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Information technology — Process assessment

Part 6: An exemplar system life cycle
process assessment model

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National foreword

This British Standard is the UK implementation of ISO/IEC 15504-6:2013. It supersedes PD ISO/IEC TR 15504-6:2008 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee IST/15, Software and systems engineering.

A list of organizations represented on this committee can be obtained on request to its secretary.

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**Information technology — Process
assessment —**

**Part 6:
An exemplar system life cycle process
assessment model**

Technologies de l'information — Évaluation des procédés —

*Partie 6: Un exemple de modèle d'évaluation des procédés du cycle de
vie d'un système*



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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 15504-6 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and systems engineering*.

This first edition of ISO/IEC 15504-6 cancels and replaces ISO/IEC TR 15504-6:2008.

- Clause 2 is modified by updating the reference to ISO/IEC 15288;
- Clauses 4 and 5 are replaced with new text provided below;
- Clause 6.6 is replaced with new text provided below;
- Annex B.2 is replaced with new text provided below;
- The Bibliography is updated to reflect current versions of works referenced.

ISO/IEC 15504 consists of the following parts, under the general title *Information technology — Process assessment*:

- Part 1: Concepts and vocabulary
- Part 2: Performing an assessment
- Part 3: Guidance on performing an assessment
- Part 4: Guidance on use for process improvement and process capability determination
- Part 5: An exemplar software life cycle process assessment model
- Part 6: An exemplar system life cycle process assessment model
- Part 7: Assessment of organizational maturity
- Part 8: An exemplar process assessment model for IT service management
- Part 9: Target process profiles
- Part 10: Safety extension

Introduction

This part of ISO/IEC 15504 provides an example of a System Life Cycle Process Assessment Model for use in performing a conformant assessment in accordance with the requirements of ISO/IEC 15504-2.

An integral part of conducting an assessment is to use a process assessment model that is constructed for that purpose, is related to a process reference model and is conformant with ISO/IEC 15504-2, which sets out the minimum requirements for performing an assessment in order to ensure consistency and repeatability of the ratings.

A process reference model cannot be used alone as the basis for conducting consistent and reliable assessments of process capability because it requires greater detail to indicate process performance and capability. Therefore:

- the descriptions of process purpose and process outcomes provided by a process reference model need to be supported with a comprehensive set of indicators of process performance; and
- the capability levels and process attributes defined in ISO/IEC 15504-2 and its associated rating scale need to be supported with a set of indicators of process capability.

This additional detail describes a process reference model in terms of a process assessment model that can enable the assessment of consistent and repeatable ratings of process capability.

This Process Assessment Model contains a set of indicators to be considered when interpreting the intent of its Process Reference Model. These indicators may also be used when implementing a process improvement program or to help evaluate and select an assessment model, method, methodology or tools.

The Process Reference Model defined in ISO/IEC 15288:2008 has been used as the basis for the Process Assessment Model in this part of ISO/IEC 15504.

As an exemplar, this Process Assessment Model embodies the core characteristics that could be expected of any Process Assessment Model consistent with ISO/IEC 15504-2. Nevertheless, use of this Process Assessment Model is not required to meet the requirements of ISO/IEC 15504; any other process assessment models meeting the requirements of ISO/IEC 15504-2 may be used in a conformant assessment.

This part of ISO/IEC 15504 has a similar structure to Part 5. It may be used in conjunction with Part 5 for joint assessment of system life cycle processes and software life cycle processes.

This part of ISO/IEC 15504 uses the classification structure of the information work products used in ISO 15289 *Systems and software engineering — Content of systems and software life cycle process information products (Documentation)* as a basis for the Generic Work Products.

Within this part of ISO/IEC 15504:

- Clause 4 provides a detailed description of the structure and key components of a process assessment model, which includes two dimensions: a process dimension and a capability dimension. Assessment indicators are introduced in this clause;
- Clause 5 addresses the process dimension. It uses process definitions from ISO/IEC 15288 to designate the Process Reference Model. The processes of the Process Reference Model are described in the Process Assessment Model in terms of purpose and outcomes and are grouped in four process categories. The Process Assessment Model expands the Process Reference Model process definitions by including a set of process performance indicators called base practices for each process. The Process Assessment Model also defines a second set of indicators of process performance by associating work

products with each process. Clause 5 is also linked directly to Annex B, which defines the work product characteristics;

- Clause 6 addresses the capability dimension. It duplicates the definitions of the capability levels and process attributes from ISO/IEC 15504-2, and expands each of the nine attributes through the inclusion of a set of generic practices. These generic practices belong to a set of indicators of process capability, in association with generic resource indicators, and generic work product indicators. Annex B is also linked directly to Clause 6 as it defines the work product characteristics;
- Annex A provides a statement of conformance of the Process Assessment Model to the requirements defined in ISO/IEC 15504-2;
- Annex B provides selected characteristics for typical work products to assist the assessor in evaluating the capability level of processes;
- Annex C contains style guides for defining base practices, work products and generic practices for adjusting the Process Assessment Model, and guidance explaining how to expand or adapt the model; and
- The bibliography contains a list of informative references.

Information technology — Process assessment —

Part 6:

An exemplar system life cycle process assessment model

1 Scope

This part of ISO/IEC 15504 constitutes a Process Assessment Model, conformant with the requirements of ISO/IEC 15504-2, for the assessment of process capability of system life cycle processes.

The Process Dimension of this Process Assessment Model is based upon the Process Reference Model contained in ISO/IEC 15288.

This part of ISO/IEC 15504 provides a new Process Dimension for the Process Assessment Model derived from the revised Process Reference Model contained in ISO/IEC 15288:2008.

The scope of this part of ISO/IEC 15504 is consistent with the scope of ISO/IEC 15504-5 in order to assist situations where assessment is being made of both system and software life cycle processes.

NOTE Users of this part of ISO/IEC 15504 can freely reproduce the detailed descriptions contained in the exemplar assessment model as part of any tool or other material to support the performance of process assessments, so that it can be used for its intended purpose.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 15288:2008, *Systems and software engineering — System life cycle processes*

ISO/IEC 15504-1:2004, *Information technology — Process assessment — Part 1: Concepts and Vocabulary*

ISO/IEC 15504-2:2003, *Information technology — Process assessment — Part 2: Performing an Assessment*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 15504-1 apply.

4 Overview of the exemplar Process Assessment Model

4.1 Introduction to Overview

This part of ISO/IEC 15504 provides an exemplar Process Assessment Model that includes examples of assessment indicators.

The Process Reference Model defined in ISO/IEC 15288, associated with the process attributes defined in ISO/IEC 15504-2, establish a Process Assessment Model used as a common basis for performing assessments of systems engineering process capability, allowing for the reporting of results using a common rating scale.

The Process Assessment Model is a two-dimensional model of process capability. In one dimension, the process dimension, the processes are defined and classified into process categories. In the other dimension, the capability dimension, a set of process attributes grouped into capability levels is defined. The process attributes provide the measurable characteristics of process capability.

Figure 1 shows the relationship between the general structure of the Process Assessment Model, ISO/IEC 15504-2 and ISO/IEC 15288.

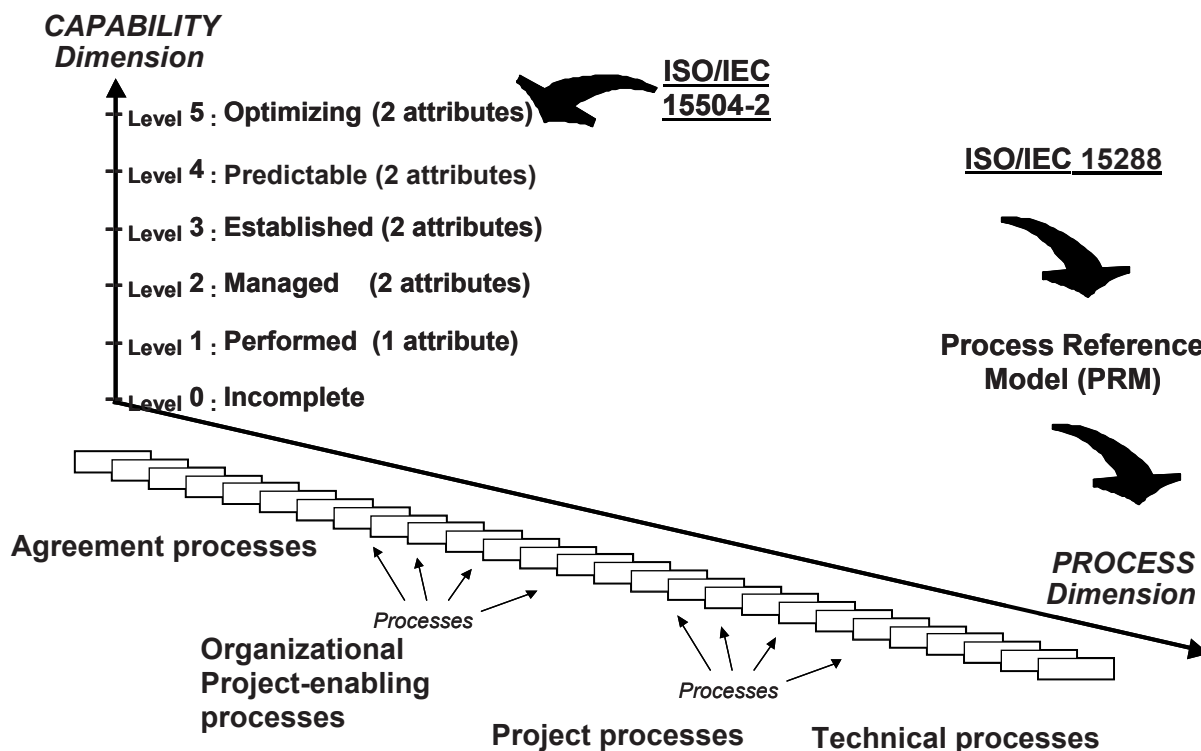


Figure 1 — Relationship between the Process Assessment Model and its inputs

A process reference model and a capability dimension defined in ISO/IEC 15504-2 cannot be used alone as the basis for conducting reliable and consistent assessments of process capability since the level of detail provided is not sufficient. The descriptions of process purpose and outcomes in a process reference model, and the process attribute definitions in ISO/IEC 15504-2, need to be supported with a comprehensive set of indicators of process performance and process capability that are used for assessment performance.

