

Literature Review of Software Process Assessment Methodology ISO/IEC 15504

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ABSTRACT: An assessment method with the objective of process improvement adapted to small software company based on the standard ISO/IEC 15504 is being developed. This article describes the design, development, validation and results of a Process Assessment Model for assessing Technological and Business Competencies on Software Development. The model follows the ISO/IEC 15504 (SPICE) requirements for Process Assessment Models. A prime motivation for developing this standard has been the perceived need for an internationally recognized software process assessment framework that pulls together the existing public and proprietary models and methods. Assessment process has been adapted and refined in order to provide ready support. The methods includes an adapted and enhanced assessment model based on the ISO 15504 exemplar model.

1. INTRODUCTION

Unique among software engineering standardization efforts, the developers of ISO/IEC 15504 deliberately initiated an international effort to empirically evaluate ISO/IEC 15504. This effort is known as the Software Process Improvement and Capability determination (SPICE) Trials (Emam and Goldenson, 1995; Golden-son and Emam, 1996; Maclellan and Ostrolenk, 1995; Maclellan et al., 1998; Smith and Emam, 1996). The SPICE Trials were conceived, partially, to address concerns within the software engineering community with the lack of evidence supporting software engineering standards; that they lack an empirical basis demonstrating that they indeed represent "good" practices. Improvement following the benchmarking paradigm almost always involves a software process assessment (SPA). An SPA provides a quantitative score reflecting the extent of an organization's or project's implementation of the best practices defined in the assessment model. The more of these best practices that are adopted, the higher this score is expected to be. The obtained score provides a baseline of current implementation of best practices, serves as a basis for making process improvement investment decisions, and also provides a means of tracking improvement efforts.

II. Components of ISO / IEC 15504

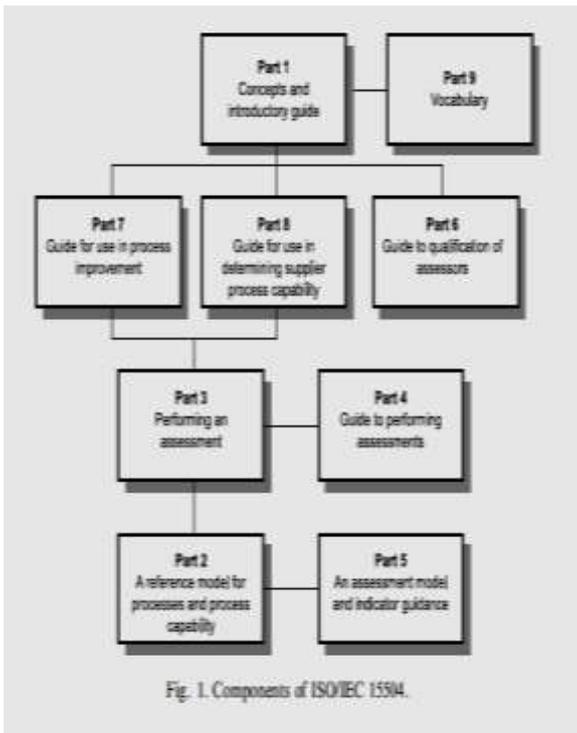
Part 1 is an entry point into ISO/IEC 15504. It describes how the parts of the document suite fit together, and

provides guidance for their selection and use. It explains the requirements contained within the standard and their applicability to the performance of an assessment.

Part 2 defines a two dimensional reference model for describing the outcomes of process assessment. The reference model defines a set of processes, defined in terms of their purpose and a framework for evaluating the capability of the processes through assessment of process attributes structured into capability levels.

Part 3 defines the requirements for performing an assessment in such a way that the outcomes will be repeatable, reliable and consistent.

Part 4 provides guidance on performing software process assessments, interpreting the requirements of Part 3 for different assessment contexts. The guidance covers the selection and use of a compatible assessment model; of a supportive method for assessment and of an appropriate assessment instrument or tool.



