国外优秀信息科学与技术系列教学用书

CMMI® 精萃

——实用集成化过程改进导论

（第二版　影印版）

CMMI® DISTILLED

A Practical Introduction to Integrated Process Improvement

(Second Edition)

■ Dennis M. Ahern
Aaron Clouse
Richard Turner

PEARSON
Addison Wesley

高等教育出版社
Higher Education Press

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江苏工业学院图书馆
藏书章

高等教育出版社

图字：01-2004-3052 号

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Published by arrangement with the original publisher, Pearson Education, Inc., publishing as Pearson Education.

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原版 ISBN: 0-321-18613-3

For sale and distribution in the People's Republic of China exclusively (except Taiwan, Hong Kong SAR and Macao SAR).
仅限于中华人民共和国境内（不包括中国香港、澳门特别行政区和中国台湾地区）销售发行。

图书在版编目（CIP）数据

CMMI 精萃——实用集成化过程改进导论：第2版 = CMMI Distilled: A Practical Introduction to Integrated Process Improvement: Second Edition / （美）埃亨（Ahern, D. M.），（美）克劳斯（Clouse, A.），（美）特纳（Turner, R.）. —影印本. —北京：高等教育出版社，2005.2
ISBN 7-04-016059-5

Ⅰ.C... Ⅱ.①埃...②克...③特... Ⅲ.软件工程—英文 Ⅳ.TP 311.5

中国版本图书馆 CIP 数据核字（2004）第 119205 号

出版发行	高等教育出版社	**购书热线**	010-64054588
社　　址	北京市西城区德外大街 4 号	**免费咨询**	800-810-0598
邮政编码	100011	**网　　址**	http://www.hep.edu.cn
总　　机	010-58581000		http://www.hep.com.cn
经　　销	新华书店北京发行所		
印　　刷	北京民族印刷厂		
开　　本	787×1092　1/16	**版　　次**	2005 年 2 月第 1 版
印　　张	20.5	**印　　次**	2005 年 2 月第 1 次印刷
字　　数	390 000	**定　　价**	29.00 元

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Preface to the Second Edition

Since the first edition of *CMMI*[SM] *Distilled* was published, there have been significant changes in the CMMI world. As promised, CMMI-SE/SW/IPPD/SS version 1.1 was released in 2002. Later that year, CMMI-SW was released. In just three years we have seen amazing worldwide adoption rates of the CMMI Product Suite, with implementation evenly divided between government suppliers and commercial sector organizations. The suite has become recognized as the cutting edge of process-improvement technology.

There has been considerable activity in the availability of CMMI-based material, as well. In February 2003, the SEI published its hardbound reference version of the complete model with practitioner information and guidance. The number of technical notes and other guidance published continues to increase. CMMI Transition Partners (licensed by SEI, and currently numbering over 100) have developed their own supplementary materials.

Given this explosion of material, along with the continuing ability to download from the Web the models and other components of the Product Suite, we felt a real need to bring out a second edition of *CMMI*[SM] *Distilled*. Here are some of the important reasons:

1. CMMI version 1.1 contains improvements over version 1.0 (which formed the basis for our first edition).
2. CMMI is now a recognized and widely adopted model, so that some of the material concerning the creation of CMMI and its relationship to the legacy models is less important to current readers.
3. The pioneer case studies are somewhat out of date.
4. Even with the publication of the CMMI reference book, the need continues for a broader, more succinct view of CMMI, one that is readily accessible to executives, managers, and practitioners, as well as to the simply curious.

5. The readers of the first edition of *CMMI*[SM] *Distilled* sent us thoughtful comments, suggestions, and requests.

Candidly, another major reason was that we were running out of copies of the last edition with which to impress friends and family members, and figured a new edition would be more fun than simply ordering more books.

Organization of the Book

The book is divided into four major parts.

Part I introduces integrated process improvement and provides a rationale for undertaking such an approach. This material is both a primer for the novice and ammunition to gain management support for the process improvement champion. It offers general guidance as well as specific hints on implementation, including pointers to support the migration from legacy process improvement activities and accomplishments. Part I also provides "Pearl of Wisdom" that are based on lessons learned from the pioneering organizations that blazed the trail toward integrated process improvement. If you wish to start your reading with the details of CMMI, you could save this first part for review at a later time.

Part II describes the work of the CMMI Team. The CMMI philosophy, architecture, and models are presented, and examples of the models are annotated in detail to provide a better understanding of their contents. This part also includes some of the rationale for specific CMMI decisions and help in navigating the rather daunting CMMI models.