The exemplar Process Assessment Model defined in this part of ISO/IEC 15504 is conformant with the ISO/IEC 15504-2 requirements for a Process Assessment Model, and can be used as the basis for conducting an assessment of systems engineering process capability.

In order to meet the process assessment model requirements of ISO/IEC 15504-2, a documented process supporting other requirements of ISO/IEC 15504-2 is also required. This need may be met, for example, by the adoption of a supporting method for conducting assessments.

4.2 Structure of the exemplar Process Assessment Model

This clause describes the detailed structure of the Process Assessment Model and its key components.

This Process Assessment Model expands upon the Process Reference Model by including a defined set of assessment indicators. Assessment indicators comprise indicators of process performance and process

capability and are defined to support an assessor's judgment of the performance and capability of an implemented process.

Clause 5, together with its associated Annex B, describes the components of the process dimension, and Clause 6 describes the components of the capability dimension. Annex A provides a statement of conformance of the Process Assessment Model to the requirements defined in ISO/IEC 15504-2.

ISO/IEC 15504-2 requires that processes included in a process reference model satisfy the following:

"The fundamental elements of a Process Reference Model are the set of descriptions of the processes within the scope of the model. These process descriptions shall meet the following requirements:

a) A process shall be described in terms of its Purpose and Outcomes.

b) In any description the set of process outcomes shall be necessary and sufficient to achieve the purpose of the process.

c) Process descriptions shall be such that no aspects of the measurement framework as described in clause 5 of this International Standard beyond level 1 are contained or implied."

As processes are derived directly from ISO/IEC 15288, these requirements are satisfied.

The Process Assessment Model includes processes, which are grouped in four process groups identical to the process groups in ISO/IEC 15288. The four process groups are:

- the Agreement system life cycle processes group;
- the Organizational project-enabling processes system life cycle processes group;
- the Project system life cycle processes group;
- the Technical system life cycle processes group.

In addition, the Tailoring Process is included since this is defined in a normative Annex of ISO/IEC 15288. The Tailoring Process is presented before the four process groups in order to align subsequent clause numbering of processes in this document with equivalent processes in ISO/IEC 15288.

4.2.1 Processes

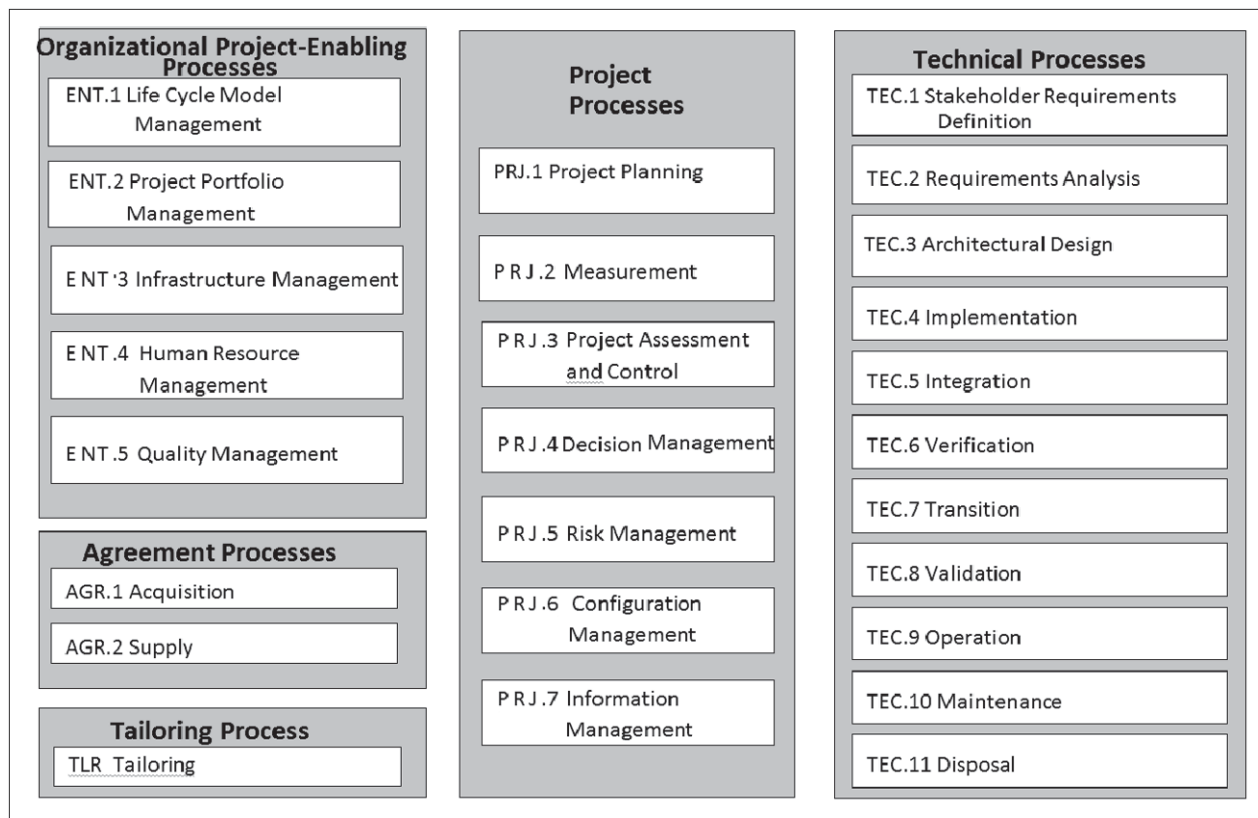


Figure 2 — Process Grouping

Figure 2 lists the processes from ISO/IEC 15288, which are included in the process dimension of the exemplar System Life Cycle Process Assessment Model.

Each Process Group includes a list of the processes it contains. Each process is identified with a Process Identifier [ID] consisting of the Group abbreviated name and a sequential number of the process in that Group.

The Process Groups are described in more detail below.

4.2.1.1 Agreement System Life Cycle Process Group

The Agreement process group consists of processes performed in order to establish agreements with organizational entities external and internal to the organization. These processes define the activities necessary to establish an agreement between two organizations. Invocation of the Acquisition Process provides the means for conducting business with a supplier of products that are supplied for use as an operational system, of services in support of an operational system, or of elements of a system being developed by a project. Invocation of the Supply Process provides the means for conducting a project in which the result is a product or service that is delivered to the acquirer.

This group includes the processes listed in Table 1.

Table 1 — Agreement System Life Cycle Process Group

Process Identification	Process name
AGR.1	Acquisition Process
AGR.2	Supply Process

4.2.1.2 Enterprise System Life Cycle Process Group

The Enterprise process group consists of processes performed in order to manage the organization's capability to acquire and supply products or services through the initiation, support and control of projects. They provide resources and infrastructure necessary to support projects and ensure the satisfaction of organizational objectives and established agreements. They are not intended to be a comprehensive set of business processes that enable strategic management of the organization's business.

This group includes the processes listed in Table 2.

Table 2 — Organizational Project-Enabling System Life Cycle Process Group

Process Identification	Process name
ENT.1	Life Cycle Model Management Process
ENT.2	Project Portfolio Management Process
ENT.3	Infrastructure Management Process
ENT.4	Human Resource Management Process
ENT.5	Quality Management Process

4.2.1.3 Project System Life Cycle Process Group

The Project process group consists of processes performed in order to establish and evolve project plans, to assess actual achievement and progress against the plans and to control execution of the project through to fulfilment. Individual Project Processes may be invoked at any time in the life cycle and at any level in a hierarchy of projects, as required by project plans or unforeseen events. The Project Processes are applied with a level of rigour and formality that depends on the risk and complexity of the project.

This group includes the processes listed in Table 3.

Table 3 — Project System Life Cycle Process Group

Process Identification	Process name
PRJ.1	Project Planning Process
PRJ.2	Measurement Process
PRJ.3	Project Assessment and Control Process
PRJ.4	Decision Management Process
PRJ.5	Risk Management Process
PRJ.6	Configuration Management Process
PRJ.7	Information Management Process

4.2.1.4 Technical System Life Cycle Process Group

The Technical process group consists of processes performed in order to define the requirements for a system; to transform the requirements into an effective product; to permit consistent reproduction of the product where necessary; to use a product to provide the required services; to sustain the provision of those services; and to dispose of the product when it is retired from service.

