
**Information technology — Process
assessment — Process assessment
model for software life cycle processes**

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives or www.iec.ch/members_experts/refdocs).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents) or the IECl list of patent declarations received (see <http://patents.iec.ch>).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html. In the IEC, see www.iec.ch/understanding-standards.

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

This document cancels and replaces ISO/IEC 15504-5:2012, which has been technically revised.

The main changes compared to ISO/IEC 15504-5:2012 are as follows:

- all processes and their base practices are changed to reflect the ISO/IEC/IEEE 12207 processes;
- all process related process outputs and their descriptions are revised;
- this process assessment model includes a process quality attribute of process performance and can be used with other models of process quality, for instance capability as described in ISO/IEC 33020.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

Introduction

The set of International Standards ISO/IEC 33001 to ISO/IEC 33099, termed the ISO/IEC 330xx family, defines the requirements and resources needed for process assessment. The overall architecture and content of the ISO/IEC 330xx family is described in ISO/IEC 33001. Several standards in the ISO/IEC 330xx family for process assessment are intended to replace and extend parts of the ISO/IEC 15504 series. Abstracts and previews of the ISO/IEC 330xx family of standards can be found on the ISO website.

This document defines a process assessment model for software life cycle processes, conformant with the requirements of ISO/IEC 33004, for use in performing a conformant assessment in accordance with the requirements of ISO/IEC 33002.

A process assessment model is related to one or more process reference models. The process reference model defined in ISO/IEC/IEEE 12207 is used as the basis for the process assessment model in this document.

A process assessment model incorporates a process measurement framework conformant with the requirements of ISO/IEC 33003 and is expressed as a process quality characteristic with a defined set of process attributes.

A process assessment model includes a set of assessment indicators. Process performance indicators address the process purpose and outcomes of each process in the process assessment model. Process quality indicators demonstrate the achievement of the process attributes in the process measurement framework. These indicators may also provide a reference source of practices when implementing a process improvement program.

The assessment indicators are used as a basis for collecting objective evidence to support an assessor's judgement in assigning ratings of the performance and quality of an implemented process. The set of indicators defined in this document are not intended to be an all-inclusive set and applicable in its entirety. Subsets appropriate to the context and scope of the assessment should be selected, and potentially augmented with additional indicators.

A process assessment is conducted according to a documented assessment process. A documented assessment process identifies the rating method to be used in rating process attributes and identifies or defines the aggregation method to be used in determining ratings.

ISO/IEC 33020 provides a process measurement framework for the assessment of process capability which may be incorporated as a process measurement framework in this document. ISO/IEC 33020:2019, Annex B includes a set of process quality indicators for each process attribute in the process measurement framework.

Information technology — Process assessment — Process assessment model for software life cycle processes

1 Scope

This document defines a process assessment model for software life cycle processes, conformant with the requirements of ISO/IEC 33004, for use in performing a conformant assessment in accordance with the requirements of ISO/IEC 33002.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC/IEEE 12207:2017, *Systems and software engineering — Software life cycle processes*

ISO/IEC 33001, *Information technology — Process assessment — Concepts and terminology*

ISO/IEC 33003:2015, *Information technology — Process assessment — Requirements for process measurement frameworks*

ISO/IEC 33004:2015, *Information technology — Process assessment — Requirements for process reference, process assessment and maturity models*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 33001 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

4 The process assessment model

4.1 General

This document provides a basis for a process assessment model that is two-dimensional. In one dimension, the process dimension, the processes are defined and classified into process groups together with the set of assessment indicators of process performance. In the other dimension, the quality dimension, for each process attribute in the process measurement framework a set of process quality indicators is defined for the selected process quality characteristic.

This document applies the software system concepts as defined in ISO/IEC/IEEE 12207. These concepts include software systems, software system architecture and enabling systems.

