SPICE

Consolidated product

**Software Process Assessment –
Part 1 : Concepts and introductory guide**

Version 1.00

(Formerly IG Version 1.00)

PREAMBLE

In January 1993 a program of work was approved by ISO/IEC JTC1 for the development of an international standard for software process assessment. In June 1993 the SPICE Project Organisation was established with a mandate from JTC1/SC7 to:

– assist the standardisation project in its preparatory stage by developing initial working drafts;

– undertake user trials in order to gain early experience data which will form the basis for revision of the Technical Report prior to publication as a full International Standard;

– create market awareness and take-up of the evolving standard.

The SPICE Project Organisation completed its task of producing the set of working drafts in June 1995. The SPICE user trials commenced in January 1995. The working drafts have now been handed over to JTC1/SC7 for the normal process of standards development, commencing in July 1995.

So far as can be determined, intellectual property rights for these documents reside with the individuals and organisations that contributed to their development. In agreeing to take part in the Project, participants agreed to abide by decisions of the Management Board in relation to the conduct of the Project. It is in accordance with this understanding that the Management Board has now agreed to release the baseline set of documents. This introductory statement sets out the terms and conditions under which this release is permitted.

The documents as released are available freely from the SPICE Project File Server, sisyphus.cit.gu.edu.au, by anonymous ftp, or from approved mirrors of the server. A hypertext version of the documents is also available on the World Wide Web at URL http://www-sqi.cit.gu.edu.au/spice/

TERMS AND CONDITIONS

These terms and conditions apply to the set of documents developed by the SPICE Project, and published within the Project as Version 1.0, with the following titles:

- Part 1 : *Concepts and introductory guide*
- Part 2 : *A model for process management*
- Part 3 : *Rating processes*
- Part 4 : *Guide to conducting assessment*
- Part 5 : *Construction, selection and use of assessment instruments and tools*
- Part 6 : *Qualification and training of assessors*
- Part 7 : *Guide for use in process improvement*
- Part 8 : *Guide for use in determining supplier process capability*
- Part 9 : *Vocabulary*

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Acknowledgment:

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Note on document formatting

Use the following margins for equivalent printing on A4 or US letter paper.

Paper size	A4	US letter (imperial)
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SOFTWARE PROCESS ASSESSMENT   Part 1

Concepts and Introductory Guide

Contents

Foreword

In June 1991, the fourth plenary meeting of ISO/IEC JTC1/SC7 approved a study period (resolution 144) to investigate the needs and requirements for a standard for software process assessment.

The results, which are documented in a Study Report (JTC1/SC7 N944R, 11 June 1992), came to the following major conclusions:

- there is international consensus on the needs and requirements for a standard for process assessment;
- there is international consensus on the need for a rapid route to development and trialing to provide usable output in an acceptable timescale and to ensure the standard fully meets the needs of its users;
- there is international commitment to resource the project with an international project team staffed by full time resource, with development being co-ordinated through four technical development centres in Europe, N America (2) and Asia Pacific;
- the standard should initially be published as a Technical Report Type 2 to enable the developing standard to stabilise during the period of the user trials, prior to its issuing as a full International Standard.

The new work item was approved in January 1993 by JTC1. In June 1993 the SPICE Project Organisation was established with a mandate from JTC1/SC7 to:

- assist the standardisation project in its preparatory stage to develop initial working drafts;
- undertake user trials in order to gain early experience data which will form the basis for revision of the published Technical Report prior to review as a full International Standard;
- create market awareness and take-up of the evolving standard.

The SPICE Project Organisation completed its task of producing the set of working drafts in June 1995. These working drafts have formed the basis for this Technical Report Type 2. The period of SPICE user trials commenced in January 1995 and is synchronised in phases to allow feedback to the stages of the technical work.

ISO/IEC Directives state that a Technical Report Type 2 may be used to publish a prospective standard for provisional application so that information and experience of its practical use may be gathered.

This Technical Report Type 2 consists of the following parts, under the general title *Software Process Assessment:*

- Part 1 : *Concepts and introductory guide*
- Part 2 : *A model for process management*
- Part 3 : *Rating processes*
- Part 4 : *Guide to conducting assessment*
- Part 5 : *Construction, selection and use of assessment instruments and tools*
- Part 6 : *Qualification and training of assessors*
- Part 7 : *Guide for use in process improvement*
- Part 8 : *Guide for use in determining supplier process capability*
- Part 9 : *Vocabulary*

This part of the International Standard (part 1) is for guidance only.

Introduction

Overview

This International Standard provides a framework for the assessment of software processes. This framework can be used by organizations involved in planning, managing, monitoring, controlling, and improving the acquisition, supply, development, operation, evolution and support of software.

The Standard provides a structured approach for the assessment of software processes for the following purposes:

a) by or on behalf of an organization with the objective of understanding the state of its own processes for process improvement;

b) by or on behalf of an organization with the objective of determining the suitability of its own processes for a particular requirement or class of requirements;

c) by or on behalf of one organization with the objective of determining the suitability of another organization's processes for a particular contract or class of contracts.