This group includes the processes listed in Table 4.

The Technical Processes define the activities that enable enterprise and project functions to optimize the benefits and reduce the risks that arise from technical decisions and actions. These activities enable products and services to possess the timeliness and availability, the cost effectiveness, and the functionality, reliability, maintainability, producibility, usability and other qualities required by acquiring and supplying organizations. They also enable products and services to conform to the expectations or legislated requirements of society, including health, safety, security and environmental factors.

Table 4 —Technical System Life Cycle Process Group

Process Identification	Process name
TEC.1	Stakeholder Requirements Definition Process
TEC.2	Requirements Analysis Process
TEC.3	Architectural Design Process
TEC.4	Implementation Process
TEC.5	Integration Process
TEC.6	Verification Process
TEC.7	Transition Process
TEC.8	Validation Process
TEC.9	Operation Process
TEC.10	Maintenance Process
TEC.11	Disposal Process

4.2.1.5 Tailoring Process

The Tailoring Process is performed in order to adapt the system life cycle processes of ISO/IEC 15288 and to define the life cycle stages that describe a life cycle model appropriate to particular circumstances of an organization. This process is derived from the requirements of the System Life Cycle Processes Management Process.

4.2.2 Process dimension

The process dimension of the Process Assessment Model includes all processes listed in Figure 2. The processes are classified into 5 Process Groups. Each process in the Process Assessment Model is described in terms of a purpose statement. These statements contain the unique functional objectives of the process when performed in a particular environment. A list of specific outcomes is associated with each of the process purpose statements, as a list of expected positive results of the processes' performance.

Satisfying the purpose statements of a process represents the first step in building a level 1 process capability where the expected outcomes are observable. The Process Groups and their associated processes are described in Clause 5.

4.2.3 Capability dimension

For the capability dimension, the process capability levels and process attributes are identical to those defined in ISO/IEC 15504-2.

Evolving process capability is expressed in the Process Assessment Model in terms of process attributes grouped into capability levels. Process attributes are features of a process that can be evaluated on a scale of achievement, providing a measure of the capability of the process. They are applicable to all processes. Each process attribute describes a facet of the overall capability of managing and improving the effectiveness of a process in achieving its purpose and contributing to the business goals of the organization.

A capability level is a set of process attribute(s) that work together to provide a major enhancement in the capability to perform a process. The levels constitute a rational way of progressing through improvement of the capability of any process and are defined in ISO/IEC 15504-2.

There are six capability levels, incorporating nine process attributes.

Level 0: Incomplete process

The process is not implemented, or fails to achieve its process purpose.

At this level, there is little or no evidence of any systematic achievement of the process purpose.

Level 1: Performed process

The implemented process achieves its process purpose.

Level 2: Managed process

The previously described Performed process is now implemented in a managed fashion (planned, monitored and adjusted) and its work products are appropriately established, controlled and maintained.

Level 3: Established process

The previously described Managed process is now implemented using a defined process that is capable of achieving its process outcomes.

Level 4: Predictable process

The previously described Established process now operates within defined limits to achieve its process outcomes.

Level 5: Optimizing process

The previously described Predictable process is continuously improved to meet relevant current and projected business goals.

Within the Process Assessment Model, the measure of capability is based upon the nine process attributes (PA) defined in ISO/IEC 15504-2. Process attributes are used to determine whether a process has reached a given capability. Each attribute measures a particular aspect of the process capability.

At each level there is no ordering between the process attributes; each attribute addresses a specific aspect of the capability level. The list of process attributes is shown in Table 5.

Table 5 — Capability levels and process attributes

Process Attribute ID	Capability Levels and Process Attributes
	Level 0: Incomplete process
	Level 1: Performed process
PA 1.1	Process performance
	Level 2: Managed process
PA 2.1	Performance management
PA 2.2	Work product management
	Level 3: Established process
PA 3.1	Process definition
PA 3.2	Process deployment
	Level 4: Predictable process
PA 4.1	Process measurement
PA 4.2	Process control
	Level 5: Optimizing process
PA 5.1	Process innovation
PA 5.2	Continuous optimization

The process attributes are evaluated on a four point ordinal scale of achievement, as defined in ISO/IEC 15504-2. They provide insight into the specific aspects of process capability required to support process improvement and capability determination.

4.3 Assessment Indicators

The Process Assessment Model is based on the principle that the capability of a process can be assessed by demonstrating the achievement of process attributes on the basis of evidence related to assessment indicators.

There are two types of assessment indicators: process capability indicators, which apply to capability levels 1 to 5 and process performance indicators, which apply exclusively to capability level 1. These indicators are defined in Clause 4.3.2.

The process attributes in the capability dimension have a set of process capability indicators that provide an indication of the extent of achievement of the attribute in the instantiated process. These indicators concern significant activities, resources or results associated with the achievement of the attribute purpose by a process.

The process capability indicators are:

- Generic Practice (GP);
- Generic Resource (GR);
- Generic Work Product (GWP).

As additional indicators for supporting the assessment of a process at Level 1, each process in the process dimension has a set of process performance indicators which is used to measure the degree of achievement of the process performance attribute for the process assessed.

The process performance indicators are:

- Base Practice (BP);
- Work Product (WP).

The performance of Base Practices (BPs) provides an indication of the extent of achievement of the process purpose and process outcomes. Work Products (WPs) are either used or produced (or both), when performing the process.

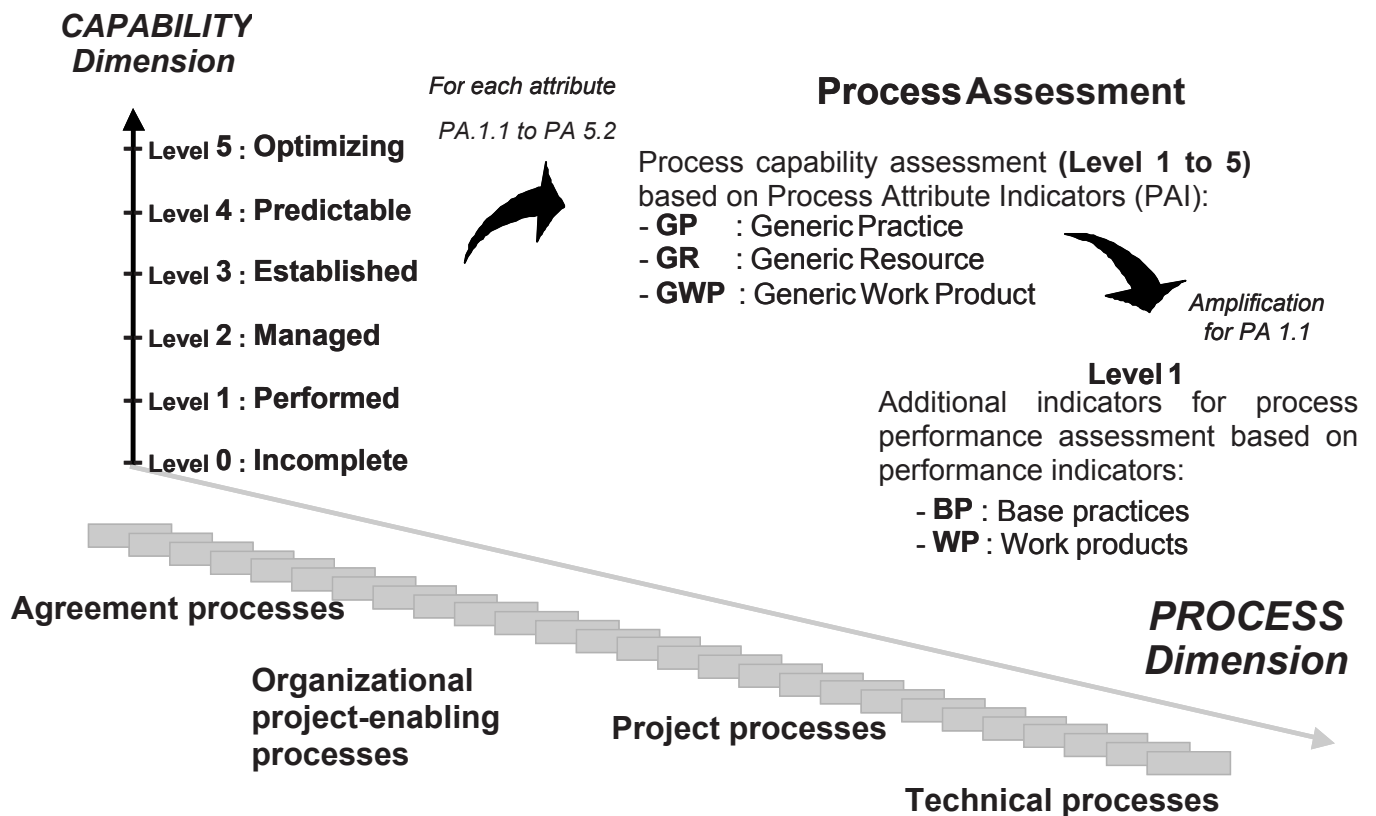


Figure 3 — Assessment indicators

The process performance and process capability indicators defined in the Process Assessment Model represent types of objective evidence that might be found in an instantiation of a process and therefore could be used to judge achievement of capability.

