SPICE

Consolidated product

**Software Process Assessment –
Part 3 : Rating Processes**
Version 1.00

(Formerly PAG 1.01)

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*

1. You may copy and distribute verbatim copies of any or all of the Documents as you receive them, in any medium, provided that you conspicuously and appropriately publish with each copy a copy of these Terms and Conditions. You may charge a fee for the physical act of transferring a copy.

2. You may copy extracts from these documents in materials for internal or public use, providing you provide clear acknowledgment of the source of the material, by citation or other appropriate means.

3. You may not copy, modify, sub-license, or distribute the Documents except as expressly provided under these Terms and Conditions.

Released on the Authority of the SPICE Management Board:

Project Manager   Alec Dorling

Technical Centre Managers:

Europe   Harry Barker

Canada, Central and South America   Jean-Normand Drouin

USA   Mark Paulk / Mike Konrad / Dave Kitson

Asia Pacific   Terry Rout

Members: Catriona Mackie, Bob Smith, Emmanuel Lazinier, Jerome Pesant, Bob Rand, Arnoldo Diaz, Yossi Winograd, Mary Campbell, Carrie Buchman, Ali Azimi, Bruce Hodgen, Katsumi Shintani

Product Managers:

– Part 1 : *Concepts and introductory guide*

Product Manager: Terry Rout

– Part 2 : *A model for process management*

Product Managers: Al Graydon, Mark Paulk

– Part 3 : *Rating processes*

Product Manager: Harry Barker

– Part 4 : *Guide to conducting assessment*

Product Manager: Harry Barker

– Part 5 : *Construction, selection and use of assessment instruments and tools*

Product Managers: Mary Campbell, Peter Hitchcock, Arnoldo Diaz

– Part 6 : *Qualification and training of assessors*

Product Manager: Ron Meegoda

– Part 7 : *Guide for use in process improvement*

Product Managers: Adriana Bicego, Pasi Kuvaja

– Part 8 : *Guide for use in determining supplier process capability*

Product Manager: John Hamilton

– Part 9 : *Vocabulary*

Product Manager: Terry Rout

Acknowledgment:

Acknowledgment is made to all contributors of the SPICE project without whom the project could not have been conceived and carried through successfully.

Note on document formatting

Use the following margins for equivalent printing on A4 or US letter paper (these are NOT the SPICE standards)

Paper size	A4	US letter (imperial)
Top margin	34.1 mm or 1.34 inches	25.4 mm or 1.0 inches
Bottom margin	34.1 mm or 1.34 inches	25.4 mm or 1.0 inches
Left margin	25.4 mm or 1.0 inches	28.4 mm or 1.12 inches
Right margin	25.4 mm or 1.0 inches	28.4 mm or 1.12 inches

SOFTWARE PROCESS ASSESSMENT   Part 3

Rating Processes

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 trialling 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 coordinated 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 this International Standard (part 3) is normative

Introduction

This part of the International Standard defines the minimum set of requirements for conducting a software process assessment to ensure that the outputs of the assessment are consistent, repeatable and representative of the process instances assessed.

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 capability determination exercise as described in part 8. In either case, the formal entry to the assessment process 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 being assessed), what constraints, if any, apply to the assessment, and any aditional information that needs to be gathered. 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 extended processes (see part 2 of this International Standard).

Process assessment is undertaken to understand an organizational unit's current processes. An assessment may be conducted as a self-assessment, an assisted self-assessment, a self-assessment with external verification, or an independent assessment. A team or an individual approach can be used to perform the assessment. This International Standard does not define one methodology for the performance of an assessment but rather a framework and key elements that an assessment methodology should incorporate.

An assessment is carried out by assessing selected processes against the process model defined in part 2 of this International Standard. This consists of a set of process-specific base practices on one hand and a set of generic practices on the other hand. The generic practices apply across all processes. The generic practices are grouped into five process capability levels that define 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 implemented with the aid of an assessment instrument, or set of instruments, constructed according to the requirements and guidance contained in part 5 of this International Standard. The process assessment may be carried out by a team with at least one qualified assessor who has the competencies described in part 6 of this International Standard, or on a continuous basis using suitable tools for data collection. Part 4 of this International Standard provides guidance for interpreting the requirements for a team-based assessment.

This part of the International Standard assumes familiarity with the relevant guidance parts of the standard. It is primarily addressed to the qualified assessor and other people, such as the sponsor of the assessment, who need to assure themselves that the requirements have been met. It will also be of value to developers of assessment methods and of tools to support an assessment.

1   Scope

As part of the Software Process Assessment Standard this document establishes the requirements for a software process assessment, for rating, analysing and profiling an assessment, and defines the circumstances under which assessment results are comparable.

Process Assessment is applicable in the following circumstances:

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.

This document describes a process assessment framework which:

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.

2 Normative references

There are no normative references in 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   Requirements

4.1   General

This clause sets out the requirements placed on an assessment in order to ensure that the assessment outputs are consistent, repeatable and representative of the process instances assessed.

4.2   Defining the assessment input

The assessment input shall be defined prior to an assessment. At a minimum, the assessment input shall define:

- the assessment purpose;

- the assessment scope;

- the assessment constraints;

- the identity of the qualified assessor and any other specific responsibilities for the assessment;

- the definition of any extended processes identified in the assessment scope;

- the identification of any additional information to be collected to support process improvement or process capability determination.