The framework for process assessment:

a) encourages self-assessment;

b) takes into account the context in which the assessed processes operate;

c) produces a set of process ratings (a process profile) rather than a pass/fail result;

d) through the generic practices, addresses the adequacy of the management of the assessed processes;

e) is appropriate across all application domains and sizes of organization.

The sophistication and complexity required of a process is dependent upon its context. For instance the planning required for a five person project team is much less than for a fifty person team. This context influences how a qualified assessor judges a practice when assessing its adequacy and influences the degree of comparability between process profiles.

The process assessment framework is based on assessing a specific process instance. A process instance is a singular instantiation of a process that is uniquely identifiable and about which information can be gathered in a manner that provides repeatable ratings. Each process instance is characterized by a set of five process capability level ratings, each of which is an aggregation of the practice adequacy ratings that belong to that level. Hence the practice adequacy ratings are the foundation for the rating system.

Practice adequacy is a rating of the extent to which a practice meets its purpose as defined in part 2 of this International Standard. The Standard therefore provides a rating framework that is as much an assessment of effectiveness as it is of conformance to the practice definition. From the ratings of process instances, a number of derived or average ratings can be determined that provide better insight into the capability of a process within an organizational unit as a whole.

Field of application

Within a process improvement context, process assessment provides the means of characterizing the current practice within an organizational unit in terms of the capability of the selected processes. Analysis of the results in the light of the organization's business needs identifies strengths, weakness and risks inherent in the processes. This, in turn, leads to the ability to determine whether the processes are effective in achieving their goals, and to identify significant causes of poor quality, or over runs in time or cost. These provide the drivers for prioritizing improvements to processes.

Process capability determination is concerned with analysing the proposed capability of selected processes against a target process capability profile in order to identify the risks involved in undertaking a project using the selected processes. The proposed capability may be based on the results of relevant previous process assessments, or may be based on an assessment carried out for the purpose of establishing the proposed capability.

Two of the parts of this International Standard (parts 7 and 8) address the use of process assessment for process improvement and for process capability determination. Other documents in the suite address various aspects relating to process assessment.
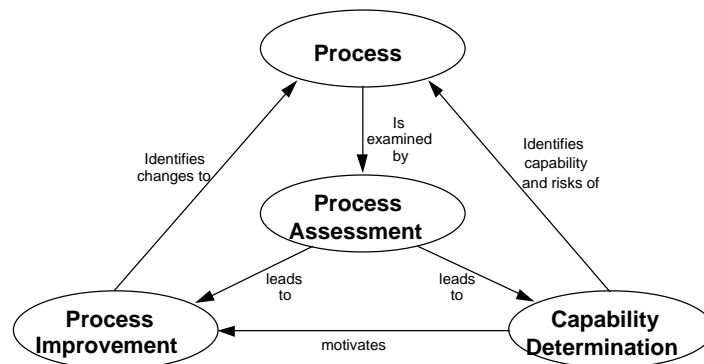

Figure 1 – Software Process Assessment

This International Standard has been designed to satisfy the needs of acquirers, suppliers and assessors, and their individual requirements from within a single source.

The benefits arising from the use of this suite of documents include:

For **acquirers:**

– an ability to determine the current and potential capability of a supplier's software processes.

For **suppliers:**

– an ability to determine the current and potential capability of their own software processes;

– an ability to define areas and priorities for software process improvement;

– a framework that defines a route map for software process improvement.

For **assessors:**

– a framework that defines all aspects of conducting assessments.

Components of this International Standard

This International Standard is comprised of nine parts. This section describes each of the parts and its role within the Standard.
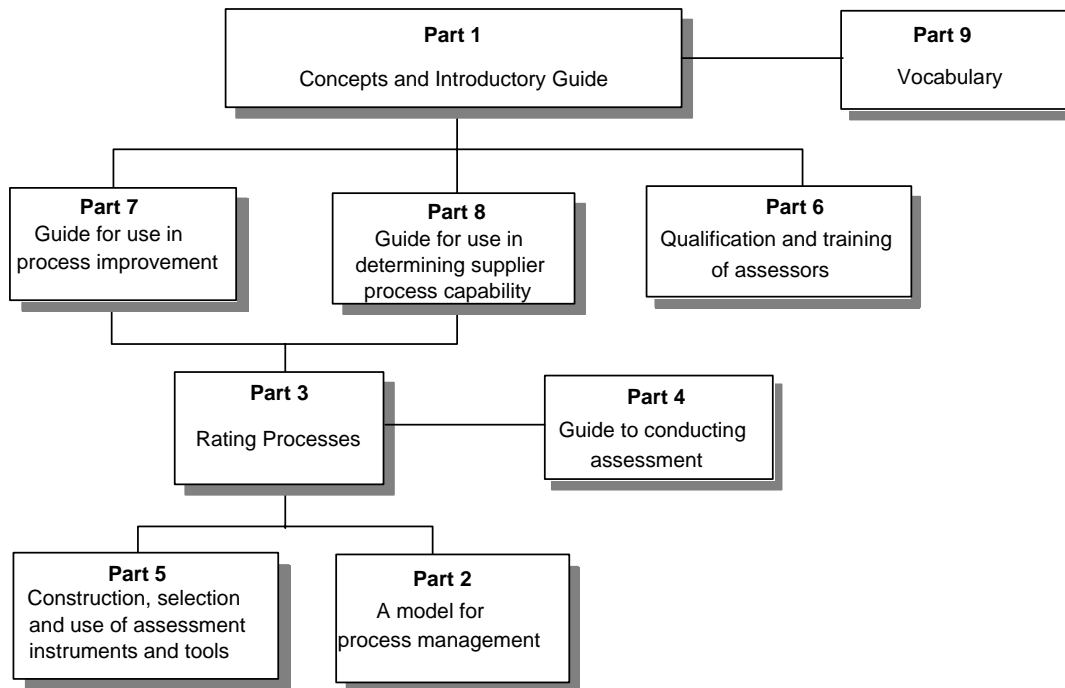
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│ Concepts and Introductory   │        │   Vocabulary     │
│          Guide              │        │                  │
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│  Part 7  │    │     Part 8      │   │     Part 6       │
│ Guide for│    │ Guide for use in│   │ Qualification and│
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      │  Processes  │         │ conducting       │
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│    Part 5     │  │    Part 2       │
│ Construction, │  │ A model for     │
│ selection and │  │ process         │
│ use of        │  │ management      │
│ assessment    │  │                 │
│ instruments   │  │                 │
│ and tools     │  │                 │
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Figure 2 –   Components of this International Standard