Figure 3 shows how the assessment indicators are related to process performance and process capability.

4.3.1 Process Capability Indicators

The three types of process capability indicators related to levels 1 to 5 are identified in Figure 4. They are intended to be applicable to all processes.

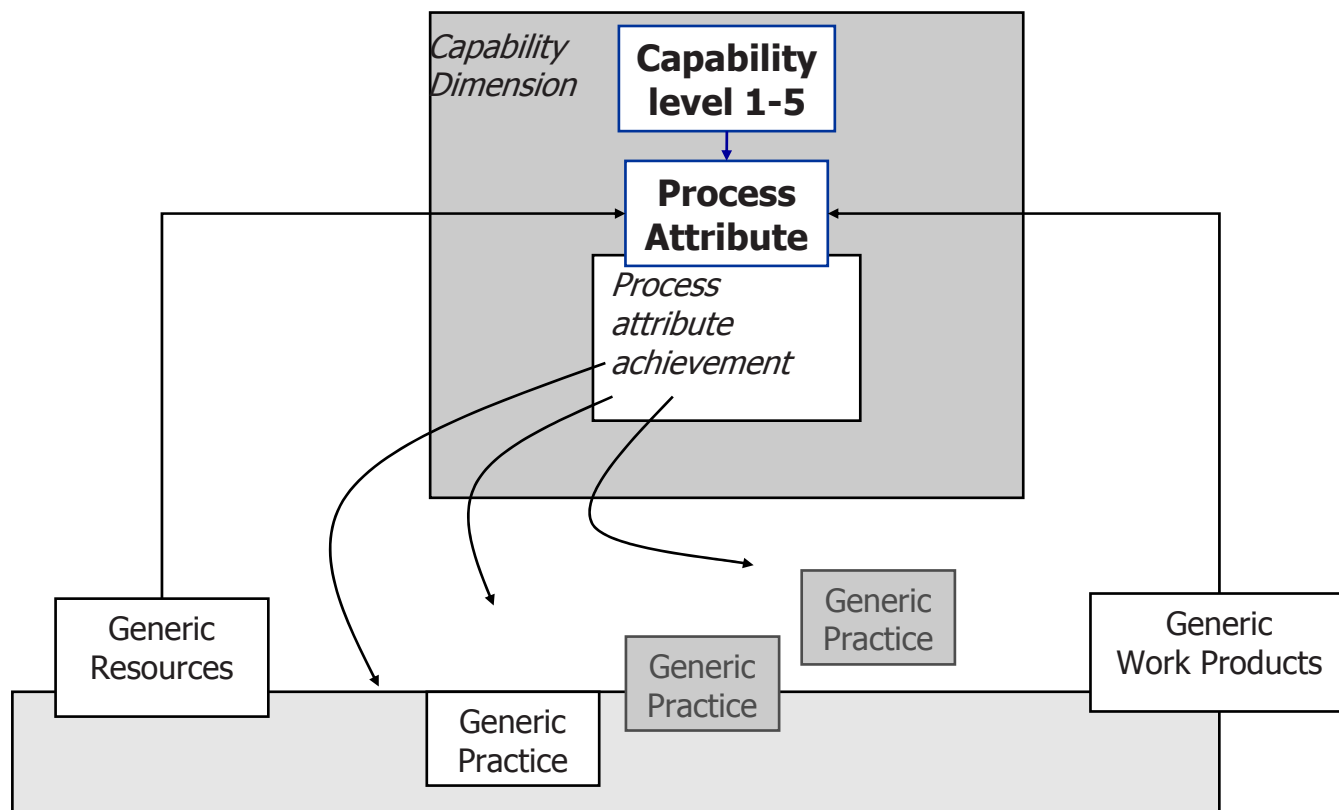


Figure 4 — Process capability indicators

All the process capability indicators relate to the process attributes defined in the capability dimension of the Process Assessment Model. They represent the type of evidence that would support judgments of the extent to which the attributes are achieved. Evidence of their effective performance or existence supports the judgment of the degree of achievement of the attribute. The generic practices are the principal indicators of process capability.

The **Generic Practice (GP)** indicators are activities of a generic type and provide guidance on the implementation of the attribute's characteristics. They support the achievement of the process attribute and many of them concern management practices, i.e. practices that are established to support the process performance as it is characterized at level 1. In general, performance of all generic practices is expected for full achievement of the process attribute.

The **Generic Resource (GR)** indicators are associated resources that may be used when performing the process in order to achieve the attribute. These resources may include human resources, tools, methods and infrastructure. The availability of a resource indicates the potential to fulfil the purpose of a specific attribute.

NOTE The assessor should interpret the generic resources according to the process assessed; e.g. for PA2.1 resources (with identified objectives, responsibilities and authorities) an assessor would look for roles (with identified objectives, responsibilities and authorities) in project and technical processes, but for enterprise and agreement processes would look for governance structures, e.g. mandated committees, positions, (with identified objectives, responsibilities and authorities).

The **Generic Work Product (GWP)** indicators are sets of characteristics that would be expected to be evident in work products of generic types as a result of achievement of an attribute. The generic work products form the basis for the classification of the work products defined as process performance indicators; they represent basic types of work products that may be inputs to or outputs from all types of process.

These three types of indicators help to establish objective evidence of the extent of achievement of the specified process attribute.

Due to the fact that Level 1 capability of a process is only characterized by the measure of the extent to which the process purpose is achieved, the process performance attribute (PA.1.1) has a single generic practice indicator (GP.1.1.1). In order to support the assessment of PA.1.1 and to amplify the process performance achievement analysis, additional process performance indicators are defined in the Process Assessment Model.

4.3.2 Process Performance Indicators

There are two types of process performance indicators: **Base Practice (BP)** indicators and **Work Product (WP)** indicators. Process performance indicators relate to individual processes defined in the process dimension of the Process Assessment Model and are chosen to explicitly address the achievement of the defined process purpose.

Evidence of performance of the base practices, and the presence of work products with their expected work product characteristics, provide objective evidence of the achievement of the purpose of the process.

A base practice is an activity that addresses the purpose of a particular process. Consistently performing the base practices associated with a process will help the consistent achievement of its purpose. A coherent set of base practices is associated with each process in the process dimension. The base practices are described at an abstract level, identifying "what" should be done without specifying "how". Implementing the base practices of a process should achieve the basic outcomes that reflect the process purpose. Base practices represent only the first step in building process capability, but the base practices represent the unique, functional activities of the process, even if that performance is not systematic. The performance of a process produces work products that are identifiable and usable in achieving the purpose of the process. In this assessment model, each work product has a defined set of example work product characteristics that may be used when reviewing the work product to assess the effective performance of a process. Work product characteristics may be used to identify the corresponding work product produced/used by the assessed organization.

Clause 5 contains a complete description of the processes, including the base practices and the associated work products.

Annex B.1 contains a list of generic work products together with the work product characteristics.

Annex B.2 contains a complete list of specific work products, with the generic work products for completeness. Similar to the concept of modularity in object orientation, the shared characteristics of a group of work products have been extracted into a generic work product. An assessor would refer to both the specific work product and the generic work product in the context of the specific work product (e.g. 3.09 project management plan and 3.00 plan) when performing an assessment.

4.4 Measuring process capability

The process performance and process capability indicators in this model give examples of evidence that an assessor might obtain, or observe, in the performance of an assessment. The evidence obtained in the assessment, through observation of the implemented process, can be mapped onto the set of indicators to enable correlation between the implemented process and the processes defined in this assessment model. These indicators provide guidance for assessors in accumulating the necessary objective evidence to support judgments of capability. They are not mandatory.

An indicator is defined as an objective characteristic of a practice or work product that supports the judgment of the performance or capability of an implemented process. The assessment indicators, and their relationship to process performance and process capability, are shown in Figure 5.

Assessment indicators are used to confirm that certain practices were performed, as shown by observable evidence collected during an assessment. All such evidence comes either from the examination of work products of the processes assessed, or from statements made by the performers and managers of the processes.

The existence of base practices, work products, and work product characteristics, provide evidence of the performance of the processes associated with them. Similarly, the existence of process capability indicators provides evidence of process capability.

The evidence obtained should be recorded in a form that clearly relates to an associated indicator, so that the support for the assessor's judgment can be readily confirmed or verified as required by ISO/IEC 15504-2.

The output from a process assessment is a set of process profiles, one for each process within the scope of the assessment. A typical process profile is illustrated in ISO/IEC 15504-4. Each process profile consists of a set of the process attribute ratings for an assessed process. Each attribute rating represents a judgment by the assessor of the extent to which the attribute is achieved. To improve the reliability and repeatability of the assessment, the judgments of the assessor are based on a coherent set of recorded objective evidences.