NOTE 1 The software systems considered in this document are human-made, created and utilized to provide products or services in defined environments for the benefit of users and other stakeholders. These software systems can include the following system elements: hardware, software, data, humans, processes (e.g. processes for providing service to users), procedures (e.g. operator instructions), facilities, services, materials and naturally occurring entities. As viewed by the user, they are thought of as products or services. (ISO/IEC/IEEE 12207)

NOTE 2 This document applies to systems for which software is of primary importance to the stakeholders. It is based upon the general principles of systems engineering and software engineering. It is a fundamental premise of this document that software always exists in the context of a system. Since software does not operate without hardware, the processor upon which the software is executed can be considered as part of the system. Alternatively, hardware or services hosting the software system and handling communications with other systems can also be viewed as enabling systems or external systems in the operating environment. The perception and definition of a particular software system, its architecture, and its elements depend on a stakeholder's interests and responsibilities. One stakeholder's system-of-interest can be viewed as a system element in another stakeholder's system-of-interest. Furthermore, a system-of-interest can be viewed as being part of the environment for another stakeholder's system-of-interest. (ISO/IEC/IEEE 12207)

NOTE 3 The life cycle processes in this document are described in relation to a software system that is composed of interacting system elements (including software elements), each of which can be implemented to fulfil its respective specified requirements. Responsibility for the implementation of any system element may therefore be delegated to another party through an agreement. (ISO/IEC/IEEE 12207)

NOTE 4 Throughout the life cycle of a system-of-interest, essential services are required from systems that are not directly a part of the operational environment of the system-of-interest, e.g. modelling system, training system, maintenance system. Each of these systems enables a part, e.g. a stage of the life cycle of the system-of-interest to be conducted. Termed "enabling systems", they facilitate progression of the system-of-interest through its life cycle. (ISO/IEC/IEEE 12207)

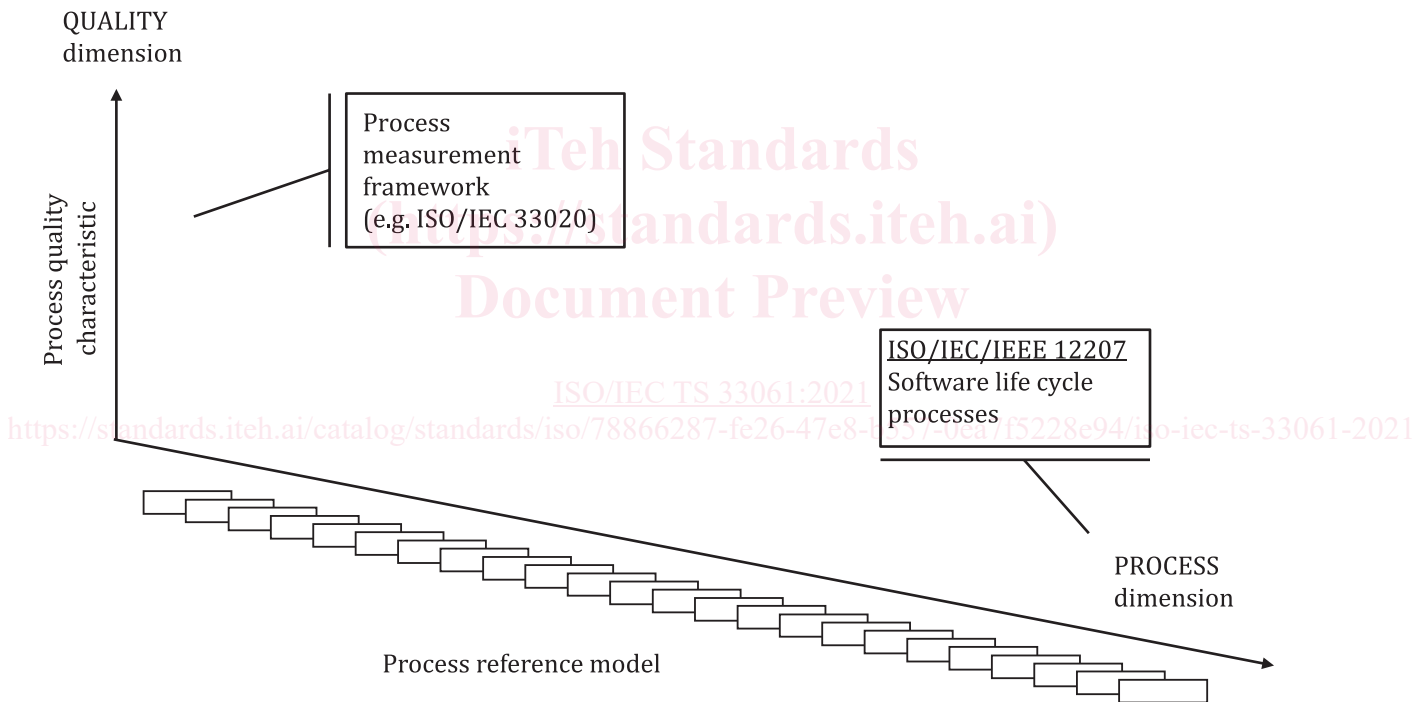


Figure 1 — Structure of the process assessment model

Figure 1 shows the process assessment model as a two-dimensional model, the process dimension with its relationship to ISO/IEC/IEEE 12207 software life cycle processes, and the quality dimension in relationship to a process measurement framework.