Part 1 (informative) is an entry point into this International Standard. It describes how the parts of the suite fit together, and provides guidance for their selection and use. It explains the requirements contained within the Standard and their applicability to the conduct of an assessment, to the construction and selection of supporting tools, and to the construction of extended processes. Extended processes are processes which include base practices additional to those defined in the part 2 of the Standard, or which are entirely new processes, for example to meet industry specific requirements.

Part 2 (normative) of this International Standard defines, at a high level, the fundamental activities that are essential to software engineering, structured according to increasing levels of process capability. These baseline practices may be extended, through the generation of application or sector specific practice guides, to take account of specific industry, sector or other requirements.

Part 3 (normative) of this International Standard defines a framework for conducting an assessment, and sets out the basis for rating, scoring and profiling process capabilities.

Part 4 (informative) of this International Standard provides guidance on the conduct of team-based software process assessments. This guidance is generic enough to be applicable across all organizations, and also for performing assessments using a variety of different methods and techniques, and supported by a range of tools.

Part 5 (normative) of this International Standard defines the framework elements required to construct an instrument to assist an assessor in the performance of an assessment. In addition, it provides guidance to acquirers or designers on the selection and usability aspects of various types of assessment instruments.

Part 6 (informative) of this International Standard describes the competence, education, training and experience of assessors that are relevant to conducting process assessments. It describes mechanisms that may be used to demonstrate competence and to validate education, training and experience.

Part 7 (informative) of this International Standard describes how to define the inputs to and use the results of an assessment for the purposes of process improvement. The guide includes examples of the application of process improvement in a variety of situations.

Part 8 (informative) of this International Standard describes how to define the inputs to and use the results of an assessment for the purpose of process capability determination. It addresses process capability determination in both straightforward situations and in more complex situations involving, for example, future capability. The guidance on conducting process capability determination is applicable either for use within an organization to determine its own capability, or by a acquirer to determine the capability of a (potential) supplier.

Part 9 (informative) is a consolidated vocabulary of all terms specifically defined for the purposes of this International Standard.

Relationship to other International Standards

This International Standard is complementary to several other International Standards and other models for evaluating the capability and effectiveness of organizations and processes. This section describes the relationship between this International Standard and the major related International Standards.

This International Standard incorporates the intent of the ISO 9000 series to provide confidence in a supplier's quality management whilst providing acquirers with a framework for assessing whether potential suppliers have the capability to meet their needs. Process assessment provides users with the ability to evaluate process capability on a continuous scale in a comparable and repeatable way, rather than using the pass/fail characteristic of quality audits based on ISO 9001. In addition, the framework described in this International Standard provides the opportunity to adjust the scope of assessment to cover specific processes of interest, rather than all of the processes used by an organizational unit.

This International Standard is related in particular to the following components of the ISO 9000 series:

- ISO 9001 - 1994, *Model for quality assurance in design, development, production, installation and servicing;*

- ISO 9000-3 - 1991, *Quality management and quality assurance standards - Part 3: Guidelines for the application of ISO 9001 to the development, supply and maintenance of software;*

- ISO 9004-4 - 1993, *Quality management and quality system elements - Part 4: Guidelines for quality improvement.*

This International Standard, and particularly part 2, is strongly related to:

– ISO/IEC12207-1-1994, *Software life cycle processes.*

Where software-based tools are developed or used to support assessments their conformance to the requirements of part 5 of this International Standard may be evaluated following the requirements of:

– ISO/IEC12119-1995, *Software products - Evaluation and test.*

Criteria for the development and/or acquisition of software-based tools are based on the characteristics defined in:

– ISO/IEC 9126-1991, *Software quality characteristics.*

1 Scope

This part of this International Standard provides overall information on the concepts of software process assessment and its use in the two contexts of process improvement and process capability determination. It describes how the parts of the suite fit together, and provides guidance for their selection and use. It explains the requirements contained within this International Standard, and their applicability to the conduct of an assessment, to the construction and selection of supporting tools, and to the construction of extended processes.

