an artifact that has been prepared in standard format and made available for widespread use. A common asset captures the knowledge, experience, artifacts, or other results developed in performing the organization's processes. The focus of a common asset is on the common characteristics of a product, a service offering, or the experiences related to them that are relevant to future work.

The term "product and service work" is used as an abbreviated form of "development, deployment, operation, maintenance, support, and management of a product, a service, or a suite of products and services." This includes products and services that are internal to the organization.

The process assets captured, as described in the Organization Process Management process area, are expanded to include all artifacts and information, including the product and service assets that can be reused in future efforts in the organization. Assets are not merely stored in a repository, but are packaged specifically for reuse.

Individuals and workgroups are encouraged to capture and share the information and artifacts they develop while performing the organization's processes and providing products and services. Selected bundles of information or artifacts are organized into common assets. Provisions for the use of these common assets are included in the organization's standard processes, and information on their use is captured.

There are several approaches that an organization can use to implement the common assets strategy, the most commonly understood approach is systematic reuse of process, product, and service artifacts. Systematic reuse is the practice of designing, building, and managing components to be reused and the reuse of these components. Systematic reuse usually is focused on well-defined domains or product and service offerings.

The management of common assets includes many of the concepts discussed in areas such as knowledge management, learning organizations, or reusable product components.

These approaches may be part of a comprehensive business strategy, or a more opportunistic, bottom-up strategy may be adopted. By viewing the products and services that the organization develops, maintains, and delivers as a collection of similar, yet distinct, products and services, rather than as one-of-a-kind, the organization can exploit commonality and address differences in an efficient and effective manner. By aligning and managing common assets, an organization can leverage resources and previous investments to achieve strategic business benefits.

The reason for this process area at maturity level 4 is that the reuse of work products, lessons, knowledge, and other results with known attributes and outcomes are significant factors that help reduce the variation in performing the work in the organization.

14.3.1.3 Specific and Institutionalization Goals

SG 1 Common Assets Are Developed

Work products, lessons, knowledge, and other results from performing the organization's processes are captured and developed into common assets.

SG 2 Common Assets Are Deployed

Common assets are deployed for use across the organization.

InG Practices Are Institutionalized

The practices for Organizational Common Assets Management are institutionalized.

Institutionalization includes:

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.3.1.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Common Assets Are Developed)	SP 1 (Identify Common Attributes and Characteristics) SP 2 (Capture Reusable Results) SP 3 (Identify Common Assets) SP 4 (Maintain Common Assets)
SG 2 (Common Assets Are Deployed)	SP 5 (Revise Standard Processes) SP 6 (Integrate Use of Common Assets) SP 7 (Deploy Common Assets) SP 8 (Provide Common Asset Information)
InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)

The five institutionalization practices, including subpractices and supplementary information, are contained in Part III, Chapter 13.

14.3.1.5 Specific Practices

SP 1 Identify Common Attributes and Characteristics

The organization's products and services and the processes, work products, and infrastructure used in developing, preparing, deploying, delivering, and supporting them are analyzed to identify common attributes and characteristics.

This practice determines the common attributes and characteristics that can be used as the basis for identifying, building, and collecting reusable components for the organization.

Common assets are made possible exploiting similarities in work products, solutions, processes, and other aspects of a product or service line that are frequently reproduced or performed repeatedly. This practice initiates common assets by investigating the areas of highest probability for commonality. Work products or activities that do not share common attributes and characteristics are not candidates for common assets and usually offer little opportunity for reuse.

Subpractices

1. Develop methods and procedures for analyzing the processes, work products, and infrastructure involved in developing, preparing, deploying, delivering, and supporting an organization's products and services to identify common attributes and characteristics that could be reused in other products, services, or work processes.

Areas of common attributes or characteristics that would provide a good basis for a common asset include:

- Common design elements
- Common implementation techniques
- Common parts
- Common problems to be solved
- Common consulting solutions

2. Analyze the processes, work products, and infrastructure involved in developing, preparing, deploying, delivering, and supporting an organization's products and services and identify common attributes and characteristics.
3. Represent common attributes and characteristics in a manner that makes them useful aides in identifying common assets and store them for future use.

SP 2 Capture Reusable Results

Work products, lessons, knowledge, and other results that emerge from the organization's product and service work and that are potentially reusable are captured.

This practice helps reduce work and increase quality by collecting existing proven assets for reuse.

Not every product, service, or work process should be targeted for capturing reusable assets. Refer to SP 1 for guidelines regarding high leverage opportunities for capturing results that can be developed into common assets.

Subpractices

1. Identify the work processes involved with information or work products that have been identified as potential contributors to common assets.
2. Augment selected work processes with tasks for capturing information or work products that are potential contributors to common assets.

Examples of work processes that can be augmented to capture information or work products include:

- Completion of a service
- Release or delivery of a product
- Phase end review in a project
- Lessons learned or post mortem session
- Filing of reports and other documents in repositories
- Manual or automated capture of information
- Problem solving, design, or planning sessions

3. Define roles and responsibilities in relation to capturing and storing information or work products that have been identified as potential contributors to common assets.
4. Communicate the importance capturing information or work products that could contribute to common assets to those who are in position to capture the desired information or artifacts.
5. Capture the information and work products that are potential contributors to common assets.
6. Store captured information and work products in a manner that retains the value of their attributes and characteristics.

SP 3 Identify Common Assets

Common assets for the organization are identified based on the organization's product and service portfolio and business strategies.

This practice ensures that the organization's common assets provide optimum benefits to the organization.

Subpractices

1. Develop guidelines and criteria based on the organization's product and service portfolio and business strategies for determining which of the organization's products and service lines could benefit most from the capture and redeployment of common assets.

Opportunities for reusing common assets are not all equally beneficial. Work products or efforts that share attributes or characteristics should be evaluated for frequency of occurrence to determine if the effort spent in developing reusable common assets will be amortized across numerous reuse opportunities.

2. Use the guidelines to determine which product or service lines should be the primary targets for developing common assets.
3. Use the common attributes and characteristics to identify specific products, services, or work processes within selected product or service lines would most likely to benefit from the development of common assets.
4. Develop a strategy and plan for creating and exploiting common assets for selected products, services, and work processes.

SP 4 Maintain Common Assets

Common assets for the organization are established and maintained using selected elements captured from the organization's product and service work.

This practice creates common assets that will, through repeated reuse, reduce work and increase quality where these assets are used.

Subpractices

1. Define standards for representing, developing, deploying, and storing common assets.

Guidelines and criteria for selecting common assets to be developed might include:

- objectives in a knowledge management strategy
- frequency with which a work product component is recreated
- frequency with which a similar problems are encountered in the delivery of a service
- potential for improving work performance
- potential reduction in operating costs
- potential for increasing organizational consistency
- potential for achieving an economy of scale

2. Evaluate captured information and work products to determine which can contribute most effectively to the development of common assets.
3. Create common assets using standard development processes and standards.

Common assets should normally be developed using a tailored version of the organization's standard product development practices. Common assets should be treated as products for internal use.

4. Verify, validate, and authorize common assets for use.

Common assets should undergo the same approval and release processes used for updates to the organization's products and services. Processes used to prepare customers for product or service updates may be helpful in releasing or updating common assets.

5. Prepare documentation, training, and other materials necessary for proper use of common assets.
6. Establish and maintain a registry of common assets and how to access them is.
7. Store common assets in appropriate repositories and are maintain them with appropriate change, version, and where appropriate, configuration control.
8. Revise common assets as necessary to ensure their viability and continued use.

SP 5 Revise Standard Processes

The organization's standard processes are revised as necessary to encourage and support the identification, development, and improvement of common assets.

This practice ensures that the people involved in the product and service work appropriately participate in making common assets available to the organization.

Subpractices

1. Evaluate the organization's standard processes to identify any adjustments needed to support the use of common assets.

2. Revise the organization's standard processes as necessary to incorporate adjustments for using common assets.
3. Maintain and deploy process revisions using the organization's common change, configuration, and release management processes.
4. Communicate process revisions to those affected by the use of common assets.

SP6 Include Provisions for Using Common Assets

Provisions for the use of common assets are included in the organization's standard processes and related infrastructure, as appropriate.

This practice ensures that the people involved in the product and service work give proper consideration to the use of existing reusable common assets.

Subpractices

1. Provide training as necessary to support the creation and use of common assets.
2. Adjust work methods and technologies as necessary to support the creation and use of common assets.
3. Adjust workforce practices to encourage the creation and use of common assets.

Examples of adjustments to workforce practices to encourage capturing, developing, or using common assets include:

- setting performance objectives
- providing performance feedback
- adjusting compensation incentives
- incorporating into promotion criteria
- providing rewards and recognition

4. Provide mentoring as needed to support the creation and use of common assets.
5. Adjust the work environment as necessary to support the creation and use of common assets.
6. Incorporate common assets into training and development activities.

SP 7 Deploy Common Assets

Common assets and changes to them are deployed across the organization.

This practice ensures that common assets are readily accessible by the people involved in the product and service work.

Subpractices

1. Establish and maintain plans for deploying and supporting common assets.
2. Deploy common assets according to plans and release schedules.
3. Monitor the deployment of common assets to evaluate progress and problems.
4. Take corrective actions to address problems with deploying or using common assets.
5. Deploy changes to common assets according to the organization's standard change, configuration, and release management processes.

6. Communicate deployment schedules and methods to all affected parties.

SP 8 Provide Common Asset Information

Information on the development, maintenance, contents, and use of common assets is captured and made available to relevant stakeholders.

This practice ensures that the people involved in the product and service work have the information they need to understand the common assets and how they apply to their work.

Subpractices

1. Capture information on the use and effectiveness of common assets.
2. Capture information on the costs of developing, maintaining, deploying, and using common assets.
3. Conduct return-on-investment and related analyses to determine the value realized through common assets.
4. Provide the results of return-on-investment and related analyses to those who can incorporate the results into strategies and guidelines for selecting and developing common assets.
5. Capture lessons learned from the use of common assets and provide them to those who develop, deploy, support, and train the use of common assets.
6. Capture information on the use of common assets to identify problems with their deployment, adoption, or effectiveness.
7. Analyze information on problems with the deployment, adoption, or effectiveness of common assets and take corrective action as appropriate.
8. Provide status, usage, and value information to those using common assets to motivate their continued use and improvement.

14.3.2 Organizational Capability and Performance Management (OCPM) Maturity Level 4

14.3.2.1 Purpose

Organizational Capability and Performance Management quantitatively characterizes the capability of the organization's standard processes, and develops and provides the capability data, baselines, and models to quantitatively manage the organization's products and services and associated work efforts.

14.3.2.2 Introductory Notes

Organizational Capability and Performance Management involves

- establishing and maintaining quantitative goals for the organization's products and service
- collecting and analyzing performance and quality measures from the organization's product and service work to characterize the capability of the organization's standard processes
- establishing, maintaining, and making available the quantitative capability baseline, models, and statistical techniques for use in the organization's product and service work
- providing reports on the organizational capability and performance management results

This is an organization-level process area. This process area is primarily the responsibility of the organizational group that is responsible for the organization's standard processes and the organizational group that is responsible for the organization's measurement activities.

The term "product and service work" is used as an abbreviated form of "development, deployment, operation, maintenance, support, and management of a product, a service, or a suite of products and services." This includes products and services that are internal to the organization.

The organizational capability baselines describe, in quantitative terms, the results that the projects, units, and workgroups can expect to achieve by implementing defined processes that are tailored from the organization's standard processes. The baselines also include the measured results that they achieved (collected as the work is performed).

The critical process components of the organization's standard processes, and the critical attributes and measures of these process components (that is, the common measures that are defined to be collected and reported to the organization) are identified.

Quantitative process models associated with the organization's standard processes are defined and specified. These quantitative process models are defined in terms of attributes and measures from various process components and the quantitative relationships among these process components. These quantitative process models are made available to the people performing the product and service work, where they are calibrated to fit their work and processes. These calibrated models are used to estimate and predict the performance and quality results of the work, as described in the Quantitative Product and Service Work Management process area.

Organizational capability baselines are established and maintained. These baselines are analyzed on a regular basis to understand the quantitative performance and quality achieved, or predicted to be achieved, by the product and service work.

The reason for this PA at maturity level 4 is to maintain the organizational data that the people performing the product and service work need to perform their quantitative management activities and to maintain measures to show how the organization is performing.

14.3.2.3 Specific and Institutionalization Goals

SG 1 Goals And Capabilities Are Quantified

Quantitative performance and quality goals for the organization's products and services, and quantitative methods for managing the capability of the processes for the product and service work are defined.

SG 2 Baselines and Quantitative Models Are Available

Capability baselines and quantitative predictive models are developed and made available for use in quantitatively managing the organization's product and service work.

SG 3 Organization Capability Is Quantified

The capability of the organization's standard processes is understood in quantitative terms.

InG Practices Are Institutionalized

The practices for Organizational Capability and Performance Management are institutionalized.

Institutionalization includes:

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.3.2.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Goals And Capabilities Are Quantified)	SP 1 (Maintain Quantitative Goals) SP 2 (Maintain Process Performance Measures) SP 3 (Maintain Capability Analyses)
SG 2 (Baselines And Quantitative Predictive Models Are Available)	SP 4 (Collect Measures) SP 5 (Maintain Capability Baselines) SP 6 (Maintain Predictive Models) SP 7 (Provide Baselines and Predictive Models)
SG 3 (Organization's Capability Is Quantified)	SP 8 (Analyze Baselines and Predictive Models) SP 9 (Perform Corrective Actions) SP 10 (Provide Baseline and Model Reports)
InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)

The five institutionalization practices, including subpractices and supplementary information, are contained in Part III, Chaptr 13.

14.3.2.5 Specific Practices

SP 1 Maintain Quantitative Goals

Quantitative performance and quality goals for the organization's products and services are established and maintained based on the organization's business goals and the quantitative capability of the organization's processes.

This practice ensures that the managers responsible for the organization's products and services have a quantitative understanding of the performance and quality they are expected to achieve.

Subpractices

1. Obtain an understanding of the organization's business goals for its products and services.

The business goals relevant to the organization's products and services would normally be derived from the organization's strategic product and service planning activities. These goals typically come from executive management, but could be obtained from groups such as product or service marketing that have the authority to set such goals. These goals could also come from customer requirements, industry standards, or governmental regulations, especially if the product or service is being customized for a specific customer, geography, or industry segment. When goals from different sources are in conflict, they must be resolved in order to determine the performance and/or quality requirements for product and service work.

2. Identify the performance and quality attributes of the organization's products and services that are most related to their business goals.

Examples of performance goals include:

- product effectiveness in use as measured by speed, strength, or similar attributes
- effort required to deliver a service
- cost to produce, repair, or maintain a product
- time a customer must wait before receiving a service
- margin to be achieved or market share to be obtained

3. Define measures for the identified performance and quality attributes that best characterize their relationship to business goals and maintain them under change and version control.
4. Analyze the relevant business goals to determine the quantitative performance and quality results required to achieve them.
5. Identify gaps between the capability of the organization's standard product and service processes and the performance and quality results required to achieve its business goals.

One measure of risk can be quantified as the probability that the current capability of the organization's standard product and service processes will fail to produce targeted performance and quality results, adjusted by the impact of failing to do so.

6. Establish performance and quality goals for the organization's products and services based on the performance and quality risks the organization is willing to take, and maintain them under change and version control.
7. Review the performance and quality goals for the organization's products and services on a periodic and event driven basis and revise them as needed.

Reasons for revising the performance and quality goals for the organization's products and services include:

- changes in customer requirements or market expectations
- improvements made by competitors
- requirements for increasing revenue or cutting costs
- changes in technology or delivery methods
- entry into new markets, industries, or geographies
- requirements to sustain market differentiation
- justification for pricing changes
- changes in standards or regulations governing the product or service

8. Communicate the performance and quality goals for the organization's products and services to all whose work affects the achievement of these goals.

SP 2 Maintain Process Attribute Measures

The critical process elements, attributes, and measures that are used to quantitatively characterize the performance of the organization's standard processes are identified.

This practice ensures that the measures that are collected, analyzed, and reported are an accurate quantitative representation of how the organization's standard processes and process elements are performed.

Subpractices

1. Analyze the organization's standard product and service processes to select process elements that most affect the performance or quality results of its products and services.

Different attributes of performance and quality will be affected by different process elements. For instance, the quality of a service may be most strongly affected by attributes of the customer interview process that initiates the service, while the cost of performing the service may be most strongly affected by the time it takes to perform various steps during delivery of the service. Thus, different sets of process elements would be selected to predict different performance or quality attributes of the organization's services.

2. Identify the attributes of each selected process element that have the strongest affect on the performance or quality results of the organization's products and services.

Different attributes of the same process element may be related to different performance or quality attributes of a product or service. The relation between the attributes of a process element and the performance and quality results of its products and services may be a many to many mapping.

3. Define measures of the identified attributes of each selected process element that best characterize how the process element affects the performance or quality results of the organization's products and services.
4. Determine how the execution of each process element is best characterized using these measures.

Process attributes are measured by the range of values within which they perform under defined circumstances. The measured attributes of a process element are different from the results achieved by performing the process element, in the same way that the speed of a golf swing is different from the distance the golf ball flies when hit. Since the speed of the swing is related to the distance the ball flies, speed would be an attribute of the process of swinging a club that would provide valuable insight into the resulting distance. The attributes of a process element are usually represented with descriptive statistics such as central tendency (mean, median, mode), variation (standard deviation, interquartile range, 95% confidence interval, $\pm 3\sigma$ control limits, specification limits), etc. The importance of process attributes is in their ability to provide insight into the capability of the process element.

5. Define how measures of the attributes of selected process elements should be captured, handled, stored, transformed statistically, and analyzed to ensure their accuracy, validity, and reliability.
6. Periodically review the attributes and related measures of selected process elements and how they are captured, handled, stored, transformed statistically, and analyzed to determine if they should be redefined to improve their accuracy, validity, or reliability and revise them when necessary.
7. Maintain the definitions of measures for characterizing the performance of process elements and their collection and handling procedures under change and version control.

SP 3 Maintain Capability Analyses

Definitions of statistical and other quantitative techniques for evaluating the capability of organization's product and service processes for achieving performance and quality goals are established and maintained.

This practice ensures that the measures and techniques used to analyze the performance and quality results for the organization's product and service work are defined to provide the needed insight into the capabilities of its processes and process elements.

Subpractices

1. Define intermediate performance and quality outcomes that can be measured at the completion of the process elements that most affect them.

Examples of intermediate performance and quality measures would include:

- Number and type of product defects found at each stage of development
- Customer understanding or satisfaction at each step of a service process
- Number of customers reached or range of services enabled at each step of business system deployment

Measures of intermediate performance and quality outcomes should be defined in ways that allow them to be related to or aggregated into the final performance and quality results measured for the organization's products and services. Intermediate measures should provide visibility or predictability of the final results.

2. Define statistical or other quantitative methods to be used for representing the capability of the organization's standard product and service processes or its process elements.

The capability of a process or process element is defined as the expected range or distribution of performance or quality results obtained through repeated performance of the process or process element under similar conditions. Thus, the capability of a process is defined in terms of the product or service results it produces. The capability of a process or process element may vary under different conditions (different common cause systems). The capability of a process may also be affected by an assignable cause of process variation which could be a transient affect (special cause of variation) or a persistent affect that occurs regularly and predominates when it occurs. Examples of statistical methods for representing capability include:

- $\pm 3\sigma$ control limits in statistical process control
- 95% confidence limits
- interquartile or other defined points in a distribution of measured results

3. Evaluate the conditions surrounding the application of the selected statistical or other quantitative techniques for evaluating the capability of the organization's standard product and service processes and process elements to ensure they are valid.

Examples of conditions surrounding the use of statistical or quantitative techniques that would affect their validity include:

- the shape of the frequency distributions of the measures used in the analyses
- whether variation in the measures appears to be random, or whether there are sources of variation that predominate
- assignable causes of process variation
- how the measures are collected
- whether the process is performed in the same repeatable way on each occurrence, or whether the method of its performance varies from occurrence to occurrence
- where the conditions under which the process is performed could be called repeatable, or whether the process is performed in the presence of different conditions on each repetition

4. Periodically reevaluate the appropriateness of the measures and statistical or other quantitative techniques used in managing the capability of the organization's standard product and service processes and revise them when necessary.
5. Maintain the organizations defined measures and quantitative analysis procedures under version and change control.

SP 4 Collect Measures

Measures of process attributes and performance and quality results emerging from the organization's product and service work are collected on a periodic basis and stored in the organizational measurement repository.

This practice ensures that the measures from the organization's product and service work are captured and available for analyzing process capability and for building and refining the capability baselines and models.

Subpractices

1. Collect and store the organization's process attribute measures and measures of the performance and quality of its products and services in the organizational measurement repository.

Data on process attributes and on the performance and quality of the organization's products and services may be stored in numerous repositories. For instance, data on the performance and quality of products and services may be captured in product support or customer relations databases, while data on process attributes may be captured in manufacturing, workflow management, or time reporting systems. Therefore an organizational measurement repository is a virtual repository provided that the data can be integrated across repositories for analysis and reporting.

2. Collect measures through manual or automated methods as the product and service work is performed.
3. Verify the accuracy of the collected measures.
4. Define the controls involved in storing, managing, accessing, analyzing, and archiving data.
5. Periodically review the status of data collection, management, and storage to ensure it is performed according to defined procedures and controls.

SP 5 Maintain Capability Baselines

Capability baselines for the organization's standard product and service processes and process elements are established and maintained.

This practice ensures that the people involved in the product and service work have information they can use for estimating, evaluating, and managing their work and results.

A capability baseline represents the expected distribution of performance or quality results when a process or process element is performed repeatedly under similar conditions. Capability baselines are typically developed from data collected continually or as samples from the performance of product or service work. Examples uses for capability baselines include:

- evaluating whether a process is performing according to its historical trends
- estimating the performance or quality results for a new product or service from historical data
- assessing the risk of events that affect the performance or quality outcomes of a process element
- planning for the resources needed to achieve product or service work
- evaluating the organization's overall product and service capabilities
- benchmarking against industry standard capabilities
- identifying areas for targeting proactive improvements

Subpractices

1. Define how capability baselines will be developed, represented, and revised.

In cases where the capability of a process or process element differs substantially (e.g., can be shown to be statistically different) across different conditions, separate capability baselines should be developed for each set of conditions. When the capability of the process is similar (e.g., statistically insignificant differences) across different conditions, a common capability baseline is adequate. Examples of issues to be defined in capability baseline procedures include:

- the performance or quality measures from which the capability baseline(s) for each process or process element is to be computed
- minimum number of samples to be included in the development of a baseline
- methods for selecting samples and the frequency with which they are to be collected
- how data are to be aggregated when they are collected from different sources
- statistical procedures or transformations to be applied to the data
- how the baseline is to be represented
- criteria for determining that different baselines should be created for different conditions under which the process or process element is performed
- methods for revalidating capability baselines and how frequently they are to be performed

2. Develop capability baselines from the data collected from ongoing product and service work according to the defined procedures.
3. Store capability baselines and maintain them under change and version control.
4. Periodically revalidate capability baselines against data from continuing samples of product and service work and revise them as necessary.

SP 6 Maintain Predictive Models

Quantitative predictive models that support the quantitative planning and managing of the organization's product and service work and achievement of the its performance and quality goals are established and maintained.

This practice ensures that the people involved in the product and service work have reliable quantitative models they can use to statistically predict future outcomes based on past data.

Subpractices

1. Model the chain of process elements that have the most direct effect on the performance and quality of the organization's products and services.

Different aspects of performance and quality may be affected by different process elements. In addition, these effects may vary among the organization's products and services. Accordingly, several models may be established to characterize or predict different aspects of performance or quality for different products or services. The number of models to establish and maintain is determined by the required predictability for each product or service outcome.

2. Define statistical or other quantitative methods that characterize the relationship between the performance attributes of each relevant process element in a model and the intermediate performance or quality outcomes affected by that process element.

In addition to characterizing the capability of a process, deeper insights may be obtained by exploring the statistical or other quantitative relationships between the performance attributes of a process or process element and the performance or quality results it produces. These analyses are especially valuable when the conditions under which a process or process element is performed tend to vary from occurrence to occurrence, violating the assumption that the process is performed in the presence of a common cause system. These insights and relationships provide the foundation for predicting product and service results from measures collected early in the product or service work. Examples of statistical or quantitative techniques for exploring these relationships include:

- scatterplots
- exploratory data analysis
- correlational or regression analysis
- non-parametric analysis

3. Evaluate how measures of process attributes or intermediate performance and quality results from various process elements interact with each other to characterize the overall capability of the standard end-to-end product or service process or to predict final performance or quality results.
4. Construct quantitative predictive models that predict performance or quality results for the organization's products and services.

Quantitative predictive models can be developed as chained models that allow predictions to be made after the performance of each process element included in the model. Such models increase in predictive accuracy as results from each subsequent process step become available. Quantitative predictive models can also be developed from evaluating outcome relationships for critical key indicators at a single point. For instance, the total cost of ownership for a product can be predicted from a few key indicators available at the beginning of product development, or it can be predicted after the performance of each step in the development process where intermediate performance or quality results become available. Examples of quantitative predictive models include:

- prediction of the cost of performing a service
- total cost of ownership models
- performance and availability characteristics of a delivered system
- defect or failure rates for delivered products
- life or hazard models
- risks inherent in a product or service
- time to complete a transaction or service
- predictions of performance against service level agreements

5. Prepare guidebooks, training, and other relevant materials to help those performing or managing product and service work use the quantitative predictive models effectively.
6. Reevaluate the process elements and measures included in each quantitative predictive model each time a significant change is made to the standard process, to the related products and services, or to their performance and quality goals.
7. Revise the process elements or measures included in a quantitative predictive model and the associated guidebooks, training, and related materials as needed to ensure the model yields the most accurate predictions possible.

SP 7 Provide Baselines and Predictive Models

The organization's capability baselines, quantitative predictive models, and guidance for using them in the planning and managing the organization's product and service work are made available for use.

This practice ensures that the people involved in the product and service work have data and information from the rest of the organization to assist them in planning, managing, and performing their work.

Subpractices

1. Provide access to the organization's capability baselines and quantitative predictive models to the roles that use them.
2. Provide courses, guidebooks, and other support materials through media that make them easily accessible to those who need guidance in applying the capability baselines and quantitative predictive models.
3. Provide experts who can advise or mentor those using the capability baselines and quantitative predictive models on proper techniques, applications, and interpretations.
4. Develop methods for rapidly deploying updated capability baselines and quantitative predictive models to those using them, including techniques for transitioning between versions in use.
5. Maintain updated versions of the capability baselines and quantitative predictive models and communicate release and transition schedules to those affected.
6. Collect status information of the use of capability baselines and difficulties experienced in deploying or using them.

SP 8 Analyze Baselines and Predictive Models

The organization's capability baselines, quantitative predictive models, and process attribute data are analyzed on a regular basis to understand the performance and quality results of the organization's product and service work.

This practice ensures that objective quantitative information is used to understand the performance and quality results of the organization's product and service work and to guide management decisions.

Subpractices

1. Monitor and analyze the distributions underpinning capability baselines and the outcomes predicted by predictive models.
2. Evaluate changes in the distributions underpinning capability baselines or predictions from predictive models for trends in the organization's capability for meeting its performance and quality goals.

The Organizational Capability and Performance Management process area concerns trends in capability baselines or the outcomes from predictive models that represent trends in the organization's performance. For practices that address circumstance where process capability or predicted results differ significantly from expectations within a specific area of product and service work, refer to the Quantitative Product and Service Management process area or the Quantitative Process Management process area.

3. Extrapolate current trends in capability baselines and predicted results to assess the organization's capability for meeting its product and service goals in the future.
4. Analyze the organization's process attribute data to understand how the execution of its product and service work affects its capability baselines, quantitative predictions, and the performance and quality of its products and services.

5. Evaluate capability baselines and process attribute data in the organization's measurement repository to identify issues that should be addressed in a proactive business process improvement activity.

SP 9 Perform Corrective Actions

Corrective actions are performed to address issues in the organization's performance and quality results.

This practice ensures that significant issues in the organization's performance and quality results are addressed.

The issues to be addressed in SP 9 are those that result from transient or special causes of variation in the organization's process capability. These issues represent temporary changes in the organization's process performance in some area of its product and service work that deviate significantly from expectations based on historical capability data. When the issues represent performance that is outside the capability exhibited in the organization's historical capability levels and trends, then it should be addressed through proactive continual improvement. Refer to Organizational Improvement Planning and Organizational Innovative Improvement for practices that support proactive continual improvement programs.

Subpractices

1. Identify trends in the organization's product and service work that deviate significantly from the organization's historical capability baselines or predicted results.
2. Evaluate process attribute data in the organization's measurement repository and other root cause information to identify potential assignable causes when trends in the organization's capability baselines or predictive models deviate significantly from performance and quality goals.

Distinguish between assignable causes of variation that are transient and those that are persistent and predominate when they occur. Transient (or special causes) can be controlled by taking corrective action as part of implementing Level 4 practices. However, persistent, predominate effects must be addressed through proactive improvement activities that are the focus of Level 5. Refer to Organizational Improvement Planning and Organizational Innovative Improvement for practices that support proactive continual improvement programs.

3. Plan and implement corrective actions to the organization's standard product and service processes to address trends that significantly deviate from the organization's expected capability or product and service results.
4. Evaluate the effectiveness of corrective actions by monitoring their affect on capability baselines and predicted product and service results.
5. Capture lessons learned from implementing corrective actions.

SP 10 Provide Baseline and Model Reports

Reports describing the results of analyses of organizational capability baselines, predictions from the organization's predictive models, and the performance and quality results of the product and service work are made available to relevant stakeholders.

This practice ensures that executive management and the rest of the organization have appropriate visibility into the performance and quality results the organization is currently achieving and will likely achieve in the future.

Subpractices

1. Organize results from analyses of the organization's performance and quality results, capability baselines, quantitative predictive models, and process attribute data into presentations and reports that are presented periodically to executive management and other stakeholders.

Different reports may be prepared for different levels of management or different stakeholders depending on their needs and the products and services with which they are involved. Examples of the purposes of these reports include:

- understanding current performance and quality results for the organization's products and services
- understanding the current and predicted future capability of the organization's standard product and service processes for achieving its product and service goals
- understanding the attributes of process execution that most affect the performance and quality of products and services
- understanding the organization's current rate of improvement
- identifying areas for corrective actions or proactive improvements
- providing information that can be used for business strategy or management decisions
- providing information for business planning

2. Provide access to these presentations and reports to all affected stakeholders, using appropriate access controls.
3. Provide briefings, guidebooks, and other support materials to help executive management and other stakeholders use the information contained in the presentations and reports for understanding trends in organizational capabilities, for making decisions, and for directing actions.
4. Provide experts who can advise or mentor those using the presentations and reports on proper interpretation and use of the information they contain.
5. Update presentations and reports periodically or on an event driven basis and highlight changes in results or interpretations.
6. Maintain presentations and reports under change and version control.