Part III builds on the first two parts and offers the authors' practical guidance in the use of the CMMI products. It suggests heuristics for choosing models and representations appropriate for a specific organization. It also describes CMMI appraisals and explains how to tailor the CMMI products to fit an organization and enhance the probability of success in applying CMMI.

Part IV presents some musings on the future of CMMI. These informed speculations reflect some of the discussions held formally and informally during and since CMMI development. The ideas included are intended to invite discussion and spark innovation, but not, as the sportswriters say, "as the basis for any actual cash wager."

Like their predecessors, the CMMI models are by necessity large and complex products. This book, while not duplicating all their information,

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will help you understand the CMMI models and auxiliary materials. It provides a rationale for integrating process improvement, a guide to the structure and contents of the CMMI models, and some practical ideas for using the models effectively in your organization. We strongly encourage you to obtain copies of the models from the CMMI Web site (www.sei.cmu.edu/cmmi) and browse through them as you are reading this book, especially Parts II and III.[1] For readers who would like a flavor of the models, Appendixes A and B present a concise summary of CMMI-SW/SE/IPPD/SS content in both the continuous and staged representations.

The CMMI project is an ongoing effort, so any time-restricted book about CMMI will necessarily be overcome by events. The authors have strived to provide information that is both timely and of lasting value, but understand the reality of the CMMI environment. To that end, the publisher has agreed to support this volume with updates through its Web site (www.awprofessional.com) and, when appropriate, further editions.

Second Edition Highlights

So what is different in the new edition? Along with the technical changes made to incorporate CMMI version 1.1, you will find more material about how process improvement can affect business goals, how management can support CMMI adoption, and how organizations can take advantage of a broad experience base to ease CMMI implementation. We've added material on the realized return on investment of process-improvement initiatives. For those who would like a 30,000-foot view, there is a new overview of the model that links the components to business practices and outcomes. Chapter 10 has been totally revised, presenting a more practical discussion based on experience with the latest version of SCAMPI.

Of course our discussion of CMMI evolution has been updated to reflect our latest understanding of how the model will continue to adapt and remain relevant for a long time to come. Most importantly, the previous edition's well-deserved paean to the author team has been

1. The models, formatted for easier reference in one volume, are now included in the SEI series book *CMMI®: Guidelines for Process Integration and Product Improvement*, by Mary Beth Chrissis, Mike Konrad, and Sandy Shrum.

replaced by a new poem, celebrating the model and its potential to provide guidance for a new generation of improving organizations.

Acknowledgments

Numerous people helped with the development of the second edition, and we are indebted to them for all their good efforts. First were the readers who gave us suggestions for improvement and identified errata, with special thanks going to Ron Radice, Suzanne Garcia, and Mike Phillips. Second were those who shared their experiences with us to bring you better examples and clearer exposition, especially Kathleen Dangle. Third, and certainly not least, were our amazing wives (Pam, Debbi, and Jo) who, in addition to providing occasional relief from family obligations, read various draft versions of our revised text, offering valuable improvement suggestions. We love you all even more.

Our hope for you, our readers, is that you will find benefit in this new edition and improvements that are informative, useful, and appropriate to your needs.

—Dennis, Aaron, and Rich
Baltimore, Dallas, and Washington, D.C., July 2003

Preface to the First Edition

This book is about a new way of approaching process improvement for engineering development. Process improvement is a generally well-understood and accepted means of achieving quality and productivity gains for software development, and the recognition of its importance for other engineering disciplines is growing. The success and wide adoption of the Capability Maturity Model (CMM) for Software have inspired increased development of similar models in disciplines other than software. The resulting proliferation of models in engineering organizations has led to conflicts in process-improvement goals and techniques, considerable increases in required training, and confusion on the part of practitioners as to which of the various models applies to their specific needs.

The Capability Maturity Model Integration (CMMI) project, an ongoing effort by industry, the U.S. government, and the Software Engineering Institute (SEI) of Carnegie Mellon University, is attempting to address this situation. Started in 1998, CMMI is an effort to codify the tenets of model-based process improvement and provide a single, integrated framework for improving engineering processes in organizations that span several disciplines. By integrating the tools and techniques used to improve individual engineering disciplines, both the quality and the efficiency of organizational process improvement are enhanced.[1]

In the last quarter of 2000, after extensive stakeholder review and piloting, the first official CMMI products were released. These models

1. CMMI initially focused on development activities (that is, building things), with a special emphasis on systems and software engineering. Clearly, many aspects of process improvement apply more broadly, to other engineering as well as nonengineering disciplines. As you learn about CMMI, you may gain insight into how its process improvement framework might be extended and applied to other areas. We assume that the majority of readers are interested in the initial CMMI focus on the development of software-intensive systems, and hence we write from that perspective. We also invite readers to think about other potential applications within the engineering development world and beyond.

provide users with a choice of single or integrated disciplines and a choice of a staged or continuous representation. They include a wealth of engineering and process-improvement information, such as clear goals and extensive guidance on the best practices to achieve them. Most importantly, a well-defined framework outlines how additional disciplines may be brought into the product suite so as to minimize the development of incompatible models in the future.

