CMMI® Interpretive Guidance Project: What We Learned

Mary Beth Chrissis
Mike Konrad
Sandy Shrum
Kenneth Smith
Gian Wemyss

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Software Engineering Process Management

This report was prepared for the

The ideas and findings in this report should not be construed as an official DoD position. It is published in the interest of scientific and technical information exchange.

FOR THE COMMANDER

Christos Scondras
Chief of Programs, XPK

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Acknowledgements

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The Project Team extends its thanks to the hundreds of people that supported this effort by participating in data collection activities and detailed interviews. Team members especially thank the Expert Group members who provided invaluable support and guidance throughout the project.

The CMMI® Interpretive Guidance Project Team members, primarily from the Software Engineering Institute (SEI[SM]), were

- Mary Beth Chrissis

- Dennis Goldenson

- Craig Hollenbach[1]

- Mike Konrad

- Brian Larman

- Sally Miller

- Kenny Smith

- Agapi Svolou

- Karintha Tervalon

- Gian Wemyss

The CMMI Interpretive Guidance Expert Group members were

- Joseph Billi, Vice President, Automatic Data Processing

- Dr. Bill Curtis, Co-Founder and Chief Scientist, TeraQuest

- Doug Ebert[2], Vice President Strategic Development, McKesson Corporation

- Christian Hertneck, Siemens, Corporate Technology

- Pat O'Toole, Principal Consultant, Process Assessment, Consulting & Training (PACT)

- M. Lynn Penn, Director, Quality Systems & Process Management, Lockheed Martin Management & Data Systems

- Bill Peterson, Director, Software Engineering Process Management Program, Software Engineering Institute

- Gowri S. Ramani, Quality Manager, Hewlett Packard

- Terry Rout, Senior Lecturer, Software Quality Institute, School of Computing and Information Technology, Griffith University

- Mark Servello, Vice President, ChangeBridge, Inc.

- Rosalind Singh[3], Director, Quality & Process Improvement, Best Practice Implementations, LLC

- Gary Wolf, Manager, Process Development, Raytheon

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[2]   Ebert was chair of the CMMI Interpretive Guidance Expert Group.
[3]   Singh was vice-chair of the CMMI Interpretive Guidance Expert Group.

Abstract

This report summarizes the results of the Capability Maturity Model Integration (CMMI) Interpretive Guidance Project. It summarizes and analyzes the 7500 comments received regarding CMMI adoption that were reported by CMMI users and potential users. It also describes the actions being taken by the Software Engineering Institute (SEI) to address the issues identified by Interpretive Guidance Project participants.

Although the initial goal of the project was to develop interpretive guidance, after data gathering and analysis the team realized that most respondents' input did not require interpretive guidance. Based on a relatively small number of comments, interpretive guidance was planned, including papers, frequently asked questions (FAQs), and new CMMI courses. However, participant comments clearly showed CMMI interpretive guidance to be less of an adoption issue than suspected.

Some comments covered issues already being addressed as part of SEI activities, including the development of Standard CMMI Appraisal Method for Process Improvement (SCAMPI[SM]) Class B and C methods, the collection of cost and benefit information, and the creation and improvement of CMMI training courses. The majority (approximately 80%) of the actionable comments received were best handled as change requests to help guide the ongoing improvement of the CMMI Product Suite.

[SM]   SCAMPI is a service mark of Carnegie Mellon University.

1 Introduction

Since the release of Version 1.1 of the CMMI Product Suite in January 2002, the SEI and its Partner Network have been helping organizations understand and adopt CMMI. The CMMI Interpretive Guidance Project was formed to understand how CMMI is being adopted and used by software, IT, and IS organizations. This report and its companion report, *CMMI Interpretive Guidance Project: Preliminary Report*, summarize the comments collected and describe the actions being taken to address them [Chrissis 2003a].

1.1 Lessons Learned

When the Interpretive Guidance Project was initiated, project members expected that their research would identify problem areas that could be addressed by specific interpretive guidance. Team members expected to find that particular process areas or practices would be problematic for software, IT, and IS organizations. Team members imagined that by providing more information to help these organizations use parts of CMMI, it would ease the adoption struggles of many organizations.

However, the data collected generally did not confirm these expectations. At the conclusion of the Interpretive Guidance Project, the team members realized that the comments they gathered did not logically conclude a strong need to develop interpretive guidance but rather provided comments that are summarized in the following sections.