14.3.3 Product and Service Process Integration (PSPI) Maturity Level 4

14.3.3.1 Purpose

Product and Service Process Integration interweaves the work processes of the different disciplines and roles involved in the product and service offering to improve the efficiency and effectiveness of interdependent work.

14.3.3.2 Introductory Notes

Product and Service Process Integration involves:

- Understanding the dependencies and interfaces among the disciplines and roles involved in the product and service work.
- Appropriately integrating the processes of the disciplines and roles that are involved in the product and service work.
- Adjusting the organizational and local structure, practices, and measures for the integrated processes.
- Performing and managing the product and service work according to the integrated processes.

The integrated processes are typically integrated around the work for a single product or service or on a set of related products and services. The people involved in the work define which processes should be integrated based on the expected benefits, considering factors such as the coupling and cohesion of the process activities. The processes that are included are those that are directly involved in the product and service work as well as those of tightly-coupled business functions (for example, marketing, sales, accounting, and sourcing).

The term “product and service work” is used as an abbreviated form of “development, deployment, operation, maintenance, support, and management of a product, a service, or a suite of products and services.” This includes products and services that are internal to the organization.

The goals and practices of this process area are expressed in context of the integrated processes for a major work effort (for example, single product, single service or set of related products and services, as described above). The process area applies to each major work effort in the organization.

This process area is primarily the responsibility of the managers who own the product and service work and process owners of the affected processes.

Integrated processes provide significant benefits by accelerating the activities of making decisions and identifying and correcting problems and addressing obstacles in performing the work. They also increase flexibility in designing work procedures and help avoid problems with workflows isolated within functions. They can accelerate the pace of performing the product and service work when contributions by different functions are required to satisfy a customer’s needs.

At the maturity level 3, individuals, work units, and workgroups use defined interfaces between the defined processes of different functions to manage mutual dependencies in their work. Integrated processes are formed by integrating and interweaving different functionally-based processes of different disciplines into a seamless process-based interaction among individuals, work units, and workgroups using the defined processes for their respective functions. Thus, a process workflow that links functionally specific processes is transformed into a product or service process that draws functions into its workflow as needed. These integrated processes provide more tightly interlaced interactions among the different functions and allow problems among these functions to be identified and corrected much earlier. Thus, individuals, workgroups, or work units from different functions work together as roles in an integrated process, rather than working separately using the separate processes of their respective functions.

Process integration involves identifying the work activities that include important dependencies among the various functions. The dependencies and interfaces among the various functions are analyzed to identify opportunities for integrating their processes. The processes of the various functions are appropriately integrated, and the work is restructured, planned, and managed based on the integrated processes.

The reason for this PA at maturity level 4 is that integrated processes can significantly reduce the amount of process variation that can result from inconsistent or incompatible process-to-process interfaces of separate processes. For these process integration practices to be effective, the various functions involved must, as a prerequisite, have well-defined processes that come from a maturity level 3 capability.

14.3.3.3 Specific and Institutionalization Goals

SG 1 Interdependent Processes Are Integrated

The processes of the disciplines involved in a product and service offering are integrated to improve the efficiency and effectiveness of interdependent work.

SG 2 Integrated Processes Are Used

Integrated product and service processes are used in planning, managing, and performing the work involved in a product and service offering.

InG Practices Are Institutionalized

The practices for Product And Service Process Integration are institutionalized.

Institutionalization includes:

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.3.3.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Interdependent Processes Are Integrated)	SP 1 (Analyze Process Dependencies) SP 2 (Integrate Interdependent Processes) SP 3 (Define Measures For Integrated Processes)
SG 2 (Integrated Processes Are Used)	SP 4 (Adjust Organizational Structures And Practices) SP 5 (Adjust Work Efforts) SP 6 (Manage Using Integrated Processes) SP 7 (Perform Integrated Processes)
InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)

The five institutionalization practices, including subpractices and supplementary information, are contained in Part III, Chapter 13.

14.3.3.5 Specific Practices

SP 1 Analyze Process Dependencies

Dependencies and interfaces among the functions, disciplines, and roles involved in the product and service work are analyzed to identify processes that would benefit if integrated.

This practice determined the cohesion and coupling among the processes to help decide which processes should be integrated.

Subpractices

1. Identify process workflows within the organization's standard product and service processes that exhibit high interdependency among different functions or departments.

Not all process elements composing a standard product or service process will exhibit high interdependency among different functions or departments. Product and Service Process Integration addresses only on those chains of process elements in the workflow that exhibit high interdependency.

2. Analyze process workflows with high interdependency and represent the dependencies in terms of roles involved, cause of the dependency, required handoffs, shared resources, and method of coordination.
3. Identify opportunities to improve process efficiencies where dependencies are shared among different functions or departments in the product or service workflow.

Examples of opportunities to improve the efficiency of interdependent processes or process elements include:

- iterative process elements among functions or departments whose iterations could be reduced by tightening integration among the roles in the different functions
- sequential process elements among functions or departments that could be performed in parallel
- waiting time that could be eliminated by tighter integration
- opportunities to organize cross-functional or integrated teams

SP 2 Integrate Interdependent Processes

Highly interdependent processes among the functions, departments, and roles that are involved in the product and service work are integrated to improve the efficiency and effectiveness of the product and service offering.

This practice ensures that the people who perform the product and service work and other relevant stakeholders know how the work is to be performed using the integrated processes so that the benefits of the integrated processes are realized.

Subpractices

1. Define process improvements that increase the effectiveness of executing interdependent work processes among functions or departments.
2. Organize the defined process improvements into a more functionally integrated product and service process.

Examples of more functionally integrated product and service processes include:

- integrating the sales, product management, product provisioning, and finance departments into a more functionally integrated order-to-cash process
- integrating product marketing, engineering, quality assurance, and manufacturing roles into a cross-functional design team that identifies requirements or design problems far earlier
- integrating service sales, customer problem diagnosis, and service providers into a more functionally integrated customer solution process

3. Develop training, guidebooks, and other materials that assist all affected parties to understand their roles in functionally integrated product and service processes.

4. Provide experts who can advise or mentor those involved in managing or performing functionally integrated product and service processes.
5. Evaluate the use of functionally integrated product and service processes to identify inefficiencies or opportunities for further improvement.
6. Make improvements to functionally integrated product and service processes and manage their release to affected parties.
7. Maintain functionally integrated product and service processes under change and version control.

SP 3 Define Measures For Integrated Processes

Definitions of measures used to plan and manage the product and service work using functionally integrated processes are established and maintained.

This practice ensures that the quantitative information and data needed to effectively plan and manage the product and service are designed based on the integrated processes.

Subpractices

1. Evaluate the measures used for managing product and service work to determine how they need to be adjusted to measure functionally integrated processes.
2. Revise measures as necessary and create new measures as needed to measure functionally integrated product and service processes.
3. Maintain measures of functionally integrated processes are under change and version control.
4. Prepare all affected parties for using measures of functionally integrated product and service processes.
5. Integrate measures of functionally integrated product and service processes into process performance analyses, capability baselines, and quantitative predictive models as appropriate.

SP 4 Adjust Organizational Structures and Practices

Organizational structures and workforce practices to support the product and service work are adjusted as needed to encourage and support the performance of functionally integrated processes.

This practice ensures that the organizational structures and practices appropriately support the use of the integrated processes.

Subpractices

1. Evaluate the performance of functionally integrated product and service processes to identify conflicts or problems created by organizational structures, reporting relationships, or workforce practices.

Examples of conflicts or problems for functionally integrated product and service processes include:

- accountability to multiple management chains
- mixed or no sources of authority
- difficulty in getting decisions made
- coordination across multiple functions
- communication up and across the organization
- rapid changes in business conditions
- conflicts in performance objectives
- conflicts in criteria for merit increases or rewards
- conflicts with promotional criteria

2. Adjust organizational structures as needed to resolve conflicts in reporting relationships, decision structure, or lines of authority.
3. Establish multifunctional management teams or steering committees where necessary to support the performance of functionally integrated product and service work.
4. Adjust the work environment or work resources as necessary to support functionally integrated product and service work.
5. Empower those performing functionally integrated product and service work where necessary to enhance their effectiveness.
6. Adjust workforce practices as needed to resolve conflicts between the objectives of a multifunctional assignment and performance objectives, compensation or reward incentives, promotional criteria, or career paths.
7. Enhance competency descriptions where appropriate to incorporate ability to work effectively in multi-functional settings.

SP 5 Adjust Work Efforts

Product and service work activities are adjusted to incorporate the integrated processes.

This practice ensures that the product and service work activities are performed in a consistent manner, according to the defined integrated processes, so that relevant stakeholders can realize the benefits of the integrated processes.

Subpractices

1. Redesign standard product and service processes where appropriate to incorporate functionally integrated processes.
2. Adjust the procedures used in affected work units to integrate with functionally integrated work where necessary.
3. Adjust work assignments and objectives where appropriate to support functionally integrated product and service work.
4. Incorporate the collection and use of measures defined for functionally integrated product and service processes where appropriate.

SP 6 Manage Using Integrated Processes

The estimating, planning, monitoring, and control of the work involved in the product and service work are based on the integrated processes.

This practice ensures that the product and service work performance and results are managed in a consistent manner, based on the defined integrated processes, so that the benefits of the integrated processes are realized.

Subpractices

1. Plan for the performance of product and service work using functionally integrated product and service processes where appropriate.
2. Manage functionally integrated product and service work using the adjustments made to organizational and workforce practices.
3. Quantitatively manage functionally integrated product and service work using measures, capability baselines, and quantitative models that have been developed for functionally integrated product and service processes.

SP 7 Perform Integrated Processes

Individuals, work units, and workgroups perform their product and service work using functionally integrated processes where appropriate.

This practice ensures that the process interactions among the individuals, work units, and workgroups involved in multifunctional product and service work is smooth and the work is performed efficiently and effectively.

Subpractices

1. Define roles to incorporate functionally integrated product and service processes where appropriate.
2. Prepare and perform assignments using functionally integrated product and service processes where appropriate.
3. Adjust communication and coordination methods as necessary to support the performance of functionally integrated product and service processes.
4. Review the performance of functionally integrated product and service work periodically to ensure that it is being performed effectively using functionally integrated product and service processes.
5. Provide advise and mentoring where necessary to support more effective performance of functionally integrated product and service work.

14.3.4 Quantitative Product and Service Management (QPSM) Maturity Level 4

14.3.4.1 Purpose

Quantitative Product and Service Management plans and manages the work involved in a product or service so that the product or service achieves its quantitative performance and quality goals.

14.3.4.2 Introductory Notes

Quantitative Product and Service Management involves

- defining quantitative goals for the product or service and allocating them to the work efforts involved in the product or service
- establishing the processes and plans that can achieve the defined goals
- establishing the methods and models used in doing the quantitative analysis of the results

- analyzing results as the work is performed and predicting whether the goals will be achieved
- performing corrective actions to achieve the goals

The products and services that are quantitatively managed may be for use internal or external to the organization. They may also include business functions that are often not considered to be a product or service (for example, marketing, sales, and human resource management). Quantitative management may be performed on a single product or service or on a set of related products and services. For example, a product availability goal may be a function of the reliability of the hardware products, the reliability of the software products, and the associated support services.

In this process area the term “product and service work” is used as an abbreviated form to refer to the relevant parts of the development, deployment, operation, maintenance, support, and management of the products and services. This includes products and services that are internal to the organization.

The goals and practices of this process area are expressed in context of a single product, single service or set of related products and services, as described above. The process area applies to each product and service offering in the organization’s portfolio.

This process area is primarily the responsibility of the management teams for the product and service work. This includes managers and team leaders and other technical staff who have planning, tracking, and directing roles for the overall product and service work as well for the individual units involved in the work.

The quantitative goals for performance and quality results are established, and these goals are allocated to the work efforts that are involved in the product and service work. The defined processes for the work are selected and tailored based on historical capability data to provide the capability needed to achieve the quantitative goals. The estimates and plans for the work are similarly derived from historical capability data.

As part of planning the product and service work, the defined process, planning parameters, and performance and quality goals are quantitatively analyzed and verified to be consistent and reasonable. Thus, the expected results of performing the defined process according to the plans will be that its quantitative performance and quality goals are achieved.

The performance of the product and service work is monitored with regard to its quantitative performance and quality goals. Quantitative models are used to statistically predict whether the performance and quality goals will be achieved. When the statistical predictions and other analyses show that the goals for performance and quality will not be achieved, corrective actions are performed.

The reason for this PA at maturity level 4 is that statistical prediction of the performance and quality results for products and services and managing to achieve these goals is ultimately what maturity level 4 is about.

14.3.4.3 Specific and Institutionalization Goals

SG 1 Goals and Management Mechanisms Are Defined

Quantitative performance and quality goals for a product or service and the defined processes, plans, models, and methods needed to achieve these goals are defined.

SG 2 Achievement of Goals Is Managed

The product and service work is statistically managed to achieve the defined quantitative goals.

InG Practices Are Institutionalized

The practices for Quantitative Product And Service Management are institutionalized.

Institutionalization includes:

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.3.4.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Goals and Management Mechanisms Are Defined)	SP 1 (Maintain Quantitative Goals) SP 2 (Maintain Capable Processes and Plans) SP 3 (Allocate Intermediate Goals) SP 4 (Calibrate Quantitative Models and Methods)
SG 2 (Achievement of Goals Is Managed)	SP 5 (Monitor Work Effort Results) SP 6 (Analyze Processes and Plans) SP 7 (Perform Capability Corrective Actions) SP 8 (Record Goal Achievement Information)
InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)

The five institutionalization practices, including subpractices and supplementary information, are contained in Part III, Chapter 13.

14.3.4.5 Specific Practices

SP 1 Maintain Quantitative Goals

Quantitative performance and quality goals for a product or service are established and maintained.

This practice ensures that the quantitative performance and quality goals for a product or service are aligned with the capability of the work efforts involved in the work and that there is a common understanding of these goals.

Subpractices

1. Identify the performance and quality needs or requirements for a product or service offering.

2. Establish the performance and quality goals for a product or service offering from its performance and quality needs or requirements and the quantitative performance and quality goals for the organization's products and services.

Examples of factors to consider in deriving quantitative performance and quality goals for a product or service offering include:

- customer requirements or expectations
- market standards
- competitor's offerings
- strategic or tactical organizational goals and objectives
- product line attributes and goals
- variations in the product or service offering from the organization's standard product or service lines
- assignable causes of variation affecting the product or service

3. Periodically review the performance and quality goals to ensure they align with organizational and customer expectations.
4. Revise performance and quality goals for a product or service as necessary.
5. Maintain the performance and quality goals for a product or service under change and version control.

SP 2 Maintain Capable Processes and Plans

Defined processes and plans that can achieve the quantitative performance and quality goals for a product or service are established and maintained.

This practice ensures that the capability of the defined processes and plans are appropriately adjusted to achieve the quantitative performance and quality goals for a product or service.

Subpractices

1. Identify the process elements to be incorporated into the defined process for the product or service work.
2. Identify in the process elements and transactions among process elements will affect the performance and quality outcomes of the product or service.
3. Select methods for performing the various process elements that combine to achieve the performance and quality goals defined for the product or service.

Many process elements have alternative methods or procedures for how they are performed. Each method or procedure may have unique effects on quantitative performance or quality results, and therefore exhibits a unique process capability. The method or procedure selected for performing a process element should be the one whose historical process capability contributes the best match for achieving the quantitative performance and quality goals set for the product or service.

4. Adjust the measures of process attributes or intermediate performance and quality outcomes of a process element to meet the needs of planning and quantitatively managing the defined process.
5. Develop a plan using the defined process for a product or service offering that achieves its defined performance and quality goals.
6. Resolve conflicts and inconsistencies when a defined process or plan for a product or service offering cannot be constructed to achieve its defined performance or quality goals.

Methods for resolving conflicts involving the defined performance and quality goals for a product or service offering include:

- adjusting the performance or quality goals for the product or service to a level that can be obtained
- Prioritizing performance and quality goals to identify which ones must be achieved and which ones are subject to negotiation
- Subcontracting to partners or vendors who can achieve the defined performance or quality goals for the product or service
- Resolving tradeoffs with relevant stakeholders

7. Coordinate the defined process, performance and quality goals, and plan for the product or service offering with all affected parties.
8. Maintain the plan and defined process for the product or service offering under change and version control.

SP 3 Allocate Intermediate Goals

Intermediate performance and quality goals are established and maintained for identified process elements involved in the product and service work.

This practice ensures that the performance and quality contributions of all the process elements involved in the product and service work are sufficient to achieve the overall product or service goals.

Subpractices

1. Identify process elements for which intermediate performance or quality goals should be defined.

Different process elements may be important for different goals. Thus, a process element may be identified because it is associated with either an intermediate performance or quality goal, or with both. Examples of critical process elements for which intermediate performance or quality goals should be defined include those that:

- have a significant impact on the final performance or quality results of the product or service offering
- occur at important points in the defined product or service process for evaluating progress toward final performance or quality results
- have capability baselines that relate to final performance and quality goals
- produce data that are incorporated into a quantitative predictive model

2. Allocate intermediate performance or quality goals to each identified process element.

In product development, performance and quality goals may be allocated to the acquisition of raw materials, the production of piece parts, the integration of the parts into the product, and to product testing. In service delivery, performance and quality goals may be allocated to the receipt and routing of a request, the preparation of a response to the request, the delivery and explanation of the service requested, and the continued support of the customer. Methods for allocating intermediate performance or quality goals include defining intermediate performance or quality results that:

- can be drawn from the organization's capability baselines
- have been shown to correlate highly with achieving the performance and quality goals for the product or service offering
- represent values in quantitative predictive models that predict achievement of the final performance or quality goals
- are consistent with industry standards that have been proven to achieve the performance and quality goals of the product or service offering

3. Evaluate the allocated set of intermediate performance and quality goals to ensure that in the aggregate they achieve the performance and quality goals of the product or service offering.
4. Resolve conflicts among intermediate performance and quality goals by involving all affected parties in reaching a consensus that reduces the risk of attaining the performance and quality goals of the product or service offering.
5. Incorporate the intermediate performance and quality goals into the plan for the product and service offering, and maintain them under change and version control.
6. Evaluate the intermediate performance and quality goals periodically to determine if they remain sufficient contributors to achieving the final performance and quality goals, and take corrective action when necessary.

SP 4 Calibrate Quantitative Models and Methods

Quantitative predictive models and other quantitative methods for managing the achievement of the goals for a product and service offering are defined and calibrated.

This practice ensures that the quantitative predictive models and other quantitative methods are adjusted to reflect the specific characteristics of a product and service offering and the capabilities of defined product or service process and its component process elements.

Subpractices

1. Evaluate historical data to identify conditions that affect the predictive capabilities of quantitative models or effectiveness of other quantitative methods for managing the product or service offering.

The predictive effectiveness of a model may be moderated by the conditions under which it is used. The variables included in the model may behave differently under different conditions. For instance, the distance a golf ball travels is related to the height of its arc, but that relationship changes dramatically depending on the speed and direction of any wind that might affect the ball during its flight. Consequently it is important to assess how the conditions surrounding a product or service offering may affect the process attributes, process capabilities, or other factors in the model to determine whether they should be calibrated for better prediction. When no historical data on the conditions affecting a particular product or service offering is available, affected parties should carefully monitor the performance of the model or its variables to detect effects that may require calibration. The same requirements for calibration may affect other quantitative methods in order to provide better information for management tracking and decision-making.

2. Calibrate the quantitative predictive models and other quantitative management methods to improve their usefulness and predictive capability under the conditions affecting the product or service offering or its defined process.
3. Evaluate the calibration of quantitative predictive models and other quantitative management methods periodically to identify needed recalibrations based on model use and effectiveness.
4. Recalibrate quantitative predictive models and other quantitative management methods as needed and integrate the revised models into regular use as appropriate.
5. Capture information regarding the conditions causing the need for recalibration, the actual adjustments, and the improved results from using the recalibrated models.
6. Maintain the calibrations to quantitative predictive models and other quantitative management methods under change and version control.

SP 5 Monitor Work Effort Results

The performance and quality results of the work efforts involved in the product and service work are monitored and compared to their quantitative performance and quality goals.

This practice ensures that the managers responsible for the overall performance and quality results of a product or service have the information from the work efforts that they need to predict whether the quantitative performance and quality goals will be achieved.

Subpractices

1. Collect data from the component work efforts of a product or service offering for use in quantitatively managing achievement of the performance and quality goals.
2. Verify the accuracy of the data and enter it into capability analyses, quantitative predictive models, or other quantitative management techniques as appropriate.
3. Present the output of capability analyses, quantitative predictive models, or other quantitative management techniques in a form that is appropriate for each use to which such analyses will be put.
4. Combine the outputs of the capability analyses, quantitative predictive models, or other quantitative management techniques into an integrated picture of progress and expected results for the product or service offering.
5. Involve appropriate parties in interpreting the output of capability analyses, quantitative predictive models, or other quantitative management techniques to establish a common understanding of the results.
6. Maintain the output of capability analyses, quantitative predictive models, or other quantitative management techniques under change and version control.

SP 6 Analyze Processes and Plans

The defined processes and plans for the product and service work are quantitatively analyzed on a regular basis to determine if they are capable of achieving the quantitative performance and quality goals.

This practice ensures that the capability of the defined processes and plans are continually monitored to identify risks to achieving the performance and quality goals of a product or service.

Subpractices

1. Review the intermediate performance and quality results of the product or service work on a periodic and event driven basis to maintain awareness of actual progress toward achieving the performance and quality goals for the product or service offering.

2. Compare actual progress and results against plans and commitments for the product or service work and identify significant deviations from expected progress or results.
3. Evaluate the output of quantitative predictive models to predict the likelihood of achieving the final performance and quality goals from the intermediate progress and quality results.
4. Evaluate the results of capability analyses from the ongoing product and service work to determine whether the defined process elements are capable of achieving their allocated performance and quality goals.
5. Use statistical or other quantitative methods to identify significant deviations from the expected results of predictive models or capability analyses.
6. Combine the actual progress versus plans, predicted performance and quality outcomes, and capability analyses to establish the level of risk in achieving the intermediate and final performance and quality goals of the product or service offering.

SP 7 Perform Capability Corrective Actions

Corrective actions are performed when it is determined that the defined processes and plans for the product and service work are not capable of achieving the quantitative performance and quality goals.

This practice ensures that, based on knowledge gained in performing the work, adjustments are made so that the confidence of achieving the quantitative performance and quality goals for a product and service continually increases.

Subpractices

1. Identify process elements whose capability or predicted performance and quality outcomes present unacceptable risk in achieving the allocated or overall performance and quality goals for the product or service offering.
2. Evaluate the capability of alternative methods for performing process elements whose current capability is not sufficient to achieve the allocated or overall performance or quality goals.
3. Identify potential changes to the defined process or its component process elements that would significantly reduce the risk of achieving the performance and quality goals of the product or service offering.
4. Evaluate potential changes to the defined process or its process components using quantitative predictive models to determine the their predicted results significantly reduce the risk of achieving the performance and quality goals of the product or service offering.
5. Plan and implement corrective actions to the defined process or its component process elements that would significantly reduce the risk of achieving the performance and quality goals of the product or service offering.
6. Evaluate the effectiveness of corrective actions by monitoring their capability for achieving allocated and overall performance and quality goals.

SP 8 Record Goal Achievement Information

The performance and quality goals, measures, analyses, predictions, and results of corrective actions for a product or service are recorded for local use and stored in the organizational measurement repository.

This practice ensures that the people involved and affected by the product and service work and others in the organization who can use the information in their quantitative management activities have access to the information.

Subpractices

1. Collect the data and results from the capability analyses, predictive models, and other quantitative methods and store them for use in managing the work for a product or service offering.
2. Collect and store the information and lessons learned from managing the work and corrective actions for a product or service offering.
3. Maintain the data, analytic results, lessons learned, and other information from managing the work for a product or service offering under change and version control.
4. Submit data, analytic results, lessons learned, and other information from managing the work for a product or service offering to the organization's measurement repository.

14.3.5 Quantitative Process Management (QPM) Maturity Level 4

14.3.5.1 Purpose

Quantitative Process Management statistically manages the performance of a work effort that performs work for developing, preparing, deploying, operating, or supporting a product or service so that the performance and quality goals assigned to that work effort are achieved.

14.3.5.2 Introductory Notes

Quantitative Process Management involves

- understanding and agreeing to the specific goals that apply to a work effort
- defining the measures and the quantitative and analytic techniques that will be used in managing the process performance
- measuring and analyzing the process performance and variation
- identifying and addressing assignable causes in the process performance
- identifying and reconciling differences between the current and predicted process performance and the goals

The products and services that are quantitatively managed may be for use internal or external to the organization. They may also include business functions that are often not considered to be a product or service (for example, marketing, sales, and human resource management).

In this process area the term “product and service work” is used as an abbreviated form to refer to the relevant parts of the development, deployment, operation, maintenance, support, and management of the products and services. This includes products and services that are internal to the organization.

The goals and practices of this process area are expressed in context of a single work effort. The process area applies to each work effort that performs product and service work.

This process area is primarily the responsibility of the process owners and process implementers.

The quantitative performance and quality goals for a work effort are based on the goals for the product or service that the work effort supports.

Variation in the performance of the work processes is quantitatively managed to ensure that they are capable of achieving the results required to achieve the performance and quality goals assigned to the work effort. Performance measures of work processes are collected and analyzed to quantitatively understand the variation in the work and the performance and quality results achieved. Exceptional variation is identified when it occurs, and corrective actions are performed, as appropriate, to eliminate or address the assignable causes of the variation.

If the performance of a process is not stable, the future results cannot be accurately predicted. Even if the performance of a process exhibits apparent stability, the variation may be larger than is needed to manage the achievement of the quantitative performance and quality goals for a work effort. Corrective actions are performed to address this unacceptable variation.

The results achieved in performing work processes are monitored to determine their effect on achieving the quantitative performance and quality goals for the work effort. Corrective actions are taken when the results achieved by these processes predict significant deviations in achieving the performance and quality goals.

The reason for this process area at maturity level 4 is that meaningful statistical predictions are difficult if the process performance varies all over in unpredictable ways.

14.3.5.3 Specific and Institutionalization Goals

SG 1 Work Effort Is Quantitatively Planned

A work effort is planned to achieve its quantitative goals.

SG 2 Process Variation Is Statistically Managed

Variation in the performance of the work processes for a work effort is understood and managed to support achieving its quantitative goals.

SG 3 Work Effort Is Statistically Managed

A work effort is statistically managed to achieve its quantitative goals.

InG Practices Are Institutionalized

The practices for Quantitative Process Management are institutionalized.

Institutionalization includes

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.3.5.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Work Effort Is Quantitatively Planned)	SP 1 (Incorporate Allocated Goals) SP 2 (Maintain Definitions of Measures) SP 3 (Determine Quantitative and Analytic Techniques)
SG 2 (Process Variation Is Managed)	SP 4 (Analyze Process Variation) SP 5 (Investigate Assignable Causes) SP 6 (Manage Assignable Causes)
SG 3 (Work Effort Is Statistically Managed)	SP 7 (Monitor Work Effort Results Quantitatively) SP 8 (Identify Assignable Causes of Capability Issues) SP 9 (Address Deviations from Expected Results) SP 10 (Record Work Effort Results)
InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)

The five institutionalization practices, including subpractices and supplementary information, are contained in Part III, Chapter 13.

14.3.5.5 Specific Practices

SP 1 Incorporate Allocated Goals

The quantitative performance and quality goals allocated to the process elements performed by a work unit or work group are approved and incorporated into plans for the work effort.

This practice ensures that the quantitative performance and quality goals for a work effort are consistent with the overall goals of a product or service offering and with the capability of the work effort.

Subpractices

1. Review the allocated performance and quality goals for the work effort of a work unit or work group.
2. Determine that the allocated performance and quality goals are within the capability of the process elements performed by the work unit or work group and resolve any inconsistencies.

Examples of ways to resolve inconsistencies include:

- negotiate new values for the allocated performance and quality goals
- identify alternate methods of performing the work that will achieve the allocated performance and quality goals
- identify the risks to achieving the allocated performance and quality goals and continue the work with best effort

3. Document the allocated performance and quality goals as work unit requirements
4. Adjust work unit plans and commitments to ensure the inclusion of work efforts that designed to achieve the allocated performance and quality goals.
5. Organize assignments and work methods to achieve the allocated performance and quality goals.
6. Review the allocated performance and quality goals periodically to ensure they valid objectives in achieving the overall performance and quality goals of the product or service offering, and revise them as necessary.
7. Maintain the allocated performance and quality goals under change and version control.

SP 2 Maintain Definitions of Measures

The definitions of the measurable attributes of a work effort that are relevant for understanding and controlling the variation in the work processes and managing the achievement of the work effort's quantitative performance and quality goals are established and maintained.

This practice ensures that the quantitative information and data needed to understand and manage the work effort's process performance are defined.

Subpractices

1. Identify attributes of the process elements involved in a work unit's work effort that are most likely to affect each process element's capability for achieving the allocated performance and quality goals.
2. Define measures of the identified attributes that can be used to understand and control variation in the performance of a work efforts conducted by a work unit.

To the extent possible, these measures should evolve from and be consistent with the measures defined in the *Organizational and Capability Management* and the *Quantitative Product and Service Management* process areas.

3. Define additional measures best suited to evaluate progress toward achieving the allocated performance and quality goals as necessary.

These measures should evolve from and be consistent with measures defined in the *Work Unit Performance*, *Work Unit Planning and Commitment*, and *Product and Service Work Management* process areas.

4. Incorporate defined measures of process attributes and work efforts into the work unit's planning parameters and monitoring activities as appropriate.
5. Review the defined measures of process attributes and work efforts periodically to ensure they continue to provide insight into process variation and the work unit's work efforts, and revise them as necessary.
6. Maintain defined measures of the process attributes and work efforts of a work unit under change and version control.

SP 3 Determine Quantitative and Analytic Techniques

Quantitative and other analytic techniques needed to understand and control the variation in the work processes and manage the achievement of a work effort's quantitative performance and quality goals are identified and adapted for use.

This practice ensures that the techniques needed to effectively analyze the work effort's process performance and variation are defined and available to the people involved in the product and service work.

Subpractices

1. Define the quantitative and other analytic techniques to be used in understanding and controlling process variation and the work unit or work group's achievement of the allocated performance and quality goals.