Purpose of the Book

This book has a threefold purpose. First, we intend to help organizations understand how an integrated approach to process improvement can help mature their technical and management processes. Second, to support this integrated approach, we present a new set of tools developed by the CMMI project specifically designed for multidiscipline process improvement. Finally, we provide practical guidance in the selection and use of those tools. This guidance is based on lessons learned from organizations that have adopted integrated process improvement, as well as the knowledge and experience gained from the hundreds of professionals who were involved in the development of the CMMI Product Suite.

Audience for the Book

The intended audience for this book comprises executives, middle managers, team leaders, acquisition specialists, process-improvement champions, and the often overlooked and overworked process-improvement practitioners. Executives, who may have deferred process improvement in the past because the scope of their business exceeded the boundaries of a single model, will find an approach and tools to mitigate their concerns. Middle managers and team leaders will find information on the effects of process improvement on their responsibilities and the cross-discipline nature of their environments. Process-improvement champions will find a means to enlarge their base of support and focus their efforts in a way that heightens the chances of adoption and success. Finally, individuals who are charged with implementing process improvement will find help in applying models in the real world. It is our hope that when unsuspecting project and program managers are instructed to "implement that CMMI stuff," this book will provide sufficient information to save both their careers and their sanity.

While applicable to any organization involved with rigorous, time-critical development of complex systems, this book will hold special interest for system developers and systems integrators who supply the U.S. government. The federal government participated in the CMMI development work, thereby supporting the efforts of its suppliers (both external and internal) to improve process performance. In October 1999, the U.S. Department of Defense established the requirement that its large program development contractors demonstrate full compliance with a maturity level 3 as measured by the CMM for Software (or equivalent).[2] More recently, it has indicated its intention to have CMMI-SE/SW identified as an equivalent evaluation tool.[3] Given the considerable interest at all levels in adding the acquisition discipline to CMMI, the authors believe that CMMI will likely see application in improving government system acquisition organizations, as well.

Our Intentions

The authors have all been active in process improvement in the real world. We bring considerable practical experience to this effort, together with our ideas on improving the way process improvement is accomplished. Together we struggled through the creation of the CMMI products, benefiting from the wide variety of views brought by the CMMI Product Development Team. Generally, this book describes the products and positions of the nearly 100 other experienced practitioners and researchers that made up that team. In some places, however, we express our own opinions. In those cases where the text may not reflect the consensus of the team, we have identified our unorthodoxy.

It is our hope that this book reflects the tremendous accomplishments of the entire CMMI Product Development Team. Most of all, we want you to obtain a clearer understanding of the practice and benefits of integrated process improvement based on CMMI products. Through the information in this book, we hope to help make your process-improvement initiatives successful.

2. "Software evaluations for ACAT 1 programs," memorandum from Dr. J. S. Gansler, Under Secretary of Defense (Acquisition and Technology), Oct. 26, 1999.
3. "Use of CMMI evaluations by the Department of Defense," memorandum from Dr. Delores M. Etter, Deputy Under Secretary of Defense (Science and Technology), Dec. 11, 2000.

Acknowledgments

The authors would like to acknowledge the help and support of the CMMI Product Development Team and the CMMI Steering Group. The members of those groups, past and present, may not agree with everything that we say here, but this book would not exist without their devoted efforts over several years on behalf of CMMI. Additionally, several individuals were key to the actual development of this book. They include Karl Arunski, Roger Bate, Denise Cattan, Jeffrey Dutton, Delores Etter, Jack Ferguson, Craig Hollenbach, Linda Ibrahim, Mike Phillips, Sarah Sheard, and Joan Weszka.

Peter Gordon, Asdis Thorsteinsson, and other Addison-Wesley personnel were invaluable in helping us meld the significantly different styles of the three authors into coherent, readable prose. The reviewers engaged by the publisher, including several from the Software Engineering Institute, provided us with many useful improvement suggestions.

Finally, the authors would like to thank our families (and especially Pam, Debbi, and Jo), who put up with crabby spouses and parents, absences from home, and frenetic holidays so that this book could make its production schedule. We love you all.

—Dennis, Aaron, and Rich
Baltimore, Dallas, and Washington, D.C., January 2001

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The Tower of Babel
Gustave Dore (1832–1883)
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