1.1.1 Positive Comments

Instead of identifying serious problems that could be addressed by interpretive guidance, the team received many comments insisting that CMMI was useful without interpretation. Much of the feedback received was positive. The team hadn't expected that. After all, it was looking to target the problem areas hampering the adoption of CMMI in software-related industries. Although there were many suggestions for improving CMMI, ultimately no fundamental flaws emerged.

1.1.2 Minimal Need for Guidance

Of all the data received, only about 20 percent pointed to the need for interpretive guidance and many of these comments were countered by comments from organizations that found little diffi-

culty with CMMI. So, instead of creating interpretive guidance as the project name suggests, the team converted the majority of comments to change requests for CMMI Version 1.2 development.

1.1.3 Software Not Unique

Although the questions posed by the Interpretive Guidance Project were aimed at software, IT, and IS organizations, responses were received from a variety of organizations besides those targeted. The comments from these organizations were similar to and consistent with the comments from the software, IT, and IS organizations. Largely, these other organizations represented systems engineering and acquisition. This aspect of the feedback seemed to imply that adoption difficulties were not specific to, unique, or limited to software, IT, and IS organizations.

1.1.4 Activities Underway

Because the Interpretive Guidance Project was a two-year project, as the team collected comments it could forward its analysis of these comments to those responsible for new and existing SEI activities intended to help CMMI adoption. So, it was no great surprise that when the team finished its analysis it found that many of the issues identified were either already being addressed by existing SEI activities or by new activities being planned, including the 20 percent in which interpretive guidance was suggested.

1.2 Resulting Actions

Generally, it appears that CMMI adoption is going well for those who have chosen to do so. Most organizations judged that CMMI was adequate for guiding their process improvement activities and that their prior investments in process improvement helped them to adopt CMMI. Nevertheless, the actionable comments that identified issues required action.

The actionable comments provided important input to CMMI Product Suite Version 1.2 development, to various SEI activities, and to CMMI-related research and communication. The greatest number of comments (2,200) was converted to CMMI change requests to be used in the development of CMMI Version 1.2.

As a result of the Interpretive Guidance Project Team's analysis of the comments, it found that there were three main areas where interpretive guidance was needed:

1. guidance about CMMI model components not found in legacy models

2. guidance for addressing overlaps within CMMI, specifically the overlap between generic practices and process areas

3. guidance for implementing generic practices

Interpretive guidance will be developed in these areas and will be packaged appropriately, typically as part of documents planned by projects already underway. For example, additional guidance about implementing generic practices will be added to the CMMI Frequently Asked Questions on the SEI Web site.

Details of the Interpretive Guidance Project Team's activities and findings are described in the remaining sections of this report.

2 The Project

Although the focus of this report is on the comments received by the Interpretive Guidance Project, it is useful to understand why and how the project was initiated. The CMMI Interpretive Guidance Project is best understood within the context of CMMI history.

The Interpretive Guidance Project began as a response to input the SEI received at a CMMI Workshop in which some participants said that CMMI was difficult for software organizations to use. This workshop was held May 7-8, 2002. The purpose of the workshop was to understand CMMI adoption barriers and benefits for software, information technology, and information systems organizations. A special report, *A Report on the May 2002 CMMI® Workshop,* resulted that summarized the workshop discussions.[4]

During the workshop, there was considerable discussion about what exactly the software community needed to guide its process improvement efforts. Possible solutions discussed during the workshop included the following:

- maintaining the SW-CMM indefinitely

- creating a "software-only" version of CMMI

- developing CMMI interpretation guidelines for software organizations

The difficulties identified at the workshop became an important concern because the SEI sought CMMI to be considered an upgrade of the SW-CMM by users, and recommended that software organizations that were beginning CMM-based process improvement efforts choose CMMI as the basis for their improvement efforts. Therefore, if additional help was needed by software organizations to enable them to adopt CMMI, the SEI wanted to provide it.

After the workshop, there were several actions taken. The decision was made to continue with the sunset of the SW-CMM. A "software-only" version of the CMMI model (CMMI-SW) was created and made available to the public. And, the SEI formed the CMMI Interpretive Guidance project to research how best to help software, IT, and IS organizations adopt CMMI.

The Interpretive Guidance Project was formed to find out just what kind of problems were being encountered by these organizations and what kind of help was needed.

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[4]   This report is available by request from cmmi-comments@sei.cmu.edu.

The objectives of the Interpretive Guidance Project were defined as follows:

- Understand and address the issues that software organizations, with a special emphasis on commercial software, IT, and IS organizations, have when using CMMI.

- Enable current Capability Maturity Model for Software (SW-CMM) users to more easily upgrade to CMMI.