Methods such as Six Sigma incorporate tools relevant to understanding and controlling process variation. Examples of analytic methods include:

- exploratory data analysis
- non-parametric analysis
- bayesian statistics
- control charts
- regression analysis
- analysis of variance
- reliability analysis techniques
- discrete event simulations

2. Develop training and other materials to support the work unit's use of quantitative and other analytic techniques.
3. Provide automated support where possible for performing analyses of the work unit's performance of their work and achievement of their allocated performance and quality goals.
4. Integrate the defined quantitative and other analytic techniques into the work unit's plans and work efforts and maintain them under change and version control.

SP 4 Analyze Process Variation

The defined processes and other characteristics of a work effort are analyzed to identify the significant sources of variation.

This practice determines the primary potential contributors to process variation so that steps can be taken to monitor and control them.

Subpractices

1. Collect and store data regarding process attributes from performance of the product and service work effort.
2. Plot process attribute data from a work unit's work efforts to understand the performance characteristics of the process elements such as their central tendency, variation, and shape of their distributions.
3. Compare the results on process attribute data to their historical trends or baselines to identify unexpected trends.
4. Use quantitative and other analytic techniques to evaluate factors that cause variation in the performance of process elements.

Examples of analytic techniques to identify causes of process variation include:

- correlating suspected sources of variation with process attribute measures, such as correlating experience levels with the speed of performing a task
- stratifying the process attribute data to determine if some characteristic of the performance differs among the strata
- inferential statistical tests between known sources of variation to determine if significant differences exist on the process attribute measures
- analyzing distribution outliers, such as events that fall outside the 95% confidence limits for measures of the process attributes

5. Sources of variation should be compared statistically to determine which have the most significant impact on the measures of process attributes.
6. Significant sources of variation are recorded for further investigation.

SP 5 Investigate Assignable Causes

The assignable causes of variation in the performance of the work processes of a work effort are identified.

This practice determines if the exceptional variation in the process characteristics can be attributed to identifiable causes, and assesses the nature of these causes.

Subpractices

1. Evaluate significant sources of variation in performing the process elements to understand the nature of the underlying assignable causes.
2. Determine whether the assignable causes are transient or persistent.

Transient (or special causes) of process variation represent infrequent or unexpected events that affect the execution or results of a process. Transient causes can be treated as risks against which the work unit should mitigating actions. Transient causes can be controlled by taking corrective action that eliminates or dampens their occurrence or effects. Examples of transient causes of process variation include:

- slow performance by a service provider due to illness
- delay in receiving a part due to a transportation strike
- inability to provide information due to power outage

Persistent causes of process variation are different states of standard conditions that affect the process or its results, and their effects predominate when they occur. At Level 4 persistent assignable causes should be accounted for as factors in quantitative predictive models and in adjustments to capability baselines. Examples of persistent causes of process variation include:

- different skill levels of people performing the process
- different conditions under which a service is delivered, such as urban versus rural locations
- different complexities of problems to be solved in building a solution

3. Re-evaluate assignable causes of process variation periodically to determine if their effects on process attributes remain constant, or whether changes need to be made in way these causes are managed.
4. Record information on assignable causes and submit it to the organizational measurement repository.

SP 6 Manage Assignable Causes

Corrective actions are performed to address identified assignable causes of variation and manage their impact on the performance of product and service work.

This practice ensures that, where possible, the circumstances that caused the identified exceptional variation do not recur.

Subpractices

1. Plan corrective actions to address transient causes of variation in performing the work unit's product or service work.
2. Implement corrective actions according to the plan and monitor the performance of the work unit's product or service work to ensure transient causes has been eliminated or controlled.
3. Design and implement the adjustments needed in the quantitative predictive models, capability baselines, and other quantitative management techniques to account for the effects of persistent assignable causes.
4. Implement the adjusted models, baselines, and other techniques in quantitatively planning and managing the work unit's product and service work.
5. Monitor the results of adjusted models baselines, and other techniques to ensure they continue to accurately account for the effects of persistent causes of process variation, and revise the models, baselines, and techniques when necessary.
6. Record information on the results of corrective actions and submit it to the organizational measurement repository.

SP 7 Monitor Work Effort Results Quantitatively

The results of a work effort's processes are quantitatively evaluated to determine their impact on achieving their allocated performance and quality goals, and significant issues are identified.

This practice determines if the results of the product and service work satisfy their allocated performance and quality goals and determines if corrective actions are needed.

Subpractices

1. Collect the performance and quality data that results from performing the work unit's product or service work on a continuing basis.
2. Develop distributions of performance and quality results and compare them to the allocated performance and quality goals allocated to the subprocesses performed by the work unit.
3. Identify significant deviations between the actual performance and quality results and the capability required to achieve the allocated performance and quality goals.
4. Use quantitative predictive models to determine if the deviations from the allocated performance or quality goals will significantly increase the risk of achieving the overall performance or quality goals of the product or service offering.
5. Identify and communicate the need to take corrective action when the results of the product or service work place achievement of the allocated or overall performance and quality goals at risk.

SP 8 Identify Assignable Causes of Capability Issues

Assignable causes for deviations between the product and service results and the capability required to achieve the allocated performance and quality goals are identified.

This practice identifies assignable causes of deviations between the results of the product and service work and the allocated performance and quality goals in order to define the corrective actions needed.

Subpractices

1. Review the assignable causes of variation in the performance of the product and service work to determine if they provide insights or explanations for deviations between the results of the product and service work and the allocated performance and quality goals.
2. Compare the results of the product and service work to relevant capability baselines to seek potential explanations for deviations from the expected results.
3. Investigate other factors that may cause the capability demonstrated by the performance of the product and service work to fall short of that needed to achieve the allocated performance and quality goals.
4. Determine whether the product and service work is being performed under conditions different from those from which the organization's capability baselines for the relevant process elements were computed, and whether new capability baselines and allocated performance and quality goals should be developed.

SP 9 Address Deviations from Expected Results

Corrective actions are taken to address significant deviations between the results of the product or service work and the capability required to achieve the allocated performance and quality goals.

This practice ensures that appropriate adjustments are made when it is determined that the work effort is not achieving the expected results with respect to their allocated performance and quality goals.

Subpractices

1. Define, plan, and implement corrective actions for eliminating or mitigating transient causes of process variation.
2. Define and implement adjustments to the quantitative predictive models, capability baselines, quantitative management techniques, or capability baselines that address the impact of persistent causes of process variation, when appropriate.
3. Replan or reassign work, reallocate resources, or take other corrective actions to manage the effects of assignable causes on the results of the product or service work.
4. Monitor the results of taking corrective actions to determine if they close significant gaps between the results of the product and service work and the allocated performance and quality goals.
5. Adjust the allocated performance or quality goals and associated risks to the overall goals for the product or service offering when corrective actions are unable to close significant gaps between performance and quality results and the allocated goals.

SP 10 Record Work Effort Results

The performance and quality goals, performance and capability measures, analyses, and the results of corrective actions for a work effort are recorded for local use and organizational use.

This practice ensures that the people involved and affected by the work effort and others in the organization who can use the information in their quantitative management activities have access to the information.

Subpractices

1. Collect the data, analyses, and results from the analyzing and managing sources of variation in process attributes and the achievement of allocated performance and quality goals.
2. Maintain the data, analytic results, lessons learned, and other information from managing the product or service work under change and version control.
3. Submit data, analytic results, lessons learned, and other information from managing the product or service work to the organization's measurement repository.

14.4 Maturity Level 5: Innovating

The following section contains the process areas that belong to maturity level 5. The maturity level 5 process areas of the BPMM are as follows:

- Organizational Improvement Planning (OIP)
- Organizational Performance Alignment (OPA)
- Defect and Problem Prevention (DPP)
- Continuous Capability Improvement (CCI)
- Organizational Innovative Improvement (OII)
- Organizational Improvement Deployment (OID)

14.4.1 Organizational Improvement Planning (OIP) Maturity Level 5

14.4.1.1 Purpose

Organizational Improvement Planning establishes the organization's quantitative improvement goals (based on the organization's business issues, goals, and strategies), establishes the infrastructure for systematically pursuing improvements, and defines the strategy for achieving the goals.

14.4.1.2 Introductory Notes

Organizational Improvement Planning involves

- Establishing the organizational improvement program and assigning responsibilities for the improvement activities and coordination
- Understanding the organization's business environment and improvement-related issues
- Setting improvement goals for the organization
- Measuring and monitoring the results of the improvement activities and making adjustments as appropriate

The goals and practices of this process area are expressed in context of the organization. The process area is primarily the responsibility of an organization's executive and middle managers. This process area is the primarily the responsibility of the organization's executive management supported by middle management and units and workgroups that are assigned responsibility for coordinating the improvement activities.

The primary focus of improvement planning is on the organization's processes, products, and services and on those functions that affect the performance or quality of the products and services.

Executive management assesses the business environment and identifies the primary business issues and factors that affect the organization's improvement strategy. This includes understanding the needs of current and potential new customers, identifying and understanding related markets the organization might enter, and understanding the current competitive environment and trends.

An organizational improvement program is established. Organizational workgroups and specific roles are established under this program to support the organizational improvement strategies. The workgroups and roles cover responsibility for the overall coordination of the improvement program, responsibility for each planned process improvement effort (usually an improvement workgroup or action team), and responsibility for other improvement activities.

Any misalignments of the management and compensation systems with the organizational improvement strategies are corrected.

Quantitative improvement goals, their priorities, and improvement strategies are defined. Improvement goals can include goals of two basic types:

- goals that provide a focus (areas of concern) to guide defect and problem prevention improvements and continuous capability improvements — these are goals to strive for, though not necessarily achieve
- goals that establish requirements for planned innovative process improvement efforts — these are goals that will be achieved

Improvement priorities are determined through a variety of mechanisms, including:

- analyzing the organization's business environment
- analyzing organizational measures
- performing process and performance benchmarks
- conducting internal surveys of the organization's managers and professional staff
- conducting external surveys of the organization's customers and others

Executive management is involved in the improvement efforts to ensure these efforts are properly focused. Executive management monitors the improvement efforts and results against the organization's improvement strategies and goals, and ensures that corrective actions are performed.

Executive management also analyzes the result of the improvements to understand their effects on the overall organization, understand how the organization is changing, understand the implications for the business, and understand the implications for guiding future improvements.

The reason for this process area at maturity level 5 is that process improvements have to be quantitatively driven by business goals and strategies. To perform these practices effectively requires stable and accurate performance measures that come from a maturity level 4 capability.

14.4.1.3 Specific and Institutionalization Goals

SG 1 Organizational Systems and Improvement Strategies Are Aligned

The organizational infrastructure and management systems are aligned to support the organization's strategies for continuous and measurable improvement of its performance and quality.

SG 2 Improvement Needs Are Defined

The organization's improvement goals are defined in quantitative terms.

SG 3 Improvement Work Is Aligned with Objectives

The organization's improvement activities and results are kept consistent with the organization's improvement strategies and quantitative improvement goals.

InG Practices Are Institutionalized

The practices for Organizational Improvement Planning are institutionalized.

Institutionalization includes

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.4.1.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Organizational Systems and Improvement Strategies Are Aligned)	SP 1 (Maintain Descriptions of Business Issues) SP 2 (Adjust Management Systems) SP 3 (Maintain Improvement Goals)
SG 2 (Improvement Needs Are Defined)	SP 4 (Analyze Measures to Identify Improvements) SP 5 (Gather Internal Inputs on Improvements) SP 6 (Obtain External Inputs on Improvements) SP 7 (Maintain Organizational Improvement Plans)
SG 3 (Improvement Work Is Aligned with Objectives)	SP 8 (Monitor Improvement Activities and Results) SP 9 (Compare Improvement Measures to Goals) SP 10 (Perform Corrective Actions on Improvement Work) SP 11 (Incorporate Improvement Lessons Learned) SP 12 (Communicate Improvement Information)
InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)

The five institutionalization practices, including subpractices and supplementary information, are contained in Part III, Chapter 13.

14.4.1.5 Specific Practices

SP 1 Maintain Descriptions of Business Issues

Descriptions of the organization's critical improvement issues and their priorities are established and maintained.

This practice ensures that there is a clear and agreed understanding of where the improvement efforts should be focused.

Subpractices

1. Obtain and review the organization's mission, business strategy, long-term business goals, and related sources of business direction and guidance.
2. Identify and document the business problems, challenges, and issues that inhibit achievement of the organization's business goals.

Examples of business problems, challenges, or issues include

- quality of products and services
- customer satisfaction and return business
- need for improved products and services
- time to get new products and services to market
- profitability of products and services
- amount and cost of rework
- business agility
- capability or performance of competitors

3. Estimate the financial or other benefits that can be achieved through improvements and compare these estimates to the estimates of the costs and other impacts of the improvement activities.
4. Review the description of the goal-related business problems, challenges, and issues with relevant stakeholders and obtain their agreement.
5. Revise the description of the goal-related business problems, challenges, and issues as necessary to reflect changing business conditions or goals.

SP 2 Adjust Management Systems

An organizational improvement program is established to plan and direct the organization's efforts to continuously and measurably improve its performance and quality.

This practice ensures that the organization's approach to improvement is carefully planned and implemented, and not just a haphazard approach to improvement.

The practice is an evolution of the practice in the Organizational Process Leadership at maturity level 2. At maturity level 2 the focus of improvement is to establish the process improvement program and achieve improvement milestones such as certification against a process standard or model (for example, achieve the BPMM maturity level 3). At maturity level 5 the focus of improvement is to improve the organization's performance and results relative to established business and improvement goals.

Subpractices

1. Establish appropriate role descriptions and performance goals for managers and staff whose primary role includes the coordination and deployment of improvement activities.
2. Adjust the performance planning and review process for the managers and staff whose primary role includes the coordination and deployment of improvement activities.
3. Adjust the performance planning and review process for the managers and staff whose primary role is performing product and service work to include an appropriate emphasis on improvement activities.
4. Adjust the performance feedback and review process to ensure appropriate corrective actions are performed for those whose performance is unsatisfactory in supporting and implementing improvements in their own work or in the units they manage.
5. Adjust the merit compensation and incentive awards processes, as appropriate, to include an appropriate emphasis on both business performance and participation and accomplishments in improving the organization's performance and results.
6. Adjust the criteria for selecting among candidates for assignments or promotions to include an appropriate emphasis on both accomplishments in improving the organization's performance and results and accomplishments in business performance.

SP 3 Maintain Improvement Goals

Quantitative improvement goals for the organization and their priorities are established and maintained.

This practice ensures that the organization's managers and staff have a shared quantitative understanding of the organization's improvement goals.

Subpractices

1. Obtain an understanding of the organization's business goals.

The organization's business goals would normally be derived from the organization's strategic product and service planning activities. These goals typically come from executive management. They are based on inputs from groups such as product or service marketing and from customers, industry standards, or governmental regulations.

2. Analyze the relevant business goals to determine the quantitative performance and quality results needed to support them.
3. Characterize the capability of the organization's standard processes in terms of the measured performance and quality attributes of its products and services.
4. Establish and maintain measures that provide near-term and long-term criteria for evaluating the success of the

improvement activities against the business goals.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

5. Specify the organization's improvement goals and their priorities.
6. Review the organization's improvement goals with relevant stakeholders and obtain their agreement.
7. Place the organization's improvement goals under version control.
8. Communicate the organization's improvement goals across the organization.
9. Revise the organization's improvement goals as needed.

Reasons for revising the improvement goals include:

- changes in the organization's processes
- changes in the organization's business goals
- changes in customer requirements or market expectations
- improvements made by competitors
- requirements for increasing revenue or cutting costs
- changes in technology or delivery methods
- entry into new markets, industries, or geographies
- requirements to sustain market differentiation
- justification for pricing changes
- changes in standards or regulations governing the products and services

SP 4 Analyze Measures to Identify Improvements

Measures of the organization's processes, activities, performance, and results are analyzed on a regular basis to identify areas that are most in need of improvements.

This practice ensures that objective, quantitative information is used to compare and understand how best to expend the improvement resources.

Subpractices

1. Review the organization's capability and performance measures against the organization's improvement goals.

Refer to the Organizational Capability and Performance Management process area for practices that cover the collection and analysis of capability and performance measures.

2. Identify improvements that could make significant contributions toward achieving the organization's improvement goals.
3. Estimate the benefits, costs, and other impacts of each selected improvement.
4. Prioritize the improvements.
5. Document the prioritized improvements along with the estimated benefits, costs, and other impacts.
6. Review the descriptions of the improvements with affected stakeholders and obtain their agreement.

7. Place the descriptions of the improvements under version control.
8. Revise the descriptions of the improvements as necessary.

SP 5 Gather Internal Inputs on Improvements

Inputs are gathered periodically and as needed from the people performing the organization's processes to identify changes that would improve performance, quality, and employee satisfaction.

This practice ensures that the knowledge of the people doing the work and most affect by the improvements is used to determine which changes would be of benefit.

This practice is an evolution of the practice in the Organizational Process Management process area at maturity level 3. At maturity level 3 the practices deal with process improvements. At maturity level 5 the focus is broader and the practices deal with any improvements that would improve the performance of the organization, the quality of the products and services, and the satisfaction of the people.

Subpractices

1. Determine candidate improvements that would improve performance, quality, and employee satisfaction.

Candidate improvements are obtained from various sources including:

- measuring and analyzing the processes and work activities
- reviewing the lessons learned from performing the work
- reviewing improvement proposals submitted by the organization's managers and staff
- soliciting inputs on improvements from the senior management and leaders in the organization
- reviewing relevant results of other organization improvement initiatives

2. Prioritize the candidate improvements.

Prioritizing candidate improvements includes:

- considering the estimated cost and effort to implement the improvements
- evaluating the expected improvement against the organization's improvement goals and priorities
- determining the potential barriers to the improvements and strategies for overcoming these barriers

3. Estimate the benefits, costs, and other impacts of each candidate improvement.
4. Document the prioritized candidate improvements along with the estimates benefits, costs, and other impacts.
5. Review and obtain agreement on the candidate improvements that will be implemented with relevant stakeholders.
6. Place the descriptions of the candidate improvements under version control.
7. Revise the list of candidate improvements as necessary.

SP 6 Obtain External Inputs on Improvements

Improvement ideas are obtained from the organization's customers and other relevant external stakeholders and by analyzing the organization's business and competitive environment.

This practice ensures that the organization's improvement program maintains an appropriate focus on the external business environment.

Subpractices

1. Periodically solicit inputs from the organization's customers and other important external stakeholders to identify changes that would improve satisfaction with the organization's products and services.
2. Regularly review the organization's business environment and other external factors that are directly related to the organization's improvement goals and strategies.
3. Perform quantitative process and performance benchmarks, as appropriate, to identify candidate improvements.
4. Identify candidate improvements that would improve customer satisfaction or improve the organization's business position.
5. Estimate the benefits, costs, and other impacts of each candidate improvement.
6. Prioritize the improvements.
7. Document the prioritized candidate improvements along with the estimates benefits, costs, and other impacts.
8. Review the descriptions of the candidate improvements with affected stakeholders and obtain their agreement.
9. Place the descriptions of the candidate improvements under version control.
10. Revise the descriptions of the candidate improvements as necessary.

SP 7 Maintain Organizational Improvement Plans

Plans for improvement efforts that the organization will perform are established and maintained.

This practice ensures that the improvement efforts are aligned with the organization's improvement strategies and goals and that the plans provides a complete and appropriate course of action.

Subpractices

1. Maintain an awareness of the organization's business goals, business strategies, operating plans, and improvement goals.
2. Regularly review the list of candidate improvements that have been developed from internal and external inputs.
3. Select the improvements that will be implemented and deployed.
4. Define and document the plans for implementing and deploying the selected improvements.
5. Define the measures that will be used for the organizational improvement program and incorporate into the organizational improvement plans.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

6. Conduct work product inspections of the descriptions of the organizational improvement plans.

Refer to the Guidelines for Work Product Inspection in Annex A for guidance that may be useful in implementing this practice.

7. Review the organizational improvement plans with affected stakeholders and obtain their agreement.
8. Place the organizational improvement plans under version control.
9. Revise the organizational improvement plans as necessary.

SP 8 Monitor Improvement Activities and Results

The organization's improvement activities and results are monitored against the organization's improvement strategies and quantitative improvement goals.

This practice ensures that the organization's executives and others responsible for the organization's improvement activities have the information they need to manage the improvement efforts so that the improvement goals will be achieved.

Subpractices

1. Periodically review the status of the organization's improvement activities against the organizational improvement plans.
2. Periodically collect and analyze measures of the organization's improvement activities and results to provide insights into progress and benefits.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

3. Aggregate the status, measures, and other information regarding the organization's improvement activities to provide a summary of the current status and issues.
4. Periodically review the status, issues, measures, other results, outlook, and risks for the organization's improvement activities with relevant stakeholders, including executive management.
5. Identify corrective actions, as needed, to address issues in the organization's improvement activities.

SP 9 Compare Improvement Measures to Goals

Measures and quantitative projections of the organization's improvements are monitored against the organization's quantitative improvement goals.

This practice ensures that the organization's executives and others responsible for the organization's improvement activities have a statistical basis for determining whether the improvement goals are likely to be achieved and whether corrective actions are needed.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Collect and analyze measures of the actual and projected results of the organization's improvement activities.
2. Compare the actual and projected results of the organization's improvement activities against the applicable organizational goals.

These measures are compared for individual improvement efforts and are aggregated to understand the overall improvement effects.

3. Periodically review the actual and projected results of the organization's improvement activities with relevant stakeholders, including executive management.
4. Identify corrective actions, as needed, to address issues in the improvement activities.

SP 10 Perform Corrective Actions on Improvement Work

Corrective actions are performed when the organization's improvement activities and results deviate significantly from the improvement strategies and quantitative improvement goals.

This practice ensures that appropriate adjustments are made, when needed, to keep the improvement approach consistent with the overall strategy and to make sure the efforts and results will achieve the organization's quantitative improvement goals.

Subpractices

1. Review proposed corrective actions with relevant stakeholders and obtain their agreement.
2. Perform or assign the identified corrective actions, and track to closure.
3. Document lessons learned from the issues and the corrective actions.

SP 11 Incorporate Improvement Lessons Learned

Lessons learned in planning, performing, and monitoring the organization's improvement activities are recorded and incorporated into the organization's improvement activities as appropriate.

This practice ensures that the organization learns from its improvement experiences and these lessons are applied.

Subpractices

1. Capture and document lessons learned from all the organization's improvement activities.
2. Review and organize the lessons learned for use in future improvement activities.
3. Incorporate the lessons learned into the planning and management of the organization's improvement efforts and into the appropriate improvement artifacts.
4. Disseminate the lessons learned to the appropriate improvement efforts and to other relevant stakeholders.
5. Revise the lessons learned as necessary.

SP 12 Communicate Improvement Information

Information, status, measures, and other results of the organization's improvement activities are provided to relevant stakeholders and communicated across the organization.

This practice ensures that the people in the organization have an appropriate understanding of the organization's improvement activities and results to help them take advantage of the improvements in developing, maintaining, delivering, managing, and improving the organization's products and services.

Subpractices

1. Document records on the initiation, status, and implementation of the organization's improvement activities.
2. Provide the organization's managers and staff with appropriate access to the descriptions of the organization's improvement goals and strategies.
3. Provide periodic executive reinforcement and updates on the improvement goals and strategies to the managers and staff in the organization.

4. Communicate the status and results of improvement activities to the managers and staff in the organization on a periodic and event driven basis.
5. Regularly publicize a summary of the major improvement activities and significant innovative improvements and results.

Examples of means to provide this feedback include:

- electronic bulletin boards
- newsletters
- information flow meetings

14.4.2 Organizational Performance Alignment (OPA)

Maturity Level 5

14.4.2.1 Purpose

Organizational Performance Alignment maintains proper alignment of the organization's business strategies and the organization's quantitative business goals up and down the organizational levels and across the organization's product and service offerings.

14.4.2.2 Introductory Notes

Organizational Performance Alignment involves

- understanding how the organization's units and workgroups work as a system to achieve the desired business results
- aligning the responsibilities and goals of the organization's product and service offerings, units, workgroups, and individuals so that the organization will implement its business strategies and achieve its business goals
- monitoring the performance and results of the organization's units, workgroups, and individuals against their responsibilities and goals, and performing corrective actions
- monitoring the organization's overall performance and results against the organization's business strategies and business goals, and performing corrective actions

The goals and practices of this process area are expressed in context of the organization. This process area is primarily the responsibility of the organization's executive managers, middle managers, and work unit managers, usually assisted by workgroups that are assigned responsibilities for coordinating the organization's improvement activities.

The term "product and service work" is used as an abbreviated form of "development, preparation, deployment, operation, support, and management of a product, a service, or a suite of products and services." This includes products and services that are internal to the organization.

The plans, goals, and performance of the organization's products and services and for the units, workgroups, and individuals within the organization are kept in alignment with the organizational business strategies and goals.

Organizational performance alignment deals with knitting together and managing a complete and consistent picture of performance and improvement within the organization. The plans, commitments, performance business goals, and improvement strategies for the various product and service offerings, and for the units, workgroups, and individuals are evaluated to determine how they fit together and how they relate to each other and to the organization's business strategies and goals. These evaluations include determining which of these organizational entities can contribute to each of the organization's business goals, and in what ways.

The plans, goals, and performance of the organization's products and services and units, workgroups, and individuals are aligned with the organizational strategy, and the organizational quantitative business goals are allocated to them in a traceable manner. The overall strategies, plans, goals, and performance of the organization are evaluated as a complete system to ensure that they are aligned to support the organization's business strategies and goals. Corrective actions are performed as needed.

For each product and service offering, there is a focus on improving alignment of performance among the units and workgroups involved in the product and service work.

Workgroups focus on improving alignment of performance among their members. Work units focus on improving alignment of performance among their workgroups and individuals. Units focus on improving performance alignment among its units, work units, and individuals. The organization focuses on improving alignment of performance among their units and among their product and service offerings.

At each level in the organization (that is, individual, workgroup, work unit, unit, product and service offering, and organizational level), results are measured and evaluated for consistency with their own quantitative performance goals, and with the goals allocated to them. Corrective actions are performed when significant deviations are identified.

Management uses this performance alignment to integrate the entire organization. Management relies on the performance and results of the product and service offerings, units, workgroups, and individuals to implement the organization's business strategies and achieve the organizational quantitative business goals.

The reason for this process area at maturity level 5 is to ensure that all the work efforts and improvement efforts contribute to the organizational business strategies and quantitative business goals in the most effective way.

14.4.2.3 Specific and Institutionalization Goals

SG 1 Strategy and Goals Are Aligned

The plans, commitments and quantitative goals for the product and service offerings, units, workgroups, and individuals are aligned with the organization's business strategies and quantitative business goals.

SG 2 Performance and Results Are Aligned

The performance and results of the individuals, workgroups, units, product and service offerings, and organization are adjusted to address the organization's business strategies and achieve the organization's quantitative business goals.

InG Practices Are Institutionalized

The practices for Organizational Performance Alignment are institutionalized.

Institutionalization includes:

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.4.2.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Strategy and Goals Are Aligned)	SP 1 (Allocate Business Goals and Responsibilities to Units) SP 2 (Adjust Unit Plans for Overall Results) SP 3 (Align Work Assignments within Units)
SG 2 (Performance and Results Are Aligned)	SP 4 (Monitor Local Alignment and Results) SP 5 (Correct Local Alignment Deviations) SP 6 (Monitor Organizational Alignment and Results) SP 7 (Correct Organizational Alignment Deviations) SP 8 (Address Organizational Alignment Deviation Causes)
InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)

The five institutionalization practices, including subpractices and supplementary information, are contained in Part III, Section 6.

14.4.2.5 Specific Practices

SP 1 Allocate Business Goals and Responsibilities to Units

The allocation of the organizational quantitative business goals and responsibilities to the organization’s product and service offerings and units is established and maintained.

This practice ensures that the units and work efforts understand what they need to do so that the organization’s business goals are achieved.

Subpractices

1. Review the responsibilities, plans, and commitments of the product and service offerings and units against the organization’s business strategies and goals to determine how they can contribute to them.
2. Allocate the organization’s business goals to the organization’s product and service offerings and units.
3. Review the allocated business goals with the responsible managers and obtain their agreement.
4. Specify measures for judging the satisfaction of the product and service offerings and units in achieving their business goals.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

5. Adjust the organization’s business goals and strategies to reflect negotiations with the product and service offering and unit managers.

6. Document and archive the results and other relevant records of the allocation of the organization's business goals to the organization's product and service offerings and units.
7. Revise the allocation of the organization's business goals to the organization's product and service offerings and units as needed.

SP 2 Adjust Unit Plans for Overall Results

The responsibilities, plans, and commitments of the units are evaluated and aligned to ensure that, individually and in aggregate, they provide the best fit for the organization's business strategies and goals.

This practice ensures that the performance of the units make appropriate contributions to the organization's business goals and strategies and do not result in suboptimized performance for the organization.

Suboptimization occurs when the performance and results of a component of a system or business is optimized without regard to the performance and results of the entire system or business. Optimizing the performance and results of a component will, in general, not optimize the performance and results of the entire system or business. Because of this, it may be necessary to limit or reduce the performance and results of individual components in order to optimize the entire system or business.

Subpractices

1. Allocate the organization's business goals to each product and service offering and unit at each level of management.
2. Incorporate process improvement activities in the plans for each product and service offering and unit at each level of management to address the allocated business goals.
3. Identify conflicts between the allocated business goals with the work plans and commitments for each product and service offering and unit at each level of management.

When the improvement plans product and service offering or unit cannot be defined to achieve the allocated business goals established by executive management, the business goals, resources, or strategies should be adjusted so that achievable plans can be developed.

4. Perform corrective action to resolve identified conflicts and track to closure.

Executive management must accept responsibility for the risks that result from mismatches between business goals and the capability and capacity available to achieve these goals.

5. Specify measures for monitoring the performance and results of the product and service offerings and units in achieving the allocated business goals.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

SP 3 Align Work Assignments within Units

The work assignments of workgroups and individuals in the work units are established and maintained to support the achievement of the business goals for the units.

This practice ensures that work is assigned to workgroups and individuals such that their efforts will make an appropriate contribution to achieving the work unit's business goals.

This practice is performed by the workgroups and individuals within a work unit relative to the improvement goals and responsibilities allocated to their work unit. In some cases improvement goals and responsibilities may not be allocated to individual work units in which case this practice is performed relative to the unit level to which the improvement goals and responsibilities are allocated.

Subpractices

1. Regularly review the work unit's business goals against the work plans, commitments, and activities of the workgroups and individuals.
2. Regularly analyze the performance data of the workgroups and individuals to identify a mismatch with the work unit's business goals.

