

## Introduction

“...what is the use of a book,” thought Alice, “without pictures....”

Lewis Carroll<sup>1</sup>

Why this book?

This *Guide* is for those who want to understand something large and complex, the Capability Maturity Model® Integration, the CMMI®, and would like help — and especially pictures — in figuring out what it might mean in their company’s work.

If you happen to be familiar with my book *A Guide to the CMM<sup>SM</sup>*, you will recognize that this *Guide* has the same style, design, structure, and purpose. First of all, it is a book meant to be used not just read. To that end, it is of a handy size with plenty of white space in the margins for notes, and a spiral binding allowing it to lie flat and fold easily. The flexible cover makes it lighter than otherwise, and the back flap listing the acronyms doubles as a bookmark.

Pictograms, the most important design feature for users of this book, illustrate the abstract text of the CMMI, called herein, the model. A

pictogram has a small vocabulary of icons to show a related set of those airy model entities: process areas, goals, and their associated practices. The icons are intuitive and easy to draw: an eye for a review, a stick figure for a person, circles or rounded rectangles for an activity, arrows for a flow of some kind, and so on. You will find them listed in Appendix A: Glossary of Icons. An example to the right is the stakeholders icon (explained under Project Planning, Specific Practice 2.6, p. 57). Phrases and acronyms annotate the pictograms. Alongside a pictogram in the book is a brief text with my interpretation of what is going on.



**Stakeholders**

The goal of the book is twofold: clarity and simplicity. The pictograms are simple and (I hope) on the intuitive level of the cave paintings at Lascaux in France or the “pictographs” American plains Indians drew on buffalo hide showing hunting trips and encounters with soldiers in uniform. Clarity of a kind seems to come from the ability of the pictogram to summarize with these fuzzy icons and to relate, better than text, the pattern behind sentences on pages in the model. Going from a word-heavy description like the model with its iterations of the same text template for each Process Area (PA) to an iconic picture of the activities implied, is what I call the Pictogram Method<sup>TM</sup>.

<sup>1</sup> Carroll 1993, p. 1.

There are two kinds of pictograms for each Process Area. The Goals View summarizes on a single page the one, two, or three Specific Goals of a PA; the Practices View expands each Specific Goal of a PA into its Specific Practices, usually on one page with a few exceptions (for example, see discussion under REQM SG1, p. 100). See the section on CMMI Structure in Chapter 1 for Process Areas, and Specific Goals and Practices. Please note that in the pictograms, the text of Specific Goals and Practices is paraphrased to allow more space for icons.

### What the *Guide* Covers

The *Guide* illustrates and discusses all 22 Process Areas in the model, the CMMI-DEV v1.2 released in 2006. This book also treats in a summary fashion some of the background of the model and its structure in Chapter 1.

### Representations

The two model representations — staged and continuous — are characterized in Chapter 1. In discussing Process Areas, the *Guide* groups them by Maturity Level and so takes the staged point of view. That viewpoint should not hinder users of the *Guide* since the model content is the same in both representations.

For newcomers to the CMMI, the two representations should trouble you only momentarily until you see that the differences are not essential, at least for process improvement, as you proceed to translate the model's recommendations for your work. But if you are a long time model pundit — the word “geek” comes to mind — and familiar with the predecessor CMM<sup>®</sup>, then you know of the two camps in the CMMI world, what you might call the “stagists” and the “continuists”. Like other holders of irreconcilable opinions about abstractions, extreme members of the two sides have been known to hurl mighty arguments at the other. The great naturalist E. O. Wilson, whose specialty is ants, but who has also observed closely specimens of the family *Hominidae*, speaks of “...the psychological Principle of Certainty, which says that when there is evidence both for and against a belief, the result is not a lessening but a heightening of conviction on both sides.” (Wilson 1992, p. 26) Eventually a time of peace arrived among the representation camps, and a truce, an easy one at that, now reigns.

### Order of Presenting Process Areas within Maturity Level

There are many possible sequences in which to discuss the Process Areas (probably around 22! — factorial — since there are 22 of them) and many different reasons to choose among them.

The CMMI text (see below) chooses the English alphabetical sequence. The SEI course, Introduction to the CMMI, treats the Process Areas in groups reflecting a reasonable view of

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how such groups relate to the work of a business.<sup>2</sup> SEI instructional designers then chose an order for presenting the groups for instructional efficiency.

Since this Guide follows a staged representation for conceptual convenience, so to speak, the sequence problem is solved for major groups: use Maturity Levels. But the problem of order of presenting within Maturity Level remains. I have chosen a sequence reflecting my view of instructional benefit as well as what I call a conceptual hierarchy for implementation. The introductory section to each of Chapters 2 – 5 explains the latter.