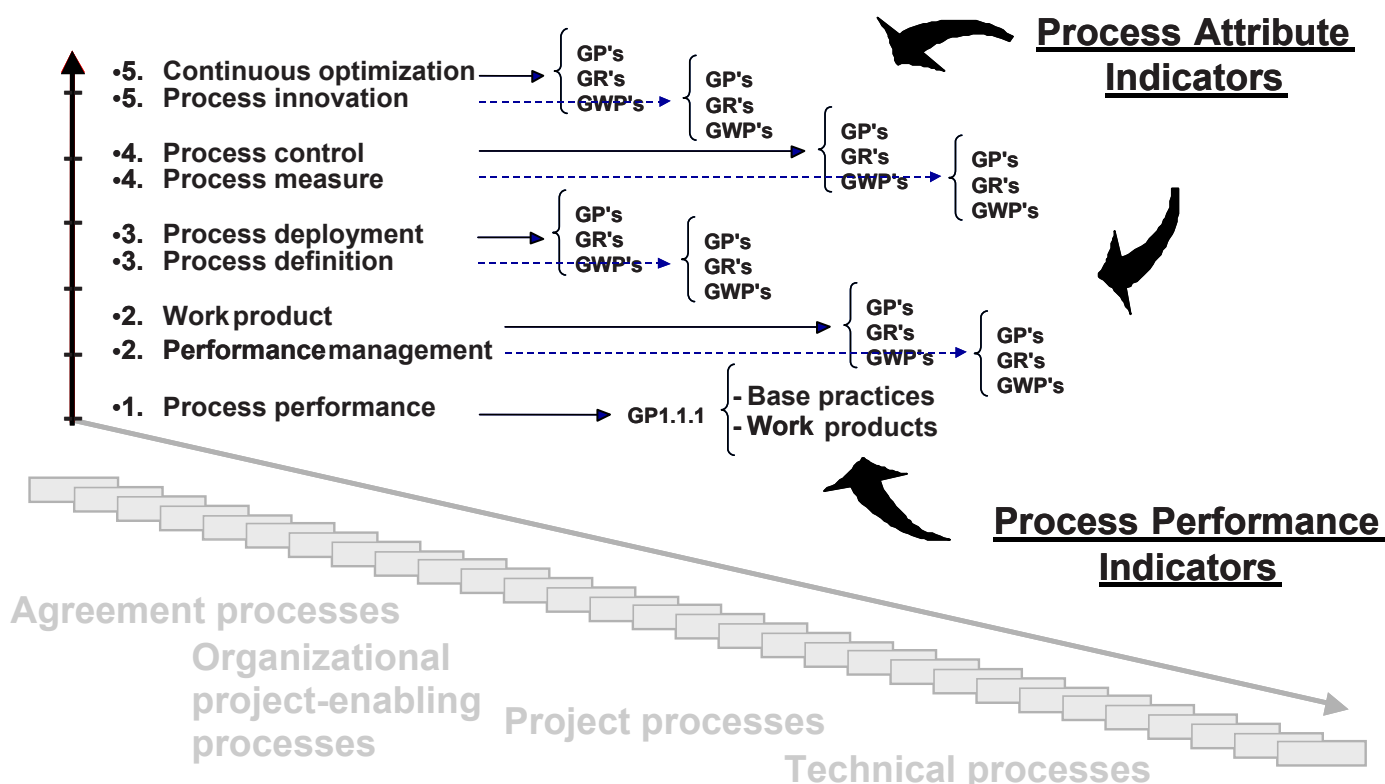


Figure 5 — Relationship between assessment indicators and process capability

5 The process dimension

5.1 Processes and Process Performance Indicators (level 1)

This clause defines the processes and the process performance indicators, also known as the process dimension, of the Process Assessment Model. The processes in the process dimension can be directly mapped to the processes defined in the Process Reference Model.

The processes are classified (for the purpose of this Process Assessment Model) into Process Groups which are listed in Clause 4.

The individual processes are described in terms of Process Name, Process Purpose, and Process Outcomes as defined in ISO/IEC 15288.

In addition, the process dimension of the Process Assessment Model provides information in the form of:

- a) a set of base practices for the process providing a definition of the tasks and activities needed to accomplish the process purpose and fulfil the process outcomes; each base practice is explicitly associated to a process outcome;
- b) a number of input and output work products associated with each process and related to one or more of its outcomes; and
- c) characteristics associated with each work product.

The process purposes, outcomes, the base practices and the work products associated with the processes are included in this clause. An explanation of the table format is provided in Annex C. The work product characteristics are contained in Annex B. The base practices and work products constitute the set of indicators of process performance.

The associated work products listed in this clause may be used when reviewing potential inputs and outputs of an organization's process implementation.

The associated work products provide objective guidance for potential inputs and outputs to look for, and objective evidence supporting the assessment of a particular process. A documented assessment process and assessor judgment is needed to ensure that process context (application domain, business purpose, development methodology, size of the organization, etc.) is explicitly considered when using this information. This list should not be considered as a checklist of what each organization must have but rather as an example and starting point for considering whether, given the context, the work products are necessary and contributing to the intended purpose of the process.

These work products are identified with their work product identifier number as used in the Annex B.

5.2 Agreement Processes (AGR)

5.2.1 Introduction

The Agreement Processes consist of the following:

- a) Acquisition Process;
- b) Supply Process.

5.2.2 AGR.1 Acquisition Process

Process ID	AGR.1
Process Name	Acquisition Process
Process Purpose	The purpose of the Acquisition Process is to obtain a product or service in accordance with the acquirer's requirements.
Process Outcomes	As a result of the successful implementation of the Acquisition Process: a) A strategy for the acquisition is established. b) One or more supplier is selected. c) Communication with the supplier is maintained. d) An agreement to acquire a product or service according to defined acceptance criteria is established.

	e) A product or service complying with the agreement is accepted. f) Payment or other consideration is rendered.
Base Practices	AGR.1.BP.1: Define acquisition strategy. [Outcome: a] Establish a strategy for how the acquisition will be conducted. NOTE This strategy includes reference to the life cycle model, a schedule of milestones and selection criteria if the supplier is external to the acquiring organization. AGR.1.BP.2: Prepare acquisition request. [Outcome: b] Prepare a request for the supply of a product or service. NOTE Provide a definition of requirements to one or more suppliers. If a supplier is external to organization, then the request can include the business practices with which a supplier is expected to comply and the criteria for selecting a supplier. AGR.1.BP.3: Communicate acquisition request. [Outcome: b] Communicate the request for the supply of a product or service to identified suppliers. NOTE This may include supply chain management partnering which exchanges information with related suppliers and acquirers to achieve a harmonized or collective approach to common technical and commercial issues. AGR.1.BP.4: Select supplier. [Outcome: b,] Select one or more suppliers. NOTE To obtain competitive solicitations, proposals to supply are evaluated and compared against the selection criteria. Where proposals include offerings that are not covered by the criteria, then the proposals are compared with each other to determine their order of suitability and thus supplier preference. The justification for rating each proposal is declared and suppliers may be informed why they were selected or were not selected. AGR.1.BP.5: Negotiate agreement. [Outcome: c,d] Negotiate an agreement with the supplier. NOTE This agreement may range in formality from a written contract to a verbal understanding. Appropriate to the level of formality, the agreement establishes requirements, development and delivery milestones, verification, validation and acceptance conditions, exception handling procedures, change control procedures and payment schedules, so that both parties of the agreement understand the basis for executing the agreement. Rights and restrictions associated with technical data and intellectual property are noted in the agreement. The negotiation is complete when the acquirer accepts the terms of an agreement offered by the supplier. Commence the agreement with the supplier. AGR.1.BP.6: Assess supplier performance. [Outcome: c] Assess the execution of the agreement.

	NOTE This includes confirmation that both parties are meeting their responsibilities according to the agreement. Projected cost, performance and schedule risks are monitored, and the impact of undesirable outcomes on the organization is evaluated regularly. Variations to the terms of the agreement are negotiated as necessary. Provide data needed by the supplier and resolve issues in a timely manner. AGR.1.BP.7: Confirm product or service compliance. [Outcome: e] Confirm that the delivered product or service complies with the agreement. NOTE Exceptions that arise during the conduct of the agreement or with the delivered product or service are resolved according to the procedures established in the agreement. AGR.1.BP.8: Closure of agreement. [Outcome: f] Make payment or provide other agreed consideration to the supplier for the product or service rendered that is required for closure of the agreement. NOTE When the supplied product or service has satisfied the conditions of the agreement, the acquirer concludes the agreement by rendering payment or other agreed consideration.
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Work Products	
Inputs	Outputs
2.07 stakeholders profile 3.02 supply strategy 3.03 business strategy 3.10 project acquisition plan 5.23 payment record 6.03 supply performance report 7.03 supply proposal 7.04 supply agreement change request 7.06 supplier directive 8.03 supply agreement 8.21 implementation enabling system requirement 8.23 integration enabling system requirement 8.25 verification enabling system requirement 8.27 transition enabling system requirement 8.29 validation enabling system requirement 8.31 maintenance enabling system requirement 8.33 disposal enabling system requirement	1.14 supplier payment [Outcome: f] 3.01 acquisition strategy [Outcome: a] 4.01 supplier selection procedure [Outcome: b] 5.01 supplier justification record [Outcome: b] 6.01 supplier assessment report [Outcome: c] 6.02 delivery acceptance report [Outcome: e] 7.01 acquisition request [Outcome: b] 7.02 acquisition agreement change request [Outcome: d] 8.01 acquisition agreement [Outcome: d] 8.02 delivery acceptance criteria [Outcome: e]