Examples of mismatched performance include:

- conflicts among individual or workgroup goals or commitments
- performance problems caused by processes whose performance impedes the performance of other processes
- timing and coordination problems among individuals or across the workgroup
- work products that satisfy the exit criteria of processes that produced them, but do not satisfy the needs of other individuals, workgroups, or units to whom they are delivered

3. Regularly adjust the work plans, processes, commitments and activities of the workgroups and individuals to align with the work unit's business goals.
4. Specify measures for monitoring the performance and results of the workgroups and individuals in supporting the achievement of the work unit's business goals.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

5. Coordinate improvement activities among the workgroups and individuals, as appropriate.
6. Identify performance conflicts among the work plans, processes, commitments and activities of the workgroups and individuals.
7. Perform corrective action to resolve identified conflicts and track to closure.

SP 4 Monitor Local Alignment and Results

The performance and results of the individuals, workgroups, units, and product and service offerings are monitored on a regular basis against their business goals.

This practice ensures that objective and quantitative information is used to determine if there are any issues in the performance and results of individuals, work units, workgroups, units, and product and service offerings relative to supporting the organization's business goals and strategies.

Subpractices

1. Periodically review the work plans, activities, and status of the individuals, work units, workgroups, units, and product and service offerings.

2. Periodically collect and analyze measures of the performance and results of the individuals, work units, workgroups, units, and product and service offerings relative to the business goals allocated to the units.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

Examples of the use of these measures include:

- determining if performance and results are properly aligned
- determining actions to take to improve alignment

3. Analyze performance and results measures to identify performance misalignment among individuals, workgroups, or other entities composing the unit.
4. Periodically collect and analyze measures of the performance and results of the individuals, work units, workgroups, units, and product and service offerings relative to the business goals allocated to the units.

When individuals work independently and are not part of a workgroup, misalignments in their performance must be managed at the unit level by a responsible individual(s) at the unit level. A unit may be composed of other units and is therefore responsible for aligning performance among these subordinate units.

Examples of misaligned performance to be managed at the unit level include”

- individuals working independently whose performance is not sufficiently synchronized with the performance of other individuals, workgroups, or units with whom they share dependencies
- timing and coordination problems among workgroups or units
- workgroups whose commitments or business activities interfere with the business activities or commitments of other workgroups or units
- timing and coordination problems that develop among individuals or workgroups who are achieving their measurable performance goals
- work products that satisfy the exit criteria of processes that produced them, but do not satisfy the needs of other individuals, workgroups, or units to whom they are delivered
- work that fails to add value
- conflicts between work activities and unit performance goals
- improvements or corrective actions that have unintended side effects on other work groups or units

5. Identify corrective actions, as needed, to address performance alignment issues.

SP 5 Correct Local Alignment Deviations

Corrective actions are performed when the performance and results of the individuals, workgroups, units, and product and service offerings deviate significantly from their business goals.

This practice ensures that adjustments are made to the plans, commitments, and activities of the individuals, workgroups, units, and product and service offerings so that they satisfy their business goals.

Subpractices

1. Review proposed corrective actions with relevant stakeholders and obtain their agreement.

2. Perform or assign the identified corrective actions, and track to closure.

Corrective actions are taken when quantitative evaluations and other analyses indicate that the improvement responsibilities or results deviate significantly from the improvement goals and improvement responsibilities allocated to the units.

Examples of corrective actions include:

- correcting problems in the performance of the work activities
- redesigning or adjusting processes and practices to improve the alignment
- modifying the improvement goals and improvement responsibilities allocated to the unit

SP 6 Monitor Organizational Alignment and Results

The overall performance and results of organization are monitored on a regular basis against the organization's quantitative improvement goals and strategies.

This practice ensures that objective and quantitative information is used to determine if the performance and results of individuals, work units, workgroups, units, and product and service offerings, in aggregate, are achieving the organization's business goals.

Subpractices

1. Periodically review the performance of the units and product and service offerings against the organization's improvement strategies.
2. Periodically collect the measures of the performance and results of the units and product and service offerings and analyze the measures relative to their business goals and the organization's business goals.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

Examples of the use of these measures include:

- determining if performance and results of the product and service offerings and units are properly aligned
- determining actions to take to improve alignment

Examples of misaligned performance to be managed at the unit level include:

- units whose performance is not sufficiently synchronized with the performance of other units with whom they share dependencies
- timing and coordination problems among product and service offerings and units
- units whose commitments or business activities interfere with the business activities or commitments of other units
- improvements or corrective actions that have unintended side effects on other units
- aggregated results of the units does not achieve the organization's performance goals

3. Analyze performance and results measures to identify performance misalignment among the product and service offerings and units.

Misalignments in the performance of individual product and service offerings and units must be managed at the organization level and by middle managers at the intermediate management levels. A unit may be composed of other units and is therefore responsible for aligning performance among these subordinate units.

Examples of performance data or measures to be analyzed include:

- performance against commitments
- contribution to the unit's business goals
- performance results aggregated across units or at the organization level
- trends in capability baselines and process performance baselines
- quality measures or customer response to products and services
- performance in meeting the organization's business goals
- measures related to customers, the organization's managers and staff, the organization, or to the community and society in which the organization operates
- financial measures, such as return on capital employed (ROCE), residual Income (RI), or cash flow return on investment (CFROI)

4. Identify corrective actions, as needed, to address performance alignment issues across units and performance alignment issues with the organization's business goals.

Examples of misaligned performance to be managed at the organizational level include:

- misalignment of business goals or performance among units
- misalignment of unit business goals or performance with organizational business strategies and goals
- mismatches between organizational process performance capabilities and business objectives
- product and service offerings that are misaligned across units or with organizational goals

SP 7 Correct Organizational Alignment Deviations

Corrective actions are performed when the performance and results of the organization deviate significantly from the organization's quantitative business goals.

This practice ensures that adjustments are made, as appropriate, so that the organization's business goals are achieved.

Subpractices

1. Review proposed corrective actions for performance misalignment with relevant stakeholders and obtain their agreement.

Examples of corrective actions include:

- improving the performance of one or more units
- improving coordination among several units
- tailoring existing processes or defining new processes to improve alignment in the performance of units
- changing or adjusting performance objectives or commitments at the unit or organizational level
- clarifying confusing or conflicting processes or objectives

2. Perform or assign the identified corrective actions, and track to closure.

SP 8 Address Organizational Alignment Deviation Causes

The likely causes of misaligned performance are identified and addressed.

This practice ensures that, where possible, actions are taken to address the root causes of misaligned performance so that future misalignment is less likely to occur.

Subpractices

1. Analyze the misaligned performance to determine its likely causes.
2. Document the likely causes of each instance of misaligned performance so that corrective actions can be performed.
3. Determine and document preventive actions that are expected to prevent the future occurrence of the identified misaligned performance.
4. Review the proposed preventive actions with relevant stakeholders, and obtain their agreement.
5. Perform the agreed preventive actions and track to completion.
6. Document as risks any significant recurring problems that are not addressed with preventive actions.
7. Communicate the results of the root cause analysis to relevant stakeholders for use in managing and improving performance-related work activities.

Examples of individuals or entities who receive analyses of the impact of workforce practices and activities on organizational performance alignment could include the following:

- those responsible for coordinating workforce practices and activities across the organization
- those responsible for performing and reporting workforce activities
- those with management responsibilities for units
- executive management

14.4.3 Defect and Problem Prevention (DPP)

Maturity Level 5

14.4.3.1 Purpose

Defect and Problem Prevention identifies and addresses the causes of defects and other problems that are the primary obstacles to achieving a work unit's or workgroup's plans and quantitative improvement goals so these defects and problems do not recur.

14.4.3.2 Introductory Notes

Defect and Problem Prevention involves

- determining the root causes of defects and problems
- identifying and performing specific actions to prevent the occurrence of those types of defects and problems in the future

The goals and practices of this process area are primarily expressed in context a single work unit or workgroup. This process area applies to each work unit and workgroup in the organization. There is also an organization-level responsibility for the group that is responsible for the organizational process management activities. This organizational responsibility is the coordination of the various defect and problem prevention activities and performing defect and problem prevention activities that are organizational in nature.

Defect and problem prevention activities improve quality, productivity, and predictability by preventing the introduction of defects into products and services and eliminating rework. Preventing defects and problems from occurring is generally much more efficient and effective than detecting defects and problems and addressing their effects after they have been introduced.

Defect and problem prevention activities also provide a mechanism for sharing lessons learned and supporting organizational learning. The defect and problem prevention information, measures, analyses, and results from each work unit or workgroup are provided to the other work units or workgroups to help them in their defect and problem prevention activities. Appropriate information is also provided to the owners of the organization's standard processes and other related processes to be used in fixing and improving these processes and related process assets.

Although defects have historically been the focus of causal analysis and prevention, these techniques can also be used on problems unrelated to defects (for example, to improve quality attributes such as cycle time). Improvement proposals, simulations, dynamic systems models, engineering analyses, new business directives, or other items may initiate such analysis.

The reason for this process area at maturity level 5 is to have a self-correcting closed loop process improvement mechanism built into the work activities.

14.4.3.3 Specific and Institutionalization Goals

SG 1 Root Causes Are Determined

Root causes of defects and other problems that are the primary obstacles to achieving the plans and quantitative improvement goals of a work unit or workgroup are systematically determined.

SG 2 Root Causes Are Addressed

Root causes of defects and other problems that are the primary obstacles to achieving the plans and quantitative improvement goals of a work unit or workgroup are systematically addressed to prevent them from recurring.

SG 3 Prevention Information Is Disseminated

Information from the work unit's or workgroup's defect and problem prevention activities of a work unit or workgroup that is useful in other improvement activities is disseminated to relevant stakeholders.

InG Practices Are Institutionalized

The practices for Defect and Problem Prevention are institutionalized.

Institutionalization includes:

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.4.3.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Root Causes Are Determined)	SP 1 (Select Defects and Problems for Analysis) SP 2 (Identify Similar Defects and Problems) SP 3 (Identify Root Causes) SP 4 (Identify Process Weaknesses)
SG 2 (Root Causes Are Addressed)	SP 5 (Perform Root Cause Corrective Actions) SP 6 (Coordinate Defect and Problem Prevention Activities) SP 7 (Inform Workgroups of Preventive Actions to Perform) SP 8 (Measure Effects of Preventive Actions)
SG 3 (Prevention Information Is Disseminated)	SP 9 (Document Prevention Data and Results) SP 10 (Communicate Prevention Information)
InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)

The five institutionalization practices, including subpractices and supplementary information, are contained in Part III, Chapter 13.

14.4.3.5 Specific Practices

SP 1 Select Defects and Problems for Analysis

Defects and other problems that are the primary obstacles to achieving the work unit's or workgroup's plans and goals are selected for analysis and preventive action.

This practice selects the defects and other problems for further analysis to determine if preventive actions can be performed.

Subpractices

1. Obtain relevant information on defects and problems that have occurred.

Examples of sources of relevant defect and problem information include:

- work problems reported by the people performing work activities
- management problems requiring corrective action
- process capability and performance problems
- defects found in work product inspections
- defects found in verification and validation
- defects reported by customers
- defects reported by end users

2. Select the defects and problems that will be analyzed to determine their root causes.

Examples of criteria used to select defects and problems for causal analysis include:

- the similarity between defects and problems (that is, whether multiple defects and problems might be addressed in a single causal analysis)
- the impact to performing the work
- the impact to the operations of products and services
- the frequency of occurrence
- the expected costs to perform the causal analysis and implement preventive actions

Examples of methods for selecting defects and problems for causal analysis include:

- Pareto analysis
- histograms
- process capability analysis

3. Describe and document the characteristics of the selected defects and problems.

Examples of aspects of defects and problems that should be included in the description include:

- what occurs
- when it occurs
- when it does not occur
- when the problem is most severe
- who is involved when the problem occurs

4. Review the description of the selected defects and problems with those who are knowledgeable and obtain their agreement.

SP 2 Identify Similar Defects and Problems

Defects and other problems that are similar to the selected defects and problems are identified and included with those selected for analysis and preventive action.

This practice determines if there are defects and problems that are similar enough that they can be grouped and addressed as groups.

Subpractices

1. Review the defects and problems that are selected for causal analysis against the work activities.
2. Identify types of defects and problems that are similar to the defects and problems selected for causal analysis

Examples of similar types of defects and problems include:

- a rollover of a clock from 23:59 to 24:00 or 0:00 is similar to a rollover of orientation from 359 degrees to 360 or 0 degrees
- use of incorrect data in requirements development may be similar to use of incorrect data in verification steps

3. Revise the list of defects and problems selected for causal analysis to include the identified similar types of defects and problems.

SP 3 Identify Root Causes

Root causes of the selected defects and problems are identified.

This practice determines the root causes that need to be addressed if the defects and problems are to be prevented from recurring.

Subpractices

1. Include the people in the causal analysis who perform or are affected by the work that is related to the defect or problem being analyzed.

Causal analysis is typically performed in a meeting with the people who have an understanding of the defect or problem being analyzed.

Examples of when to perform causal analysis include:

- shortly after a task is completed that resulted in the selected defect or problem
- during a task if and when the number of defects and problems identified warrants causal analysis
- periodically after a product and service offering is released to customers
- periodically during tasks of long duration of the process

2. Analyze the selected defects and problems to determine their root causes.

Examples of methods to determine root causes include:

- cause-and-effect (fishbone) diagrams
- check sheets
- five whys

3. Group the selected defects and problems into categories based on the determined root causes.

Examples of root cause categories include:

- inadequate training
- incomplete or ambiguous inputs
- breakdown of communications
- making mistakes in manual procedures (for example, typing mistakes)
- process deficiency
- process not followed
- problems in using tools and support environment

4. Document the causal analysis activities that were performed and the results.
5. Define and document proposed actions to prevent the future occurrence of similar defects and problems.

Some root causes are addressed by taking actions to prevent them from recurring (for example, certain types of defects not being discovered in work product verification). Some root causes are addressed by fixing the process (for example, changing the process to improve cycle time or throughput).

Examples of the content of an action proposal for preventive action includes:

- originator of the action proposal
- description of the defect or problem
- description of the root cause
- root cause category
- process step or work phase that the defect or problem was introduced
- process step or work phase that the defect or problem was identified
- description of the actions proposed to prevent recurrence

6. Review the proposed actions with affected stakeholders and obtain their agreement.

SP 4 Identify Process Weaknesses

Process weaknesses that allowed the selected defects and problems to remain undetected are identified.

This practice identifies fixes to the process so that undetected defects and problems of the types previously encountered are caught and addressed closer to the point they are introduced.

Subpractices

1. Review the work process flow and tasks against the defect or problem and its root cause to identify process steps that should have caught the defect or problem.
2. Document the analysis and results of determining the process weaknesses that allowed the defect or problem to remain undetected.
3. Define and document proposed actions to address the process weaknesses that allowed the defect or problem to remain undetected.
4. Review the proposed actions with affected stakeholders and obtain their agreement.

SP 5 Perform Root Cause Corrective Actions

Corrective actions are identified and performed to address the root causes of the selected defects and problems and process weaknesses that allowed the defects and problems to remain undetected.

This practice ensures that appropriate actions are performed so that the selected defects and problems are unlikely to recur, and are more likely to be identified and eliminated closer to the point they are introduced if they do occur.

Subpractices

1. Analyze the preventive action proposals from causal analysis and determine their priorities.

Priority is usually nonrigorous and is based on an understanding of:

- causes of the defects and problems
- implications of not addressing the defects
- cost to implement the preventive actions
- expected impact on performance and quality

2. Analyze the action proposals for addressing process weaknesses and determine their priorities.
3. Select the action proposals that will be addressed.
4. Assign responsibility for implementing each selected action proposals.
5. Document action items resulting from the preventive action proposals.

Examples of information in action items include:

- person responsible for implementing
- description of the affected areas
- people who are to be kept informed of status
- rationale for key decisions
- description of implementation actions
- estimated time and cost of implementation the actions

6. Implement the action items and track to closure.

SP 6 Coordinate Defect and Problem Prevention Activities

Defect and problem prevention activities are coordinated within a work effort.

This practice ensures that the priorities and the planned and implemented actions appropriately address a work unit's or workgroup's primary issues and obstacles to achieving its plans and goals.

Subpractices

1. Review the output from the causal analysis meetings, including the action proposals and action items.
2. Review actions taken by the other teams in the organization to assess whether these actions can be applied to the work effort's activities and processes.
3. Periodically analyze the action proposals, action items, and their implementation, and adjust priorities and assignments as appropriate.
4. Reassign action proposals to teams at another level in the organization, as appropriate.

Some action proposals are outside the authority of individual work efforts. For example, some action proposals have to be addressed by the work unit manager, some by middle or executive management, and some have to be addressed as changes to organizational process assets such as the standard processes or organizational training.

5. Document the rationale for decisions and provide the decisions and rationale to affected stakeholders.
6. Review and verify completed action proposals before they are closed.
7. Ensure that significant efforts and successes in preventing defects and problems are recognized.

SP 7 Inform Workgroups of Preventive Actions to Perform

Those performing the work within the work unit or workgroup are informed of actions they can perform to prevent the selected defects and problems from recurring.

This practice ensures that the identified preventive actions and process changes are implemented.

Subpractices

1. Periodically prepare and distribute a summary of the major defect and problem categories to the people within the work unit or workgroup.
2. Periodically prepare and distribute a list of defects and problems discovered, causal analyses performed, and resulting action proposals to the people within the work unit or workgroup.
3. Provide guidance to the people performing the work tasks on actions to take to prevent defects and problems.

This guidance is often provided at the start of a new task or at other points during the performance of a task.

Examples of areas of guidance that is provided include:

- changes made to applicable process descriptions
- available new or updated training
- information on new or updated tools and methods
- list of errors that are commonly made or introduced and recommended preventive actions

SP 8 Measure Effects of Preventive Actions

The effects of the work unit's or workgroup's defect and problem prevention actions on its plans and quantitative improvement goals are measured and analyzed.

This practice ensures that quantitative information is used to understand the benefits of the defect and problem prevention activities and their contribution to the work unit's and workgroup's goals.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

Since there may be numerous improvements underway in the organization and in individual work units and workgroups, it may not be possible to measure the effects of preventive actions for a single causal analysis activity. Measures of the overall change in capability and performance should be collected and analyzed to ensure that improvement is occurring. To the extent possible, the changes in results should be correlated to the preventive actions. The analysis helps determine whether the preventive actions have positively influenced the ability to meet the improvement goals.

Subpractices

1. Periodically measure and analyze the change in the process performance of the work unit or workgroup, as appropriate.
2. Periodically measure and analyze the change in the process capability of the work unit or workgroup, as appropriate.
3. Identify and document issues uncovered by measuring the process performance or process capability of the work unit or workgroup.
4. Review the identified process performance or process capability issues with the manager responsible for the work unit or workgroup and with other relevant stakeholders.

Refer to the Work Unit Monitoring and Control process areas.

SP 9 Document Prevention Data and Results

The work unit's and workgroup's defect and problem prevention information, measures, analyses, and results are documented.

This practice ensures that the defect and problem prevention information is available for reference in future activities.

Subpractices

1. Record the defect and problem prevention information, measures, analyses, and results.

Examples of defect and problem prevention information include:

- defect and problem logs
- phase the defect or problem was detected
- severity the defect or problem
- type the defect or problem (for example, Orthogonal Defect Classification)
- activity detecting the defect or problem
- analysis performed to select defects and problems for root cause analysis
- problem statements describing the select defects and problems
- causal analysis steps performed and results
- identified root cause
- action proposals
- preventive actions (status tracked to closure)
- prevention steps to be communicated to staff
- defect prevention reports
- defect prevention measures

2. Place the defect and problem prevention records under version control.
3. Revise the defect and problem prevention records as necessary.

SP 10 Communicate Prevention Information

The defect and problem prevention information, results, and records of a work unit or workgroup are shared with those who are responsible for related processes and work efforts.

This practice ensures that the defect and problem prevention analysis, actions, and results from the work unit and workgroup are considered and appropriately incorporated into the other processes in the organization.

Subpractices

1. Provide the defect and problem records to those who are responsible for related processes and work efforts.

Examples of those who are responsible for related processes and work efforts include:

- the workgroup responsible for the organizational process management activities
- work units and workgroups performing similar work
- work units and workgroups performing related upstream or downstream work

2. Provide the defect and problem records to the group responsible for the organization's process management activities.
3. Document and submit change requests for the organization's standard processes to address defect and problem prevention action proposals.

14.4.4 Continuous Capability Improvement (CCI) Maturity Level 5

14.4.4.1 Purpose

Continuous Capability Improvement continually and measurably improves the performance of the organization's processes by identifying and deploying incremental improvements.

14.4.4.2 Introductory Notes

Continuous Capability Improvement involves

- maintaining a quantitative understanding of the performance and results of the individual's and workgroup's processes
- maintaining goals for the individual's and workgroup's processes
- identifying and implementing incremental improvements to the individual's and workgroup's processes
- coordinating the changes to the individual's and workgroup's processes with relevant stakeholders
- documenting and distributing information about the process improvements to others in the organization who might benefit

The goals and practices of this process area are primarily expressed in context of a single workgroup or individual. This process area applies to all workgroups and individuals in the organization. This process area is primarily the responsibility of the people who perform the various processes in the organization. There is also an organization-level responsibility the

group that is responsible for the organization's process management activities. This organizational responsibility is the coordination of the various continuous capability improvements activities and results to ensure that the organization's processes are kept appropriately consistent.

All the organization's processes are candidates for improvement, including the organization's standard processes; the defined processes for the products and services; the defined processes for the workgroups and work units; and the individuals' processes.

Continuous capability improvements are incremental improvements that are identified and deployed at the local level (that is, deployed by the people performing a process, into their process). Measurable improvement in performance and quality is demonstrated over time.

Individuals focus on the capability of their personal process for performing their work. They analyze the capability of their personal work processes, identify opportunities for improvement, establish measurable improvement goals, and define improvement plans. They continually search for, identify, and implement improvements to their personal work processes. This process improvement approach is replicated at all levels throughout the organization.

For each individual and workgroup, candidate improvements are evaluated, and selected improvements are incorporated into their processes and process assets.

Process improvements identified by the individuals and workgroups are reviewed to determine if these improvements are applicable to other related processes. As appropriate, improvements are documented and proposed to those who are responsible for these related processes.

Organization-wide support is provided to the individuals and workgroups as they focus on improving their process performance. Within each process community, actions are taken to continually improve the performance of their processes.

The reason for this process area at maturity level 5 is to involve everyone in the organization in the process improvement effort, and take advantage of the knowledge of the people who are actually performing the processes and the quantitative data that are developed at maturity level 4.

14.4.4.3 Specific and Institutionalization Goals

SG 1 Individual Processes Are Improved

The performance and results of the individuals' personal work processes are continually and measurably improved.

SG 2 Workgroup Processes Are Improved

The performance and results of the workgroups' work processes are adjusted for the workgroup characteristics and continually and measurably improved.

InG Practices Are Institutionalized

The practices for Continuous Capability Improvement are institutionalized.

Institutionalization includes:

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.4.4.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Individual Processes Are Improved)	SP 1 (Maintain Data for Personal Work Processes) SP 2 (Evaluate Personal Work Processes) SP 3 (Identify Improvements to Personal Work Processes) SP 4 (Implement Improvements to Personal Work Processes) SP 5 (Coordinate Improvements to Personal Work Processes) SP 6 (Disseminate Individual Improvement Proposals)
SG 2 (Workgroup Processes Are Improved)	SP 7 (Maintain Data on Workgroup Processes) SP 8 (Adjust Workgroup Processes) SP 9 (Evaluate Workgroup Processes) SP 10 (Identify Improvements to Workgroup Processes) SP 11 (Implement Improvements to Workgroup Processes) SP 12 (Coordinate Changes Made to Workgroup Processes) SP 13 (Disseminate Workgroup Improvement Information)
InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)

The five institutionalization practices, including subpractices and supplementary information, are contained in Part III, Chapter 13.

14.4.4.5 Specific Practices

SP 1 Maintain Data for Personal Work Processes

Each individual establishes and maintains quantitative and qualitative descriptions of the performance and results of their personal work process.

This practice ensures that each individual has an objective and quantitative basis for selecting areas of improvement and judging the results of improvements.

Subpractices

1. Analyze personal work activities in order to describe unique personal aspects of performing work processes.

2. Define measures of personal activities that are derived from standard measures of work performance.
3. Refine measures of personal work continually to improve the insights derived from their analysis.
4. Evaluate measures of personal work processes periodically and make revisions when necessary.

SP 2 Evaluate Personal Work Processes

Each individual evaluates their personal work process to identify opportunities for improvement.

This practice ensures that improvements can be selected based on maximizing the benefits to the individual and other relevant stakeholders.

Subpractices

1. Measure personal work processes and evaluate personal capability and performance.
2. Represent personal work processes in a format that supports analysis.
3. Analyze personal work processes quantitatively to identify areas to improve.
4. Identify root causes of inefficiencies or defects in personal work processes.

SP 3 Maintain Improvement Goals for Personal Work Processes

Each individual establishes and maintains quantitative improvement goals and improvement plans for their personal work process.

This practice allows the individual's workgroup and work unit to understand the likely improvement contribution of each individual so they can set and manage their improvement goals and improvement plans.

Subpractices

1. Review work group, work unit, or organizational goals for process improvement to identify areas of focus related to personal work processes.
2. Prioritize opportunities to improve personal work processes considering personal performance and work group, work unit, or organizational improvement goals.
3. Set measurable goals for improving personal work processes in the areas of highest priority.
4. Review personal improvement goals periodically to ensure they continue to represent the most valuable areas for personal improvement, and revise them as necessary.

SP 4 Implement Improvements to Personal Work Processes

Each individual develops, documents, and incorporates selected improvements into their personal work process to improve their performance and results.

This practice ensures that improvements become an inherent part of the individual's work processes.

Subpractices

1. Identify improvements to personal work processes.
2. Ensure improved personal work processes will be consistent with the work unit's defined processes and the organization's standard product and service processes.
3. Define and represent the improved personal work processes.

4. Plan the actions required for improving personal work processes.
5. Engage in training, practice, or other activities that support improvements to personal work processes.
6. Use mentors or other experts, when available, to guide improvements to personal work processes.
7. Incorporate improvements into personal work activities.
8. Measure the performance and results to track progress against personal improvement goals, and take corrective actions when improvement results deviate significantly from goals.
9. Use measures of improved personal work processes to plan personal work activities and commitments.

SP 5 Coordinate Improvements to Personal Work Processes

Changes made to each individual's personal work processes are coordinated with relevant stakeholders.

This practice ensures that other relevant stakeholders affected by changes in the individual's work processes understand the changes so they can make appropriate adjustments in their processes, activities, and expectations.

Subpractices

1. Coordinate the improvements in personal work processes with the work activities and processes of work groups, work units, and other relevant stakeholders.
2. Resolve conflicts or inefficiencies caused by improvements to personal work processes.
3. Review commitments for personal work results and revise them as necessary based on improved work processes.
4. Recalibrate quantitative predictive models, capability baselines, or other quantitative management techniques based on the results produced by improved work processes.

SP 6 Disseminate Individual Improvement Proposals

Improvements identified by each individual that are also potential improvements to other processes are documented and provided to those responsible for these related processes.

This practice ensures that others in the organization can take advantage of the individual's improvements.

Subpractices

1. Document improvements to personal work processes and quantitative results from their performance.
2. Submit improvement proposals to the organization's standard product and service processes based on a judgment that the improved personal process is relevant to the work of others.
3. Disseminate lessons learned from improving personal work processes to those who might benefit from them.

SP 7 Maintain Data on Workgroup Processes

Each workgroup establishes and maintains quantitative and qualitative descriptions of the performance and results of their processes.

This practice ensures that each workgroup has an objective and quantitative basis for selecting areas of improvement and judging the results of improvements.

Subpractices

1. Analyze workgroup activities in order to describe unique group aspects of performing work processes.

2. Define measures of workgroup activities that are derived from standard measures of work performance.
3. Refine measures of workgroup processes continually to improve the insights derived from their analyses.
4. Evaluate measures of workgroup work processes periodically and make revisions when necessary.

SP 8 Adjust Workgroup Processes

Each workgroup makes adjustments to how their work is performed to account for the skills and other unique characteristics of the workgroup and its members.

This practice ensures that the workgroup utilizes its members to so effectively and efficiently accomplish the assigned work.

Subpractices

1. Analyze how workgroup members perform and integrate their personal work processes to accomplish the workgroup's work.
2. Tailor the workgroup's define processes to incorporate adjustments that best integrate and exploit the workgroup's skills and capabilities.
3. Collect data on the workgroup's performance of their tailored processes.

SP 9 Evaluate Workgroup Processes

Each workgroup evaluates their processes to identify opportunities for improvement.

This practice ensures that improvements can be selected based on maximizing the benefits to the workgroup and other relevant stakeholders.

Subpractices

1. Measure workgroup processes and evaluate workgroup capability and performance.
2. Represent workgroup work processes in a format that supports analysis.
3. Analyze workgroup processes quantitatively to identify areas to improve.

SP 10 Maintain Improvement Goals for Workgroup Processes

Each workgroup establishes and maintains quantitative improvement goals and improvement plans for their processes.

This practice allows the work units and organization to understand the likely improvement contribution of each workgroup so they can set and manage their improvement goals and improvement plans.

Subpractices

1. Review work unit or organizational goals for process improvement to identify areas of focus related to workgroup work processes.
2. Prioritize opportunities to improve workgroup processes considering personal, work unit, and organizational improvement goals.
3. Set measurable goals for improving workgroup processes in the areas of highest priority.
4. Review workgroup improvement goals periodically to ensure they continue to represent the most valuable areas for workgroup improvement, and revise them as necessary.

SP 11 Implement Improvements to Workgroup Processes

Each workgroup develops, documents, and incorporates selected improvements into their processes to improve their performance and results.

This practice ensures that improvements become an inherent part of the workgroup's work processes.

Subpractices

1. Identify improvements to workgroup processes.
2. Ensure improved workgroup processes will be consistent with the work unit's defined processes and the organization's standard product and service processes.
3. Define and represent the improved workgroup processes.
4. Plan the actions required for improving workgroup processes.
5. Engage in training, practice, or other activities that support improvements to workgroup processes.
6. Use mentors or other experts, when available, to guide improvements to workgroup processes.
7. Incorporate improvements into workgroup activities.
8. Measure the performance and results to track progress against workgroup improvement goals, and take corrective actions when improvement results deviate significantly from goals.
9. Use measures of improved workgroup processes to plan workgroup activities and commitments.

SP 12 Coordinate Changes Made to Workgroup Processes

Changes made to each workgroup's work processes are coordinated with relevant stakeholders.

This practice ensures that other relevant stakeholders by changes in the workgroup's work processes understand the changes so they can make appropriate adjustments in their processes, activities, and expectations.

Subpractices

1. Coordinate the improvements in workgroup processes with the work activities and processes of other workgroups, work units, and other relevant stakeholders.
2. Resolve conflicts or inefficiencies caused by improvements to workgroup processes.
3. Review commitments for workgroup results and revise them as necessary based on improved work processes.
4. Recalibrate quantitative predictive models, capability baselines, or other quantitative management techniques based on the results produced by improved workgroup processes.