Users of this document may freely reproduce the detailed descriptions contained in the 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.

4.2 Structure of the process assessment model

4.2.1 General

This subclause describes the detailed structure of the process assessment model and its key components.

The process dimension comprises the set of processes defined with process purpose and process outcomes together with a set of assessment indicators of process performance.

Processes included in a process reference model shall be in accordance with ISO/IEC 33004:2015, 5.4.

The processes in this document are derived directly from ISO/IEC/IEEE 12207 and meet the ISO/IEC 33004 requirements for process descriptions, process purposes and outcomes.

The quality dimension comprising a set of process attributes for a selected process quality characteristic is incorporated as a process measurement framework together with a set of process quality indicators.

NOTE ISO/IEC 33020 provides a process measurement framework for the assessment of process capability which can be incorporated into this document. ISO/IEC 33020 also includes a set of process quality indicators for each process attribute in the process measurement framework.

4.2.2 Processes

The process assessment model is based upon the software life cycle processes defined in ISO/IEC/IEEE 12207. The process reference model drawn from ISO/IEC/IEEE 12207 consists of the process purpose and outcomes defined in that standard. The purpose and outcomes are a statement of the goals of the performance of each process.

In this document, ISO/IEC/IEEE 12207 serves as the process reference model for process assessments; any other use of the processes shall adhere to the requirements of ISO/IEC/IEEE 12207.

[Figure 2](#) lists the processes from ISO/IEC/IEEE 12207 that are included in the process dimension of the process assessment model and shows their classification into process groups.

The process groups and their associated processes are described in [Clause 5](#). The description of each process group includes a characterization of the processes it contains. In this process assessment model, each process belonging to a group is identified with a process identifier (ID) consisting of the group abbreviated name and the sequential number of the process in that group.

