

# Preface

This book is intended for current and potential users of the emerging International Standard on Software Process Assessment (SPA). Users may include organizations wanting to conduct process assessments internally or as a service to their customers, providers of models, methods, and tools compliant with the requirements of the emerging standard, educators wanting to teach the principles of SPA as part of a university course, and researchers developing technology to support process assessments and then empirically evaluating them.

This book provides the first comprehensive coverage of the theory and practice of SPA as embodied in the current version of the ISO/IEC documents. The official title of these documents is ISO/IEC PDTR 15504, although they are also commonly known as the SPICE Version 2.00 documents. The main focus of the book is twofold: to help the reader understand the evolution of the SPA ideas that were developed between 1993 and 1997 and to provide guidance for interpreting and using the documents for assessment and subsequent improvement and/or capability determination.

Initial thoughts about writing this book began to emerge in March 1996, primarily to address the needs of the software engineering community:

- There was little technical information about the SPICE document set available to the general software engineering community when we started to write this book. We wanted to fill this gap by providing up-to-date information.
- Early and potential users of the emerging standard asked such questions as “Why does the emerging standard do X this way and not that way?” By describing the rationale for the design decisions that were made during the development of the SPICE document set, these questions could be answered. Different perspectives and issues about how a Software Process Assessment framework could and would be used were considered carefully throughout the documents’ development and these views are described in the following chapters.
- While potential users can obtain the ISO/IEC documents—instructions for doing so are included below—the practical experi-

ences and empirical evaluations of those who have used them are not available just by reading the emerging standard. To provide insights into the practice and empirical evaluations that have been gained, both key elements of the SPICE Project, half of this book has been devoted to reporting the results of experienced users of the emerging standard.

In short, much of the content of this book is not and will not be available elsewhere and contained in a single package. The information is complementary to that which is available in the ISO/IEC documents and provides a contextual frame of reference to those readers who want to understand the rationale behind its development.

The name SPICE—Software Process Improvement and Capability dEtermination—was given to this project as the development vehicle for the initial version of the SPA documents and as the management of the trials. The ISO/IEC/SC7 Working Group mandated to develop the SPA standard is WG10. While each of the two entities has a different objective, they consist of mainly the same people. Therefore, the document set is commonly referred to as the SPICE documents or the ISO/IEC documents. We have retained the use of the term *SPICE documents* because, within the software engineering community, it has become synonymous with the ISO/IEC emerging standard document set.

The set of documents comprising ISO/IEC PDTR 15504 is available freely under certain conditions. For example, organizations participating in the SPICE Trials can request access to the documents by sending an email to “sugar@qai.u-net.com” and including in the subject field “DOCUMENT REQUEST.”

This book is divided into three parts, a paper appendix, and an electronic appendix on a CD-ROM.

Part 1 describes software engineering standardization efforts mainly from the perspective of ISO and the place of WG10 and the SPICE Project within that context.

Chapter 1 *Introduction to Software Engineering Standards* describes the structure, goals, and projects in ISO/JTC1/SC7 and places the SPA effort within the context of other software engineering projects within ISO.

Chapter 2 *Introduction to SPICE* provides the history of the project to date as it tries to help the reader understand the multiple parts of the emerging standard. It describes how the project started, how the teams were formed, how the precedent-setting use of the Internet facilitated worldwide communication and the relatively-fast development of the emerging standard. It also describes why user trials—the first such formalized trials within the software engineering standards community—were introduced. It chapter also explains the difference

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between the SPICE Project and WG10, which in the past has been a constant source of confusion.

Part 2 provides a complete description of the ISO/IEC PDTR 15504 (or SPICE Version 2.00) documents. This part gives the reader an insight into the technical aspects of SPICE through the SPICE reference model and its rating framework. The reader will also gain an understanding of how to perform a SPICE-conformant assessment. The emphasis in this part of the book is on the principles of the emerging standard and how to interpret its contents.

Chapter 3 *Introduction to the SPICE Documents and Architecture* describes the basic SPA architecture and its evolution. It provides insight into how the architecture has evolved to where it is today, presents its basic principles and the two-dimensional process model, introduces the current nine parts, and describes how the parts were derived from their requirements. An addendum to this chapter explains ongoing work to further harmonize the emerging SPA standard with the existing ISO/IEC 12207 standard on Software Life Cycle Processes.