SP 13 Disseminate Workgroup Improvement Information

Improvements identified by each workgroup that are also potential improvements to other processes are documented and provided to those responsible for these related processes.

This practice ensures that others in the organization can take advantage of the individual's improvements.

Subpractices

1. Document improvements to workgroup processes and quantitative results from their performance.

2. Submit improvement proposals to the organization's standard product and service processes based on a judgment that the improved workgroup process is relevant to the work of other workgroups.
3. Disseminate lessons learned from improving workgroup processes to those who might benefit from them.

14.4.5 Organizational Innovative Improvement (OII)

Maturity Level 5

14.4.5.1 Purpose

Organizational Innovative Improvement formulates a complete improvement solution that, when deployed, will achieve specific assigned quantitative improvement goals.

14.4.5.2 Introductory Notes

Organizational Innovative Improvement involves

- establishing a workgroup responsible for a planned improvement effort
- planning and managing the improvement activities of the improvement workgroup to achieve the assigned improvement goals
- identifying and evaluating candidate improvements to address the goals
- conducting experiments to measure and evaluate the overall improvement solution against the goals, and performing corrective actions
- developing and preparing the complete improvement solution for deployment

The goals and practices of this process area are expressed in context of a single planned improvement effort. The process area applies to each of the organization's planned improvement efforts. This process area is primarily the responsibility of the improvement workgroup established for the planned improvement effort.

An innovation is an improvement that introduces new methods, new practices, or new technology that significantly changes the way work is performed and the results that are achieved. In this process area the term "planned improvement" and the concept of improving to achieve specific goals are used to emphasize that the innovations are a result of specific steps implemented by the organization, and not just chance occurrences.

A planned improvement effort is an effort performed by an improvement workgroup that is charged with the responsibility of identifying, evaluating, and packaging a set of changes that, when deployed, will achieve specific quantitative improvement goals. The assigned goals are levied on the workgroup as requirements. Each improvement effort is planned and managed to achieve these goals.

Executive management sponsors each planned improvement workgroup and negotiates the quantitative improvement goals, plans, and ground rules with the workgroup or unit.

The quantitative improvement goals for a planned improvement effort should be expressed as target values for a unified set of measures. Improvement goals expressed as a single measure (for example, improve productivity by 20 percent) easily lead to dysfunctional behavior — achieving "improvement" in a single dimension while ignoring the other dimensions. When goals are expressed as a unified set of measures, all the critical business dimensions are quantitatively represented. It becomes explicit when it is acceptable to sacrifice improvement in one dimension for improvement in another dimension (for example, increase development costs to reduce the number of defects in the delivered product). Improvement sub-optimization (if it occurs) is visible, and real improvement (if it occurs) is also visible.

A workgroup responsible for a planned improvement effort investigates all relevant aspects of the improvement area, including processes, technologies, training and skills, and facilities. Candidate changes that address the assigned quantitative improvement goals are identified. These candidate changes are piloted, measured, and evaluated. A complete improvement solution that will achieve the assigned goals is developed and prepared for deployment.

A planned improvement effort is typically an implementation of the Plan-Do-Check-Act (PDcA) cycle. Lessons learned are a critical aspect of a planned improvement effort, both in terms of the current improvement effort and for other improvement efforts in the organization.

The reason for this process area at maturity level 5 is that planned improvements provide results that are specifically targeted to the organization's critical business issues, as defined by the quantitative goals. The maturity level 4 analyses provide the measures to show the actual performance and quality data in quantitative terms; this provides the basis for setting quantitative improvement goals and taking measures to judge to what extent these goals are achieved.

14.4.5.3 Specific and Institutionalization Goals

SG 1 Improvements Are Identified

Improvements are identified to address specific quantitative improvement goals assigned to a planned improvement effort.

SG 2 Improvement Solution Is Developed

A complete improvement solution that, when deployed, will achieve specific quantitative improvement goals, is developed and verified.

SG 3 Improvement Solution Is Prepared for Deployment

A complete improvement solution that, when deployed, will achieve specific quantitative improvement goals, is prepared for deployment.

InG Practices Are Institutionalized

The practices for Organizational Innovative Improvement are institutionalized.

Institutionalization includes:

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.4.5.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Improvements Are Identified)	SP 1 (Establish Improvement Workgroup) SP 2 (Plan Improvement Work) SP 3 (Identify Candidate Improvements) SP 4 (Evaluate Candidate Improvements)
SG 2 (Improvement Solution Is Developed)	SP 5 (Prepare Improvement Solution) SP 6 (Perform Corrective Action for Goals) SP 7 (Incorporate Improvement Lessons Learned)
SG 3 (Improvement Solution Is Prepared for Deployment)	SP 8 (Prepare Improvement for Deployment) SP 9 (Communicate Improvement Information)
InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)

The five institutionalization practices, including subpractices and supplementary information, are contained in Part III, Section 6.

14.4.5.5 Specific Practices

SP 1 Establish Improvement Workgroup

An improvement workgroup is established and assigned responsibility and authority for achieving specific quantitative improvement goals.

This practice ensures that achieving the goal is planned and managed as a project with well-defined requirements.

Innovative improvements are typically planned and performed to achieve specific quantitative improvement goals. The improvement work effort is performed by an improvement workgroup that is charged with the responsibility of identifying, evaluating, and packaging a set of changes that, when deployed, will achieve these goals. These improvements may be breakthrough innovations, or they may be significant evolutionary improvements.

Subpractices

1. Obtain appropriate management sponsorship for the improvement effort.
2. Determine the effort, knowledge, and skills needed for the improvement effort.
3. Identify individuals with the appropriate knowledge, skills, and availability to participate in the improvement effort.
4. Arrange for the appropriate assignment of people needed to the improvement effort.
5. Arrange for appropriate skills development activities for the assigned people

SP 2 Plan Improvement Work

A work plan to achieve the assigned quantitative improvement goals is established and maintained by the improvement workgroup or unit.

This practice ensures that the effort and resources required to perform the improvement work are understood and obtained, appropriate commitments are established, and the plans for performing and managing the improvement work are in place.

The improvement effort should be planned in a manner similar to planning a project. The plan should include content that is similar to a project plan.

Subpractices

1. Identify, document, and obtain agreement on the improvement goals and constraints that determine the improvement effort.
2. Assign responsibility and authority for the improvement effort.
3. Arrange for adequate funding and resources for the improvement effort.

Resources include adequate funding, appropriate physical facilities, skilled people, and appropriate tools.

4. Assign responsibility and authority for performing the improvement work.
5. Plan the involvement of relevant stakeholders in the improvement effort.
6. Document the improvement work plan.

A documented improvement work plan typically covers identification of:

- processes and procedures that will be followed
- inputs
- needed resources
- responsibility and authority
- activities and the associated schedule
- dependencies
- outputs
- measures and analyses needed to obtain insight into the activities, progress, performance, and results

7. Review the improvement work plan with relevant stakeholders and obtain their agreement.
8. Place the improvement work plan under version control.
9. Revise the improvement work plan as necessary.

SP 3 Identify Candidate Improvements

Candidate improvements that address the quantitative improvement goals assigned to an improvement workgroup or unit are identified and selected for evaluation.

This practice selects improvements that are likely to help achieve the assigned improvement goals for further evaluation and, depending on the evaluation results, for deployment into practice.

Subpractices

1. Analyze the organization's standard processes to determine areas where improvements would be most helpful.
2. Investigate improvements that could help achieve the applicable improvement goals.

Examples of ways to investigate improvements include:

- systematically maintaining awareness of leading relevant technical work and technology trends
- periodically searching for commercially available process and technology innovations
- systematically reviewing processes and technologies used externally and compare to those used within the organization
- identifying areas where innovations have been used successfully and reviewing data and documentation of experience using them.

3. Perform preliminary cost/benefit analysis for each of the candidate improvements.
4. Determine and document which candidate improvements should undergo formal piloting or evaluation prior to broad-scale deployment.

SP 4 Evaluate Candidate Improvements

Candidate innovative improvements are rigorously evaluated to determine their costs, impacts, and contribution to achieving the quantitative improvement goals assigned to an improvement workgroup.

This practice evaluates candidate innovative improvements to determine if they should be deployed into practice as part of an overall improvement solution.

Subpractices

1. Identify the candidate innovative improvements that are medium or high risk and which need to be carefully evaluated before they are deployed.
2. Determine the approach for evaluating each selected improvement.

Examples of approaches for evaluating innovative improvements include:

- piloting
- prototyping
- formal analysis
- quasi-experimental design

3. Define and document the evaluation plan for the selected improvements.
4. Review the evaluation plan for the selected improvements with relevant stakeholders and obtain their agreement.
5. Evaluate the selected improvements according to the plan.
6. Observe and measure the results of the selected improvements.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

7. Document the results of the improvement evaluations and lessons learned.

8. Use the results and lessons learned of the improvement evaluations to decide on next steps.

The evaluation is typically a Plan-Do-Check Act cycle.

Examples of next steps include:

- terminate the evaluation and discard the candidate improvement
- terminate the evaluation proceed and continue with deploying the improvement
- re-plan and continue the pilot

9. Revise the plan and continue the evaluation of the innovative improvements as appropriate.

SP 5 Prepare Improvement Solution

A set of changes that makes up a complete improvement solution are developed, prepared and evaluated to determine if the solution will achieve the assigned quantitative improvement goals.

This practice ensures that the integrated set of improvements work together appropriately to support achieving the improvement goals.

Subpractices

1. Define and document the plan for developing, preparing and evaluating a complete improvement solution.
2. Review the development, preparation and evaluation plan for the complete improvement solution with relevant stakeholders and obtain their agreement.
3. Evolve a complete improvement solution from the candidate improvements.
4. Continually measure and evaluate the complete improvement solution against the improvement goals applicable to the improvement effort.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

5. Predict the costs, contribution to achieving the quantitative improvement goals, and other impacts and benefits of the complete improvement solution as the solution evolves.
6. Document the results of the evaluations and lessons learned.
7. Identify significant deviations from the improvement plan, expected results, and other issues related to the complete improvement solution.
8. Identify corrective actions, as needed, to address significant deviations.
9. Use the results and lessons learned of the development, preparation and evaluation to decide on next steps.

The evaluation is typically a Plan-Do-Check Act cycle.

Examples of next steps include:

- continue evolving and evaluating the improvement solution
- reject one or more of the candidate improvements
- investigate, evaluate, and incorporate one or more new candidate improvements
- re-plan the improvement effort and continue
- terminate the improvement effort

10. Revise the plan and continue the development, preparation and evaluation of the complete improvement solution as appropriate.

SP 6 Perform Corrective Action for Goals

Corrective actions are performed when the results and predictions of the pilots and other measurements and evaluations activities indicate that the assigned improvement goals will not be achieved or indicate other significant problems.

This practice ensures that appropriate adjustments are made when the results of the pilots, evaluations, and statistical predictions indicate that the quantitative improvement goals will not be achieved or indicate other significant problems.

Subpractices

1. Review proposed corrective actions with relevant stakeholders and obtain their agreement.
2. Perform the identified corrective actions, and track the corrective actions to closure.
3. Document lessons learned from issues and the corrective actions.

SP 7 Incorporate Improvement Lessons Learned

Lessons learned in performing and managing a planned improvement effort are recorded and incorporated in planning and performing this and other process improvement efforts.

This practice ensures that the workgroup or unit performing the improvement effort and the rest of the organization learn from the improvement effort.

Subpractices

1. Capture and document lessons learned from the improvement planning and evaluation activities.
2. Incorporate the lessons learned in the remaining development, preparation, evaluation, and deployment activities for the improvement effort.
3. Disseminate the lessons learned to related improvement efforts and other relevant stakeholders.
4. Revise the lessons learned as necessary.

SP 8 Prepare Improvement Solution for Deployment

The complete improvement solution that will be deployed to achieve the assigned quantitative goals is prepared for deployment.

This practice ensures that the improvement solution, when deployed, will accomplish what is intended and needed, and that it will not unduly disrupt the ongoing operations in the organization.

Subpractices

1. Obtained appropriate authorization before assembling the improvement solution deployment package.
2. Assemble the improvement solution deployment package.

The improvement solution deployment components includes those that are:

- deployed into use
- needed to support the deployment
- needed to support deployed changes

3. Verify the improvement solution deployment package.

Examples of things to verify for a improvement solution deployment package include:

- the correct components are included
- the assembled components are assembled in the correct sequence
- satisfaction of applicable standards and requirements
- licensing and copyright provisions have been properly addressed
- satisfaction of applicable security requirements

4. Document the improvement solution deployment package.
5. Place the improvement solution deployment package and the documentation of the package under configuration management.

Refer to the Organizational Configuration Management process area.

SP 9 Communicate Improvement Information

Information, status, measures, and other results of a planned improvement effort are provided to relevant stakeholders and communicated across the organization.

This practice ensures that the people in the organization have an appropriate understanding of the planned improvement effort's activities and results to help them prepare for the deployment and use of the improvements.

Refer to the Organizational Improvement Planning process area for practices that cover the communication of improvement information.

14.4.6 Organizational Improvement Deployment (OID)

Maturity Level 5

14.4.6.1 Purpose

Organizational Improvement Deployment continually and measurably improves the organization's performance and quality by transitioning improvements into use in a systematic manner.

14.4.6.2 Introductory Notes

Organizational Improvement Deployment involves:

- selecting improvements to be deployed and planning the deployment
- statistically predicting the costs and benefits for the selected improvements
- managing the deployment of the improvements according to the plans
- measuring the costs and benefits and comparing them to the predictions

The goals and practices of this process area are expressed in context of a single improvement deployment effort. The process area applies to each of the organization's improvement deployment efforts. This process area may be the responsibility of the organizational group that is responsible for the organization's standard processes, but deployment of a major change may be assigned to workgroup specifically formed for that purpose.

Organizational improvement deployment deals with deployment across the organization. The improvements that are candidates for organizational improvement include continuous capability improvements, defect and problem prevention improvements, and planned improvements.

Continuous capability improvements and defect and problem prevention improvements are deployed at the local level (that is, where they were initially identified), as described in the Continuous Capability Improvement and Defect and Problem Prevention process areas. This process area addresses the organization-wide deployment of these improvements and with the deployment of planned improvement, which are formulated as described in the Organizational Innovative Improvement process area.

Incremental improvements (usually corresponding to continuous capability improvements and defect and problem prevention improvements) are typically bundled together and deployed on a somewhat regular basis (for example, every 6 months or when a certain number of changes are ready for deployment). The cost and effects of the individual improvements are typically not of particular concern. The primary concern for incremental improvements is the overall performance and quality trends. Projections of the overall effects of the improvements over time are made, and actual results are measured and compared to these projections.

Depending on the cost, expected benefits, expected impacts, risks, etc., changes from each planned improvement effort are often deployed as a separate bundle and not bundled with other changes. A planned improvement usually represents a substantial investment by the organization, and it usually will have a significant effect on how work is done in the organization and on the results of the work.

It is important to be able to recognize obstacles and resistance to the changes so they can be addressed. It is also important to be able to measure the effects of the changes on throughout and following the deployment activities. Sometimes changes that worked well in the evaluation stages do not scale up when fully deployed, or they may work well in one area but not in others. Sometimes the full expected benefits are not realized when deployed, and occasionally there can be a negative effect on performance and quality, and the improvement has to be changed or withdrawn. Quantitative understanding of these changes (the cost and the effects) is essential.

Improvements that will be deployed are selected from candidate improvements based on:

- a quantitative understanding of the organization's current performance and quality, as described in the Organizational Capability and Performance Management process area
- the organization's improvement strategies and quantitative improvement goals, as described in the Organization Improvement Planning process area
- estimates of the improvement in organization's capability resulting from deploying the improvements
- estimates of the cost to implement the improvements and the impacts to the organization
- resources and funding available for the deploying the improvements

Plans for deploying the selected improvements are established, maintained, and used in deploying them. The costs, impacts, and performance and quality changes of the improvements are predicted in quantitative terms.

Process change and process stability are carefully managed. Change that is too great or too rapid can overwhelm the organization, destroying the investment in organizational learning. Rigid stability results in stagnation, and a changing business environment can erode the organization's business position.

Depending on the improvements and the situation, the improvements may be deployed all at once or incrementally (for example, deploying the changes piecemeal or deploying the changes to subsets of the organization incrementally). If deployed incrementally, the deployment is typically an implementation of the Plan-Do-Check-Act (PDCA) cycle. The deployment is monitored against the deployment plans and predictions. Depending on the results achieved in deployment, corrective actions may have to be taken. Measures of the costs, impacts, and benefits of the deployed changes are collected and analyzed during and after the deployment and compared to the predictions.

Lessons learned are captured during each improvement deployment effort, and these lessons are used to improve the deployment process.

The reason for this process area at maturity level 5 is that deployment is the most critical aspect of process improvement. The best improvements will fail in practice if the deployment is done poorly. On the other hand, seemingly beneficial improvement may not scale up to organization-wide use, and careful deployment can recognize this early and perform timely corrective action.

14.4.6.3 Specific and Institutionalization Goals

SG 1 Deployment of Improvements Is Planned

Deployment of improvements that contribute to meeting the organization's quantitative improvement goals is planned, and the results are predicted in quantitative terms.

SG 2 Improvements Are Deployed

Improvements are deployed that continually and measurably improve the organization's performance and quality.

SG 3 Improvement Program Is Improved

Information on the organization's process improvement activities and results is recorded, analyzed, and communicated to improve the organization's improvement program.

InG Practices Are Institutionalized

The practices for Organizational Improvement Deployment are institutionalized.

Institutionalization includes:

- performing the institutionalization practices
- consistently performing the specific practices such that they are persistent and recognized as the way the work is done

For an organization that is implementing maturity level 2 (Managed), the practices are institutionalized as a managed process, as described under Institutionalization Practice 1. For an organization that is implementing maturity level 3 (Standardized), maturity level 4 (Predictable), or maturity level 5 (Innovating), the practices are institutionalized as a tailored, defined process, as described under Institutionalization Practice 1.

14.4.6.4 Practice-to-Goal Relationship Table

Goal	Practice
SG 1 (Deployment of Improvements Is Planned)	SP 1 (Select Improvements for Deployment) SP 2 (Plan Deployment) SP 3 (Predict Improvement Costs and Benefits)
SG 2 (Improvements Are Deployed)	SP 4 (Manage Improvement Deployment) SP 5 (Measure Deployed Improvements) SP 6 (Perform Improvement Deployment Corrective Actions)
SG 3 (Improvement Program Is Improved)	SP 7 (Incorporate Deployment Lessons Learned) SP 8 (Maintain Deployment Records) SP 9 (Communicate Deployment Information)
InG (Practices Are Institutionalized)	InP 1 (Describe the Process) InP 2 (Plan the Work) InP 3 (Provide Knowledge and Skills) InP 4 (Control Performance and Results) InP 5 (Objectively Assure Conformance)

The five institutionalization practices, including subpractices and supplementary information, are contained in Part III, Chapter 13.

14.4.6.5 Specific Practices

SP 1 Select Improvements for Deployment

Improvements that will be deployed across the organization are selected.

This practice ensures that the improvements are selected for deployment based on what is best for the organization.

Selection of improvements for deployment across the organization is based on quantifiable criteria derived from the organization's improvement goals.

Subpractices

1. Review candidate improvement solutions and individual improvements for possible deployment into use.

Refer to the Organizational Innovative Improvement, Continuous Capability Improvement, and Defect and Problem Prevention process areas for sources of improvements.

2. Estimate the contribution of the improvement solutions and individual improvements toward the organization's improvement goals.

Estimates for improvement solutions that are expected to make large contributions toward the organization's improvement goals should be derived for each improvement solution. Estimates for other improvements may be aggregated.

3. Estimate the cost, effort, and schedule for deploying the improvements.
4. Identify potential barriers to deploying the improvements.

Examples of barriers to deploying software process improvements include:

- turf guarding and parochial perspectives
- unclear or weak business rationale
- lack of short-term benefits and visible successes
- lack of a clear picture of what is expected from everyone
- distractions of too many changes at the same time
- lack of involvement and support of those affected

Refer to the Guidelines for Organizational Change Management in Annex A for guidance that may be useful in implementing this practice.

5. Identify the risks associated with deploying the improvements.

Examples of risk factors that affect the deployment of software process improvements include:

- compatibility of the improvement with existing processes, values, and skills of potential users
- complexity of the improvement
- ease of implementing the improvement
- ability to demonstrate the value of the improvement prior to widespread diffusion
- justification for large, up-front investments in areas such as tools and training
- technology drag where the current implementation is used successfully by a large and mature installed base of users

6. Prioritize the candidate improvements for deployment.

Priority is based on an evaluation of the estimated costs and estimated benefits and contribution toward achieving the organization's improvement goals.

7. Select the improvements that will be deployed.

The selection of the improvements is based on their priorities and the available resources.

SP 2 Plan Deployment

Plans for deploying the selected improvements are established and maintained.

This practice ensures that the effort and resources required to perform the deployment are understood and obtained, appropriate commitments are established, and the plans for performing and managing the improvement work are in place, so that the deployment is minimally disruptive to the organization,

Subpractices

1. Identify the improvement solutions and individual improvements that will be included in each deployment.

Each deployment should have a specific scope of improvements defined.

2. Identify special adjustments that must be made for each improvement deployment for different parts of the organization.
3. Plan the coordination of the deployment with other improvement activities and ongoing operations.
4. Determine all the artifacts and activities that need to change for each improvement deployment.

Examples of changes needed for deploying improvements include:

- organizational policies
- work rules
- process descriptions, standards, and procedures
- work environments
- education and training
- skills
- existing commitments
- existing activities
- support to end users

5. Determine and document strategies to address potential barriers for each improvement deployment.

Refer to the Guidelines for Organizational Change Management in Annex A for guidance that may be useful in implementing this practice.

6. Establish measures and improvement goals, based on the organization's improvement goals, for determining the contribution of each improvement deployment.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

Examples of measures for determining the value of a set of deployed improvement include:

- return on investment
- time to recover the cost of the improvement efforts
- measured improvement in the organization's performance
- number and types of risks mitigated by the improvements
- average time required to respond to changes in product and service requirements, market situations, and the business environment

7. Document the plan for each improvement deployment.
8. Review the plan for each improvement deployment with relevant stakeholders and obtain their agreement.
9. Revise the plan for each improvement deployment as necessary.

SP 3 Predict Improvement Costs and Benefits

The costs, contribution to achieving the organization's quantitative improvement goals, and other significant impacts and benefits of the improvements are predicted initially and updated during deployment.

This practice ensures that there is a continually updated objective statistical basis to determine if the deployment, when completed, is likely to achieve the improvement goals and other plan objectives.

Subpractices

1. Predict the costs, contribution to achieving the quantitative improvement goals, and other impacts and benefits of each improvement deployment.
2. Collect and analyze measures of the actual and extrapolated costs, contribution to achieving the quantitative improvement goals, and other impacts and benefits of each improvement deployment.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

3. Compare the actual and projected measures to the predictions.
4. Revise the predictions based on the actual and extrapolated measures.
5. Compare the predictions to the goals and constraints for each improvement deployment.
6. Identify areas where the predictions differ significantly from the goals and constraints for the improvement deployment.
7. Identify corrective actions, as needed, to address issues in the predictions for the improvement deployment.
8. Document the results of the predictions and lessons learned.

SP 4 Manage Improvement Deployment

The deployment of the selected improvements is managed in accordance with the deployment plans.

This practice maintains visibility into the deployment so that deployment issues are recognized early and corrective actions can be performed when appropriate.

Refer to the Guidelines for Organizational Change Management in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Deploy the improvements, according to the deployment plan, in a controlled and disciplined manner.
2. Monitor the deployment of the improvements against the deployment plan.
3. Provide training, mentoring, and consulting, as appropriate, to support the deployment of improvements.
4. Observe, measure, and document the results of each improvement deployment as it is deployed.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

5. Identify significant deviations from the improvement deployment plan, expected results, and other issues.

6. Periodically review the status, issues, measures, other results, outlook, and risks with relevant stakeholders, including executive management, during and following the improvement deployment.
7. Identify corrective actions, as needed, to address issues in the deployment.
8. Document the results of the deployment and lessons learned.

SP 5 Measure Deployed Improvements

The costs, contribution to achieving the organization's quantitative improvement goals, and other significant impacts and benefits of the deployed improvements are measured and compared to the predicted values throughout and following the deployment.

This practice develops or obtains objective statistical information on improvements as they are being deployed into practice that can be used as a basis to determine whether the deployment is proceeding as planned and whether the costs and benefits are as predicted.

Refer to the Guidelines for Measurement and Analysis in Annex A for guidance that may be useful in implementing this practice.

Subpractices

1. Regularly measure the actual and projected cost, effort, and schedule for developing, evaluating, and deploying the improvements.

Estimates for improvement solutions that are expected to make large contributions toward the organization's improvement goals should be derived for each improvement solution. Estimates for other improvements may be aggregated.

2. Regularly measure and evaluate the value of the overall improvement solution against the improvement goals and constraints applicable to each improvement deployment.
3. Regularly observe and measure the results of the improvements after deployment.
4. Measure and analyze the progress toward achieving the organization's improvement goals.
5. Identify any significant issues uncovered in observing and measuring the improvements during and after deployment.
6. Identify corrective actions, as needed, to address any significant issues uncovered in observing and measuring the improvements during and after deployment.
7. Store the measures of the improvement deployment in the organization's measurement repository.

SP 6 Perform Improvement Deployment Corrective Actions

Corrective actions are performed when the results and measurements of the deployed improvements indicate significant deviations from the deployment plans, predicted results, or indicate other significant problems.

This practice ensures that significant issues in the results and measurements of the deployed improvements are recognized and addressed so that the deployment plans, commitments, and predictions can be adjusted to reflect a reasonable plan forward.

Subpractices

1. Review proposed corrective actions with relevant stakeholders and obtain their agreement.

Examples of corrective action include:

- adjust the deployment plans
- adjust the characteristics of the improvement changes
- return the improvement solution to the development and evaluation stages
- terminate the deployment and restore operations to the previous baseline
- re-plan and continue the pilot

2. Perform the identified corrective actions, and track the corrective actions to closure.
3. Document lessons learned from the issues and the corrective actions.

SP 7 Incorporate Deployment Lessons Learned

Lessons learned in deploying improvements are recorded and incorporated in planning, managing, and performing the deployment of this and other improvements.

This practice ensures that the workgroup or unit performing the improvement deployment and the rest of the organization learn from the deployment effort.

Subpractices

1. Capture and document lessons learned from the improvement deployment activities.
2. Incorporate the lessons learned in the remaining deployment activities for the improvement effort.
3. Disseminate the lessons learned to related improvement efforts and other relevant stakeholders.
4. Revise the lessons learned as necessary.

SP 8 Maintain Deployment Records

Records of the organization's improvement deployment activities are established and maintained.

This practice ensures that records are available that accurately describe the organization's deployment activities for consideration in performing future deployment work, and to learn from past experiences.

Subpractices

1. Document information about the initiation, disposition, deployment, and results of the improvements.
2. Produce reports on the improvement deployment activities.
3. Revise the improvement deployment records as necessary.

SP 9 Communicate Deployment Information

Information, status, measures, and other results of the organization's improvement deployment activities are provided to relevant stakeholders and communicated across the organization.

This practice ensures that the people in the organization have an appropriate understanding of the improvement deployment activities and results to help them prepare for the use of the improvements and to maintain buy in for the organization's improvement program.

Refer to the Organizational Improvement Planning process area for practices that cover the communication of improvement information.

Part IV - Annexes

This Part contains the following annexes:

- A - Guidance for Selected Practice Topics
- B - Continuous Representation and Capability Levels
- C - Domain-specific BPMMs
- D - Glossary

Annex A

Guidance for Selected Practice Topics

(informative)

The following section contains general guidelines that can be used to support the implementation of practices of the process areas in Chapter 14. They cover topics that are applicable for many practices. From an improvement and appraisal perspective, these guidelines are considered to be optional for the practices. These guidelines are not rated in the BPMM appraisals. The topics covered are the following:

- Guidelines for Measurement and Analysis (G-MA)
- Guidelines for Work Product Inspection (G-WPI)
- Guidelines for Problem and Decision Resolution (G-PDR)
- Guidelines for Risk Management (G-RM)
- Guidelines for Organizational Change Management (G-OCM)

A.1 Guidelines for Measurement and Analysis (G-MA)

A.1.1 Description

Measurement and Analysis provides quantitative information that can be used in making decisions that affect business outcomes.

Measurement and Analysis involves planning and preparing for measurement, specifying the measures and measurement activities, and performing the measurement activities.

Typically measurement is a capability that is a component of other processes and is not a standalone process (though many of the measurement activities can be separately assigned). Some of the processes that measurement supports include

- Estimating and planning work efforts
- Monitoring and controlling work efforts against plans
- Determining outcomes of work efforts
- Establishing organizational capability baselines
- Benchmarking
- Identifying areas for improvement
- Determining costs and benefits of improvements

Measurement is performed at all levels in an organization — at the individual, workgroup, project, work unit, unit, organization, and enterprise levels.

It is often beneficial to separate responsibility for performing the measurement activities for a work unit or project from the people who use the data in making decisions (that is, assign measurement responsibility to someone other than the manager) — this helps ensure objectivity in decision making. The objectivity and rigor of the measurement activities is typically less at the individual and workgroup levels.

These guidelines are expressed in context of a single measurement or work effort (for example planning and managing the work performed by a work unit or monitoring the performance of all work units in a unit). The guidelines apply to each effort within an organization that needs measurement.

Activities

Activity 1: Maintain Descriptions of Information Needs

Descriptions of the measurement information needs are established and maintained.

1. Identify and document the measurement-related objectives and issues.

The term “objective” is often used as a synonym for goal (that is, a desired or intended result, usually expressed quantitatively). However, in these guidelines the term “objective” is used to mean the intent or purpose of doing measurement. For example, a measurement-related objective might be to understand how satisfied the customers are with the usability of a product.

2. Prioritize the measurement-related objectives and issues and select the ones that will be addressed in the measurement program.
3. Describe and document the measurement information needs for each of the selected objectives and issues.
4. Review the measurement-related objectives and issues and measurement information needs with relevant stakeholders, and obtain their agreement.
5. Place the descriptions of the measurement-related objectives and issues and measurement information needs under change management.

Refer to the Work Unit Change Management process area for practices that cover change management.

6. Revise the descriptions of the measurement-related objectives and issues and measurement information needs as needed.

Activity 2: Maintain Specifications of Measures

Specifications of measures that address the information needs are established and maintained.

1. Identify the measures that address the identified measurement information needs and measurable concept.
2. Specify the operational definition of the measures.