5.2.3 AGR.2 Supply Process

Process ID	AGR.2
Process Name	Supply Process
Process Purpose	The purpose of the Supply Process is to provide an acquirer with a product or service that meets agreed requirements.
Process Outcomes	As a result of the successful implementation of the Supply Process: a) An acquirer for a product or service is identified. b) A response to the acquirer's request is made. c) An agreement to supply a product or service according to defined acceptance criteria is established. d) Communication with the acquirer is maintained. e) A product or service conforming to the agreement is supplied according to agreed delivery procedures and conditions. f) Responsibility for the acquired product or service, as directed by the agreement, is transferred. g) Payment or other agreed consideration is received.
Base Practices	AGR.2.BP.1: Identify supply opportunity. [Outcome: a] Determine the existence and identity of an acquirer who has, or who represents an organization or organizations having, a need for a product or service. NOTE For a product or service developed for consumers, an agent, e.g. a marketing function within the supplier organization, may represent the acquirer. AGR.2.BP.2: Evaluate supply request. [Outcome: a] Evaluate a request for the supply of a product or service to determine feasibility and how to respond. AGR.2.BP.3: Prepare supply response. [Outcome: b] Prepare a response that satisfies the solicitation. AGR.2.BP.4: Negotiate agreement. [Outcome: c] Negotiate an agreement with the acquirer. NOTE This agreement may range in formality from a written contract to a verbal understanding. Negotiate the differences, where applicable, between the acquisition request or tasking statement and the capability expressed in the response. The Supplier confirms that the requirements, delivery milestones and acceptance conditions are achievable, that exception handling and change control procedures and payment schedules are acceptable, and that they establish a basis for executing the agreement without unnecessary risks. In the agreement or project plans, the supplier should define or select a life cycle model appropriate to the scope, magnitude, and complexity of the project. Ideally, this is performed by using an organizationally-defined life cycle model.

	Commence the agreement with acquirer. AGR.2.BP.5: Execute supply agreement. [Outcome: d,e] Execute the agreement according to the Supplier's established project plans and in accordance with the agreement. NOTE A supplier may adopt, or agree to use, acquirer processes. AGR.2.BP.6: Assess supply performance. [Outcome: d] Assess the execution of the agreement. NOTE Projected cost, performance and schedule risks are monitored and communicated to the acquirer as appropriate. The impact of undesirable outcomes on the organization is evaluated. AGR.2.BP.7: Deliver product or service. [Outcome: e] Deliver the product or service in accordance with the agreement criteria. Provide assistance to the acquirer in support of the delivered system or service in accordance with the agreement criteria. AGR.2.BP.8: Receive payment. [Outcome: g] Accept and acknowledge payment or other agreed consideration. AGR.2.BP.9: Transfer responsibility and knowledge. [Outcome: c,f] Transfer the responsibility for the product or service to the acquirer, or other party, as directed by the agreement to obtain closure of the agreement.
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Work Products	
Inputs	Outputs
1.10 validated system 1.14 supplier payment 2.07 stakeholders profile 3.01 acquisition strategy 3.03 business strategy 4.01 supplier selection procedure 5.01 supplier justification record 5.03 decision history record 5.05 risk history record 5.07 configuration history record 5.08 information history record 7.01 acquisition request 7.02 acquisition agreement change request 7.05 project control directive 7.07 supply agreement change directive 7.10 operation request 7.11 maintenance request 8.01 acquisition agreement 8.02 delivery acceptance criteria	1.01 supplied system [Outcome: e] 3.02 supply strategy [Outcome: a] 5.23 payment record [Outcome: g] 6.03 supply performance report [Outcome: d] 7.03 supply proposal [Outcome: b] 7.04 supply agreement change request [Outcome: c,d] 8.03 supply agreement [Outcome: c,f]

5.3 Organizational Project-Enabling Processes (ENT)

5.3.1 Introduction

The Organizational Project-Enabling Processes consist of the following:

- a) Life Cycle Model Management Process;
- b) Project Portfolio Management Process;
- c) Infrastructure Management Process;
- d) Human Resource Management Process;
- e) Quality Management Process.

5.3.2 ENT.1 Life Cycle Model Management Process

Process ID	ENT.1
Process Name	Life Cycle Model Management Process
Process Purpose	The purpose of the Life Cycle Model Management Process is to define, maintain, and assure availability of policies, life cycle processes, life cycle models, and procedures for use by the organization with respect to the scope of this International Standard. This process provides life cycle policies, processes, models, and procedures that are consistent with the organization's objectives, that are defined, adapted, improved and maintained to support individual project needs within the context of the organization, and that are capable of being applied using effective, proven methods and tools.
Process Outcomes	As a result of the successful implementation of the Life Cycle Model Management Process: a) Policies and procedures for the management and deployment of life cycle models and processes are provided. b) Responsibility, accountability, and authority for life cycle management are defined. c) Life cycle processes, models, and procedures for use by the organization are defined, maintained, and improved. d) Prioritized process, model, and procedure improvements are implemented.
Base Practices	ENT.1.BP.1: Define system life cycle policies and procedures. [Outcome: a] Establish policies and procedures for process management and deployment that are consistent with organizational strategies. NOTE The actual range and detail of the life cycle implementation within a project will be dependent upon the complexity of the work, the methods used, and the skills and training of personnel involved in performing the work. A project tailors policies and procedures according to its requirements and needs. Relevant policies and procedures include risk management, quality management and resource management.

	ENT.1.BP.2: Establish the processes. [Outcome: a] Establish the processes that implement the requirements of this international standard and are consistent with organizational strategies. ENT.1.BP.3: Establish system life cycle roles and responsibilities. [Outcome: b] Define, integrate, and communicate the roles, responsibilities and authorities to facilitate implementation of system life cycle processes and the strategic management of system life cycles. ENT.1.BP.4: Define system life cycle progression criteria. [Outcome: a,b] Define business criteria that control progression through the system life cycle. NOTE Establish the decision-making criteria regarding entering and exiting each life cycle stage, and for other key milestones. Express these in terms of business achievement. Establish standard life cycle models for the organization that are comprised of stages and the purposes and outcomes for each stage. NOTE The life cycle model comprises one or more stage models, as needed. It is assembled as a sequence of stages that may overlap and/or iterate, as appropriate for the system-of-interest's scope, magnitude, complexity, changing needs and opportunities. Stages are illustrated in a future Technical Report (ISO/IEC TR 4748) using a commonly encountered example of life cycle stages. Specific examples for systems are provided in ISO/IEC TR 19760, A Guide for the application of ISO/IEC 15288 System life cycle processes. The life cycle processes and activities are selected, tailored as appropriate and employed in a stage to fulfil the purpose and outcomes of that stage. ENT.1.BP.5: Review system life cycle model. [Outcome: c] Monitor process execution, analyze process measures, and identify trends with respect to business criteria. NOTE This should include feedback from the projects regarding the effectiveness and efficiency of the processes. Conduct periodic reviews of the system life cycle model used by a project. NOTE Confirm the continuing suitability, adequacy and effectiveness of the life cycle models used by each project and make improvements as appropriate. This includes the stages, processes and achievement criteria that control progression through the life cycle. ENT.1.BP.6: Improve system life cycle management policies and procedures. [Outcome: c,d] Conduct periodic reviews of the life cycle model used by a project. NOTE Confirm the continuing suitability, adequacy and effectiveness of the life cycle models used by each project and make improvements as appropriate. This includes the stages, processes and achievement criteria that control progression through the life cycle.
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	Identify improvement opportunities from assessment results. Prioritize and plan improvement opportunities. Implement improvement opportunities and communicate results through the organization.
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Work Products	
Inputs	Outputs
3.03 business strategy 3.01 acquisition strategy 3.02 supply strategy 3.14 decision-making strategy 3.15 risk management strategy 4.03 quality management system 8.09 quality measures	2.03 system life cycle stage model [Outcome: c] 2.04 system life cycle processes model [Outcome: c] 3.04 system life cycle management policy [Outcome: a, b] 3.06 system life cycle processes policy [Outcome: a, b] 4.02 system life cycle management procedure [Outcome: a] 6.04 system life cycle model review [Outcome: b,c] 6.07 system life cycle processes review [Outcome: c,d] 6.08 system life cycle improvement report [Outcome: c,d] 8.06 system life cycle process measures [Outcome: c]

5.3.3 ENT.2 Project Portfolio Management Process

Process ID	ENT.2
Process Name	Project Portfolio Management Process
Process Purpose	The purpose of the Project Portfolio Management Process is to initiate and sustain necessary, sufficient and suitable projects in order to meet the strategic objectives of the organization. This process commits the investment of adequate organization funding and resources, and sanctions the authorities needed to establish selected projects. It performs continued qualification of projects to confirm they justify, or can be redirected to justify, continued investment.
Process Outcomes	As a result of the successful implementation of the Project Portfolio Management Process: a) Business venture opportunities, investments or necessities are qualified, prioritized and selected. b) Resources and budgets for each project are identified and allocated. c) Project management accountability and authorities are defined. d) Projects meeting agreement and stakeholder requirements are sustained. e) Projects not meeting agreement or stakeholder requirements are redirected or terminated.