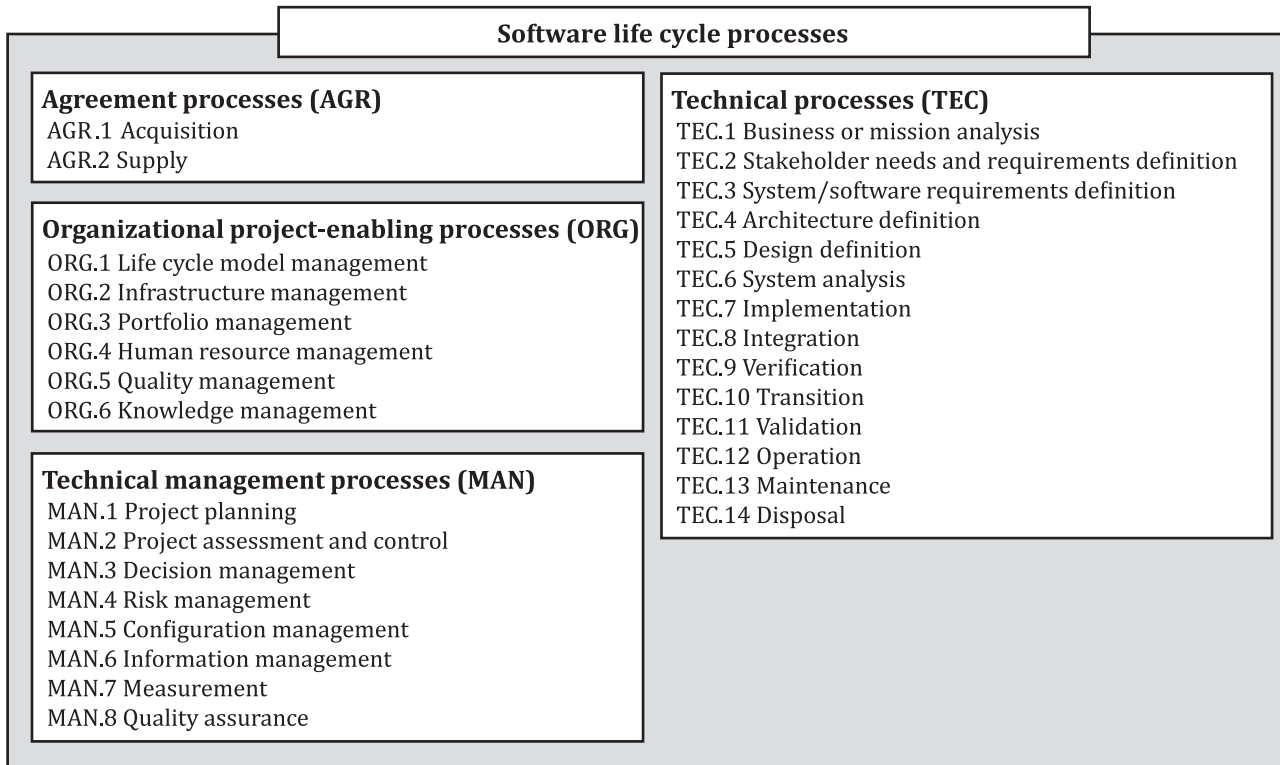


Figure 2 — Process groups

4.2.3 Process dimension

Each process has a process identifier (ID) consisting of the process group abbreviated name and the sequential number of the process in that group. Each process is described by its name, purpose, outcomes, base practices, and process outputs.

Each process 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 process outcomes is associated with each of the process purpose statements, as a list of expected positive results of the process performance.

4.2.4 Quality dimension

For the quality dimension, the minimum requirement is that the process is performed, i.e. the implemented process achieves its process purpose and the expected outcomes are observable.

Process attributes are features of a process that can be evaluated on a scale of achievement, providing a measure of the quality of the process and are applicable to all processes.

4.3 Assessment indicators

A process assessment model is based on the principle that the quality of a process can be assessed by demonstrating the achievement of process attributes on the basis of evidences related to assessment indicators.

There are two types of assessment indicators: process performance indicators and process quality indicators. Process performance indicators address the process purpose and outcomes of each process in the process dimension. Process quality indicators demonstrate the achievement of the process attributes in the quality dimension.

The process performance indicators are:

- base practice (BP);
- process output (PO).

The performance of base practices (BPs) provides an indication of the extent of achievement of the process purpose and process outcomes. The base practices correspond to ISO/IEC/IEEE 12207 activities and tasks. Process outputs (POs) are either used or produced (or both), when performing the process. Information items that are the key outputs of the process, are primarily used as performance indicators.

[Annex A](#) provides the list of process outputs associated with the processes in [Clause 5](#). The process outputs are identified by categories. The process outputs are indicated by the process IDs.

Process quality indicators depend on the process quality characteristic of interest. The minimum requirement is that at least one of the process attributes shall comprise the achievement of the defined process purpose and process outcomes for the process; this is termed the process performance attribute (see ISO/IEC 33003:2015, 4.2.1). Other process quality attributes can be defined as needed.

The process performance and process quality indicators represent types of objective evidence that can be found in an instantiation of a process and therefore can be used to judge achievement of quality. [Figure 3](#) shows how the assessment indicators are related to process performance and process quality.