- Eliminate as many barriers to CMMI adoption as possible.

- Encourage CMMI adoption.

An Interpretive Guidance Project Team was formed to perform the work. An Interpretive Guidance Expert Group was also formed to help guide the work of the project team and to help ensure the work would be useful and objective. The team did not presume they understood the problem, so their first activities were focused on data collection.

In the next section the data collection activities of the project team are described.

3 Data Collection

Data was collected using several means: (1) facilitated birds-of-a-feather (BOF) sessions at conferences, Software Process Improvement Network (SPIN) meetings, and selected CMMI training courses; (2) an online survey; and (3) detailed interviews of organizations. Details of how the BOF sessions were conducted as well as the detailed results of these events and the online survey are covered in the report *CMMI Interpretive Guidance Project: Preliminary Report* [Chrissis 2003a].

3.1 BOF Sessions

The primary purpose of the BOF sessions was to identify the areas of CMMI that required additional guidance. BOF session attendees completed a background questionnaire to help the Interpretive Guidance team understand the context from which interpretation issues would arise.

At each BOF session, attendees selected one or more areas of interest and joined a working group to provide their input and discuss CMMI issues with other attendees. Generally, each working group provided a short presentation outlining their group's top five issues. The sessions ended with a general discussion period.

The following artifacts were collected from each session:

- flipcharts describing the issues discussed by the working groups
- detailed notes taken by volunteer recorders selected from within the working groups that documented the context of issues and other relevant information
- marked up "lean view" of the CMMI Framework collected from participants to capture issues that were not recorded or discussed during the working group session due to time or other constraints
- CMMI background questionnaires that described participants' background and context

For more information about the comments received from the BOF sessions, see the report *CMMI Interpretive Guidance Project: Preliminary Report* [Chrissis 2003a].

3.2   Web-Based Questionnaire

Geography, schedule, and other barriers kept many members of the targeted community from providing input at the BOF sessions. Consequently the team chose a Web-based questionnaire as an additional vehicle for collecting information. The Web-based questionnaire allowed the team to collect in-depth information regarding CMMI adoption and transition since participants could provide detailed information without the time constraints of a workshop session.

Members of the Interpretive Guidance team and the SEI's Software Engineering Measurement and Analysis Initiative created the Web-based questionnaire. To capture data consistent with other data gathering tasks, the questionnaire included many of the components of the BOF sessions. Any input to the questionnaire that could identify the respondents or their organizations was (and is) held in strict confidence by the SEI.

The Interpretive Guidance Project Team invited over 7,000 people to participate in the questionnaire. Of those, 668 elected to participate. For more information about the comments received from the Web-based questionnaire, see the report *CMMI Interpretive Guidance Project: Preliminary Report* [Chrissis 2003a].

3.3   Detailed Interviews

The Interpretive Guidance Project Team received both positive and negative comments from BOF sessions and the online survey. To gain more detailed information, the team chose to interview a select group of respondents to determine how individuals and organizations resolved the issues identified by the earlier interpretive guidance data collection activities. This information, when combined with the much broader data collected from the survey and BOF sessions, provided a more complete picture of CMMI adoption to help guide interpretive guidance activities.

These interviews were conducted either at a company site or by telephone. Comments from these interviews were held in the strictest confidence and were subject to the same high confidentiality and non-attribution guidelines that governed the Web-based questionnaire. In both cases, comments were presented only in summary form or in a way that could not be attributed to any particular person or organization.

From a candidate list of approximately forty organizations, the Interpretive Guidance Project Team, with guidance from the Interpretive Guidance Expert Group, selected eight organizations to interview. This set of organizations represented a cross-section of the community of interest and had addressed many of the issues discovered during data-collection tasks.

The following organizations were selected for interviews, based on the selection criteria, their desire to participate, and the resources available to conduct the interview:

- Automatic Data Processing
- Bank of America
- Electronic Data Systems
- John Hancock Financial Services

- Lockheed Martin M&DS
- Northrop Grumman IT
- McKesson Corporation
- Raytheon Space and Airborne

Candidate organizations were chosen using the following selection criteria designed to ensure that a cross-section of organization types and issues were examined:

1. At least 50% of the organizations to be interviewed must be IT, IS, or commercial software development and maintenance organizations (could be a sub-organization of a non-IT organization).

2. The remainder of organizations should represent a variety of sectors (e.g., defense contractors, automotive, telecommunications, banking, financial, and insurance).