The operational definition of a measure includes:

- the base measures that are obtained by direct measurement
- the derived measures that are the combination of two or more base measures (for example, a ratio) — derived measures are usually more readily interpretable than base measures
- the indicators that are the result of analysis and presented in a form that can be interpreted relative to the information need and measurable concept (for example, a table or graph).

3. Review the definitions of measures with relevant stakeholders, and obtain their agreement.
4. Place the definitions of measures under change management.

Refer to the Work Unit Change Management process area for practices that cover change management.

5. Revise definitions of measures as needed.

Activity 3: Maintain Specifications of Information Package

A description of the measurement information package is established and maintained.

A measurement information package includes the measures, indicators, criteria, and other information that the users of the data need to understand and use the data in making decisions.

1. Specify the analysis that will be performed on the measures.
2. Specify the criteria and other information that will be used to understand and use the measures.
3. Define the format and content of the measurement information package.
4. Document the description of the measurement information package.
5. Review the description of the measurement information package with relevant stakeholders, and obtain their agreement.
6. Place the description of the measurement information package under change management.

Refer to the Work Unit Change Management process area for practices that cover change management.

7. Revise the description of the measurement information package as needed.

Activity 4: Maintain Measurement Plans and Procedures

The measurement plans and procedures are established and maintained.

The measurement plans and procedures should be appropriately integrated with the work processes and activities that the measures support.

1. Identify the sources of the base measures.
2. Define plans and procedures for the collection, verification, and storage of the measures.
3. Define the plans and procedures for calculating derived measures and indicators and assembling the measurement information package.
4. Define the plans and procedures for distributing the measurement information package.
5. Document the measurement plans and procedures.
6. Review the measurement plans and procedures with relevant stakeholders and obtain their agreement.
7. Place the measurement plans and procedures under change management.

Refer to the Work Unit Change Management process area for practices that cover change management.

8. Revise the measurement plans and procedures as needed.

Activity 5: Collected and Verified Measurement Data

The measurement data are collected and verified as defined in the measurement specifications, plans, and procedures.

1. Obtain the specified base measures.
2. Verify the base measures.

Examples of ways to verify measures include:

- ensuring that the data matches the measurement specification
- identifying unusual trends and inconsistencies in the data
- ensuring that the data use the correct measurement units
- ensuring that the values are valid for the type of scale or format being used

3. Generate the specified derived measures.
4. Generate the specified indicators.
5. Review the base measures, derived measures, and indicators and identify any issues with the data.
6. Perform appropriate corrective actions for identified data issues and track to closure.
7. Place the base measures, derived measures, and indicators under change management.

Refer to the Work Unit Change Management process area for practices that cover change management.

Activity 6: Assemble Information Package

The measurement data are assembled into a measurement information package as defined in the measurement plans and procedures.

Activity 7: Analyze the Measurement Data

The measurement data are analyzed and used for making decisions as defined in the measurement specifications, plans, and procedures.

Examples of the types of analyses that are performed include:

- estimation to support planning
- analyzing feasibility of plans and alternatives
- monitoring work performance
- monitoring performance of products

1. Analyze the measurement information package.
2. Identify and document any actual or potential issues based on the analysis procedures and criteria.

3. Define and document recommendation for the identified issues.
4. Review the identified issues and recommendations with relevant stakeholders and obtain their agreement.
5. Document the results of the measurement analysis, the identified issues and the recommendations.
6. Provide the results of the measurement analysis, the identified issues and the recommendations to relevant stakeholders.
7. Refine and document the analysis procedures and criteria for future reviews as appropriate.
8. Place the results of the measurement analysis, the identified issues and the recommendations under change management.

Refer to the Work Unit Change Management process area for practices that cover change management.

A.2 Guidelines for Work Product Inspection (G-WPI)

A.2.1 Description

Work Product Inspection identifies and removes defects from work products in the phase the work product is developed and prevents defects from escaping to the next phases in the life cycle.

Work Product Inspection involves a methodical examination of a work product that has been developed as part of a work effort.

The people inspecting a work product are typically peers of the work product developer and other people who are knowledgeable and concerned about the work product. Generally managers of the developer and other inspection participants should not participate in the inspection. The number of people inspecting a work product is usually small — typically four to eight.

There are several methods that can be used for a work product inspection. Some of these methods include

- Formal inspections with explicitly defined roles and explicit entry and exit criteria
- Structured walkthroughs of the work product conducted by the developer or other knowledgeable person

Work product inspections are performed on individual work products as they are developed. The inspections are typically performed on key work products such as plans, process descriptions, training materials, requirements specification, design documents, developed product components, test and evaluation artifacts, product release documents, and product operations and support documents. The manager of a work effort determines which work products will undergo inspection.

These guidelines are expressed in context of an inspection of a single work product. The guidelines apply to each work product that is designated to be inspected.

Activities

Activity 1: Prepare Work Product for Inspection

A work product is prepared for inspection.

1. Determine the scope of the inspection.

Some inspections will only address a portion of the work product or limited aspects of the work product such as conformance to standards.

2. Review the work product to determine if it satisfies the inspection entry criteria prior to distribution, and identify any issues.
3. Perform corrective actions to address any issues with the work product, and track to closure.

Activity 2: Plan the Inspection

The inspection of a work product is planned.

1. Determine the type of inspection that will be conducted on the work product.
2. Define the entry and exit criteria for the inspection and the criteria for requiring that a re-inspection be performed.
3. Define the requirements for collecting, analyzing, and reporting measures and data for the inspection.
4. Obtain commitments from the people who will participate in the inspection, especially key inspectors and the people needed to perform the essential roles in the inspection.
5. Prepare any support materials that will be used during the inspection (for example, checklists, defect and issue recording forms, and inspection criteria)
6. Develop a detailed schedule for the inspection, including the dates for training, distribution of materials, and the inspection meeting.
7. Assign roles for the inspection as appropriate (for example, moderator and recorder).

Activity 3: Train Inspection Participants

The participants of a work product inspection receive the training they need to perform their inspection roles.

1. Determine the role that each individual will perform in the inspection.
2. Determine the knowledge and skills that each individual needs for their role.
3. Determine the knowledge and skills gaps for each individual.
4. Address the knowledge and skills gaps through appropriate activities such as training, mentoring, and on-the-job training.

Activity 4: Prepare for the Inspection Event

The participants of a work product inspection prepare for their roles.

1. Distribute the plan and schedule for the inspection, including the assignments and the dates for training, distribution of materials, and the inspection meeting.
2. Distribute the work product that will be inspected and the support materials that will be used during the inspection to the participants.
3. Confirm that the participants perform the necessary preparation (for example, reviewing the work product and documenting defects and issues) prior to the inspection event, and identify any issues.

Typically the inspection event is a meeting, but there are other mechanisms that can be used such as computer-assisted collaboration.

4. Perform corrective actions to address any issues with the preparation for the inspection, and track to closure.

Activity 5: Perform the Work Product Inspection

The inspection of a work product is performed.

1. Determine if the entry criteria for the inspection have been satisfied, and reschedule the inspection if the criteria have not been satisfied.
2. Perform the inspection according to the defined process and procedures, with the participants performing their assigned roles.
3. Identify and document defects and other issues in the work product.
4. Document the action items from the inspection.
5. Collect the measures and data for the inspection.
6. Determine whether a re-inspection of the work product is needed, based on the criteria for re-inspection.
7. Confirm that the exit criteria for the inspection are satisfied before concluding the inspection.

Activity 6: Address Inspection Action Items

The action items from a work product inspection are addressed.

1. Provide the action items from the inspection to those individuals who are responsible for addressing them.
2. Develop a plan for addressing the action items.
3. Review the plan for addressing the action items with relevant stakeholders and obtain their agreement.
4. Implement the action items from the inspection.
5. Track the action items to closure.
6. Verify that the action items have been appropriately addressed.

Activity 7: Use Inspection Measures and Data

Measures and data on the preparation, conduct, and results of a work product inspection are stored, analyzed, and used.

Refer to the Guidelines for Measurement and Analysis in Appendix C for guidance that may be useful in implementing this activity.

1. Store the measures and data related to the preparation, conduct, and results of the inspection for future use, including for use in other inspections and use at the organization level.
2. Protect the inspection measures and data to ensure they are not used inappropriately.

What constitutes inappropriate use of measures and data is largely determined by the culture of the organization. The primary concern is that if the measures and data are used inappropriately to evaluate the performance of individuals or to grant awards, this may cause “measurement dysfunction” and destroy the usefulness of the measures and data.

3. Analyze the inspection measures and data to obtain objective information that can be used in making informed decisions, and performing appropriate corrective actions.
4. Communicate the results of measurement and analysis activities to relevant stakeholders.

Activity 8: Plan and Perform a Re-inspection

A re-inspection of a work product is planned and performed if needed.

1. Determine the reasons a re-inspection is required and what actions need to be performed before the re-inspection can occur.
2. Develop a plan for addressing the action items that need to be performed to prepare for the re-inspection.
3. Implement the action items to prepare for the re-inspection.
4. Track the action items to closure.
5. Verify that the action items have been appropriately addressed.
6. Define the scope of the re-inspection if it is less than a complete re-inspection.
7. Plan, prepare, and conduct a re-inspection of the work product.

The re-inspection is performed as described in Activities 1 through 8.

A.2.2 Guidelines for Problem and Decision Resolution (G-PDR)

Description

Problem and Decision Resolution identifies and solves critical problems using rigorous procedures and criteria.

Problem and Decision Resolution involves determining which problems and decisions are critical enough to warrant using rigorous procedures and criteria, selecting a solution from a set of defined alternatives, and implementing the solution. Not all problems and decisions require the use of a rigorous method.

Although the term “problem and decision resolution” is used in these guidelines, other terms are often used for this activity. Some of these other terms include “problem solving,” “decision making,” “decision analysis and resolution,” and “issue resolution.” All of these are covered by these guidelines.

Problem and Decision Resolution can be used to support various types of work efforts, including the following

- Determining product and service offerings to include in an organization’s portfolio
- Selecting features for a product or service
- Selecting suppliers
- Selecting a product or service for purchase

- Determining a design solution for a system or component
- Defining a methodology for performing work
- Addressing a business quality or performance problem
- Defining mitigation actions for a risk
- Selecting process improvements

A rigorous problem and decision resolution procedure improves the objectivity in identifying and selecting solutions.

Problem and decision resolution (using rigorous procedures and criteria) may be performed at any level in an organization — at the individual, workgroup, work unit, project, unit, organization, and enterprise levels. It is particularly relevant to workgroups, work units, and projects.

These guidelines are expressed in context of a single problem or decision. The guidelines apply to each problem and decision that is critical enough to warrant using rigorous procedures and criteria.

Activities

Activity 1: Define the Problem

The description of the problem or decision that needs to be resolved is established and maintained.

1. Identify the problem or decision to be resolved.

Examples of ways to identify a problem or decision to be solved include:

- a methodical review of an area of concern
- encountering a problem or decision in routine activities
- tradeoffs and decisions inherent in performing work (for example, design decisions)
- a problem or decision presented by another person or organization such as a customer, supplier or management

2. Document the critical characteristics of the problem.
3. Determine if the problem or decision requires the use of a rigorous problem and decision resolution method.
4. Review the problem or decision description with relevant stakeholders to ensure a common understanding.
5. Place the problem or decision description under change management.

Refer to the Work Unit Change Management process area for practices that cover change management.

6. Revise the problem or decision description as needed.

Activity 2: Analyze the Problem

The problem or decision that needs to be resolved is analyzed to understand the characteristic of the problem or decision and its causes and effects.

Activity 3: Maintain the Solution Approach

The guidelines, procedures, and criteria for selecting a solution for a problem or decision are established and maintained.

1. Identify who will participate in solving the problem or decision and their roles.
2. Define and document the guidelines and procedures for solving the problem.
3. Define and document the criteria that will be used to evaluate the alternative solutions.
4. Define and document the relative importance of the criteria that will be used to evaluate the alternative solutions.
5. Review the problem and decision resolution approach and criteria with relevant stakeholders and obtain their agreement.
6. Place the problem and decision resolution approach and criteria under change management.

Refer to the Work Unit Change Management process area for practices that cover change management.

7. Revise the problem and decision resolution approach and criteria as needed.

Activity 4: Define Alternative Solutions

Alternative solutions that would potentially resolve the problem or decision are identified.

1. Solicit candidate solutions from relevant stakeholders involved in the analysis and others who are knowledgeable.
2. Assign workgroups and individuals to investigate and propose candidate solutions as appropriate.
3. Document the identified candidate solutions.
4. Review and revise the identified candidate solutions to define the set of alternative solutions that will be evaluated.

If the number of candidate solutions is excessively large, the number may have to be reduced. Some candidate solutions may be readily eliminated. Aspects of several candidate solutions may be combinable to generate other alternative solutions.

5. Review the set of alternative solutions with relevant stakeholders and obtain their agreement.
6. Place the set of alternative solutions under change management.

Refer to the Work Unit Change Management process area for practices that cover change management.

Activity 5: Select the Problem Solution

The solution to address the problem is selected based on evaluating the alternative solutions according to the defined guidelines, procedures, and criteria.

1. Rate each of the alternative solutions using the guidelines, procedures, and criteria.
2. Determine if any of the highly ranked solutions provide an adequate solution.
3. Repeat the problem and decision resolution activities if no adequate solution has been identified.
4. Select the solution to address the problem.
5. Document the solution evaluation.
6. Document the selected solution and the rationale for the selection.

7. Review the solution evaluation, the selected solution, and the rationale for the selection with relevant stakeholders and obtain their agreement.
8. Archive the solution evaluation, the selected solution, and the rationale for the selection with relevant stakeholders and obtain their agreement.

Activity 6: Plan Actions to Implement Solution

Action plans to implement the selected solution to the problem or decision are established and maintained.

1. Identify actions to address the identified solution.
2. Assign responsibility and authority to implement the actions.
3. Review and obtain agreement on the action plans with relevant stakeholders.
4. Place the action plans under change management.

Refer to the Work Unit Change Management process area for practices that cover change management.

5. Revise the action plans as necessary.

Activity 7: Implement Solution Actions

The action plans to implement the selected solution to the problem or decision are implemented.

1. Review the action plans with the individuals and workgroups responsible for implementing the plans and obtain their agreement.
2. Implement the action plans.
3. Conduct regular reviews of the progress of the actions with relevant stakeholders.
4. Evaluate the results of the implemented actions.
5. Measure and analyze the results of the implemented actions.
6. Inform relevant stakeholders of the plans, status, activities, and results related to the implementation of the action plans.

A.2.3 Guidelines for Risk Management (G-RM)

Description

Risk Management identifies potential problems that could have a critical impact on a business product, service, or activity, and plans and performs actions to prevent or mitigate the impacts.

Risk management involves identifying risks, assessing the risks, determining the risks that need to be managed, planning how to handle these risks, and handling the risks according to the plans.

Risk management is an integral part of managing any business or work effort. Risk management is performed on a continuous or regular basis during all phases of the work since the circumstances surrounding the risks change continuously. The risks to be managed and the plans for handling the risks need to be adjusted based on the changing circumstances.

For most organizations, risks can be categorized as:

- **Internal work risk:** These risks are associated with the ability of performing the work. These risks usually are related to the scope of the work, resources, schedule, and quality of the results.
- **Business risk:** These risks are associated with business losses or errors that inherent in performing the business activities. These risks can be related to many business aspects including financial, legal, environmental, and safety.

Risk management is performed at various levels in an organization — at the project, work unit, unit, organization, and enterprise levels. Some risks are managed hierarchically at multiple levels of an organization or enterprise. For example, a risk that jeopardizes a project’s ability to meet schedule commitments may be dependent on the organization’s ability to obtain and provide critical resources.

It is often beneficial to assign a person other than the manager to perform the role of “risk manager” — this helps ensure objectivity in identifying and quantifying the likelihood and potential impact of risks.

These guidelines are expressed in context of a single risk management program (for example risk management for a project). The guidelines apply to each risk management program within an organization that needs risk management.

Activities

Activity 1: Establish Risk Management Strategy

The strategies for risk management are established and maintained.

1. Specify the scope of the risk management effort.
2. Identify possible sources of risks.
3. Establish the procedures, methods, and tools used for the risk management activities.
4. Define and document the parameters and criteria used to analyze categorize, and prioritize risks.
5. Identify and specify the measures used to manage risks
6. Define and document the parameters and criteria that are used to monitor and handle risks.
7. Specify the schedule of activities for monitoring and reassessing risks.

Activity 2: Identify Risks

Risks that could jeopardize the work or other business aspects are identified and documented.

1. Identify and document the sources of the risks.
2. Identify and document the risk categories used to group the risks.
3. Identify the risks associated with all aspects of the scope of risk management effort including the context, conditions, and potential consequences of risk occurrence.

Examples of methods for identifying risks includes:

- examining the elements of the work breakdown structure
- using a risk taxonomy
- interviewing experts familiar with the work and business aspects
- reviewing risk management activities and results from similar work and business
- reviewing key documents related to the work and business aspects (for example, requirements, plans, implementation documents, and operational documents)

4. Determine the interrelationships among identified risks.
5. Document the identified risks in a concise statement that includes the context, conditions, and consequences of risk occurrence.
6. Identify the relevant stakeholders associated with each risk.

Activity 3: Assess Risks

The list of risks that will be actively managed are established and maintained.

1. Determine the probability of occurrence for each risk.
2. Determine the likely consequences for each risk.

The likely consequences for a risk are often impossible to determine with high confidence and is often determined by some consensus method. The likely consequences for a risk can be stated in terms such as high, medium, and low or on a scale of 1 to 5 or 1 to 10.

3. Evaluate the identified risks using the defined risk parameters.
4. Categorize and group risks according to the defined risk categories.
5. Prioritize the risks.
6. Identify and document the risks that will be actively managed.

Activity 4: Maintain Risk Plans

Plans to manage the selected high-priority risks are established and maintained.

1. Determine the interrelationships among the selected risks.
2. Determine the mitigation plans for the selected risks.

Examples of risk mitigation options include:

- risk monitoring: Watching and periodically reevaluating the risk for changes to the assigned risk parameters
- risk acceptance: Acceptance of the consequences of the risk without taking any action
- risk avoidance: elimination of the causes and/or consequence of the risk
- risk reduction: implementation of controls that minimize the probability of occurrence and/or the adverse impact of a risk occurrence
- risk transfer: transfer all or part of the risk so that the risk is owned by some other organization (for example, purchasing insurance or outsourcing the area of concern and ownership of the risks)

3. Assess the cost of the mitigation plans for each selected risk against the expected benefits.
4. Select and define risk measures to monitor the status of the risks.
5. Define the criteria that will be used to trigger the primary mitigation plan activities.
6. Assign responsibility for managing each risk.
7. Document the plans for managing the risks.

8. Review the plans for managing the risks with relevant stakeholders, and obtain their agreement.
9. Place the plans for managing the risks under change management.

Refer to the Work Unit Change Management process area for practices that cover change management.

10. Revise the plans for managing the risks as needed.

Activity 6: Handle Risks

Risk management actions for the selected risks are performed according to the plans.

1. Monitor the status of each risk.
2. Perform the planned risk-handling actions when the defined criteria for the actions are satisfied and track the actions to closure.
3. Update the risk information to reflect actions taken and other changes.

Examples of risk information to be updated include:

- actions performed and results
- the context, conditions, and potential consequences of risk occurrence
- the probability of occurrence for the risk
- the likely consequences for the risk

4. Update the plans for managing the risks.

Activity 7: Communicate Risk Information

Status and information on the marketing risks for a product and service offering and on the preventive and mitigation plans and actions are communicated to relevant stakeholders.

A.2.4 Guidelines for Organizational Change Management (G-OCM)

Description

Organizational Change Management plans and manages significant organizational changes using defined procedures and criteria with the objective of improving the collective performance and results of the organization.

Organizational Change Management involves determining the changes that will be implemented, establishing management sponsorship for the changes, planning the deployment of the changes, deploying the changes, measuring and evaluating the results of the changes, and learning from the changes and the change effort.

Organizational changes are driven by any of a number of reasons including competitive pressures, organization restructuring, business strategies, statutory changes, technology changes, and dissatisfaction with the way things are done in the organization (that is, the need for improved processes). Every organization experiences some pressures to change.

An organizational change can be a single focused change such as converting to a new standard tool set. An organization change can also be a multi-year continuing effort such as a continuous process improvement effort. In the latter case, the change is typically segmented into multiple improvement projects, with requirements, goals, and plans for each project defined in context of the overall change program.

Although a change may be focused on a certain aspect of an organization (for example, implementing a new technology) organization change management is concerned with addressing all the dimensions of the change; these may include dimensions such as process descriptions, technology, staffing, training, organizational structures, client and supplier relationships, employee reward structures, and organizational culture — the whole change.

These guidelines are expressed in context of a single organizational change. The guidelines apply to each organizational change that is significant enough to warrant using rigorous procedures and criteria.

Activities

Activity 1: Maintain Sponsorship for the Change Program

Executive sponsorship for the organizational change program is established and maintained.

1. Identify the members of the initial sponsorship team with sufficient authority, influence, and commitment to effectively lead the change effort.
2. Obtain agreement and commitment from the members for the sponsorship team for the full change effort.
3. Establish the mechanisms to grow the initial sponsorship team in size and influence into a powerful guiding coalition.
4. Establish mechanisms to encourage the sponsorship team to work together in leading the effort.

Activity 2: Maintain the Vision, Strategies, and Goals for the Change

The description of the goals and strategies for the organizational change are established and maintained by executive management.

1. Create a vision to direct the change effort.
2. Develop strategies for achieving the vision for the change effort.
3. Identify the organizational change goals that will support the achievement of the vision and strategies.
4. Communicate and allocate, as appropriate, the organizational change goals to the units in the organization.
5. Review the vision, strategies, and goals for the change effort with the sponsorship team and obtain their agreement.
6. Review and prioritize strategies and goals with affected stakeholders.
7. Communicate on a regular basis the vision the change effort to the managers and staff of the organization.
8. Revise the vision, strategies and goals for the change effort as needed.

Activity 3: Maintain Justification for the Change

Business reasons justifying the organizational change are established and maintained by executive management.

1. Examine the markets of concern to the organization, the competitive environment, and the organization's performance to identify and discuss crises, potential crises, and major opportunities.
2. Establish and maintain an appropriate sense of urgency and support for the change effort based on the identified and discussed crises and opportunities.
3. Identify the units affected by the crises and opportunities.
4. Identify the business problems, challenges, and issues that must be addressed.
5. Estimate the financial or other benefits compared to the cost and other impacts of the change effort.

6. Develop and document the business reasons that justify the investment in the change effort.

Activity 4: Maintain the Solution Description

The description of the solution for the organizational change is established and maintained.

1. Identify the areas of improvement and the full set of likely solution components, and their requirements that will be needed to achieve the goals, strategies, and vision of the change effort.
2. Review the full scope and requirements of the solution description with the sponsorship team and obtain their agreement.
3. Place the solution description under change management.

Refer to the Work Unit Change Management process area for practices that cover change management.

4. Revise the solution description as needed.

Activity 5: Maintain the Change Plan

Plans for developing and deploying the organizational change are established and maintained.

1. Identify the short, intermediate, and long term goals, solutions, and change efforts, including the quick wins and the most visible performance improvements.
2. Establish plans to maximize the quick delivery of the short term goals and visible performance improvements, while still realizing the achievement of intermediate and long term goals within agreed realistic time frames.
3. Review the plans with the sponsorship team and other relevant stakeholders and obtain their agreement.
4. Revise the change plan as needed.

Activity 6: Develop the Change Solution

The plans for developing and deploying the organizational change solution are implemented.

Activity 7: Deploy the Change Solution

The organizational change solution is deployed according to the plans.

1. Identify all real and potential obstacles to the change effort
2. Plan and act on effectively removing, preventing, or minimizing the effects of the identified obstacles.
3. Hire, promote, and develop employees who are able to implement the vision (through the solution).
4. Empower all others (through knowledge, training, responsibility, structures, directives, etc.) to act on the solution as it is deployed.
5. Deploy the solution according to the plans.

Activity 8: Monitor the Change Program

The organizational change activities and results are monitored against the strategies, goals, and plans, and appropriate corrective actions are performed.

1. Track all parts of the change effort closely, particularly the achievement of those initiatives identified to achieve visible short term performance improvement.
2. Recognize and reward employees involved in the achievement of the improvements resulting from the change effort.

3. Use any increases in credibility to change the systems, structures and policies that don't fit the vision.
4. Identify issues, new obstacles, and organized resistance and adjust the plans or take other corrective actions to counter the identified issues.

Activity 9: Incorporate Improvement Lessons Learned

Lessons learned in planning, developing, and deploying the organizational change are recorded and incorporated into the organizational change activities as appropriate.

1. Document and store the lessons learned.
2. Incorporate the lessons learned into the plans and processes of the change effort.
3. Communicate the lessons learned to all involved in the change effort so that they can each make use of them.
4. Change systems or structures that seriously undermine the vision and solution.

Activity 10: Communicate Improvement Information

Information, status, measures, and other results of the organizational change are provided to those affected and communicated across the organization.

1. Re-invigorate the process with new projects, themes, and change agents.
2. Communicate all visible successes to relevant stakeholders.
3. Articulate the connections between the new behaviors and corporate success.
4. Develop the means to ensure leadership development and succession, so that new leaders are fully inculcated with the new approach.
5. Teach the new behaviors by the example of the sponsorship team.

Annex B

Continuous Representation and Capability Levels

(informative)

There are two primary maturity model representations — the “staged representation” and the “continuous representation.” The original process maturity framework [Humphrey-1987], the CMM for Software [Weber-1991, Paulk-1995], the People CMM [Curtis-2001], and the Software Acquisition [Ferguson-1996] all used the staged representation. The various systems engineering maturity models used the continuous representation. The CMMI models [SEI-2001a, SEI-2001b] are available in both the staged representation and continuous representation.

The continuous versus staged representation debate is long and complicated. This section is not intended to fully debate the relative merits of the two representations, but rather to describe how BPMM can provide the same features of the continuous representation. (BPMM uses the staged representation exclusively).

However, it is relevant to note that when SEI last reported the use of the two CMMI representations in August 2004 [SEI-2004], only about 23 percent of the organizations used the continuous representation.¹

The authors of maturity models of the “continuous representation,” such as CMMI continuous, often claim that the continuous representation provides advantages that the “staged representation” cannot easily provide. The primary advantages claimed for the continuous representation are

1. The continuous representation allows the organization to select the order of improvements that best meets the organization’s business goals and mitigates the organization’s areas of risk
2. The continuous representation allows the organization to improve process areas at different rates (that is, achieve different capability levels for different process areas)

On the surface this seems desirable. However, these claims are erroneous because

1. An organization can select the order of improvements (that is, select process areas) using either the staged representation or the continuous representation — there is no advantage of one representation over the other in this regard.
2. The capability levels of the continuous representation do not reflect improvements to the specific practices of the process areas. They do not reflect an improvement to the way the work is performed. They merely and primarily reflect the improvement (addition) of institutionalization (or generic) practices for each higher capability level.

Crosby’s maturity grid [Crosby-1979] was a continuous representation that attempted to depict processes that improved as they progressed up the grid. The five stages that Crosby defined for a process were (1) uncertainty, (2) awakening, (3) enlightenment, (4) wisdom, and (5) certainty. This is in contrast to the CMMI capability levels which just deal with increased institutionalization.

1. Subsequent SEI Process Maturity Profiles for CMMI have not updated these numbers.

Returning to the question of capability levels of a continuous maturity model, it is claimed that process areas can be improved from capability levels 0 to 1 to 2 to 3 (although some process improvement experts dispute this). From an improvement perspective, there are more serious issues with the continuous representation and capability levels for capability levels 4 and 5, as even the authors admit:

... a question that is often asked is “why don’t target profiles 4 and 5 extend into the capability level and capability level 5 columns?” The maturity level 4 process areas describe a selection of the subprocesses to be stabilized based, in part, on the quality and process-performance objectives of the organization and projects. Not every process area will be addressed in the selection and the model does not presume in advance which process areas might be addressed in the selection. The achievement of capability level 4 for process areas cannot be predetermined because the choices will be dependent upon the selections made by the organization in its implementation of the maturity level 4 process areas. Thus, the table above does not show target profile 4 extending into the capability level 4 column although some process areas will have achieved capability level 4. The situation for maturity level 5 and target profile 5 is similar. [SEI-2001b].

For organizations that want to plan to achieve or appraise the capability levels of process areas in the manner of the continuous representation, the BPMM, as a staged representation, can readily provide that feature. For a BPMM process area, the “capability level” for individual process areas can be determined as follows:

- For a process area to be at capability level 1, all the Specific Goals are satisfied and the Institutionalization Goal is not satisfied.
- For a process area to be at capability level 2, all the Specific Goals are satisfied and the Institutionalization Goal is satisfied. Institutionalization Practice 1 (Describe the Process) is implemented as a managed process and not as a defined process (that is, it is defined at the local unit level and may be different from one unit to another).
- For a process area to be at capability level 3, all the Specific Goals are satisfied and the Institutionalization Goal is satisfied. In addition, Institutionalization Practice 1 (Describe the Process) is implemented as a defined process (that is, it is tailored from a standard process and satisfies the other attributes of a defined process).
- For a process area to be at capability level 4 or 5, the capability level cannot be planned and achieved a priori, but it can only be determined after the maturity level 4 or maturity level 5 process areas are implemented and satisfied; the capability levels of the individual process areas are then determined in the same manner as described for CMMI (see above).

Annex C

Domain-specific BPMMs

(informative)

C.1 The BPMM as Basis for Domain BPMMs

Although the BPMM provides a model that is applicable to a broad range of domains, in some instances users might want to have a Domain BPMM that specifically addresses the unique aspects of the domain processes and states the process areas in the domain terminology. The need for this may be driven by the special characteristics of the domain, because a more detailed or domain-specific description is needed, or because the domain is a critical core competency for an organization. For example, at one level of abstraction the BPMM covers the practices for the finance domain, but an organization may want a model that provides a more detailed, specific description of the finance practices. For these cases, the BPMMs for specific domains can be (and have been) developed.

There is still considerable commonality between the BPMM and a Domain BPMM. This commonality can be exploited in developing the BPMMs for these different domains. As shown in Table 11.1, the core of the BPMM consists of process areas and other model components that are common across domains. Using these components along with a set of design principles, rationale, and construction principles and guidelines a Domain BPMM can be constructed.

These core components include everything in the BPMM except the six Product and Service process areas:

- Product and Service Business Management
- Product and Service Work Management
- Product and Service Preparation
- Product and Service Deployment
- Product and Service Operations
- Product and Service Support

These process areas can be supplemented with or replaced by domain-specific process areas.