Readers of this guide should familiarize themselves with the terminology and structure of the document suite, and then reference the appropriate parts of the suite for the context in which they propose to conduct an assessment. If the assessment is to be conducted for the purposes of internal process improvement within an organization, the relevant context is in part 7 of this International Standard. If the results of the assessment are to be used for the purposes of determining the process capability of the organizational unit in the context of a specified requirement, the guidance is in part 8 of this International Standard.

More detailed description of the use of this International Standard is given in clause 4 of this guide.

2   Normative references

There are no normative references for this part of the International Standard.

3 Definitions

For the purposes of this part of this International Standard, the definitions in *Software Process Assessment - Part 9 : Vocabulary* apply.

4 Overview

4.1 General

This International Standard provides a framework for the assessment of software processes. This framework can be used by organizations involved in planning, managing, monitoring, controlling and improving the acquisition, supply, development, operation, evolution and support of software.

Process assessment examines the processes used by an organization to determine whether they are effective in achieving their goals. The assessment characterizes the current practice within an organizational unit in terms of the capability of the selected processes. The results may be used to drive process improvement activities or process capability determination by analysing the results in the context of the organization's business needs, identifying strengths, weaknesses and risks inherent in the processes.

The documents provide a structured approach to software process assessment for the following purposes:

a) by or on behalf of an organization with the objective of understanding the state of its own processes for process improvement;

b) by or on behalf of an organization with the objective of determining the suitability of its own processes for a particular requirement or class of requirements;

c) by or on behalf of one organization with the objective of determining the suitability of another organization's processes for a particular contract or class of contracts.

The high level view of the relationships between process assessment, process improvement and process capability determination is shown in figure 3, along with an indication of the places of the various components of this International Standard in the processes.
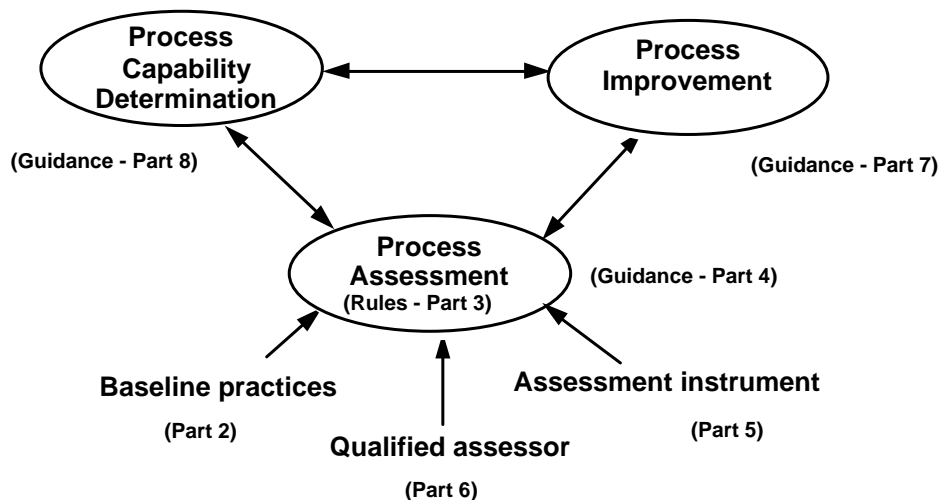
Figure 3 – Overview of relationships of elements of this Standard

The standard is designed to provide assessment results that are repeatable, objective, comparable within similar contexts, and able to be used for either process improvement or process capability determination.

Dependable assessment results are achieved through the definition of a framework for the conduct of assessments. The framework includes an architecture for rating practices and processes and for presenting assessment ratings. The assessment framework also provides guidance on the conduct of the assessment, supported by an assessment instrument to assist in the objective rating of processes. This International Standard provides guidance in the contexts of both process improvement and process capability determination. It further provides a definition of the required skills and experience for assessors.

This section describes how the other parts of this International Standard can be used to conduct and use process assessments. The key determinant in the use of the Standard is the purpose for which the assessment is being conducted. This may be:

  – to promote an understanding of the software process;

  – to support process improvement;

  – to support process capability determination.

4.2   The Assessment framework

4.2.1   The context of process assessment

The context of a process assessment is summarized in figure 4. Part 3 of this International Standard defines the requirements for conducting an assessment, sets out the basis for rating, scoring and profiling process capabilities, and defines the circumstances under which assessment results may be compared. Part 4 provides guidance on conducting a team-based assessment and interpreting the requirements in part 3. This guidance is generic enough to be applicable across all organizations, and for conducting assessments using a variety of methods, techniques and tools.