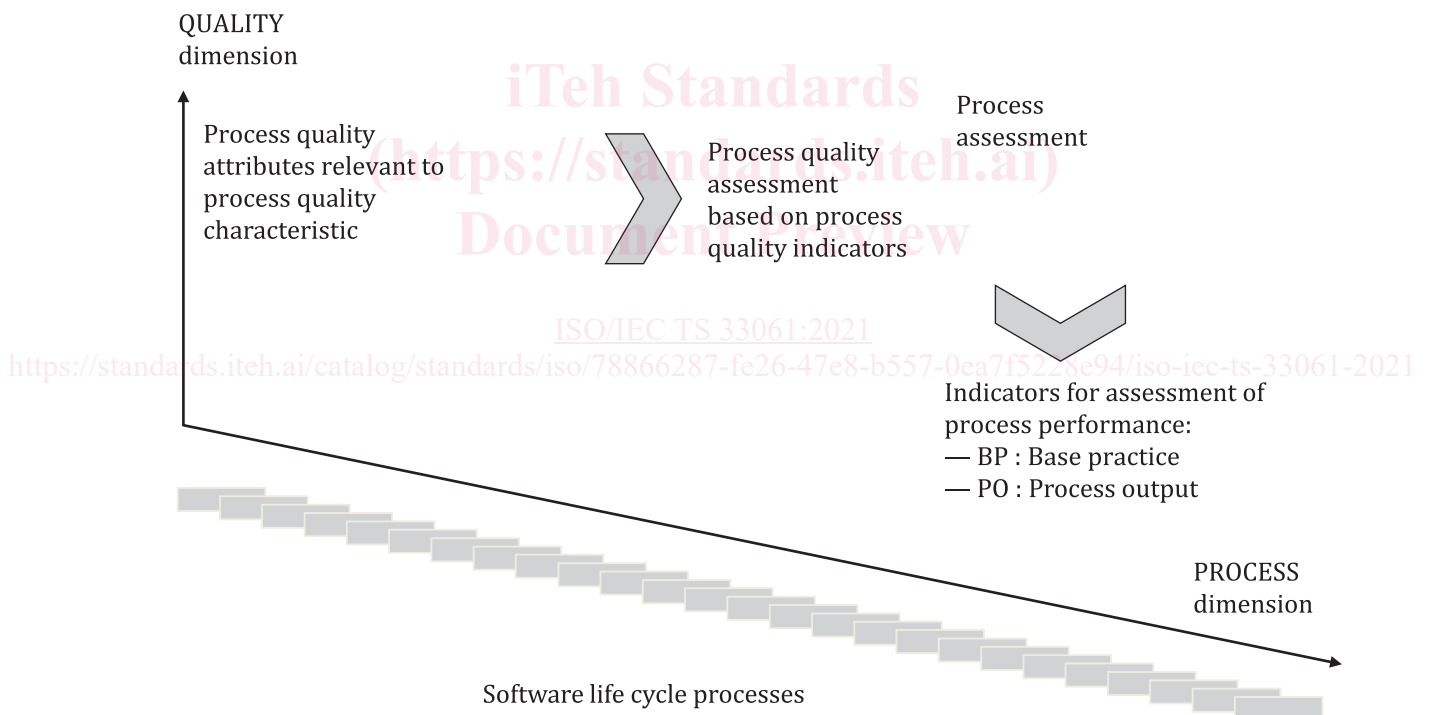


Figure 3 — Assessment indicators

5 The process dimension

5.1 General

The process dimension comprises the set of processes defined with process purpose and process outcomes together with a set of assessment indicators of process performance.

The individual processes each have a process identifier (ID) consisting of the process group abbreviated name and the sequential number of the process in that group and are described in terms of process

name, process purpose, and process outcomes as defined in ISO/IEC/IEEE 12207. The process group descriptions are compiled from ISO/IEC/IEEE 12207.

In addition, the process dimension of the process assessment model provides information in the form of a set of:

- a) 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 associated to one or more process outcomes;
- b) process outputs that are related to one or more process outcomes;

The process purposes, outcomes, base practices and process outputs associated with the processes are included in this clause. The base practices and process outputs constitute the set of indicators of process performance.

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.

5.2 Agreement processes (AGR)

5.2.1 General

Organizations are producers and users of software systems. One organization (acting as an acquirer) can task another (acting as a supplier) for products or services. This is achieved using agreements. Agreements allow both acquirers and suppliers to realize value and support business strategies for their organizations.

The agreement processes are organizational processes that apply outside of the span of a project's life, as well as for a project's lifespan. Generally, organizations act simultaneously or successively as both acquirers and suppliers of software systems. The agreement processes can be used with less formality when the acquirer and the supplier are in the same organization. Similarly, they can be used within the organization to agree on the respective responsibilities of organization, project and technical functions.

This subclause specifies the requirements for the establishment of agreements with organizational entities external and internal to the organization.

The agreement processes consist of the following:

- a) acquisition process – used by organizations for acquiring products or services;
- b) supply process – used by organizations for supplying products or services.

These processes define the activities necessary to establish an agreement between two organizations. If the acquisition process is invoked, it provides the means for conducting business with a supplier. This may include products that are supplied for use as an operational software system, services in support of operational activities, software elements of a system, or elements of a software system being provided by a supplier. If the supply process is invoked, it provides the means for an agreement in which the result is a product or service that is provided to the acquirer.