C.2 Content of Domain BPMMs

When the BPMM is extended to cover a specific domain, it is referred to as the “Business Process Maturity Model for [Domain].” It is abbreviated as “BPMM for [Domain]” or “BPMM-[Domain]” or “[Domain] BPMM” – for example, “BPMM for Finance,” or “BPMM-Finance,” or “Finance BPMM.”

A Domain BPMM is constructed from the core components. These core components are used without modification in a Domain BPMM and constitute approximately 80 percent of a Domain BPMM. A Domain BPMM is created by adding domain-specific components to the BPMM core components. These domain-specific components include:

- Domain process areas – usually four to six
- A Foreword for the Domain BPMM
- A section describing the domain and the Domain BPMM (this section is added to Chapter 14 of this document)

- A Change History for the Domain BPMM
- Identification and definition of domain glossary terms, acronyms, and references – to be added to Chapter 3, 4, and 5 of the BPMM

The domain process areas most commonly replace the six Product and Service process areas that are included in the BPMM, though in some cases the six Product and Service process areas are retained and the domain process areas are added.

C.3 Constructing Domain BPMMs

To construct a Domain BPMM, the domain-specific process areas, along with supporting materials such as domain description and glossary terms, are developed and added to the BPMM. All of the domain-specific process areas reside at maturity level 3. They will be part of the Domain Work Management or Domain Work Performance Process Area Threads.

Domain process areas include the essential domain-specific activities or best practices required to perform the organization's work within a domain of the business processes. Some examples of domain process areas include the following:

- In the CMM for Software, the two domain process areas are Integrated Software Management and Software Product Engineering.
- In CMMI (for Software and Systems Engineering), the seven domain process areas are Integrated Project Management, Risk Management, Requirements Development, Technical Solution, Product Integration, Verification, and Validation.
- In the BPMM for Service Operations, the five domain process areas are Integrated Service Management, Service Development, Service Deployment, Service Delivery, and Service Maintenance and Support.
- In the BPMM for Marketing, the five domain process areas are Integrated Marketing Management, Market Offering Business Management, Market Opportunity Analysis, Market Offering Preparation, and Market Offering Introduction.

Domain process areas are developed based on information gathered from interviews with domain experts and management, reviews of process and business documentation, and other appropriate sources. Domain process areas are constructed, in consultation with the domain experts, by analyzing the gathered information to identify (1) the essential domain processes that must be performed and improved, and (2) the management activities required to control and support these domain processes.¹

Because the core of the BPMM makes up the major part of the Domain BPMMs (approximately 80 percent) and each of the various Domain BPMMs are constructed in the same manner, the appraisal method and artifacts, the training materials, and the improvement approaches are similarly standardized and reusable.

The knowledge and expertise used in developing a BPMM are basically of two types:

- Model development expertise acquired from developing and using the CMMs, BPMMs, and other maturity models

Domain knowledge of experts in the domain for which a BPMM is being developed (for example, banking or marketing).

1. Each Domain BPMM will include a process area at maturity level 3 that address the overall management of the work of the domain. This includes establishing and maintaining the defined process for the work and planning and managing the work according to the defined process.

Annex D

Glossary

(informative)

D.1 Glossary of Terms

A

activity	An element of work performed as part of a planned effort. An activity is often the lowest level work element in a work breakdown structure. It normally has an expected duration, an expected cost, and expected resource requirements, [Derived from PMI-2000].
alternative practice	A practice that is a substitute for one or more of the CMM practices; the alternative practice achieves an equivalent effect toward satisfying the goal associated with CMM practices. Alternative practices are not necessarily one-for-one replacements for the CMM practices.
appraisal	An examination of one or more processes by a trained team of professionals using an appraisal reference model (for example, a CMM) as the basis for determining strengths and weaknesses [SEI-2001].
archive	The secure storage and cataloging of data and information such that they can be retrieved.
attribute	A property or characteristic of an entity that can be assigned a quantitative value or described qualitatively. [Derived from ISO-2000].
assignable cause of process variation	Variation in the process performance that is exceptional and for which the cause can be determined.

B

baseline	(See <i>CM product baseline</i> .)
base attribute	A single property or characteristic of an entity that can be assigned a quantitative value. Base attributes can be combined to estimate effort, cost, schedule, throughput, demand/production schedule, and other planning parameters.
base measure	A property or characteristic of an entity, object, or attribute and the method for assigning a quantitative value to it.
benchmarking	<p>A process in which an organization quantitatively measures its performance and results, compares it against that of best-in-class organizations, determines how those organizations achieved their performance levels, and uses the information to guide its own improvement efforts.</p> <p>The subjects that can be benchmarked include strategies, operations, processes, and procedures [Weber-2002a].</p>

branding	The establishment of a long-term image of a product and service offering, as viewed from outside the organization (that is, by buyers). {Note: This term is only used in the BPMM for Marketing.}
business continuity	The capability of a business to survive a disaster or other disruptive event and to continue its operations with minimal disruption or downtime during and after the event. (See <i>disaster recovery</i> .)
business function	A collection of related interdependent business activities that exhibit high cohesion and low coupling of activities, and that have been organized to provide certain products and services. A business function performs a significant component of an organization's business processes. Examples of business function include finance, contracts, legal, human resource management, and marketing.
business process	A process of an organization that describes one of the standard sets of activities the organization needs to do to address one or more business requirements.
business risks	Risks that are associated with business losses or errors inherent in performing the business activities.
business rules	Specification of obligations and constraints that guide how procedures or activities are performed. There are usually explicit enforcement mechanisms in place to ensure conformance.
Business Process Maturity Model	A conceptual model, based on best practices, that describes an evolutionary roadmap for implementing the essential practices for one or more business domains. It contains guidance for an organization to help it evolve from poorly defined and inconsistent practices to implementation of stable practices at the unit level, to standard organization-wide end-to-end business processes, to statistically managed and predictable processes, and finally to continuous process innovation and optimization.

C

capability	Possessing the skills, knowledge, proficiency, and resources to accomplish a specific purpose or to be used for a specific purpose.
capacity	The quantities of a specific product or service that can be produced or provided relative to a timeline or other scale.
capacity planning	The process of determining the resources (that is, quantities, types, and timing of people, equipment, computing and communication infrastructure, supplies, and other resources) and strategy that will be available and applied to address a demand/production schedule. A demand/production schedule can be addressed by the following: <ul style="list-style-type: none"> • continually adjusting capacity to match the demand volume profile • building inventory during low demand periods to support high demand periods • implementing actions to shift and smooth the demand volume profile, for example through pricing and incentives • accepting the resulting loss of not being able to satisfy peak demand (See <i>capacity</i> and <i>demand/production schedule</i> .)

change control	The process of making changes to configuration items in a controlled manner. This typically involves documenting the need for changes (for example, a problem report or change request), evaluating candidate changes, approving or disapproving the changes, making the changes, reviewing and approving the changes, and updating or replacing the configuration items with the approved changes.
change management	(As related to configuration management) A method in which releases of a work product are uniquely identified with an incrementing version number, changes to each subsequent version are controlled, the version in use at any given time is known, previous versions of the work product are retained, and it is possible to return to a previous version. Change management is an aspect of formal configuration management, but the term by itself applies to work products that are not part of a CM product baseline.
change management	(As related to managing changes to an organizational entity) Making changes to an organization or part of an organization in a planned and controlled manner. The term, “organizational change management” is often used.
change package	A set of modifications to an existing product or service offering that are approved by the appropriate authority, that addresses a defined set of problem reports and change requests, and that is incorporated into the product or service offering as a single change.
channel	The mechanism through which a product or service is delivered. Examples of channels include physical buildings, automatic teller machines, and internet. <i>{Note: This term is only used in the BPMM for Service Operations.}</i>
CM product baseline	A set of related work products that <ul style="list-style-type: none"> • has been formally designated to be controlled • has been formally reviewed and agreed upon • represents a well-defined point in the effort • thereafter serves as the basis for further work, and • can be changed only through formal change control procedures. CM product baselines provide a mechanism for coordinating work of teams and managing changes to the work.
competency	An underlying characteristic of an individual that is causally related to effective and/or superior performance, as determined by measurable, objective criteria, in a job or situation [Curtis-2001]. (See <i>workforce competency</i> .)
compliance	(See <i>conformance</i>)
commercial off-the-shelf products	(See <i>off-the-shelf products</i> .)
commitment	An agreement to perform specific actions and/or provide identified work products, services, or support within agreed time and resource constraints [SEI-1997]. (See the section on “Requirements, Work Requests, Commitments, and Goals” in the “Comparison and Elaboration of Related Terms” following this Glossary of Terms.)

common asset	A bundle of information that has been developed and packaged in standard format and made available for wide-spread use [Curtis-2001]. They can include a description of a partial solution (such as a software code unit, a subsystem, or a design document) or captured knowledge (such as a requirements database or test procedure) that can be used to build, modify, and provide products and services [SEI-1997].
configuration architecture	A description of the relationships among the various configuration components (that is, configuration items and CM product baselines) and their relationships to their installation and use environment.
configuration item	Any artifact designated as a component of a CM product baseline. Configuration items are placed under configuration management and are formally controlled.
conformance	Whether or to what extent the customer requirements, standards, and internal business rules, organizational policies, process descriptions, and work procedures are adhered to.
configuration management	The discipline of identifying the work products that make up a CM product baseline for an effort at discrete points in time, controlling changes to the work products and the CM product baselines, creating and releasing CM product baselines for internal use and for delivery to customers, and recording and reporting change processing and implementation activities and status.
consumables	Items used in performing a transaction or other work activity that are not intended to be reusable. Examples of consumables include paper application forms, paper receipts, cleaning supplies, and magnetic storage devices for permanent storage. { <i>Note: This term is only used in the BPMM for Service Operations.</i> }
continuous capability improvements	Improvements that deal with any aspects of the processes, but they do not necessarily relate directly to any of the stated improvement goals.
critical dependency	A work product, action, information, etc. that must be provided by one unit, workgroup, or individual to another so that the receiver can perform planned work.
customer	The party (that is, individual, work unit, or organization) who receives a product or service. (See <i>product customer</i> and <i>service customer</i> .)
customer requirements	Statements of fact and assumptions, expressed in the natural language and terms of the customers, that define the customers' expectations of a system, product, or service in terms of mission or goals, environment, constraints, and measures of effectiveness. (See <i>requirement</i> and <i>requirements specification</i> .)
customized off-the-shelf product	(See <i>modified off-the shelf product</i> , which is the preferred term.)

D

data management

The process of identifying the data that must be kept and managed for an effort and managing the data. This includes data that are inputs to the effort, data that are essential for performing the effort, data that are outputs from the effort, data that may be needed for future reference and use, data that are required by the organization, data that are required by laws and regulations, etc. Data management involves

- identifying the data that are to be managed
- defining the requirements, procedures, and plans for data collection, storage, access, distribution, and disposal
- collecting and storing the data
- ensuring the completeness and integrity of the data
- controlling access to the data to ensure security and privacy of the data
- distributing the data to those who need it, when they need it
- disposing of the data when it is obsolete or no longer needed
- providing reports to relevant stakeholders documenting the status of the data and data management activities

Both hardcopy and softcopy data are managed. Different storage, management, and access mechanisms are used for different types of data, from simple filing to storage at remote protected locations. Configuration management, in contrast, only deals with a subset of the data of concern to the effort — the CM product baselines.

data model

A depiction of the data entities of a system and the relationships between these data entities. A data model typically takes the form of an entity relationship diagram.

defined process

The complete operational definition of the process used by a workgroup, work unit, or project. It covers a well defined, bounded, meaningful set of related activities such as a process for delivering a service or a configuration management process.

A defined process is a well-characterized and understood process, described in terms of standards, procedures, tools, and methods. It specifies, in a complete, precise, verifiable manner, the entry criteria, inputs, standards and procedures, work activities, verification mechanisms, outputs, exit criteria and other characteristics of a process and its component subprocesses. It is developed by tailoring the organization's standard processes to fit the specific characteristics of the workgroup, work unit, or project. (See the section on "Standard, Defined, and Managed Process Descriptions and Plans" in the "Comparison and Elaboration of Related Terms" following this Glossary of Terms.)

delta release

An update release for a product in which only the changed component is released rather than the entire product or system.

demand profile

A quantitative description of how the demand for products and services changes over time (that is, quantities relative to a timeline) and due to seasonal or other cyclic conditions or due to other predictable conditions.

demand/production schedule

A quantitative description of the quantity of products and services that will be provided over time (that is, quantities relative to a timeline) to address a demand profile. (See *schedule capacity*.)

derived measure

A measure that is defined as a function of two or more base measures [ISO/IEC CD 15939]. Examples of derived measures include productivity and effort variance.

derived requirement	A requirement that is not explicitly stated in the requirements specification for a product and service offering, but that is needed to construct the offering from the offering components. Derived requirements are often a result of the design solution selected for the offering.
disaster recovery	The capability of a business to reestablish operations following a disaster or other disruptive event.
discipline	The study or practice of an area of knowledge using a specific set of methods, tool, skills, references, and approaches. A discipline implies significant knowledge and skills in the area. Examples of disciplines include archaeology, accounting, software engineering, configuration management, and work unit management.
disruptive technology	A technology that disrupts and redefines the evolutionary path of the technology by introducing products and services that are not as good as currently available, but that offer other benefits such as being simpler, more convenient, and less expensive, and that appeals to new and less demanding customers. [Christensen-2003] <i>{Note: This term is only used in the BPMM for Marketing.}</i>
domain	A sphere of activity, concern, or function, where the people involved share interests. A domain could require the involvement and participation of multiple disciplines. Examples of domains include software engineering, manufacturing, marketing, banking operations, and finance.

E

establish and maintain	This phrase connotes a meaning beyond the component terms; it includes documenting, using, and revising based on the usage.
event-driven	A review or activity that is performed based on the occurrence of an event (for example, a formal review at the completion of a transaction or set of transactions).
executive manager	A management role at a high enough level in an organization that the primary focus of the person filling the role is the long-term vitality of the organization, rather than short-term unit/project and contractual concerns and pressures.
exceptional condition	A situation encountered in performing a process, the handling of which is not addressed by the process description

F

facilities	The physical constructions, equipment, and other components that are needed and used in performing work. Examples include buildings, offices and other rooms, computers, peripherals, networks, tools (including software tools), workstations, desks, chairs, and storage cabinets.
field support function	The organizational function that is responsible for supporting the ongoing operations and use of a product and service offering for customers and end-users. They help ensure that the offering is used as intended and in the most effective manner. They also help determine how the offering can be improved to provide a better fit for customers and end-users. <i>{Note: This term is only used in the BPMM for Marketing.}</i>

findings The conclusions of an appraisal, audit, or review that identify the most important issues, problems, or opportunities within the area of investigation [Paulk-1995].

function A set of related actions, undertaken by individuals or tools that are specifically assigned or fitted for their roles, to accomplish a set purpose contribute to a larger action [Paulk-1995].

G

goal A statement of the desired or intended result, effect, or consequence. As used in BPMM, goals are typically driven by some perceived business need and are expressed relative to perceived customer or organization needs. Goals are usually expressed quantitatively. Goals might be specified in areas such as business operations, product and service quality and performance, customer expectations, financial performance, organizational capabilities, and process performance. (See the section on “Requirements, Work Requests, Commitments, and Goals” in the “Comparison and Elaboration of Related Terms” following this Glossary of Terms.)

I

improvement goal A process performance or quality goal whose set value is beyond the current capability. (See *goal*, *process performance goal*, and *quality goal*.)

institutionalization The building and reinforcement of infrastructure and organization culture that supports methods, practices, and procedures so that they are the ongoing way of doing business, even after those who originally defined them are gone [SEI-1997].

integration The process of combining product and service components into more complex product and service components or into a complete product and service offering.

internal work risks Risks that are associated with the ability to perform a work effort.

K

knowledge The information and understanding that someone must have to perform a task successfully. Knowledge provides the basis for performing a skill [Curtis-2001].

M

managed process A process that is established for and performed by a local work unit work group or project. The process descriptions may be different from one work unit, workgroup, or project to another, even when they perform essentially the same work. The process descriptions describe the “as is” processes, with significant gaps filled in. It covers the work procedures for performing the crucial activities of the processes. (See the section on “Standard, Defined, and Managed Process Descriptions and Plans” in the “Comparison and Elaboration of Related Terms” following this Glossary of Terms.)

market displacement The sale of a product and service offering to a buyer, where the offering dislodges and replaces a competitor’s offering.
{*Note: This term is only used in the BPMM for Marketing.*}

market offering	A set of closely related products and services features that are targeted to a specific market segment. A product and service offering is described by the available features, along with the descriptions of the feature selection options, pricing, distribution, and communications associated with the offering. (Also referred to as <i>product and service offering</i> .)
market penetration	The sale of a product and service offering to a buyer who is not currently using an offering of this type. {Note: This term is only used in the BPMM for Marketing.}
market position	The place or position a product and service offering occupies in the market based on how the characteristics of the offering differentiates it from the offering of competitors. {Note: This term is only used in BPMM for Marketing.}
market retention	The retained installed position of a product and service offering for a customer. {Note: This term is only used in the BPMM for Marketing.}
market segmentation	The partitioning of the market into homogeneous groups that exhibit similar motivation for buying a product and service offering and similar buying patterns. {Note: This term is only used in the BPMM for Marketing.}
market share	The percentage of the served available market for a market segment that is covered by sales from the organization's product and service offerings. (See <i>served available market</i> .) {Note: This term is only used in the BPMM for Marketing.}
market validation	The process of determining whether, or to what extent, a product and service offering fulfills the functional and value needs of the buyers. {Note: This term is only used in the BPMM for Marketing.}
marketing	The activities involved in developing concepts for product and service offerings and coordinating the delivery of the offerings to customers. These activities include evaluating the competitive situation, defining packaging of capabilities and features, developing pricing strategies, promoting and positioning the offering, creating and maintaining relationships with current and potential customers, arranging distribution, and coordinating the evolution of the offering. {Note: This term is only used in the BPMM for Marketing.}
marketing communication plan	A plan detailing the external and internal communications program to systematically position a new product and service offering in the market; strengthen the organization's overall market position with its current and potential customer base; promote near and long-term sales; and foster positive relationships with customers, industry opinion leaders, members of the trade press, financial analysts, and organization's staff and managers. {Note: This term is only used in the BPMM for Marketing.}
marketing introduction plan	A plan defining the sequence of activities required to publicly announce, promote, and demonstrate a new product and service offering. {Note: This term is only used in the BPMM for Marketing.}

marketing roadmap	A description of the organization’s full life-cycle strategy for a product and service offering. It is based on an understanding of the expected relevant technology changes and other forces, the customer needs and desires, and the organization’s business strategies. A roadmap contributes to the integration of a product and service offering with the relevant technology, customer, and business forces by describing how the offering evolves over time in response to these forces. It also addresses the relationships to other related offerings and to follow-on offerings. <i>{Note: This term is only used in the BPMM for Marketing.}</i>
master schedule	A plan that specifies the quantity of each end item (product and/or service) that will be or is expected to be provided in each time period (for example, each day or each week) in a planning horizon. The master schedule is the overall plan that guides the overall business operations planning and forecasting.
measure (noun)	The rule for assigning a quantitative or categorical value from a defined scale to one or more entities, objects, or attributes [ISO/IEC CD 15939].
measure (verb)	To make a measurement [ISO/IEC CD 15939].
measurement	A set of operations having the object of determining a value of a measure [ISO/IEC CD 15939].
modified off-the-shelf product	An off-the-shelf product that is modified or customized to be installed and operate in an environment that is different from the original intended environment. The product may be modified by the purchaser, by the vendor, or by another party to meet the requirements of the purchaser. <i>(See off-the shelf product.)</i>

N

natural variation	Variation in the process performance that is due to the normal interactions within the process [Weber-2002a].
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O

off-the-shelf products	Items that are mass-produced and which can be purchased from a commercial vendor. Off-the-shelf products are relatively low cost (because of mass productions). They are designed to be used “as is,” to be easily installed, and to interoperate with existing components. Off-the-shelf products are often referred to as “COTS” — commercial off-the-shelf products.
offering infrastructure	The buildings, computing hardware and software, communication hardware and software, and other equipment and facilities needed to operate and support a product and service offering.
operation	When used in reference to a product/ service offering, the term refers to: <ul style="list-style-type: none"> • providing the offering customers appropriate access to the offering products, supplies, and other offering resources • operating the equipment that is part of the offering • delivering the offering services to customers • performing the transactions of the offering

operations and support characteristics

Characteristics of a product and service offering that deal with how well the offering fulfills the usage requirements and expectations of the customers and users. Some of the common operations and support characteristics include:

- availability
- continuity
- capacity
- performance
- security
- data management
- customer support
- handling of problems and incidents

opportunistic reuse

The incidental reuse of assets that were not specifically designed or built to be reused. (See *systematic reuse* for contrast.)

organization

An autonomous unit within a company or other enterprise, under the management of a single executive, within which work efforts are managed as a whole entity of related efforts. An organization is typically part of a larger company or enterprise, although in some cases, the organization unit may be the whole company or enterprise. Organizations typically have responsibility for planning, allocating resources, motivation, organizing, directing, controlling, and improving their people, processes and technologies. The BPM operational definition for “organization” is the scope of a process appraisal and improvement effort. Organizational analysis is necessary to define exactly what that scope will be. It is the highest level in a company or enterprise where the executive in charge takes management ownership for an overall process appraisal and improvement program. Examples of an organization include a company, a division of a corporation, and a government agency.

organizational policy

A guiding principle typically established by executive management that establishes rules for an organization to guide actions and influence and determine decisions. Organizational policies are established to ensure that work is performed in ways that are consistent across the organization and acceptable to executive management.

organizational process assets

The collection of process materials, maintained by an organization, for use by work units, projects, and workgroups in developing, tailoring, maintaining, and implementing their processes. (See *process asset*.)

organization’s standard processes

A set of process descriptions, established at the organization level, which describe processes that guide the work activities in an organization. These process descriptions are defined at an abstract level that is applicable to a set of different work efforts. They cover the fundamental process elements and their relationships to each other that must be incorporated into the defined processes that are implemented in units, projects, and groups across the organization. A standard process enables consistency in how similar work activities are performed across the organization. It is essential for long-term stability, learning, and improvement.

P

periodic	Occurring, appearing, or recurring at regular intervals. As used in BPMM, the term “periodic” implies that events are planned to occur periodically and occur as planned.
plan	<p>A document describing a course of action for performing a specific work effort and satisfying specific requirements, commitments, goals, and constraints applicable to that work effort. A plan typically covers:</p> <ul style="list-style-type: none"> • identification of the processes and procedures that will be followed • identification of the inputs • identification of needed resources • assignment of responsibility and authority • schedule of activities • identification of dependencies • identification of the outputs • measures and analyses needed to obtain insight into the activities, progress, performance and results <p>(See the section on “Standard, Defined, and Managed Process Descriptions and Plans” in the “Comparison and Elaboration of Related Terms” following this Glossary of Terms.)</p>
planned process Improvement	Improvements that are usually performed by an improvement workgroup that is charged with the responsibility of identifying, evaluating, and packaging a set of changes that, when deployed, will achieve specific quantitative improvement goals.
planning parameters	Characteristics of work to be done, that enables the work unit, project, or workgroup to perform the necessary planning, organizing, staffing, directing, coordinating, reporting, and budgeting of their work.
predictable process	A process that, based on statistical analysis of past performance, can be expected to produce measured results within statistically-derived or predicted limits [Wheeler-1998].
procedure	A description of a course of action to be taken to perform a given task [SEI-1997].
process	A set of activities, methods, and practices that transforms a set of inputs into a set of products and services.
process ability	The capacity to perform individual skills in the specifics sequencing or method used in the organization to coordinate activities among individuals or groups, and to adjust the performance of skills, as necessary, to maintain an orderly flow of work [Curtis-2001].
process architecture	A description of the ordering, interfaces, interdependencies, and other relationships among the process elements within a process and with process elements in external processes (for example, from operations processes to facilities management processes). (See <i>process element</i> .)
process area	A maturity model construct that contains a cluster of related practices in an area, that when implemented collectively, provides a process capability that is an important component of the maturity level at which it resides.

process asset	<p>Any work product that a work unit, workgroup, or organization considers to be useful in developing, tailoring, maintaining, and implementing their processes. Examples of process assets include:</p> <ul style="list-style-type: none"> • standard process descriptions • defined process descriptions • process maps • procedures (for example, estimating procedure) • configuration management plans • training materials • process aids (for example, checklists) • lessons learned reports • document templates
process-based plan	<p>A plan that is based on an underlying defined process description. The plan activities, dependencies, commitments, milestones, and monitoring is based on the process elements and the attributes of the process description such as input/output relationships, sequence relationships, entry/exit criteria, defined roles, key work products, and decision points and criteria. (See the section on “Standard, Defined, and Managed Process Descriptions and Plans” in the “Comparison and Elaboration of Related Terms” following this Glossary of Terms.)</p>
process capability	<p>[1] The range of expected results, expressed quantitatively, that can be achieved by following a process. (See <i>process performance</i> and <i>process capability baseline</i>.) [2] The degree to which a process is able to achieve the goals or specifications that are assigned, usually expressed quantitatively.</p>
process capability baseline	<p>A documented characterization of the range of expected results, expressed quantitatively, that would normally be achieved by following a specific process under typical circumstances. A process capability baseline contains measures that can be used to predict the performance and results of efforts that follow the process for which the baseline is established. (See <i>process performance baseline</i> and <i>process capability — the first definition</i>.)</p>
process description	<p>The documented operational description of the components and activities of a process. The process description specifies, in a complete, precise, verifiable manner, the requirements, design, behavior, or other characteristics of a process. Process descriptions may be found at the task, work unit, project, group, or organizational level [SEI-1997].</p>
process element	<p>A fundamental unit of a process description. Each process element is a well-defined, bounded, closely related set of activities that can be linked together to form an overall process description. A process element is not decomposed into finer-grained descriptions. [Derived from SEI-1997]. (See <i>process architecture</i>.)</p>
process engineering group	<p>A collection of specialists that facilitates the definition, maintenance, and improvement of the processes used by the organization.</p>
process management	<p>The application of tools and techniques to specify, design, document, plan, implement, measure, maintain, and improve processes.</p>

process performance	A measure of the actual results achieved by performing a process. Process performance is typically expressed as a small number of measures (for example, throughput, cycle time, and defect removal efficiency of the process. (See <i>process performance baseline</i> , <i>process capability</i> , and <i>process capability baseline</i> .)
process performance baseline	A documented characterization of the actual results achieved by following a process, expressed quantitatively. A process performance baseline contains measures of the performance of a single managed effort (for example, work unit, delivering a service, or project) in dimensions of importance to that effort, along with other quantitative parameters and information needed to re-plan, predict outcomes, and manage the effort and its results. (See <i>process performance</i> and <i>process capability baseline</i> .)
process performance goal	A tangible, quantitative value for a measure that describes the intended efficiency or effectiveness for performing a process. Examples include specific productivity, throughput, and defect removal effectiveness. (See <i>goal</i> , <i>quality goal</i> , and <i>improvement goal</i> .)
process tailoring	To make, alter, or adapt a standard process description for a particular purpose. For example, a work unit or project tailors its defined process from the organization's standard processes to meet its constraints and environment [SEI-1997].
process variation	The distribution of measured results that are observed as a process is performed repeatedly. Process variation is caused by one of four factors: assignable cause of variation, natural variation, structural variation, or tampering [Weber-2002a].
product	Any tangible output that is a result of a process and that is intended for delivery to a customer or end user. A product is a work product that is delivered to the customer [SEI-2001].
product and service offering	A set of closely related products and services that are targeted to a specific customer or customer segment. A product and service offering is described by the available features, along with the descriptions of the feature selection options, pricing, distribution, and communications associated with the offering. A product and service offering may include a product as the main component with supporting services, a service as the main component with supporting products, a set of products that are used together, a set of products and services that form a business offering, or a single product or service.
product and service operation	Performing the functions of a product and service offering to provide the customers with the capabilities and features of the offering. This includes providing the offering customers appropriate access to the offering products, supplies, and other offering resources; operating the equipment that is part of the offering; delivering the offering services to customers; and performing the transactions of the offering.
product and service user	An individual or other entity that interacts with a product and service offering to perform the day-to-day operations transactions in support of product and service and transaction customer (e.g., inquiry clerk for an offering).
product and service work	A term used as an abbreviated form for the work an organization performs in developing, preparing, deploying, operating, and supporting, a product and service offering, as well as managing these activities.

product customer	The party (that is, individual, unit, or organization) responsible for formally contracting or arranging for a product, accepting the product and authorizing payment for the product. For a new product, the product customer typically defines or agrees to the requirements for the product. The product customer is external to the unit providing the product, but may not be external to the organization.
product line	A group of related products that share a common, managed set of characteristics that satisfy the needs of a selected market.
product obsolescence	A product that no longer meets the needs of buyers or has been overtaken by market technology or vastly superior products. <i>{Note: This term is only used in the BPMM for Marketing.}</i>
product owner	The party (that is, individual, unit, or organization) responsible for the overall requirements for a product; formally contracting or arranging for the development of the product; accepting the product; and managing the deployment, delivery, maintenance, and support of the product.
project	A temporary endeavor undertaken to create a unique product or service or specific result. A project has a definite beginning and definite end and typically operates according to a plan. A project may be composed of projects (that is, sub-projects). A project is a special instance of a work unit. A project may be composed of multiple work units. [Derived from PMI-2000]. (See <i>work unit</i> .) (See the section on “Unit, Work Unit, and Project” in the “Comparison and Elaboration of Related Terms” following this Glossary of Terms.)

Q

quality goal	A customer-oriented, tangible, quantitative value associated with a measure, specifying the intended result, effect, or consequence that will occur from carrying out a defined set of activities, such as the overall results of performing a service or creating a product. Examples of quality goals include specific levels of reliability of a product, defect density of product, number of mistakes made in delivering a service, and customer wait time for a transaction. (See <i>goal</i> , <i>process performance goal</i> , and <i>improvement goal</i> .)
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R

requirement	A condition or capability that must be met or possessed by a product or service offering to solve a problem or achieve an objective, as specified in contract, standard, specification, or other formally imposed document. [Derived from IEEE-1991]. Requirements come from various sources, including the customers contracting for the products and services, laws and regulations, and organizational business requirements. (See the section on “Requirements, Work Requests, Commitments, and Goals” in the “Comparison and Elaboration of Related Terms” following this Glossary of Terms.)
requirements specification	Requirements stated in technical, objective, verifiable language to a level of detail needed to plan activities, build required work products, and perform required services. (See <i>requirement</i> and <i>customer requirements</i> .)
release	(“Release” is used in context of a release of a CM product baseline as part of the configuration management process.) Release of a CM product baseline involves making available or delivering an approved CM product baseline, either for internal use or to an external customer.

release management	The discipline of managing and deploying a product and service offering and changes to the offering into the production or user environment.
relevant stakeholder	A stakeholder that is explicitly identified to be involved in some activity. Since it may be impractical to involve all stakeholders, those stakeholders who are most essential to the activity are involved. (See <i>stakeholder</i> .)
role	A defined set of work tasks, dependencies, and responsibilities that can be assigned to an individual as a work package. A role describes a collection of tasks that constitute one component of a process, and would normally be performed by an individual [Curtis-2001].