Process assessment is an activity that is performed either during a process improvement initiative as described in part 7 of this International Standard, or as part of a process capability determination exercise as described in part 8. In either case, the formal entry to the assessment processes occurs with the compilation of the assessment input which defines the purpose of the assessment (why it is being carried out), the scope of the assessment (which processes are to be assessed) and what constraints, if any, apply to the assessment. The assessment input also defines the responsibility for carrying out the assessment and gives definitions for any processes within the scope of the assessment that are extensions of the processes defined in part 2.
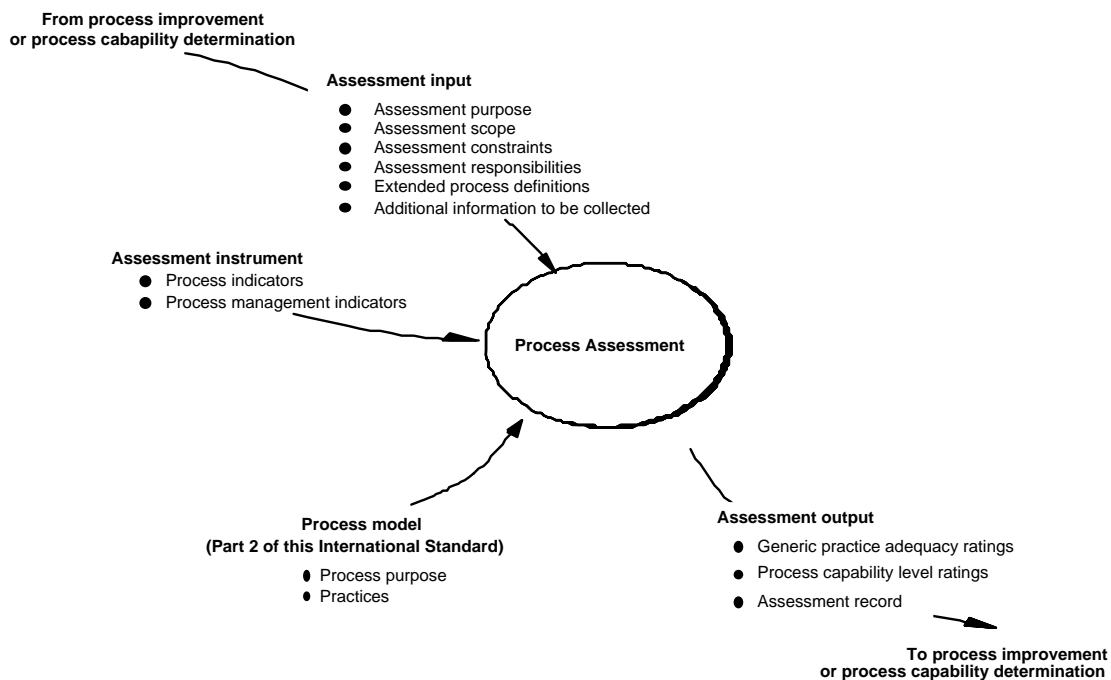
**From process improvement
or process cabapility determination**

Assessment input
- Assessment purpose
- Assessment scope
- Assessment constraints
- Assessment responsibilities
- Extended process definitions
- Additional information to be collected

Assessment instrument
- Process indicators
- Process management indicators

Process Assessment

**Process model
(Part 2 of this International Standard)**
- Process purpose
- Practices

Assessment output
- Generic practice adequacy ratings
- Process capability level ratings
- Assessment record

**To process improvement
or process capability determination**

Figure 4 – Context of process assessment

An assessment is carried out by assessing selected processes against the process model defined in part 2 of this International Standard. This two-dimensional model consists of a set of process-specific base practices and a set of generic practices. The generic practices apply across all processes. The generic practices are grouped into common features and capability levels that may be used to determine how well the process is managed. The assessment output includes a set of process capability level ratings for each process instance assessed.

An assessment is supported by an assessment instrument, or set of instruments, constructed according to part 5 of this International Standard. The process assessment is carried out either by a team with at least one qualified assessor who has the competence described in part 6; or, on a continuous basis using suitable tools for data collection and verified by a qualified assessor.

4.2.2   An architecture for software processes

Part 2 of this International Standard defines, at a high level, the fundamental activities that are essential to good software engineering. It describes what activities are required, not how they are to be implemented. The baseline practices may be extended through the generation of application or sector specific practice guides to take account of specific industry, sector, or other requirements.

Each process in part 2 is described by base practices, which are the essential activities of the specific process. Processes are grouped in turn into five process categories as shown in the table below.

Table 1 – Description of process categories

Process category	Brief description
Customer-Supplier	Processes that directly impact the customer
Engineering	Processes that specify, implement, or maintain a system and software product
Project	Processes that establish the project, and co-ordinate and manage its resources
Support	Processes that enable and support the performance of the other processes on the project
Organization	Processes that establish the business goals of the organization and develop process, product, and resource assets which will help the organization achieve its business goals

Evolving process capability is expressed in terms of capability levels, common features, and generic practices. Generic practices are applicable to all process. These practices represent the activities necessary to manage a process and improve its capability to achieve desired outputs. They are grouped into common features and capability levels which help define how the process will be managed towards achieving its defined purpose.