Part 5 provides an exemplar model for performing process assessments that is based upon and directly compatible with the reference model in Part 2. The assessment model

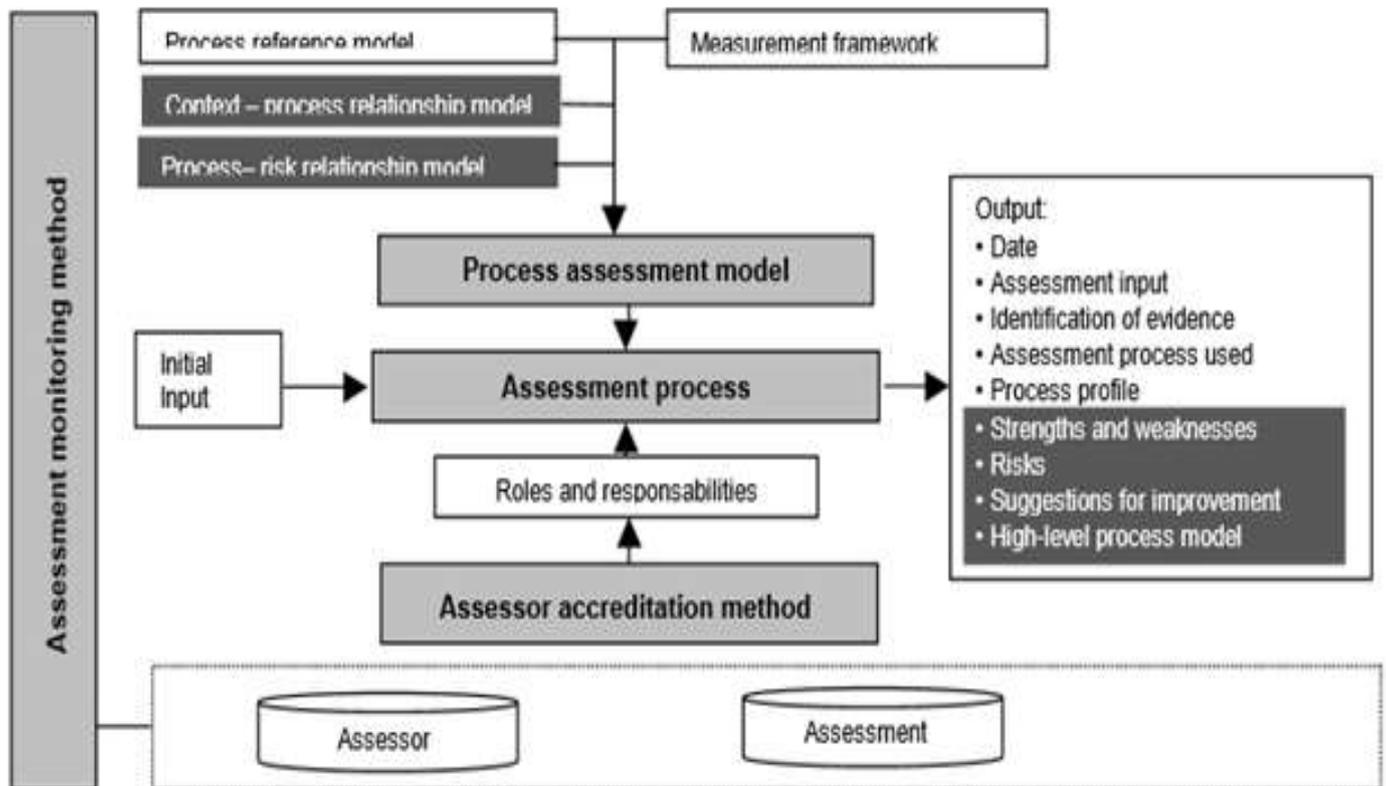
extends the reference model through the inclusion of a comprehensive set of indicators of process performance and capability.

Part 6 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 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 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.

Part 9 is a consolidated vocabulary of all terms specifically defined for the purposes of ISO/IEC 15504



III. THE MARES PROCESS ASSESSMENT MODEL

In designing the MARES process assessment model, the exemplar assessment model from part 5 of ISO/IEC 15504 is taken as a basis. The capability dimension from the part 5 exemplar assessment model is adapted as is from level 0-3. The MARES process dimension has also been developed based on SO/IEC 15504-5. However, due to the specific characteristics of SCs, several processes of the exemplar assessment model have been excluded as being irrelevant in most cases. The process assessment model is also enhanced by the definition of a context-process relationship model, which models the relationship between the specific characteristics, known problems and business goals to relevant processes in form of heuristics.

In accordance with these requirements, a customized process assessment method is currently being developed as part of the MARES methodology for process assessment in small software companies, which basically consists of:

- **A process assessment model** based on the exemplar model of Part 5 of ISO/IEC 15504, including a process reference model and a measurement framework, as well, as a context-process relationship model and a process risk relationship model.
- **An assessment process** that meets the requirements of the assessment process defined in 15504-2, including also guidelines for its application in SCs and document templates.
- **An assessor accreditation method**, which defines a procedure by which a formal recognition is given that a body or person is competent to carry out an assessment based on 15504-3.
- **An assessment monitoring method** which enables the constant monitoring of the assessment methodology as a basis for continuous improvement.

