
**Information technology — Process
assessment —**

Part 5:

**An exemplar software life cycle process
assessment model**

Technologies de l'information — Évaluation des procédés —

*Partie 5: Un exemple de modèle d'évaluation des procédés du cycle de
vie d'un logiciel*

This document is a preview generated by EVIS



COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2012

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword	vi
Introduction	viii
1 Scope	1
2 Normative references	2
3 Terms and definitions	2
4 Overview of the exemplar Process Assessment Model	2
4.1 Introduction	2
4.2 Structure of the exemplar Process Assessment Model	3
4.2.1 Processes	4
4.2.2 Process dimension	9
4.2.3 Capability dimension	9
4.3 Assessment Indicators	10
4.3.1 Process Capability Indicators	12
4.3.2 Process Performance Indicators	13
4.4 Measuring process capability	13
5 The process dimension and process performance indicators (level 1)	15
5.1 Agreement Processes group (AGR)	16
5.1.1 AGR.1 Acquisition Process	16
5.1.2 AGR.1A Acquisition preparation (subprocess)	17
5.1.3 AGR.1B Supplier selection (subprocess)	18
5.1.4 AGR.1C Agreement monitoring (subprocess)	19
5.1.5 AGR.1D Acquirer acceptance (subprocess)	20
5.1.6 AGR.2 Supply	21
5.1.7 AGR.2A Supplier tendering (subprocess)	23
5.1.8 AGR.2B Contract agreement (subprocess)	24
5.1.9 AGR.2C Product/service delivery and support (subprocess)	25
5.1.10 AGR.3 Contract change management	27
5.2 Organizational Project-Enabling Processes group (ORG)	28
5.2.1 ORG.1 Life cycle model management	28
5.2.2 ORG.1A Process establishment (subprocess)	29
5.2.3 ORG.1B Process assessment (subprocess)	31
5.2.4 ORG.1C Process improvement (subprocess)	32
5.2.5 ORG.2 Infrastructure management	34
5.2.6 ORG.3 Project portfolio management	35
5.2.7 ORG.4 Human resource management	36
5.2.8 ORG.4A Skill development (subprocess)	38
5.2.9 ORG.4B Skill acquisition and provision (subprocess)	39
5.2.10 ORG.4C Knowledge management (subprocess)	40
5.2.11 ORG.5 Quality management	41
5.2.12 ORG.6 Organizational alignment	43
5.2.13 ORG.7 Organization management	44
5.3 Project Processes group (PRO)	46
5.3.1 PRO.1 Project planning	46
5.3.2 PRO.2 Project assessment and control	47
5.3.3 PRO.3 Decision management	49
5.3.4 PRO.4 Risk management	50
5.3.5 PRO.5 Configuration management	51
5.3.6 PRO.6 Information Management	53
5.3.7 PRO.7 Measurement	54
5.4 Technical Processes group (ENG)	55

5.4.1	ENG.1 Stakeholder requirements definition	55
5.4.2	ENG.2 System requirements analysis	57
5.4.3	ENG.3 System architectural design	58
5.4.4	ENG.4 Software implementation	60
5.4.5	ENG.5 System integration.....	61
5.4.6	ENG.6 System qualification testing	63
5.4.7	ENG.7 Software installation.....	64
5.4.8	ENG.8 Software acceptance support.....	65
5.4.9	ENG.9 Software operation	66
5.4.10	ENG.9A Operational use (subprocess)	67
5.4.11	ENG.9B Customer support (subprocess)	68
5.4.12	ENG.10 Software maintenance.....	69
5.4.13	ENG.11 Software disposal	71
5.5	Software Implementation Processes group (DEV).....	72
5.5.1	DEV.1 Software requirements analysis	72
5.5.2	DEV.2 Software architectural design.....	74
5.5.3	DEV.3 Software detailed design.....	75
5.5.4	DEV.4 Software construction	76
5.5.5	DEV.5 Software integration.....	77
5.5.6	DEV.6 Software qualification testing	79
5.6	Software Support Processes group (SUP).....	80
5.6.1	SUP.1 Software documentation management.....	80
5.6.2	SUP.2 Software configuration management.....	81
5.6.3	SUP.3 Software quality assurance.....	83
5.6.4	SUP.4 Software verification	84
5.6.5	SUP.5 Software validation	86
5.6.6	SUP.6 Software review	87
5.6.7	SUP.7 Software audit.....	88
5.6.8	SUP.8 Software problem resolution.....	90
5.7	Software Reuse Processes group (REU)	91
5.7.1	REU.1 Domain engineering.....	91
5.7.2	REU.2 Reuse asset management.....	93
5.7.3	REU.3 Reuse program management.....	94
6	Process capability indicators (level 1 to 5).....	96
6.1	Level 1: Performed process.....	96
6.1.1	PA 1.1 Process performance attribute.	96
6.2	Level 2: Managed process	96
6.2.1	PA 2.1 Performance management attribute	97
6.2.2	PA 2.2 Work product management attribute.....	99
6.3	Level 3: Established process	101
6.3.1	PA 3.1 Process definition attribute	101
6.3.2	PA 3.2 Process deployment attribute	103
6.4	Level 4: Predictable process	105
6.4.1	PA 4.1 Process measurement attribute.....	105
6.4.2	PA 4.2 Process control attribute	108
6.5	Level 5: Optimizing process	109
6.5.1	PA 5.1 Process innovation attribute	109
6.5.2	PA 5.2 Process optimization attribute	112
6.6	Related Processes for Process Attributes.....	113
Annex A	(informative) Conformity of the exemplar Process Assessment Model	115
A.1	Introduction	115
A.2	Requirements for Process Assessment Models (from ISO/IEC 15504-2).....	115
A.2.1	Introduction	115
A.2.2	Process Assessment Model scope.....	115
A.2.3	Process Assessment Model elements and indicators.....	116
A.2.4	Mapping Process Assessment Models to Process Reference Models.....	116
A.2.5	Expression of assessment results.....	119
Annex B	(informative) Work product characteristics	120