4.2.3   Tools to support process assessment

Part 5 of this International Standard provides the framework for building an assessment instrument. An assessment instrument is a tool, or set of tools, used during the performance of an assessment to assist the assessor in obtaining reliable, consistent and repeatable results.

An assessment instrument built according to requirements and guidance in part 5 contains a set of assessment indicators which help the assessor to analyse the process under review, and to make consistent judgements about the implemented practices. In addition, an assessment instrument provides a mechanism for the assessor to record notes and results, and may provide a means of capturing other types of information for use in process improvement or process capability determination. An assessment instrument may also provide assistance to the assessor in analysing ratings and compiling process profiles.

Part 5 does not attempt to prescribe a particular format for an assessment instrument, which could be implemented as a manual, paper-based tool; a questionnaire; an automated, on-line tool; or even as an expert system. It does, however, provide a common framework, and prescribes a set of elements that should be incorporated into any type of assessment instrument. In addition, it provides guidance for designers, users and acquirers of assessment instruments about the characteristics and usability of different types of instrument.

4.3   Assessor training and qualification

The qualified assessor in a team has the pivotal role of ensuring that other team members collectively have the right blend of specialized knowledge and assessment skills. The qualified assessor provides the necessary guidance to the team, and helps to moderate the judgements and ratings made by the other members of the team to ensure consistency of interpretation.

Part 6 of this International Standard provides guidance for the preparation and qualification of assessors to perform assessments. Specifically, its purpose is to define initial and ongoing qualification of assessors. It is concerned with assessor competencies and appropriate education, training and experience, and includes mechanisms that may be used to demonstrate competence and to validate education, training and experience.

4.4   Process improvement context

Successful software process improvement occurs in a business context by addressing specific needs and business goals of the organization that are clearly stated and understood.

Part 7 of this International Standard provides guidance on using software process assessment as part of a complete framework and method for performing software process improvement in a continuous cycle although there is no reason why the organization could not employ the guidance for a single cycle of improvement activity. The guidance covers:

–   invoking a software process assessment;

–   using the results of a software process assessment;

–   measuring software process effectiveness and improvement effectiveness;

–   identifying improvement actions aligned to business goals;

–   using the process model in part 2 of this International Standard as a route map for improvement;

–   cultural issues in the context of software process improvement;

–   dealing with management issues for software process improvement.

The guidance provided does not presume specific organizational structures, management philosophies, software life cycle models or software development methods. The concepts and principles are appropriate for the full range of different business needs, application domains and size of organization, so that they may be used by all types of software organizations to guide their improvement activities.
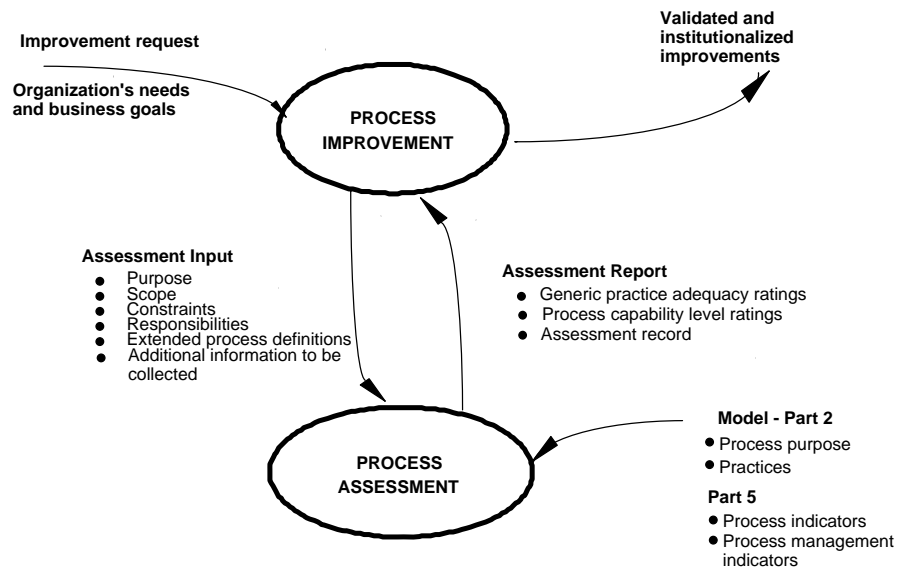
Figure 5 – Process improvement

4.5   Process capability determination context

The procedure for process capability determination is described in part 8 of this International Standard. Process capability determination is mainly built upon process assessment as described in the Standard. Processes are rated against the process model defined in part 2, using the measurement and rating framework defined in part 3. The context of process capability determination is shown in figure 6.

An acquirer of software products or services has technical and other needs as expressed in the specified requirements. Before making a contract the acquirer may need to determine the process capability of the prospective contractor, or a supplier may want to ascertain its own process capability before responding to an acquirer's proposal. The technical and other needs for process capability determination are documented in the specified requirements.