Chapter 4 *The Reference Model* presents the first of two normative components of the emerging standard. The reference model is one of the key documents that provides a framework for process assessment.

Chapter 5 *Process Assessment Using SPICE: The Assessment Activities* provides comprehensive guidance on how to conduct an assessment and how to select a compatible model, method, and tool to conduct the assessment.

Chapter 6 *Process Assessment using SPICE: The Rating Framework* explains the measurement framework and its evolution. The measurement framework is one of the key elements for ensuring the repeatability of assessment results and for clearly presenting and interpreting assessment scores.

Chapter 7 *The Assessment Model* describes the exemplar model that is part of the document set. The exemplar model is compliant with the requirements of the emerging standard and can be used for conducting an assessment.

Chapter 8 *Guidelines for Process Improvement* provides information on what needs to be done to ensure successful process improvement following an assessment.

Chapter 9 *Guidelines for Determining Supplier Process Capability* explains how the results of an assessment can be used in the context of capability determination, such as, for example, during supplier selection.

Chapter 10 *Qualification and Training of Assessors* provides information about a recommended process for the qualification of assessors as well as the outline of a course for training assessors. Assessor qualification is one of, if not the most, critical element to ensure the repeatability of assessments.

Chapter 11 *A Comparison of ISO 9001 and the SPICE Framework* discusses

how the SPICE framework is suitable for use as a prerequisite process management model when considering registration to ISO 9001. It presents the SPICE framework as a path toward achieving compliance with the Quality System standard as well as for maintaining its process improvement objectives post-registration. It also provides a table showing a SPICE-ISO 9001 mapping.

Part 3 discusses experiences in using the SPICE document set. The reader will find a discussion about the background of the SPICE Trials' activity, a summary of the results, and a detailed analysis of the findings. Through a case study, the reader will be walked through a typical SPICE Trial assessment and thereby gain an insight into the whole process.

Chapter 12 *Introduction to the SPICE Trials* gives an overview of the trials, the hypothesis upon which the Phase 1 Trials were based, their objectives, the structure of the program, and an overview of the empirical research methods used.

Chapter 13 *Empirical Evaluation of SPICE* presents the results of evaluating Version 1.00 of the SPICE document set during the Phase 1 Trials.

Chapter 14 *Analysis of Assessment Ratings from the Trials* provides a summary of the ratings from the Phase 1 Trials as well as an analysis of the ratings and how they were defined. It also identifies clusters of similar organizations that can be useful for doing benchmarking.

Chapter 15 *Analysis of Observation and Problem Reports* describes the structured feedback that was collected from the Phase 1 Trials and discusses the analysis based on the data provided by the assessors. The discussion includes the problems they faced, the classification systems used to group the problems, and action items derived for input into the new version of the emerging standard.

Chapter 16 *Interrater Agreement in Assessment Ratings* describes a case study to evaluate the repeatability of ratings within the context of a single assessment.

Chapter 17 *Using SPICE as Framework for Software Engineering Education: A Case Study* describes an application of SPICE in teaching a software engineering course at university, lessons learned, and speculations about how such applications could be used in the future.

Chapter 18 *Assessment Using SPICE: A Case Study* describes an assessment using Version 2.00 of SPICE documents, the methods, templates, assessment plans used, as well as discussions of the assessment report.

Chapter 19 *The Future of the SPICE Trials* describes the ongoing Phase 2 Trials and how readers can find out more about participating in them.

Version 2.00 of the document set is the version that will be used in the official SPICE Trials until Version 4.00 of the document set is baselined. (Version 3.00

will be an interim developmental version only.) Early experience with Version 4.00 of the document set is expected to be available during the SPICE Trials toward the end of 1998 at the earliest.

There are two appendices that provide information on how to install the automated tools included with the CD-ROM. Contact information about the developers of these tools is also provided for readers with questions or who want to obtain upgrades.

The CD-ROM contains two automated tools that can help to improve the efficiency of conducting assessments. The first tool is useful mainly for conducting assessments, and the second was developed for visualizing and manipulating assessment ratings data. These tools should help the reader get started with conducting assessments. We also included the full Version 1.00 document set as well as a program to read and print the document files.

We hope this book will shed a clear and insightful light on the emerging standard for SPA and on the SPICE Project, as well as provide you with additional incentive to embark on the long and never-ending journey that is Software Process Improvement and Capability dEtermination.