Base Practices	ENT.2.BP.1: Establish business ventures. [Outcome: a] Identify, prioritize, select and establish new business opportunities, ventures or undertakings consistent with the business strategy and action plans of the organization. NOTE Prioritize the projects to be started and establish thresholds to determine which projects will be executed. ENT.2.BP.2: Establish projects. [Outcome: b,c] Define projects, accountabilities and authorities. ENT.2.BP.3: Define project outcomes. [Outcome: b] Identify the expected goals, objective and outcomes of the projects. ENT.2.BP.4: Allocate resources. [Outcome: b] Identify and allocate resources for the achievement of project objectives. ENT.2.BP.5: Identify project interdependencies. [Outcome: b,c] Identify any multi-project interfaces that must be managed or supported by the project. NOTE This includes the use of enabling systems used by more than one project and the use of common system elements by more than one project. ENT.2.BP.6: Specify project reporting and reviews. [Outcome: d,e] Specify the project reporting requirements and review milestones that will govern the execution of the project. ENT.2.BP.7: Authorize project execution. [Outcome: b,d] Authorize the project to commence execution of approved project plans, including the technical plans. ENT.2.BP.8: Evaluate projects. [Outcome: d,e] Evaluate ongoing projects to confirm that: i) projects are making progress towards achieving established goals; ii) projects are complying with project directives; iii) projects are being conducted according to system life cycle plans and procedures; iv) projects remain viable, as indicated by, for example, continuing need for the service, practicable product implementation, acceptable investment benefits. ENT.2.BP.9: Authorize project progression. [Outcome: d] Act to continue or redirect projects that are satisfactorily progressing or
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	can be expected to progress satisfactorily by appropriate redirection. ENT.2.BP.10: Close projects. [Outcome: e] Where agreements permit, act to cancel or suspend projects whose disadvantages or risks to the organization outweigh the benefits of continued investments. After completion of the agreement for products and services, act to close the project per organizational policies and procedures and the agreement. NOTE Ensure project closure accounts for documentation retention by the organization after the project is closed.
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Work Products	
Inputs	Outputs
1.02 organization infrastructure 3.01 acquisition strategy 3.02 supply strategy 3.03 business strategy 3.04 system life cycle management policy 3.14 decision-making strategy 3.15 risk management strategy 6.06 investment decision report 6.10 customer satisfaction report 6.18 risk management report 7.08 authorization to proceed request 8.07 organization resource requirement 8.10 project team requirements	3.05 resource allocation plan [Outcome: d] 6.05 resource commitment report [Outcome: b] 6.06 investment decision report [Outcome: a,d,e] 7.05 project control directives 8.04 project requirements [Outcome: a,c] 8.05 project authorization [Outcome: c]

5.3.4 ENT.3 Infrastructure Management Process

Process ID	ENT.3
Process Name	Infrastructure Management Process
Process Purpose	The purpose of the Infrastructure Management Process is to provide the enabling infrastructure and services to projects to support organization and project objectives throughout the life cycle. This process defines, provides and maintains the facilities, tools, and communications and information technology assets needed for the organization's business with respect to the scope of this International Standard.
Process Outcomes	As a result of the successful implementation of the Infrastructure Management Process: a) The requirements for infrastructure to support the organization's projects are defined. b) The infrastructure elements are identified and specified. c) Infrastructure elements are developed or acquired.

	d) The infrastructure elements are implemented. e) A stable and reliable infrastructure is maintained and improved. NOTE The infrastructure may include hardware, software, services, methods, tools, techniques, standards, and facilities for development, operation, or maintenance.
Base Practices	ENT.3.BP.1: Define infrastructure requirements. [Outcome: a] Define project infrastructure requirements and business constraints that influence and control provision of infrastructure resources and services for the project. NOTE Consider the infrastructure resource needs for the project in context with other projects and resource within the organization, as well as policies and strategic plans of the organization. Project plans and future business needs contribute to the understanding of the resource infrastructure that is required. Physical factors, such as facilities, and human factors, such as ambient noise level, of the work environment are defined. ENT.3.BP.2: Provide infrastructure. [Outcome: c,b] Identify, obtain and provide infrastructure resources and services that are needed to implement and support projects. ENT.3.BP.3: Monitor infrastructure [Outcome: d] Continuously or routinely communicate with projects to determine the degree to which delivered infrastructure resources satisfy their needs. ENT.3.BP.4: Maintain infrastructure. [Outcome: d,e] Identify and provide improvements or changes to the infrastructure resources as the project requirements change.

Work Products	
Inputs	Outputs
	1.02 organization infrastructure [Outcome c, d] 3.05 resource allocation plan [Outcome: e] 8.07 organization resource requirement [Outcome: a, b] 8.10 project team requirements [Outcome: a, b] 8.33 disposal enabling systems requirement [Outcome a]

5.3.5 ENT.4 Human Resource Management Process

Process ID	ENT.4
Process Name	Human Resource Management Process
Process Purpose	The purpose of the Human Resource Management Process is to ensure the organization is provided with necessary human resources and to maintain their competencies, consistent with business needs. This process provides a supply of skilled and experienced personnel

	qualified to perform life cycle processes to achieve organization, project and customer objectives.
Process Outcomes	As a result of the successful implementation of the Human Resource Management Process: a) Skills required by projects are identified. b) Necessary human resources are provided to projects. c) Skills of personnel are developed, maintained or enhanced. d) Conflicts in multi-project resource demands are resolved. e) Individual knowledge, information and skills are collected, shared, reused and improved throughout the organization.
Base Practices	ENT.4.BP1: Identify skills. [Outcome: a] Identify skill needs based on current and expected projects. Identify and record skills of personnel. ENT.4.BP2: Develop skills [Outcome: c] Establish skills development plan. Obtain or develop training, education or mentoring resources. NOTE These resources include training materials that are developed by the organization or external parties, training courses that are available from external suppliers, computer based instruction, etc. Provide planned skill development. Maintain records of skill development. ENT.4.BP3: Manage personnel resource. [Outcome: b,c] Obtain qualified personnel when skill deficits are identified based on plans. NOTE This includes: i) the recruitment and retention of personnel with experience levels and skills necessary to properly staff projects; staff assessment and review, e.g., their proficiency, motivation, ability to work in a team environment, as well as the need to be retrained, reassigned or reallocated. li) outsourced resources. Maintain and manage the pool of skilled personnel necessary to staff ongoing projects. Make project assignments based on project and staff-development needs. ENT.4.BP4: Motivate personnel. [Outcome: c] Motivate personnel. NOTE This includes undertaking career development and defining reward mechanisms.

	ENT.4.BP5: Manage resource conflicts. [Outcome: b,d] Control multi-project management interfaces to resolve schedule conflicts: – of capacity in organizational infrastructure and supporting services and resources among ongoing projects; – from project personnel being over-committed. ENT.4.BP6: Perform knowledge management [Outcome: e] Establish and maintain infrastructure for sharing common and domain information across the organization. Select an appropriate knowledge management strategy. Capture and maintain information for access by the organization per the strategy.
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Work Products	
Inputs	Outputs
3.05 resource allocation plan 3.09 project management plan 3.17 information management strategy 6.05 resource commitment report	1.15 human resource assignment [Outcome: a,c] 1.03 competent personnel [Outcome: b] 3.07 training strategy [Outcome: b] 6.09 training report [Outcome: b]

5.3.6 ENT.5 Quality Management Process

Process ID	ENT.5
Process Name	Quality Management Process
Process Purpose	The purpose of the Quality Management Process is to assure that products, services and implementations of life cycle processes meet organization quality goals and achieve customer satisfaction.
Process Outcomes	As a result of the successful implementation of the Quality Management Process: a) Organization quality management policies and procedures are defined. b) Organization quality goals and objectives are defined. c) Accountability and authority for quality management are defined. d) The status of customer satisfaction is monitored. e) Appropriate action is taken when quality goals are not achieved.
Base Practices	ENT.5.BP.1: Establish quality management system. [Outcome: a] Establish quality management policies, standards and procedures. NOTE A process model for quality management system requirements can be found in ISO 9001:2000 with further guidance in ISO 9004:2000.

	ENT.5.BP.2: Define quality management criteria. [Outcome: b] Establish organization quality management goals and objectives based on business strategy for customer satisfaction.
	ENT.5.BP.3: Define quality management responsibilities. [Outcome: c] Define responsibilities and authority for implementation of quality management.
	ENT.5.BP.4: Assess customer satisfaction. [Outcome: d] Assess and report customer satisfaction. NOTE The implementation of this International Standard provides the organization with an approach to achieving customer satisfaction.
	ENT.5.BP.5: Review project quality plans. [Outcome: a,b] Conduct periodic reviews of project quality plans. NOTE Assure that quality objectives based on the stakeholder requirements are established for each project.
	ENT.5.BP.6: Manage quality improvements. [Outcome: e] The status of quality improvements on products and services is monitored. Plan corrective actions when quality management goals are not achieved. Implement corrective actions and communicate results through the organization.