The specified requirement is translated into a target capability that represents the required process capability, and process assessment input that will scope the process assessment. The supplier may put forward a proposed process capability as a set of process-by-process capability level ratings to be offered by the organizational unit concerned. In a straightforward situation, the proposed process capability may be based on a recent self-assessment or by other means. In more complex cases, a supplier may propose a process capability to be achieved in the future based on the supplier's current profile and relevant improvement plans, backed up if possible with improvement records, or a constructed capability including the capability of one or more sub-contractors or partners.
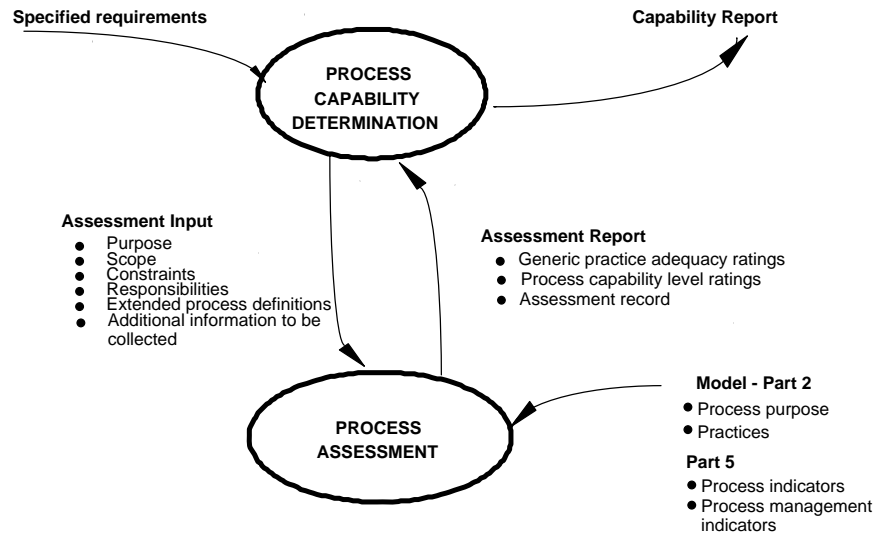
Specified requirements

Capability Report

PROCESS CAPABILITY DETERMINATION

Assessment Input
- Purpose
- Scope
- Constraints
- Responsibilities
- Extended process definitions
- Additional information to be collected

Assessment Report
- Generic practice adequacy ratings
- Process capability level ratings
- Assessment record

PROCESS ASSESSMENT

Model - Part 2
- Process purpose
- Practices

Part 5
- Process indicators
- Process management indicators

Figure 6 – Process capability determination

The credibility of the proposed process capability is analysed together with the risks involved and reported on in the process capability report.

Part 8 of this International Standard provides guidance on how to use the results of an assessment for the purpose of determining the process capability of suppliers. The guide specifically addresses process capability determination both for use within an organization to determine the risks associated with undertaking a new project (sometimes called first party use) and for use by an acquirer for assessing external suppliers (sometimes called second party or contractual use).

5   Conformance

This International Standard contains three principal areas where conformance may be claimed: in the conduct of a software process assessment, in the development of processes which extend those listed in the defined model, and in the construction of assessment instruments. This clause explains the nature of conformance in these three areas.

5.1   Conducting software process assessments

5.1.1   Overview of the requirements

This guidance describes how to conduct assessments in such a way that conformance to the requirements can be readily demonstrated.

The requirements, set out in part 3 of this International Standard for conducting a software process assessment are designed to ensure that the results are reliable, consistent and repeatable. This is important where an organization wishes to compare its assessment results with those of other similar organizations. It is especially important in process capability determination in a contractual situation where competing or collaborating suppliers are being compared.

In general terms, an assessment meeting the requirements of this standard is one which:

– is conducted by an assessor, or a team containing an assessor, qualified as described in part 6 of this International Standard;

– uses an assessment process that at minimum meets the requirements specified in part 3 of this International Standard;

– is based on a set of practices that at minimum include those defined in part 2 of this International Standard for the processes assessed;

– uses an assessment instrument meeting the requirements of part 5 of this International Standard;

– utilizes the process rating scheme defined in part 3 of this International Standard; and

– has objective evidence retained that demonstrates that the above conditions have been met.

It is the responsibility of the assessment team, and specifically the qualified assessor, to ensure that the requirements for conducting an assessment are met. The sponsor of the assessment will normally be the party requiring that the assessment conforms to the requirements.

5.1.2 Assessment team membership

When a decision is taken to perform an assessment, the sponsor of the assessment should be responsible for assembling the assessment inputs, as described in part 7 or part 8 of this International Standard. In particular, the assessment input includes the nomination of an assessor qualified as described in part 6 (the qualified assessor).

The qualifications of an assessor may be verified by following the procedure defined in part 6. This may be performed by the organization being assessed; by the employer of the assessor (if different); or by a third party. Details of the verification should be available, on request, to the sponsor of the assessment. Sufficient records of the assessor's personal history should be retained.

5.1.3 The assessment process

When performing an assessment, the team is responsible for ensuring that the requirements for this process are followed and documented. Specific requirements cover documenting the

– assessment purpose;
– assessment scope;
– assessment constraints;
– assessment responsibilities;
– any extended processes used;
– any additional information to be collected for process improvement or capability determination.