But, in fact, the presentation order is strictly for convenience. If yours doesn't match mine, feel free to start anywhere in the *Guide* and to begin your process improvement activities wherever your analysis tells you is the right place, after due consideration of all the factors you can muster from all the stakeholders. For the elements of all the Process Areas are connected and in many more ways than 22!, since there are many more subpractices than PAs. They are all woven in “implementation threads” through the process elements; and the resulting weave is like an enormous many-sided tent: pull a loose thread anywhere and eventually you would traverse the whole model.

#### The CMMI Comes in a Choice of Formats

The model is available in two formats, as a hardcover book (Chrissis 2007)<sup>3</sup> and as an electronic or digital softcopy (SEI 2006c). The electronic format is downloadable from the SEI web site ([www.sei.cmu.edu](http://www.sei.cmu.edu)) as an Adobe® Acrobat® Reader™ file. The electronic format is handy because you can locate terms and phrases with a software search function. This feature has been invaluable to me in tracing concepts, since not all model-specific terms are found in its glossary. The search function, when it returns a “Not Found,” also enables you to learn what's missing from the CMMI.

Besides being free, you can also print the downloadable format, but beware of the pagination snare. The Adobe® application will number the pages according to the page size of your printer, and standard page sizes differ among countries. The letter size paper customary in the U.S. will paginate differently from the same softcopy document generated by the same text application but printed on ISO A4-size paper.

The hardcover format from Addison-Wesley (Chrissis 2007) is a handier size, though still pretty large, and weighs less than the printout of a downloadable format. It has the same content as the electronic format but includes an index, portions of a case study of applying the CMMI to a company supplying services,<sup>4</sup> and many “hints” and “tips” set off on page margins.<sup>4</sup>

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<sup>2</sup> SEI 2005, Module 5, slide #3.

<sup>3</sup> Abbreviated references are inserted in the text and footnotes with author and date. Full references are listed in the *Guide's* Bibliography, Appendix B; references to multi-author works in both the text and bibliography list the name of the first author without “et al.”

<sup>4</sup> The full case study is Ceva 2005.

### How to Use the *Guide*

First, truth in labeling. My interpretation of the Process Areas and CMMI is not SEI's (Software Engineering Institute) or anyone else's. In particular, my interpretation has not been vetted by the SEI.

Since this book is a guide, it does not repeat everything in the model. For that reason, you should use the *Guide* with a copy of the model at hand and consider the latter authoritative whenever my interpretation is not the one you would construct from your own reading of the model text.

Your own interpretation is crucial, for it consists in translating the necessarily abstract language of the model into the day-to-day equivalents in your company. You might proceed by parsing my interpretation, then consulting the model (or vice versa). Next, critique my interpretation: what would be different in your company? Then, the most important step: figure out how to implement the processes you need to streamline work with ever less waste and miscommunication. That last move is the whole game, and an enormous one, of which the CMMI and your and my interpretation are only baby steps. For you have to figure out how to package and sell your insights to others, a difficult job in any organization.<sup>5</sup> The model is like those annoying college math books that present a tricky problem with a few hints but leave the solution to the student as an exercise.

### No Checklists or Process Templates

Some books giving guidance on maturity models come with procedures, checklists, and templates for model practices. You won't find any here. The book is a guide; it assumes a follower who makes the journey on her own. In Process Transition International (PTI) we think we have learned one big thing over the years in helping companies interpret maturity models. It is that outsiders can never know enough about the daily tasks, pressures, and concerns to produce the process pieces and changes needed in a company. Only the people performing those tasks and facing those concerns and pressures can do so with lasting success. This is the gist of the common maxim "The map is not the terrain." It is also the universal recommendations of the leaders of process improvement, Dr. Deming — embodied in the Plan-Do-Check-Act cycle<sup>6</sup> — and Dr. Joseph Juran. Outsiders like Dr. Juran could advise Japanese manufacturers on what to do, but the insiders had to do it. Finally, the most brilliant and doubly, or triply, efficient process improvements we have seen are in companies who followed a maturity model but figured it out for themselves.<sup>7</sup>

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<sup>5</sup> More difficult if you have stagists and continuists.

<sup>6</sup> See Deming 1986, p. 88.

<sup>7</sup> Two case studies of such instances are downloadable from our website, [www.processtransition.com](http://www.processtransition.com).

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## Examples

When first learning in a serious way about cmms<sup>8</sup> — serious enough to read books, take a course, or try to imagine how your company would implement improved processes, you find yourself wanting examples. Twenty to thirty percent of the student evaluations from every one of our courses ask for more examples.

In discussing the pictograms we do give many examples of implementing goals and practices. (The hardcover CMMI has similar “hints” and “tips” in margin notes.) But there are never enough to satisfy the requests. There are three main reasons for the scarcity of examples.