B.1	Generic Work products	121
B.2	Generic and specific work products	126
Annex C	(informative) Adaptation of the assessment model	183
C.1	Assessment indicators identification	183
C.1.1	Base practices	183
C.1.2	Generic practices	184
C.2	Adaptation of the exemplar process assessment model	185
C.2.1	Adding to or removing processes from the process dimension	185
C.2.2	Identifying process performance indicators for a new process	185
Annex D	(informative) Supplementary process definitions	187
D.1	Supplementary processes	187
D.1.1	QNT.1 Quantitative process improvement	187
D.1.2	QNT.2 Quantitative performance management	190
D.1.3	SUP.9 Software change request management	192
D.1.4	AGR.2D Product release (subprocess)	193
D.1.5	AGR.2E Product/service acceptance support (subprocess)	194
	Bibliography	196

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 15504-5 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and systems engineering*.

This second edition cancels and replaces the first edition (ISO/IEC 15504-5:2006), which has been revised as follows:

- Clause 2 has been modified by updating the reference to ISO/IEC 12207;
- Clauses 4 and 5 have been replaced with new text;
- 6.6 has been replaced with new text;
- B.2 has been replaced with new text;
- a new Annex D – Supplementary process definitions has been added;
- the Bibliography has been 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* [Technical Report]
- *Part 7: Assessment of organizational maturity* [Technical Report]

- *Part 9: Target process profiles* [Technical Specification]
- *Part 10: Safety extension* [Technical Specification]

The following part is under preparation:

- *Part 8: An exemplar process assessment model for IT service management* [Technical Report]

Introduction

An integral part of conducting an assessment is to use a Process Assessment Model constructed for that purpose, related to a Process Reference Model and conformant with the requirements defined in ISO/IEC 15504-2. ISO/IEC 15504-2 provides a framework for process assessment and 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 since the level of detail is not sufficient. Therefore:

- the descriptions of process purpose and process outcomes provided by the 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.

Used in this way, in conjunction with a documented process, consistent and repeatable ratings of process capability will be possible.

The ISO/IEC 15504-5 exemplar Process Assessment Model contains a set of indicators to be considered when interpreting the intent of the 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 12207:2008 has been used as the basis for the ISO/IEC 15504-5 exemplar software life cycle Process Assessment Model.

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.

Information technology — Process assessment —

Part 5:

An exemplar software life cycle process assessment model

1 Scope

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

This part of ISO/IEC 15504 is structured as follows.

- Clause 4 provides a detailed description of the structure and key components of the 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 12207:2008 to identify a 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 three 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. Annex B is also linked directly to Clause 5 as it 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 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.
- Annex D presents some processes supplementary to the Process Assessment Model.

NOTE Copyright release for the Exemplar Process Assessment Model: Users of this part of ISO/IEC 15504 may 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 referenced documents are indispensable for the application 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 12207:2008, *Systems and software engineering — Software 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

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

A Process Assessment Model comprises a set of indicators of process performance and process capability. The indicators are used as a basis for collecting the objective evidence that enables an assessor to assign ratings. The set of indicators included in this part of ISO/IEC 15504 is not intended to be an all-inclusive set nor is it intended to be applicable in its entirety. Subsets that are appropriate to the context and scope of the assessment should be selected, and possibly augmented with additional indicators (see Annex C).

Any Process Assessment Model meeting the requirements defined in ISO/IEC 15504-2 concerning models for process assessment may be used for assessment. Different models and methods may be needed to address differing business needs. The assessment model in this part of ISO/IEC 15504 is provided as an exemplar of a model meeting all the requirements expressed in ISO/IEC 15504-2.

The Process Reference Model defined in ISO/IEC 12207:2008 and 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 software 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 12207:2008.

The Process Reference Model and the 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 the 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 software engineering process capability.