Some of the items - particularly assessment scope and constraints - contain a number of elements, and care must be taken to ensure that all of these have been addressed.

The requirements for rating are contained in part 3 of this International Standard. Guidance on reviewing the inputs of an assessment is contained in part 4. The assembly of the inputs themselves will depend on the purpose of the assessment, and guidance is contained in parts 7 and 8. Documentation of the assessment inputs should be retained in the assessment record, and traceability provided to ensure that it can be verified that the necessary reviews have been performed.

5.1.4 Selecting processes for assessment

The Assessment scope sets out which of the organizational unit's processes are to be assessed, and their mapping into the corresponding processes as defined in part 2 of this International Standard. The mapping will normally be a task for the qualified assessor. Defining the scope in this way ensures that there is a common basis for rating and measurement.

The requirements for identifying processes and process instances and for selecting process instances for the assessment are set out in part 3 of this International Standard. Guidance on mapping to the defined processes, and for rating the process instances is contained in part 4 of this International Standard.

Apart from guiding the assessment, the mapping of organizational processes to the model defined in part 2 of this International Standard forms an essential part of the assessment record. It should be possible, after the assessment has been completed, for any person examining the assessment record to be able to relate the mapping to records of organizational structure, procedures, and standards within the assessed organization.

5.1.5   Reporting assessment results

One of the main reasons for conducting a conformant assessment is to ensure comparability with other assessment outputs. This is made possible by the requirements for rating processes and calculating results within the measurement framework, and reporting them in a way that makes the results of the calculation obvious.

Part 3 of this International Standard defines the requirements for conducting ratings, and for calculating practice adequacy ratings, process capability ratings and process profiles. Detailed guidance on deriving these ratings is contained in part 4 of this International Standard. Requirements for recording the assessment outputs are contained in part 3 of this International Standard. It should be noted that this International Standard does not mandate any specific format for the process profile; a variety of numerical or graphical presentation formats would meet the requirements.

Whatever the final format of the process profile, it is essential that clear traceability to the practices and processes contained in the model defined in part 2 of this International Standard is provided, to enable the process of calculation to be verified. In addition, it should be noted that assessment output contains full details of the process context in the assessment record. This record will also include additional information collected as part of the assessment, and required as inputs to the process improvement or process capability determination activities to follow on from assessment.

5.2   Extensions to the baseline practices

Part 2 of this International Standard provides a model for assessing and improving processes. These processes identify critical attributes that a process should have to be considered complete and effective, but without unduly constraining the implementation of the process. Further guidance on implementing processes may be found in related software standards such as ISO/IEC 12207-1 or ISO 9000-3.

Variant process models may be built that address the unique needs of an industry sector or organization by selecting specific processes from the model in part 2, providing guidance on how to interpret the practices, and/or developing extended processes. Extended processes may include additional base practices, guidance on how to interpret practices for adequacy, or be an entirely new process.

Extended processes and variant models may be developed by organizations for their own internal use; by acquirers of software systems for use in specific acquisition situations; or by professional organizations defining requirements for specific application domains or use situations.

The requirements for building conformant variants and extended processes are set out in Annex A of part 2 of this International Standard together with a style guide in Annex G. The essence of the requirements is to allow only variants that are equivalent to or extend the process model in part 2, and to provide traceability of the base practices of variants and extended processes to the base practices in part 2.

Documentation of the extended process or variant and its differences from the model in part 2 is essential for assessment and rating, and for demonstrating conformance to the requirements. New processes and new practices in extended processes should be identified. The assessment results generated for an extended process should explicitly identify the variations from the standard model. In an individual assessment, the team leader should document any extended processes used, and refer to the location of evidence of their conformance.

5.3   Constructing and selecting an assessment Instrument

An assessment instrument is used during an assessment to assist assessors in identifying work products, practices and processes, in making consistent judgements, and in analysing and presenting the results. The instrument may be in the form of a simple questionnaire, or it may be an automated tool. The instrument for a given assessment might be constructed specifically by the assessment team; it might be a tailored version of an available tool; or it might be a commercial product. The minimum set of requirements to be met by an assessment instrument of any type are defined in part 5 of this International Standard.

It is the responsibility of the qualified assessor to ensure that the assessment instrument chosen meets the requirements expressed in the part 5, and to document the relevant evidence demonstrating conformance. Documentation may consist of point-by-point analysis of the chosen tool against the requirements in the part 5; alternatively, it may be that the supplier of a tool provides certification of conformance.

Documentation of the conformance of the assessment instrument to the requirements forms part of the records of the assessment. Where software-based tools are developed or used to support assessments, ISO 12119 - 1995 may provide a useful mechanism for demonstrating or verifying their conformance to the requirements of part 5 of this International Standard.

Annex A (informative)

References

These references provide background information on the theoretical and practical applications of software process assessment. They are for information purposes only, and should not be taken as implying support for any or all of the approaches described. The list of references is limited to material that has been published officially and is available widely.

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