First, successful companies do not usually reveal proprietary information about their capability and do not want to give away their processes for free. And if you are lucky — or foolish — enough to be a maturity model lead appraiser, nondisclosure agreements prevent showing artifacts from the best practices you have seen (except for the few published case studies that are not just press releases).

Second, cmms must be written in abstract terms to encompass the complete range of companies — from a few people in an office to a giant engineering project like a space program. One model must fit all. Whatever examples the model gave, someone from a company in that enormous size range would say “The model wants X, our business is Y, so it doesn’t apply to us. And we don’t need no stinkin’ process anyway.” Too specific would be too exclusive.

Third, process itself is a 2<sup>nd</sup> (or 3<sup>rd</sup>?) order<sup>9</sup> concept, the first order being your product flow if you have one. If you don’t have one, it’s the set of steps you do for today’s problems; and the set you do tomorrow for its problems. You can produce stuff without a clue that you have a process, but you will be less efficient than competitors where production capacity is based on reliable process. (Note that if process is a higher order phenomenon, process improvement is one order higher still.) So maturity models cannot describe the first order product flow, they have to deal with the 2<sup>nd</sup> (or 3<sup>rd</sup>?) order general features of first order production.

One of the secrets in putting the process wisdom of cmms to work for you is to interpret their recommendations in the context of your own product flow. In other words, invent your own examples for the process you know best — your own. No one else, and no book, can do that for you.

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<sup>8</sup> “cmms,” lower case, refers to process capability maturity models in general, i.e., to the properties any such model will have.

<sup>9</sup> The notion of “process orders” is discussed in Appendix C.

### How the *Guide* References Model Text

Since page numbers in the model vary by format (hardcover or downloadable), and within the latter by the page size set on your computer (see above), references to the model in this book will never be to a page number but to a format-invariant signpost such as “the Introductory Note under SP 1.1.”

### Special Terms in this *Guide*

Like any other specialty, process modeling and improvement has its own vocabulary of polysyllabic phrases and an alphabet soup of acronyms as a shorthand for those phrases. The *Guide*'s list of acronyms (see the inside back cover) will be familiar to most users of maturity models, but departs from the SEI's acronyms for two Process Areas. The standard SEI acronym for Technical Solution is TS and for Product Integration, PI. The *Guide* uses TS&I for Technical Solution, the appended “I” a reminder to me that the Process Area includes what many software people call implementation.

The *Guide* also makes idiosyncratic use of PI&D as a reminder to me that the Product Integration Process Area includes delivery. (I need all the help I can get to sort out these model subtleties.)

Within you will also find “company” used to mean any organization whether for-profit, non-profit, not-for-profit, government, and so on. Both terms are understood herein to be the same as “organizational unit” for the CMMI appraisal method, SCAMPI. (See SEI 2006b.)

CMMI conflates in “product life cycle” both a period of time, what I would call a “life span,” as well as a connected series of work units. For this *Guide*, both project and product life cycles refer to successive phases (high level) composed of subphases and activities (low level), and both imply respectively a “work breakdown structure” (WBS) or a “product breakdown structure” (PBS). A life cycle is reflected in a plan; a life history is what actually occurred during the project's life span. A like distinction holds between the plan for a ship's voyage (route, crew, provisions, fuel, budget) and the ship's log. The distinction is crucial for the *Guide* which sees Lessons Learned and Feed Forward (LLaFF) as an implementation mechanism; in fact the most effective mechanism there is. (See the Introduction to Chapter 3 and Figure 10.) The Lessons Learned function would compare life cycle (from the Project Planning PA) to life history (compiled, probably by the S/EPG, from Project Monitoring and Control activities) and make appropriate changes to future project and company practices (feeding forward the lessons learned thereby).

“Mechanism” is used to mean an effective integration of procedures, routinely used by trained people, aided by appropriate automation and updated at need — in other words, an “institutionalized” practice or set of practices.

The term “Goal” without a qualifier always refers to a “Specific Goal,” never to a “Generic Goal.” Similarly, “Level” without a qualifier always refers to a “Maturity Level,” never to a “Capability Level” unless so designated.

The strange terms “Level 1-ness, Level 2-ness,” etc. are used in contrast to the usual “Level 1, Level 2,” etc. For me the former refers to the state of the practice in a company, its “look and feel,” the latter, to the result of an appraisal. This book concerns mainly the former. Figure 7 shows the distinction: “Level 1-ness,” “Level 2-ness,” etc. concern the left side and “Level 1,” “Level 2,” etc. the right side of the diagram.

### Let Us Know What You Think

We at PTI would be happy to learn what you find useful or otherwise in our *Guide* as you broach fortress CMMI. Feel free to send an email ([spi@processtransition.com](mailto:spi@processtransition.com)) with your suggestions and comments. We will respond as time allows and perhaps include your suggestion in a future book or course, giving due credit.