NOTE Security is an increasing concern in systems and software engineering. See ISO/IEC 27036 (all parts) for requirements and guidance for suppliers and acquirers on how to secure information in supplier relationships. Specific aspects of information security supplier relationships are addressed in ISO/IEC 27036-3:2013 and ISO/IEC 27036-4. (ISO/IEC/IEEE 12207)

5.2.2 Acquisition process

Process ID	AGR.1
Process name	Acquisition process

Process purpose	<p>The purpose of the acquisition process is to obtain a product or service in accordance with the acquirer's requirements.</p> <p>NOTE As part of this process, the agreement is modified when a change request is agreed to by both the acquirer and supplier.</p>
Process outcomes	<p>As a result of the successful implementation of the acquisition process:</p> <ul style="list-style-type: none"> a) A request for supply is prepared. b) One or more suppliers are selected. c) An agreement is established between the acquirer and supplier. d) A product or service complying with the agreement is accepted. e) Acquirer obligations defined in the agreement are satisfied.
Base practices	<p>AGR.1.BP1: Prepare for the acquisition. [Outcome: a]</p> <ul style="list-style-type: none"> 1) Define a strategy for how the acquisition will be conducted. 2) Prepare a request for the supply of a product or service that includes the requirements. <p>AGR.1.BP2: Advertise the acquisition and select the supplier. [Outcome: b]</p> <ul style="list-style-type: none"> 1) Communicate the request for the supply of a product or service to potential suppliers. 2) Select one or more suppliers. <p>AGR.1.BP3: Establish and maintain an agreement. [Outcome: c, d]</p> <ul style="list-style-type: none"> 1) Develop an agreement with the supplier that includes acceptance criteria. 2) Identify necessary changes to the agreement. 3) Evaluate impact of changes on the agreement. 4) Negotiate the agreement with the supplier. 5) Update the agreement with the supplier, as necessary. <p>AGR.1.BP4: Monitor the agreement. [Outcome: d, e]</p> <ul style="list-style-type: none"> 1) Assess the execution of the agreement. 2) Provide data needed by the supplier and resolve issues in a timely manner. <p>AGR.1.BP5: Accept the product or service. [Outcome: d, e]</p> <ul style="list-style-type: none"> 1) Confirm that the delivered product or service complies with the agreement. 2) Provide payment or other agreed consideration. 3) Accept the product or service from the supplier, or other party, as directed by the agreement. 4) Close the agreement.
Process outputs	<p>Acquisition approach [Outcome: a]</p> <p>Request for supply [Outcome: a]</p> <p>Acquisition agreement [Outcome: c]</p> <p>Acquisition agreement change request [Outcome: c]</p> <p>Accepted system or system element (e.g. software) [Outcome: d]</p> <p>Acquisition report [Outcome: e]</p> <p>Acquisition record [Outcome: e]</p>

5.2.3 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 produced. c) An agreement is established between the acquirer and supplier. d) A product or service is provided. e) Supplier obligations defined in the agreement are satisfied. f) Responsibility for the acquired product or service, as directed by the agreement, is transferred.
Base practices	<p>AGR.2.BP1: Prepare for the supply. [Outcome: a] 1) Determine the existence and identity of an acquirer who has a need for a product or service. 2) Define a supply strategy.</p> <p>AGR.2.BP2: Respond to a request for supply of products or services. [Outcome: b] 1) Evaluate a request for the supply of a product or service to determine feasibility and how to respond. 2) Prepare a response that satisfies the solicitation.</p> <p>AGR.2.BP3: Establish and maintain an agreement. [Outcome: c] 1) Negotiate an agreement with the acquirer that includes acceptance criteria. 2) Identify necessary changes to the agreement. 3) Evaluate impact of changes on the agreement. 4) Negotiate the agreement with the acquirer, as necessary. 5) Update the agreement with the acquirer, as necessary.</p> <p>AGR.2.BP4: Execute the agreement. [Outcome: d, e] 1) Execute the agreement according to the established project plans. 2) Assess the execution of the agreement.</p> <p>AGR.2.BP5: Deliver and support the product or service. [Outcome: d, e, f] 1) Deliver the product or service in accordance with the agreement criteria. 2) Provide assistance to the acquirer in support of the delivered product or service, per the agreement. 3) Accept and acknowledge payment or other agreed consideration. 4) Transfer the product or service to the acquirer, or other party, as directed by the agreement. 5) Close the agreement.</p>