Work Products	
Inputs	Outputs
3.13 project quality plan 6.14 project quality report	3.08 quality management policy [Outcome: a] 4.03 quality management system [Outcome: a,c] 6.10 customer satisfaction report [Outcome: d] 6.11 quality management report [Outcome: d,e] 8.08 quality management goals and objectives [Outcome: b] 8.09 quality measures [Outcome: b,d]

5.4 Project Processes (PRJ)

5.4.1 Introduction

The Project Processes consist of the following processes:

- a) Project Planning Process;
- b) Project Measurement Process;
- c) Project Assessment and Control Process;
- d) Decision-making Process;

- e) Risk Management Process;
- f) Configuration Management Process;
- g) Information Management Process.

5.4.2 PRJ.1 Project Planning Process

Process ID	PRJ.1
Process Name	Project Planning Process
Process Purpose	The purpose of the Project Planning Process is to produce and communicate effective and workable project plans. This process determines the scope of the project management and technical activities, identifies process outputs, project tasks and deliverables, establishes schedules for project task conduct, including achievement criteria, and required resources to accomplish project tasks.
Process Outcomes	As a result of the successful implementation of the Project Planning Process: a) Project plans are available. b) Roles, responsibilities and authorities are defined. c) Resources and services necessary to achieve the project objectives are formally requested and committed. d) Project staff are directed in accordance with the project plans. e) Plans for the execution of the project are activated.
Base Practices	PRJ.1.BP.1: Identify project objectives. [Outcome: a] Identify the project objectives and constraints. NOTE Objectives and constraints include performance and other quality aspects, cost, time and stakeholder satisfaction. Each objective is identified with a level of detail that permits selection, tailoring and implementation of the appropriate processes and activities. PRJ.1.BP.2: Define project scope. [Outcome: a] Define the project scope as established in the agreement. NOTE The project includes all the relevant activities required to satisfy business decision criteria and complete the project successfully. A project can have responsibility for one or more stages in the complete system life cycle. Planning includes appropriate actions for maintaining project plans, performing assessments and controlling the project. Define and maintain a life cycle model that is comprised of stages using the defined life cycle models of the organization. PRJ.1.BP.3: Establish work breakdown. [Outcome: a,d] Establish a work breakdown structure based on the evolving system architecture.

	NOTE Each element of the system architecture, and appropriate processes and activities are described with a level of detail that is consistent with identified risks. Related tasks in the work breakdown structure are grouped into project tasks according to organizational responsibilities. Project tasks identify every work item being developed or produced and its associated tasks. PRJ.1.BP.4: Define project schedule. [Outcome: a] Define and maintain a project schedule based on project objectives and work estimates. NOTE This includes definition of the duration, relationship, dependencies and sequence of project activities, achievement milestones, resources employed and the reviews necessary to achieve timely completion of the project. PRJ.1.BP.5: Define project achievement criteria. [Outcome: a] Define project achievement criteria for the life cycle stage decision gates, delivery dates and major dependencies on external inputs or outputs. NOTE The time intervals between internal project reviews are defined in accordance with organizational policy on issues such as business and system criticality, schedule and technical risks. PRJ.1.BP.6: Define project budget. [Outcome: a,c] Define the project costs and plan a budget. NOTE Costs are based on, e.g. the project schedule, labour estimates, infrastructure costs, procurement items, acquired service and enabling system estimates, and budget reserves for risk management. PRJ.1.BP.7: Allocate project responsibilities. [Outcome: b] Establish the structure of authorities and responsibilities for project work. NOTE This includes defining the project organization, staff acquisitions, the development of staff skills and the methods of team working. They include the effective use of human resources and draw on organizational functions that contribute to all stages of the system life cycle. The structure of authority is designated, including, as appropriate, the legally responsible roles and individuals, e.g. design authorization, safety authorization, award of certification or accreditation. PRJ.1.BP.8: Define resource and service requirements. [Outcome: c] Define the infrastructure and services required by the project. NOTE This includes defining the capacity needed, its availability and its allocation to project tasks. Also included are facilities, tools, communications and information technology assets. The requirements for enabling systems for each life cycle stage within the scope of the project are also specified. PRJ.1.BP.9: Plan resource and service acquisition. [Outcome: c] Plan the acquisition of materials, goods and enabling system services supplied from outside the project. NOTE This includes, as necessary, plans for solicitation, supplier selection, acceptance, contract administration and contract closure. The agreement processes are used for the planned acquisitions.
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	PRJ.1.BP.10: Establish technical management plans. [Outcome: a,b] Generate and communicate a plan for technical management of the project, including reviews. PRJ.1.BP.11: Generate project quality plan. [Outcome: a,d] Generate a project quality plan. NOTE This includes defining project quality objectives that assures that the enterprise quality goals and objectives and enterprise quality management policies and procedures are attained. Plan in accordance with ISO 9001 or other quality standards. Define the project measures to be generated and the associated data to be collected, validated and analyzed. NOTE This includes identifying project data sources, recipients and timing. PRJ.1.BP.12: Activate the project. [Outcome: e] Obtain authorization for the project. Submit requests and obtain commitments for necessary resources to perform the project. Initiate the implementation of the project plans to satisfy the objectives and criteria set, exercising control over the project.
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Work Products	
Inputs	Outputs
1.02 organization infrastructure 1.03 competent personnel 2.01 tailored system life cycle stage model 2.02 tailored system life cycle process model 2.03 system life cycle stage model 2.04 system life cycle process model 2.07 stakeholders profile 3.01 acquisition strategy 3.02 supply strategy 3.03 business strategy 3.04 system life cycle management policy 3.05 resource allocation plan 3.06 system life cycle process policy 3.07 training strategy 3.08 quality management policy 3.14 decision-making strategy 3.15 risk management strategy 3.16 configuration management strategy 3.17 information management strategy 7.05 project control directive 7.06 supplier directive 7.07 supply agreement change directive 7.09 configuration baseline change request 8.01 acquisition agreement 8.03 supply agreement 8.04 project requirements 8.05 project authorization	3.09 project management plan [Outcome: a,b] 3.10 project acquisition plan [Outcome: c] 3.11 technical management plan [Outcome: a,b,e] 3.12 service management plan [Outcome: a,b,c] 3.13 project quality plan [Outcome: a,d] 8.10 project team requirements [Outcome: c]

5.4.3 PRJ.2 Measurement Process

Process ID	PRJ.2
Process Name	Measurement Process
Process Purpose	The purpose of the Measurement Process is to collect, analyze, and report data relating to the products developed and processes implemented within the organization, to support effective management of the processes, and to objectively demonstrate the quality of the products.
Process Outcomes	As a result of the successful implementation of the Measurement Process: a) The information needs of technical and management processes are identified. b) An appropriate set of measures, driven by the information needs are identified and/or developed. c) Measurement activities are identified and planned. d) The required data is collected, stored, analyzed, and the results interpreted. e) Information products are used to support decisions and provide an objective basis for communication. f) The measurement process and measures are evaluated. g) Improvements are communicated to the measurement process owner.
Base Practices	PRJ.2.BP.1: Define measures to assess performance. [Outcome: a,b] Describe the characteristics of the organization that are relevant to measurement. Identify and prioritize the information needs. Select and document measures that satisfy the information needs. PRJ.2.BP.2: Define measurement resources. [Outcome: c] Define data collection, analysis, and reporting procedures. Define criteria for evaluating the information products and the measurement PRJ.2.BP.3: Establish measurement capability. [Outcome: c] Review, approve, and provide resources for measurement tasks. Acquire and deploy supporting technologies. Integrate procedures for data generation, collection, analysis and reporting into the relevant processes. PRJ.2.BP.4: Perform measurement. [Outcome: d] Collect, store, and verify data. PRJ.2.BP.5: Assess performance. [Outcome: d] Analyze data and develop information products.

	PRJ.2.BP.6: Report measurements. [Outcome: e] Document and communicate results to the measurement users. PRJ.2.BP.7: Evaluate measurement. [Outcome: f,g] Evaluate information products and the measurement process. Identify and communicate potential improvements.
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Work Products	
Inputs	Outputs
3.09 project management plan 3.03 business strategy 3.10 project acquisition plan 3.11 technical management plan 3.12 service management plan 3.13 project quality plan 4.03 quality management system 8.08 quality management goals and objectives 8.09 quality measures	3.26 measurement strategy [Outcome: a,b,c] 5.24 measurement records [Outcome: d] 5.25 measurement information products [Outcome: e] 6.12 measurement report [Outcome: c]

5.4.4 PRJ.3 Project Assessment and Control Process

Process ID	PRJ.3
Process Name	Project Assessment and Control Process
Process Purpose	The purpose of the Project Assessment and Control Process is to determine the status of the project and direct project plan execution to ensure that the project performs according to plans and schedules, within projected budgets, to satisfy technical objectives. This process evaluates, periodically and at major events, the progress and achievements against requirements, plans and overall business objectives. Information is communicated for management action when significant variances are detected. This process also includes redirecting the project activities and tasks, as appropriate, to correct identified deviations and variations from other project management or technical processes. Redirection may include re-planning as appropriate.
Process Outcomes	As a result of the successful implementation of the Project Assessment and Control Process: a) Project performance measures or assessment results are available. b) Adequacy of roles, responsibilities, accountabilities, authorities and resources and services necessary to achieve the project is assessed. Project action to progress (or not) from one scheduled milestone or event to the next is authorized. c) Deviations in project performance indicators are analyzed. d) Affected parties are informed of project status. e) Corrective action is defined and directed, when project achievement is not meeting planned targets.