IV. SOME OTHER METHODS

RAPID (Rapid Assessment for Process Improvement for software Development) developed by the Software Quality Institute(Australia) defining an assessment method, which is intended for use by experienced ISO/IEC 15504 assessors for process improvement in small and medium enterprises.

SPINI (An approach for SPI Initiation) developed by Tampere University of Technology (Finland) for conducting SPICE-compatible assessment in small organizations with the objective of process improvement.

FAME (Fraunhofer Assessment Method) developed by the IESE (Germany), which allows to perform either a SPICE or a BOOTSTRAP assessment focusing on improvement. In addition, especially for small software companies, a FAMElight Assessment can be done in a one-day workshop.

TOPS (Toward Organised Processes in SMEs) project

As part of the ESPRIT/ESPINODE initiative for Central Italy resulted in the development of an assessment method for small and medium enterprises based on ISO/IEC 15504 focusing on process improvement in order to promote innovation.

V. CONCLUSION

This study was an evaluation of the exemplar assessment model in ISO/IEC 15504. The objective was to determine how good the model is, whether it was useable, useful, whether the rating and aggregation scheme was meaningful, and whether there were general weaknesses in its architecture.

Majority of the assessors used Part 5 as a source of indicators for conducting their assessment. In general, found Part 5 useful and easy to use), the rating scheme was found to be meaningful, and the process dimension was found to be easy to understand). Furthermore, they were satisfied with the level of detail of the exemplar model, although a minority indicated that less detail in the collected evidence would not have harmed the accuracy of their judgments.

In this paper, also present the MARES process assessment method in conformance with ISO/IEC 15504, with the enhanced the process assessment model basically by integrating a context-process relationship model in order to support the selection of relevant processes and a process-risk relationship model in order to support the identification of potential risk and improvement suggestions

REFERENCES

- [1] "An empirical evaluation of the ISO/IEC 15504 assessment model" by Khaled El Emam, Ho-Won Jung.
- [2] A Method for Process Assessment in Small Software Companies. Alessandra Anacleto, Christiane Gresse von Wangenheim, Clênio F. Salviano, Rafael Savi-2004
- [3] MacLennan, F., Ostrolenk, G., Tobin, M., 1998. Introduction to the SPICE Trials. In: El Emam, K., Drouin, J.-N., Melo, W. (Eds.),
- [4] SPICE: The Theory and Practice of Software Process Improvement and Capability Determination. IEEE CS Press, Silver Spring.

- [5] MacLennan, F., Ostrolenk, G., 1995. The SPICE Trials: validating the framework. *Software Process ± Improvement and Practice* 1, 47±55
- [6] Validating the ISO/IEC 15504 measures of software development process capability Khaled El Emam, Andreas Birk
- [7] A. Beitz, K. El Emam, J. Järvinen. A Business Focus to Assessments. *Proceedings of the European Conference on Software Process Improvement*, 1999.
- [8] G. A. Cignoni. Rapid software process assessment to promote innovation in SMEs. *Proceedings of Euromicro 99*, Italy, 1999.
- [9] Fraunhofer Institute Experimentelles Software Engineering. FAME: A Business Focused Method for Process Assessment. <http://www.iese.fraunhofer.de/fame>
- [10] International Organization for Standardization, ISO/IEC 15504: Information Technology – Process Assessment.
- [11] C. Jones. *Assessment and control of software risks*. Yourdon Press, 1994.
- [12] Research project 15504MPE. <http://lqps.sj.univali.br/sub-paginas/projetos/15504MPE/15504MPE.htm>
- [13] S. McConnell. *Rapid Development – Taming Wild Software Schedules*, Microsoft Press, 1996
- [14] Ministério de Ciência e Tecnologia. *Pesquisa Nacional de Qualidade e Produtividade no Setor de Software Brasileiro*. Brazil, 2001
- [15] T. Mäkinen, T. Varkoi, M. Lepasaar. A Detailed Process Assessment Method for Software SMEs”, *EuroSPI*, 2000.
- [16] PROFES <http://www.iese.fhg.de/projects/profes/>
- [17] T. P. Rout, A. Tuffley, B. Cahill. *CMMI Mapping to ISO/IEC 15504-2:1998*, Defence Material Organisation, 2000
- [18] T. P. Rout, A. Tuffley, B. Cahill, B. Hodgen. *The RAPID Assessment os Software Process Capability, SPICE 2000*