4.3   Responsibilities

The qualified assessor named in the assessment input shall be a member of the assessment team in a team based assessment or shall oversee an assessment conducted using a continuous or tool-based approach.

The qualified assessor shall ensure that the assessment is conducted in accordance with the requirements of this International Standard.

The qualified assessor shall ensure that the organizational unit's processes to be assessed, as defined in the assessment scope, are mapped to the corresponding processes in part 2 of this International Standard or are defined as extended processes.

The qualified assessor shall ensure that the set of process instances selected for assessment is adequate to meet the assessment purpose and will provide outputs that are representative of the assessment scope.

The qualified assessor shall ensure that all of the information required in the assessment output is recorded in a suitable format to fulfil the assessment purpose and that it meets the requirements of this International Standard (see 4.5).

4.4 Assessing and rating processes

4.4.1 Assessing processes

The assessment shall include at least one process instance of each process identified in the assessment scope.

4.4.2 Rating components

4.4.2.1 Base practice rating

A base practice adequacy rating (see 4.4.3.1) or a base practice existence rating (see 4.4.3.2) shall be determined and validated for every base practice within each selected process instance for each process and/or extended process identified within the assessment scope.

4.4.2.2 Generic practice adequacy rating

A generic practice adequacy rating (see 4.4.3.3) shall be determined and validated for every generic practice within each selected process instance of each process and/or each extended process identified within the assessment scope.

4.4.2.3 Process capability level rating

An actual process capability level rating shall be determined for each process instance assessed by aggregating the generic practice adequacy ratings within each capability level.

For each process instance, the actual process capability level ratings shall describe, for each capability level, the proportion of generic practices that were rated at each point on the generic practice adequacy scale in a clear and unambiguous way.

A set of derived process capability level ratings shall be determined for each process identified in the assessment scope by aggregating the actual process capability ratings of the process instances. These derived ratings shall be sufficiently representative of the process capability levels of each process assessed to satisfy the assessment purpose.

For each process identified in the assessment scope, the derived process capability level ratings shall describe, for each capability level, the proportion of generic practices that were rated at each point on the generic practice adequacy scale in a clear and unambiguous way.

NOTE 1 - If only one process instance was identified and assessed then the derived ratings will be the same as the actual ratings of that process instance.

4.4.3 Rating scales

4.4.3.1 Base practice adequacy rating scale

Base practice adequacy shall be rated using the base practice adequacy rating scale defined below.

N; Not adequate: The base practice is either not implemented or does not to any degree contribute to satisfying the process purpose;

P; Partially adequate: The implemented base practice does little to contribute to satisfying the process purpose;

L; Largely adequate: The implemented base practice largely contributes to satisfying the process purpose;

F; Fully adequate: The implemented base practice fully contributes to satisfying the process purpose.

4.4.3.2 Base practice existence rating scale

Base practice existence shall be rated using the base practice existence rating scale defined below:

N; Non-Existent: The base practice is either not implemented or does not produce any identifiable work products;

Y; Existent: The implemented base practice produces identifiable work products.

4.4.3.3 Generic practice adequacy rating scale

Generic practice adequacy shall be rated using the generic practice adequacy rating scale defined below.

N; Not adequate: The generic practice is either not implemented or does not to any degree satisfy its purpose;

P; Partially adequate: The implemented generic practice does little to satisfy its purpose;

L; Largely adequate: The implemented generic practice largely satisfies its purpose;

F; Fully adequate: The implemented generic practice fully satisfies its purpose.

4.4.4 Weighting

Equal weighting shall be applied to each generic practice adequacy rating when aggregating or deriving ratings.

NOTE 2 - Within a given process, each generic practice in the process model in part 2 of this International Standard is regarded of equal importance, both within a common feature, within a capability level and across multiple instances of the process.

4.4.5 Rating references

NOTE 3 - For definitions of the terms used within these subclauses see part 2 of this International Standard.

4.4.5.1 Base practice rating references

A unique reference shall be generated for each base practice rating that includes the process category, the process within the process category, the base practice of the process, and a process instance reference.

4.4.5.2 Generic practice rating references

A unique reference shall be generated for each generic practice rating that includes the process category, the process within that process category, the capability level, the common feature within that capability level, the generic practice within that common feature, and a process instance reference.

4.4.6 Basis for Comparison

In some circumstances it may be desirable to compare the outputs of the assessment of two or more organizational units, or for the same organizational unit at different times. Comparisons of assessment outputs shall be valid only if their process contexts are similar.

NOTE 4 - The sample size used to generate the ratings will influence the precision with which results may be compared.

4.4.7 Assessment Instrument

An assessment instrument that conforms to the requirements set out in part 5 of this International Standard shall be used to support the assessment.

4.5   Recording the assessment output

4.5.1   The process profile

The ratings for the assessed process instances within the assessment scope shall be recorded as the process profile consisting of:

– the actual generic practice ratings and process capability level ratings for each process instance;

– derived generic practice ratings and process capability level ratings for each process within the scope of the assessment;

4.5.2   The assessment record

Any other information which is pertinent to the assessment and which may be helpful in understanding the output of the assessment shall be compiled and recorded as the assessment record . At a minimum, the assessment record shall contain:

– the assessment input;

– the assessment approach that was used;

– the assessment instrument used;

– the base practice ratings for each process instance assessed;

– the date of the assessment;

– the names of team who conducted the assessment;

– any additional information collected during the assessment that was identified in the assessment input to support process improvement or process capability determination;

– any assessment assumptions and limitations.