S

sales function	The organizational function that is directly responsible for selling product and service offerings and generating revenue from existing and new customers. <i>{Note: This term is only used in the BPMM for Marketing.}</i>
schedule	A list of activities and milestones (that is, significant event) that make up an effort and the planned dates for performing these activities and meeting these milestones.
schedule capacity	The number of transactions or activities that can be performed or the quantity of work products that are produced relative to a timeline. Schedule capacity describes how the number or quantity varies over time. It describes the normal number or quantity, how it the potential number or quantity shifts or trends over time, and changes due to seasonal or other cyclic time periods. (See <i>throughput</i> .) <i>{Note: This term is only used in the BPMM for Service Operations.}</i>
served available market	The current sales of a set of similar product and service offerings in a market segment, including sales of all vendors. <i>{Note: This term is only used in the BPMM for Marketing.}</i>
service	Work carried out for or on behalf of others.
service component	A fundamental unit of a service offering. Each service component provides well-defined, bounded functionality and can be deployed in a service offering as a separate entity. A service component may be used in one or more service offerings. <i>{Note: This term is only used in the BPMM for Service Operations.}</i>
service component owner	The party (that is, individual, unit, or organization) responsible for the development, deployment, delivery, maintenance, and support of a component that is used in one or more service offerings. <i>{Note: This term is only used in the BPMM for Service Operations.}</i>
service customer	The party (that is, individual, unit, or organization) for whom a service is performed. The service customer may or may not be directly involved in a service activity (that is, the service may be performed for others as defined by the service customer). An example of a service customer is an organization, such as a department store, that has a contract with a bank to provide and support a specially branded credit card. <i>{Note: This term is only used in the BPMM for Service Operations.}</i>
service level agreement	A document which defines the relationship between two parties, the nature of the services each parties provides to the other, and the measures used to monitor the level of service provided against the agreed level of service.

service offering line	<p>A group of related service offerings that share a common, managed set of characteristics that satisfy the needs of a selected market.</p> <p><i>{Note: This term is only used in the BPMM for Service Operations.}</i></p>
service offering	<p>A system or method of providing a class of service customers with a set of related transactions that give these customers access to certain resources of the service offering provider (for example, home mortgage service offering or a message handling service offering).</p> <p><i>{Note: This term is only used in the BPMM for Service Operations.}</i></p>
service offering owner	<p>The party (that is, individual, unit, or organization) responsible for the overall requirements of a service offering; formally contracting or arranging for the development of the service offering; accepting the service offering; and managing the deployment, delivery, maintenance, and support of the complete service offering.</p> <p><i>{Note: This term is only used in the BPMM for Service Operations.}</i></p>
service offering partner	<p>An organization that jointly provides a service offering. (See <i>service customer</i>.)</p> <p><i>{Note: This term is only used in the BPMM for Service Operations.}</i></p>
skills	<p>The behaviors that an individual must be able to perform in order to accomplish specific tasks. Skills may involve behaviors that directly accomplish the task or that provide the support of, or coordination with, others involved in accomplishing tasks. [Derived from Curtis-2001].</p>
sourcing	<p>An arrangement in which an organization purchases products or services from an external organization.</p>
sourcing agreement	<p>A legally binding agreement between an organization and a supplier for products and/or services.</p>
sponsor	<p>A person who has the authority and provides the long-term commitment, funding, resources, and direction for an effort. Typically the sponsor of a change effort is the executive manager of the unit that is undergoing the change. Ideally sponsorship should cascade down through the middle managers and unit managers — this will ensure that a change effort will continue even if the executive manager leaves. Sponsorship includes</p> <ul style="list-style-type: none"> • demonstrating commitment to the effort • establishing goals and incentives • establishing long-term plans and commitments for funding, staffing, and other resources • establishing strategies for managing and implementing the effort • obtaining the support and participation of the managers and staff involved with and affected by the effort • monitoring the institutionalization and implementation of organizational software process improvement • coordinating plans and issues with customers and other relevant stakeholders <p>[Derived from Paulk-1995]</p>
stable process	<p>A process for which the variations among the observed samples of the measure can be attributed to the natural variation of the process [ASQ-2001].</p>

stakeholder	A person, unit, organization or other entity who might be able to influence or who might be affected by some action. Stakeholders might include government agencies, customers, suppliers, partners, managers, professional staff, and nearby business enterprises or people. In the BPMM goals and practices, the term “relevant stakeholder” is used to signify that it may be impractical to involve all stakeholders. The relevant stakeholders must be explicitly identified and involved as described by the goal or practice. (See <i>relevant stakeholder</i> .)
standard process	A process defined at a level of abstraction such that it is applicable to a defined set of different work efforts (for example, different work units or different projects). A standard process is not actually implemented. It is tailored for the specific work, and this tailored process (that is, defined process) is implemented. (See <i>organization’s standard processes</i> .) (See the section on “Standard, Defined, and Managed Process Descriptions and Plans” in the “Comparison and Elaboration of Related Terms” following this Glossary of Terms.)
supplier	An organization delivering products or services to an acquirer. The acquirer typically repackages or incorporates the acquired products or services into its products, service offerings, internal infrastructure, or work activities.
supply chain management	The coordination, and flow management of materials, resources, information, and money as they move from suppliers to users or clients to distributors to retailers to customers to users, usually with the intent of ensuring adequate supply and reducing inventory at each stage.
support group	A workgroup consisting of professional staff who are experts in a specific discipline that supports, but is not directly responsible for, developing, preparing, maintaining, and delivering the organization’s products and services. Support groups provide enabling capability to support the people who actually develop, prepare, maintain, and deliver products and service. Examples of support groups might include a process engineering group, training group, configuration management group, and process and product assurance group. Some support groups may be organizational units, others may be workgroups whose members are part-time and change on a regular basis. (See <i>work unit</i> .)
systematic reuse	The practice of designing, building, and managing components to be reused and the reuse of these components. Systematic reuse usually is focused on well-defined domains or product and service offerings. (See <i>opportunistic reuse</i> for contrast.)

T

tailor	Altering or adapting a standard process description for a particular work situation (for example, a specific work unit or project), to meet the specific goals, constraints, and environment of the work.
tailoring guidelines and criteria	Descriptions of what can and cannot be modified when adapting a standard process description for a particular purpose, and criteria for making these tailoring decisions. They typically apply to the tailoring of the organization’s standard processes to fit the specific characteristics of a work unit, project, or workgroup. These guidelines and criteria help ensure that the processes used by the work units, projects, and workgroups are appropriately similar.
task	A specific, definable activity to perform an assigned piece of work, often finished within a certain time [ASQ-2001].

terms and conditions	Specific promises made between parties in a contract, which the law will enforce. It can include identification of parties to the contract, dates of work involved, duties, responsibilities, legal jurisdiction, definitions, and other considerations.
throughput	The normal or average number of clearly-defined activities or transactions that are processed according to a well-defined procedure in a given period of time or for a given quantity of effort expended. Examples of throughput include 193 savings account deposits posted per day and 40 packages packed and shipped in an hour. {Note: This term is only used in the BPMM for Service Operations.}
total available market	An estimate of the maximum value of sales of product and service offerings for an application, by all vendors, that is possible in a market segment. {Note: This term is only used in the BPMM for Marketing.}
transaction	A unit of work that is performed in response to a single request and that performs specified operations on a set of data. A transaction has the following characteristics: <ul style="list-style-type: none"> • requested by a transaction customer, event-driven, or periodic • request can be automated or not automated • may relate to one or more transaction customers • constitutes a meaningful unit of work, performed as one or more procedures or activities • may be performed in real time, in batch processing, or protracted over a period of time • single request, single final response (with possible intermediate responses) • has a recognizable beginning point and unambiguous conclusion (as seen by the requestor and the people or equipment performing the transaction) • represents a move from one known state to another known state • can be undone completely and unambiguously at any point during the procedure • one or more types of transaction constitute a service offering • may or may not include delivery of a product to the transaction customer [Derived from Allamaraju-1999]. {Note: This term is only used in the BPMM for Service Operations.}
transaction customer	The individual or other entity (for example, a computer program) that participates with the service offering provider in performing a transaction. The transaction customer may be the same as the service customer (for example, for a home mortgage service), or the transaction customer may be different from the service customer (for example, a service customer for a credit card service might be a company, and the transaction customers might be the individuals employees). {Note: This term is only used in the BPMM for Service Operations.}

U

unit

A single, well-defined organizational component (for example, a department, section, or project) within an organization. The term “unit” is used to refer to any organizational entity that is accountable to a specified individual(s) (usually a manager), who is responsible for accomplishing a set of performance goals that can be met only through collective action. “Unit” is a recursive concept, since units may be composed of other units cascading down the organization. For instance, a division may be a unit consisting of departments, each of which may be a unit consisting of sections, each of which may be a unit consisting of work units. [Derived from Curtis-2001]. (See the section on “Unit, Work Unit, and Project” in the “Comparison and Elaboration of Related Terms” following this Glossary of Terms.)

V**validation**

The process of determining whether, or to what extent, a product or a service will fulfill the needs of the customers and end users. Validation ensures that the delivered product or service is what the customers and end users need. Validation is normally performed on the completed product and service under defined conditions. However, validation is often performed in earlier stages, such as validating the requirements or validating a prototype of a product or service. (See *verification* for contrast.)

verification

The process of evaluating a product, a work product, a service, or an activity to determine whether it satisfies its specified requirements. A product, work product, service, or activity that is verified may not satisfy the real needs of the customers and end users. Verification can be accomplished by inspection, testing, analysis, or review. Verification can be applied to work products and activities throughout the product or service life cycle. (See *validation* for contrast.)

version control

A method by which the content of a work product is changed in a controlled manner and the version of the work product in use at a given time (past or present) is recorded and known. Version control is an aspect of configuration management, but it can also be used by itself for work products that do not require the rigor of configuration management.

W**work breakdown structure**

A hierarchical representation of work to be performed. It is built by iteratively decomposing the work into manageable units, and is intended to reflect how the work is conceptualized, planned, and managed. Each descending level representing a more detailed definition of the work. It is typically a deliverable-oriented arrangement of work elements and their relationships to each other that organizes and defines the total scope of work. Guidelines for the work elements of a work breakdown structure (WBS) include:

- all work is represented somewhere in the work elements
- each work activity is found in just one work element
- each work element is uniquely identified
- each work element is work for a small number of people
- each work element is for a uniform type of work
- each work element is defined with a minimal number of dependencies
- each work element has well-defined completion criteria
- each work element is small enough to detect problems and recover quickly
- granularity of summary work elements is refined as the work proceeds

work effort	A well-defined set of activities performed by a workgroup, that has an expected cost, expected effort, schedule of activities and milestones, and planned outputs and results. Examples of work efforts include developing an annual plan for a work unit, developing a standard process description for managing requirements for a product, and completing the software design for a specific service offering.
workforce	The people an organization needs to perform its business activities. [Curtis-2001].
workforce competency	A cluster of knowledge, skills, and process abilities that an individual should possess to be able to perform a particular type of work in the organization. A workforce competency is stated at a very abstract level, such as a need for a workforce competency in software engineering, financial accounting, or technical writing. Workforce competencies can also be decomposed to more granular abilities, such as competencies in designing avionics software, testing switching system software, managing accounts receivable, preparing consolidated corporate financial statements, or writing user manuals and training materials for reservation systems. [Derived from Curtis-2001]. (See <i>competency</i> .)
workgroup	A collection of people who work closely together on tasks that are highly interdependent, in order to achieve shared goals. A workgroup may or may not be a permanent organizational component. Assignment to workgroups may be dynamic and individuals may participate in multiple workgroups. A workgroup may be a work unit, a support group, or a collection of people drawn from one or more work units and support groups. A workgroup, even when it is not a permanent organizational component, is typically responsible to a unit manager. [Derived from Curtis-2001]. (See <i>work unit</i> , <i>unit</i> , and <i>support group</i> .) (See the section on “Unit, Work Unit, and Project” in the “Comparison and Elaboration of Related Terms” following this Glossary of Terms.)
work order	An agreement between an organization or unit and a supplier that authorizes the supplier to perform a specific, defined assigned piece of work, usually within a defined time. As used in this document, a work order is performed under the terms and conditions of an existing supplier agreement.
work package	An element at the lowest level of a work breakdown structure representing a unit of work that can be assigned to a specific party for execution.
work product	Any artifact created in performing any process. These artifacts can include files, documents, parts of a product, process descriptions, specifications, invoices, etc.
work product inspection	An inspection or review of a work product, following defined procedures, for the purpose of identifying defects and improvements. The review team typically includes peers of the product’s producers as well as other people who are knowledgeable in the subject matter. [Derived from Paulk-1995]
work request	A formal request to have specific work performed. A work request is usually logged, reviewed, approved or disapproved, assigned, scheduled, tracked to completion, and closed.

work unit

A well-defined collection of people, managed as a single unit within the organization, who work closely together on tasks specifically related to developing, preparing, maintaining, and delivering the organization's products and services or performing internal business functions. A work unit is an organizational unit whose manager is accountable for agreeing to requirements, making commitments, obtaining and removing resources, assigning responsibility, and tracking and ensuring performance. A work unit is at a level in the organization where the people who do the work can appropriately participate in the planning and commitment activities and where the manager can maintain sufficient awareness of the work against the requirements and commitments to be able to take corrective action. (See *unit* and *project*.) (See the section on "Unit, Work Unit, and Project" in the "Comparison and Elaboration of Related Terms" following this Glossary of Terms.)

D.2 Comparison and Elaboration of Related Terms

BPMM often uses distinct but subtly different terms that are intended to distinguish closely related concepts. These terms are used to express goals, practices, and other material in a way that is consistent throughout the model. The Glossary of Terms provides definitions of the terms that are important to understanding the model.

There are, however, some terms that may be better understood when contrasted with related terms. This section supplements the above Glossary of Terms and provides this additional explanation for these terms. The following needs to be read in conjunction with the definitions in the Glossary of Terms.

Unit, Work Unit, and Project

A "unit" is an organizational entity that is typically headed by a manager. On an organization chart or organogram, the boxes (or other elements) — including the subordinate boxes — typically represent a unit. The term "unit" is a recursive term and applies to every management level in the organization.

"Work units" are the lowest level units in the organization where the people who do the work can appropriately participate in the planning and commitment activities and where the manager can maintain sufficient awareness of the work against the requirements and commitments to be able to take corrective action. A "work unit" is the lowest level at which negotiations and commitments are made on requirements, budget, and commitments. Within a work unit, adjustments can be made as to how the requirements, budget, and commitments are satisfied, but they cannot be changed at that level.

On a detailed organization chart or organogram, work units are typically the lowest level boxes (or other elements) that is headed by a manager. However, in some cases the work unit may be at the second or third level from the bottom of the chart, if the activities described earlier in this paragraph apply at that level.

For operations work, units and work units are continuing organizational entities, created or disbanded primarily when there is a change in the organization's business strategies.

A "project" is established to create a unique product or service or specific result. A project is a temporary endeavor. Once the endeavor is finished, the project is disbanded. A project may be established by using people from existing units in the organization or units may be established specifically for the project. Units that are established specifically for the project are created or disbanded when their project work is completed. A large project may be broken down into subprojects — for example by subsystem or by domain such as a hardware project and a software project.

The BPMM “work unit” process areas¹ are written to apply both to projects and to work units that are continuing entities of an organization. The key similarities that are reflected in the practices of these process areas are that the plans and commitments and the monitoring of the work against the requirements and commitments are done by both work units and projects.

Requirements, Work Requests, Commitments, and Goals

A “requirement” is a condition or capability that must be met or possessed by a product or service to satisfy a contract, standard, specification, or other formally imposed document. Satisfying the requirements is a condition for acceptance of the offering. Requirements that are not satisfied can be deferred or temporarily waived, but if a requirement is permanently waived, it is no longer a requirement. Requirements come from explicitly identified requirements providers and are explicitly identified as requirements. Requirements usually have a financial or legal force to ensure that they are satisfied, though for requirements from within the organization other enforcement mechanisms are used.

Service units have requirements that define the services that they must be able to perform — the functions, capacity, quality, responsiveness, etc. A “work request” deals with requesting specific work within the scope and boundaries of the requirements for the service units. A work request is usually logged, reviewed, approved or disapproved, assigned, scheduled, tracked to completion, and closed. A work request is a project in miniature.

A “commitment” is an agreement between units, workgroups or individuals within the context of the work needed to satisfy the requirements (for example, within a project or product and service offering). There may be numerous ways to perform the work and satisfy the requirements. Each of these may involve different dependencies with other groups and individuals (for example, to perform specific actions and/or provide identified work products, services, or support within agreed time and resource constraints). A commitment is made in context of how the requirements will be met. In the pure sense, commitments are not of concern to the requirements providers in their role as requirements providers (though commitments may be made with the requirements providers separate from the requirements). Enforcement of commitments is handled by management and there is not a financial or legal force to ensure that they are satisfied.

A “goal” is a desired or intended result, effect, or consequence. Goals can be defined by customers or by managers within the organization. Although there may be professional and business consequences of satisfying or not satisfying a goal, goals do not have the force of a requirement.

As used in BPMM, goals are typically driven by some perceived business need and are expressed relative to perceived customer or organization needs. Goals are usually expressed quantitatively.

The terms “goal” and “objective” are synonymous. The term “goal” was chosen for use in BPMM since in business literature and applications that term seems to be more commonly used.

Goals can address many difference dimensions. Therefore when the term is used, it should be qualified appropriately (for example, quality goal, performance goal, quantitative goal, process area specific goal). Goals can also have different levels of importance and obligation. A goal can be set to define a direction or objective to pursue. A goal can be set to define a direction or objective to pursue as possible (for example, 100 percent customer satisfaction). A goal can also be set to define a specific end state that is intended to be achieved (for example, a goal of 30 percent productivity improvement where explicit actions are taken to achieve that goal).

1. WURM, WUPM, WUMC, and WUCM process areas.

Standard, Defined, and Managed Process Descriptions and Plans

There are distinct differences between the processes and plans for maturity level 2 and maturity level 3, and these differences are inherent in the terminology differences between the two maturity levels. Refer to Figure D.1.¹

A “process” is an integrated or coordination set of naturally related activities, methods, and practices that transform a set of inputs into a set of products and services.

A “process description” specifies the requirements, design, behavior, or other characteristics of a process — the expected behavior.

At maturity level 2 the BPMM refers to a “managed process.” A managed process is defined within the individual projects and work units that are performing the work. Although there may be similarities among processes for similar work, these similarities are incidental because of similar backgrounds of the project managers and staff — not because of planned coordination or a common reference.

At maturity level 3, the managed processes of the individual work units are analyzed to identify the best common practices for the work the organization performs. “Standard processes” are defined at the organization level, at a level of abstraction such that they are applicable to a defined set of different work efforts (for example, for a set of work units doing similar work, such as processing invoices, or for similar projects, such as system maintenance projects). There may be standard processes at multiple levels in an enterprise — for example, there may be a high-level, general standard process at the enterprise level and more detailed standard processes for each division within the enterprise.

Standard processes are scalable for different sizes and complexities of efforts. For example, all work efforts or projects might be required to have a documented work plan. A small work effort or project of 16 staff hours would have a simple plan for doing the work. A larger work effort or project of 160 staff hours would have a larger plan and include additional plan components. A still larger work effort or project would have a plan that contains still more detail to increase their chance of success and reduce risk.

Though work units or projects may be similar, they do have some unique characteristics that may require some tailoring of the standard processes to meet the specific goals, constraints, and environment of the work. At maturity level 3 this tailoring is carefully prescribed and controlled to ensure that the processes used by the work units, projects, and workgroups are appropriately similar. The tailored processes are referred to as “defined processes.” It is the defined processes that are actually implemented.

In some cases, the defined processes are the same documents or files as the standard processes. In these cases, the work in the organization is similar enough and the standard processes are sufficiently detailed that no tailoring is needed or performed. From a BPMM terminology perspective, these processes can be considered to be both the standard processes and the defined processes.

The completeness and rigor of a defined process and managed process are also different. A managed process may only cover the work procedures for performing the crucial activities of the processes along with some descriptions of overall workflow. A defined process is a well-characterized and understood process, described in terms of standards, procedures, tools, and methods. It specifies, in a complete, precise, verifiable manner, the entry criteria, inputs, standards and procedures, work activities, verification mechanisms, outputs, exit criteria and other characteristics of a process and its component subprocesses.

1. Note: In the BPMM, Figures 7 and 8 do not appear. Those figure numbers are reserved for use for Domain BPMM in Section 7.

A “plan” is a document describing a course of action for performing a specific work effort and satisfying specific requirements, commitments, goals, and constraints applicable to that work effort. At maturity level 2, the process descriptions and plans are often only loosely connected. At maturity level 3, the process description forms the foundation for the plans. The plans directly reflect and use the details of the defined processes to plan and manage the work effort.

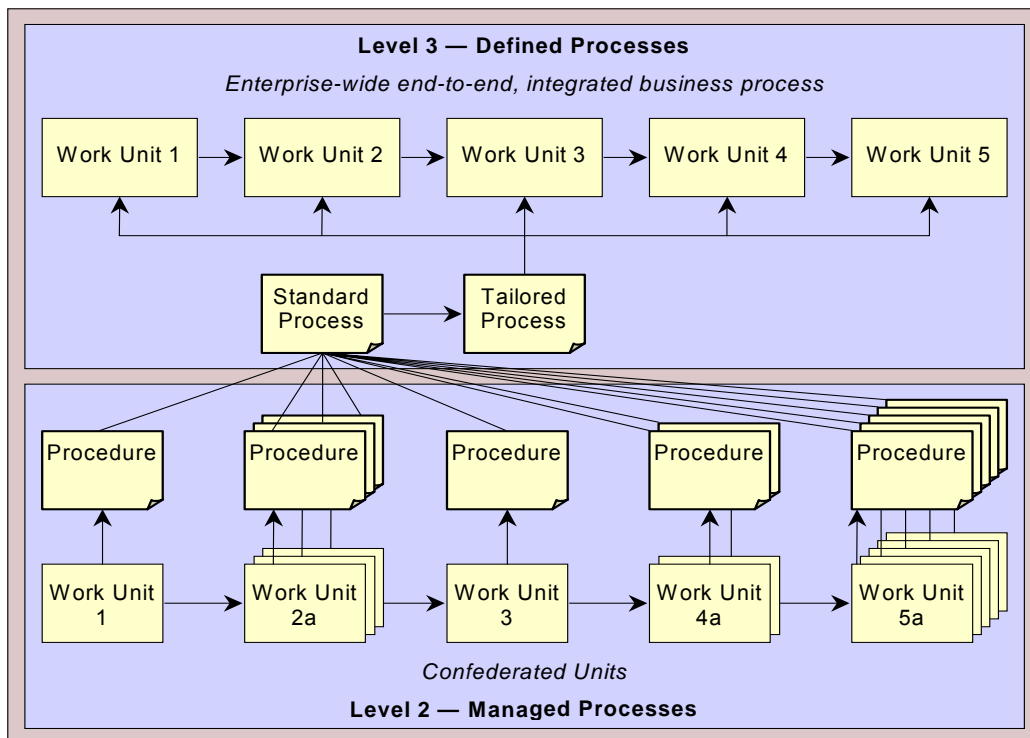


Figure D.1 - Maturity Level 2 and 3 Process Structure

Work Unit Configuration Management versus Organizational Configuration Management

Configuration management (CM) evolves from Maturity Level 2 to Maturity Level 3. At Maturity Level 2, configuration management is performed in the context of individual work units or projects (refer to the Work Unit Configuration Management process area). At Maturity Level 3, configuration management is performed in the context of the organization (refer to the Organizational Configuration Management process area). The key differences and similarities are summarized below.

Maturity Level 2 — Work Unit Configuration Management	Maturity Level 3 — Organizational Configuration Management
<p><i>(Applies to both levels of CM)</i> Some of the process models and standards such as the COBIT [COBIT-2000] and ITIL [ITIL-2002] address “configuration management,” “change management,” and “release management” as separate processes or objectives. In the BPMM the practices for “configuration management” and “change management” are combined and addressed as “configuration management.” In the BPMM “release management is primarily address in the Product and Service Deployment and Product and Service Support process areas.</p>	

<p>CM is implemented separately for each individual work unit (or small number of closely-related work units) or a project responsible for a distinct product release.</p>	<p>CM is addressed at the organization level since the organization's product and service offerings may share configuration items, For some organizations, this will dictate that CM is fully integrated across the organization. For other organizations, this will dictate a federation of CM efforts (for example, within product and service lines) with appropriate coordination and interface mechanisms specified and managed as part of the CM efforts.</p>
<p><i>(Applies to both levels of CM)</i> The work products that are designated as configuration items to be placed under CM are determined based on criteria such as the following:</p> <ul style="list-style-type: none"> • it is one of a collection of work products which are highly interdependent • it is a critical single point of failure for a work effort, system, or operation • multiple versions or variants will exist • more than one person or workgroup will use it for their development or other work • it will be the basis for work products or work efforts in multiple units or organizations • it will be reused in the future • it will impact a work effort, system, or operation if a fault or failure is experienced • it is a work product that when changed may affect the capacity and availability of an offering • it is a work product that should be protected against theft or loss • it is a work product for which information such as the serial number, purchase date, and supplier needs to be recorded and available <p>Individual work products created or modified as part of the transactions or operations of a product and service offering (for example, forms completed as part of the transactions, daily transaction logs, and individual letters to customers) are typically not designated as configuration items and are not placed under CM — however there are exceptions.</p>	
<p><i>(Applies to both levels of CM)</i> Examples of configuration items include</p> <ul style="list-style-type: none"> • product or service requirements specifications • system architecture descriptions • product or service design documents • hardware components • hardware maintenance contracts • developed software components • commercial software packages • software licenses • system operating manuals • process descriptions for performing work • training materials • forms and templates used in performing work • critical records (that satisfy the above criteria for configuration items) resulting from performing work (for example, records from acceptance testing of a system) 	

<p>The CM scope covers the configuration items of a single work unit (or small number of closely-related work units) or a project. CM is performed while the configuration items are in development and/or are maintained by the work unit or project. CM ceases when the work unit completes the work, delivers the configuration items (either to a customer or to another unit in the organization), and relinquishes all ownership responsibilities. A separate CM effort may then be implemented by the receiving customer or unit. But there is not an all-encompassing, end-to-end, conception-to-disposal CM on the configuration items. In cases where configuration items are released to a customer or another unit, but the originating work unit retains maintenance/support responsibility or may reacquire responsibility for maintenance/support of the configuration items, the work unit may continue the CM effort and coverage of the configuration items.</p>	<p>The CM scope covers the organization's product and service offerings for their entire life cycle from conception to disposal, or until the organization delivers the configuration items to an external customer and relinquishes all ownership responsibilities. In cases where configuration items are released to an external customer but the organization retains maintenance/support responsibility or may reacquire responsibility for maintenance/support of the configuration items, the organization may continue the CM effort and coverage of the configuration items.</p>
<p>The scope and content of CM product baselines are determined to a large extent by the scope of responsibilities of the work unit (or small number of closely-related work units) or the project that develops and/or maintains the configuration items, and not primarily by the coupling and cohesion of the configuration items. The types of configuration items contained in a single CM product baseline are usually similar (for example, only software and software documents; only hardware and software documents; or only training materials).</p>	<p>The scope and content of CM product baselines are determined primarily by the coupling and cohesion of the configuration items composing the organization's product and service offerings with only minor consideration to unit and work unit boundaries. Different types of configuration items (for example, software, hardware, process descriptions, training materials, manuals, and forms) that are developed and maintained by separate units in the organization and by suppliers are often contained in a single CM product baseline. The important consideration is that the CM product baselines are determined from an organizational perspective.</p>

<p>Examples of CM product baselines for Work Unit Configuration Management include:</p> <ul style="list-style-type: none"> • the hardware configuration that an workstation installer needs to be controlled and consistent for a desktop workstation (e.g., a standard-configured PC system unit, monitor, keyboard, mouse, and printer) • the software configuration that needs to be controlled and consistent for acceptance testing and installation of a network server (e.g., the requirements specification, design document, and software modules) • the materials an invoicing person needs to be controlled and consistent to perform the work (e.g., training materials, process descriptions, and related forms for preparing invoices) 	<p>Examples of CM product baselines for Organizational Configuration Management can range from simple baselines, similar to those described for Work Unit Configuration Management, to complex baselines. CM product baselines for Organizational Configuration Management are determined by what is needed to most effectively manage the full set of configurations for the organization’s products and services. Typically the CM product baselines for Organizational Configuration Management will include many — even all — of the types of configuration items in the list in the previous item, “examples of configuration items.”</p>
<p>Interdependencies among configuration items that compose a CM product baseline are understood and documented as work unit or project plans. The interdependencies are not necessarily documented and managed as part of the CM efforts.</p>	<p>Interdependencies among configuration items that compose a CM product baseline are explicitly documented and explicitly managed as part of the CM efforts.</p>
<p>Interdependencies among CM product baselines are handled as work unit or project dependencies and commitments, and by communicating and reporting CM change plans and CM changes to the owners of related CM product baselines.</p>	<p>Interdependencies among CM product baselines are explicitly documented and formally managed as part of the CM efforts. The management of the interdependencies is defined by the organization’s CM strategy. (See the previous item on “scope and content of CM product baselines are determined”).</p>
<p>The interdependencies and relationships of the configuration items and CM product baselines are informally managed by the owners of the CM product baselines.</p>	<p>A configuration architecture is defined and managed as a configuration item.</p>
<p><i>(Applies to both levels of CM)</i> The CM effort manages the creation and changes to the identified configuration items and CM product baselines.</p>	

	<p>The CM effort also manages designated configuration data about the configuration items and CM product baselines that are important to managing the configuration across the whole life cycle of the product and service offerings. Examples of these configuration data include:</p> <ul style="list-style-type: none"> • financial data, such as the cost and current value • installation information • operational status • problem and change history • expiration/replacement information • usage and consumption • supplier and license information • spares and supplies provisioning data
<p>CM audits are performed by the work unit to ensure integrity of the work unit’s or project’s CM system, configuration items, CM product baselines, and CM records.</p>	<p>CM audits are performed by the organization (consistent with the previous items on “CM scope” and “scope and content of CM product baselines are determined”) to ensure the integrity of the organization’s CM system or systems, configuration items, CM product baselines, deployment of the CM product baselines into product and service offerings, CM records, and the relationships among the CM product baselines.</p>