3. At least one organization must be a legacy SW-CMM user.

4. A variety of maturity levels (2 through 5) against SW-CMM or CMMI should be represented (i.e., at least one organization at each level).

5. A variety of organization sizes should be represented.

6. Participants should represent issues in one or more of the following categories: interpretation of phrases and concepts, generic goals and generic practices, process areas, CMMI transition.

7. Participants should reflect both recent adopters of CMMI and those who adopted CMMI years ago.

8. Include at least one organization that has chosen not to adopt CMMI.

9. Include at least one organization that has adopted CMMI but is otherwise new to CMMs.

10. Consider organizations that have submitted more than 10 questionnaire responses.

11. Include at least one international company.

12. Include at least one organization that is using CMMI with other standards/approaches (e.g., Six Sigma, ISO 9001:2000).

13. Include no more than one organization from the same company/enterprise.

14. Consider organizations highly recommended by the Interpretive Guidance Expert Group or an Interpretive Guidance Project Team member.

15. Consider organizations that have developed interpretive guidance (or similar artifacts) that the organization would be willing to share.

16. Consider well-regarded industry leaders.

The Interpretive Guidance Project Team developed an initial set of generalized questions designed to elicit more information about CMMI within the targeted organization. These questions focused around the following general topics:

- what in CMMI works for the organization

- what in CMMI does not work for the organization

- obstacles encountered by the organization

- how the organization dealt with obstacles

- examples of what the organization has done in their adoption of CMMI (e.g., templates, interpretation notes, policy guidelines, procedure notes, and training materials)

In the next section, the team's analysis of the data collected is described. Included in this section are the number and types of comments received and a characterization of these comments.

4 Data Analysis

In an effort to reach a broad sampling of the software, IT, and IS communities, data collection sessions were held at conferences, SPIN meetings, and training sessions; a Web-based questionnaire was administered; and detailed interviews were conducted with candidate organizations.

Appendix A contains a summary of responses to general questions from the Interpretive Guidance Questionnaire. This summary provides a sampling of opinions about CMMI. More information about the responses to questions from the Interpretive Guidance Questionnaire is available in the report *CMMI Interpretive Guidance Project: Preliminary Report*, a companion report to this one [Chrissis 2003a].

The Interpretive Guidance Project team collected about 7,500 comments on specific issues from the BOF sessions, the online survey, and the detailed interviews and compiled them into a database[5]. This section discusses the analysis of these comments.

The analysis process was designed to help the team determine (1) if interpretive guidance was needed, (2) where interpretive guidance was appropriate, (3) what form interpretive guidance should take, and (4) whether there were other activities outside of interpretive guidance that would address the comments received. To help make this determination, the comments were first categorized into the following groups:

1. CMMI Models	8. Benefits Evidence and Case Studies
2. Using CMMI with Other Standards	9. CMMI Training Courses
3. CMMI Model Coverage	10. General Interpretation
4. Cost of CMMI Adoption	11. CMMI for Small Organizations
5. Process Improvement Guidance	12. How to Get Started
6. SCAMPI Appraisals	13. CMMI Marketing and Communication
7. CMMI Model Representations	14. High Maturity Guidance

Figure 1: The Categories Used to Characterize Comments

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[5] For the purpose of this report, only the comments on specific issues that were collected are discussed.

Within each of these categories, there were multiple comments that ranged from those relating to interpretation of the model to those that suggested that there could be errors or improvements that could be made to the product suite. For example, within the category of *CMMI Models*, there were comments that discussed a particular aspect of the Causal Analysis and Resolution process area that caused difficulty for an organization during adoption as well as comments that specifically asked how a particular generic practice relates to a process area. There were also comments suggesting that process areas be combined or deleted.

As illustrated in Figure 2, the largest number of comments covered topics specific to CMMI models. There were 3,458 comments, or over 45 percent of all comments received, that pertained to confusing content or defects found in CMMI models. Other topics that got a lot of attention included the following:

- Expanding coverage of CMMI models to new areas

- Using CMMI with other standards

- Reducing the cost of adopting CMMI
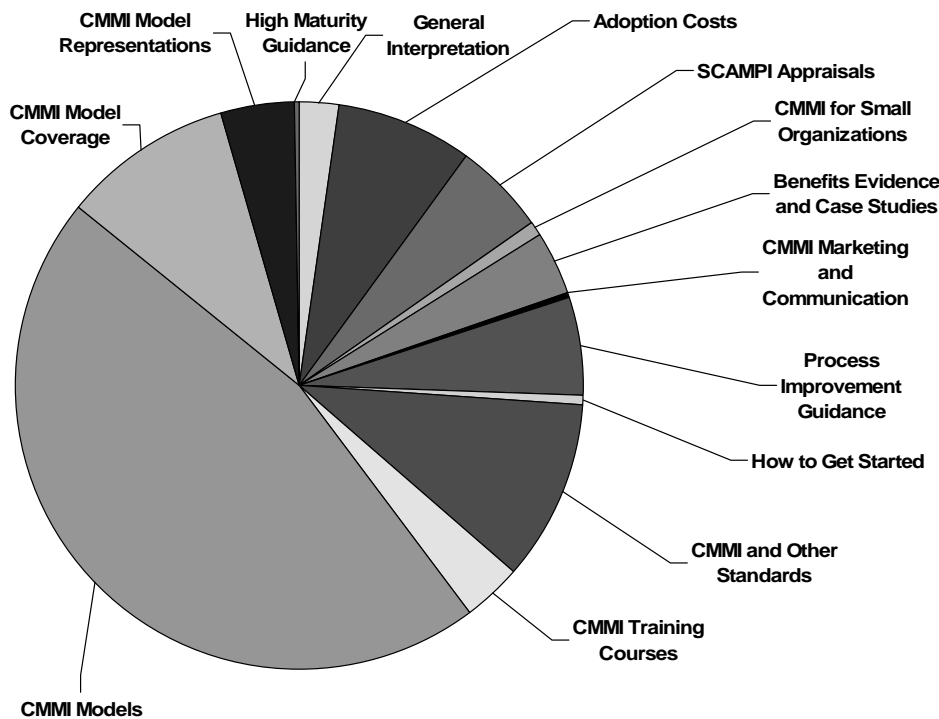
Figure 2: Categories of Comments and Their Relative Number

After organizing the comments into these 14 categories, Interpretive Guidance Project Team members read each comment and determined whether the comment was positive, negative, or non-actionable and also whether a comment should be categorized as open or closed. All positive and non-actionable comments were categorized as "closed" because no further processing of the comment was required. There were about 4,800 comments closed by the team.

About 28 percent of the closed comments provided positive feedback. Some examples of positive comments received are listed below:

- CMMI effective[ly] establishes an understandable framework, in which an organization can ferret out problem areas, and develop appropriate improvements.

- CMMI practices help eliminate loss of information about a process over time, allowing for more reuse of legacy development.

- I have been involved with two different types of organizations on their process improvement efforts at an EPG or program management level and I feel it is a great model for guiding process improvement for any organization whether large or small. It is easy to interpret and to me is common sense.

- There appears to be adequate classes, seminars, and other organizations that serve as resources to gain answers to questions in implementing CMMI.

Where appropriate, the positive comments were included in change requests so a balanced picture of the issue was presented whenever both positive and negative feedback on the same issue was received. The comments that were purely positive and not linked to any other issues were closed and no further processing was done.

About 72 percent of the closed comments were non-actionable. Some examples of non-actionable comments were comments such as "*not applicable*," "*none*," and "*I have not yet spent enough time assessing this to provide a meaningful answer*." Although these comments provided answers to the survey questions, there was no further processing necessary.

Of the approximate 7,500 comments, 64 percent were closed, leaving about 2,700 open.

Percentage of Comments Open and Closed
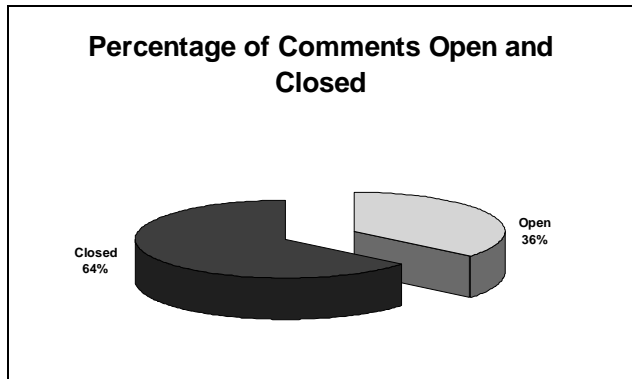
Closed
64%

Open
36%

Figure 3: Percentage of Comments Open and Closed

These 2700 open comments were subject to further analyses. The results of these analyses are described in the next section.

5 Analysis Results

Once the open comments in the Interpretive Guidance database were analyzed, many were consolidated into change requests and submitted as part of the CMMI User Feedback Process[6]. These change requests will be analyzed and addressed as part of the CMMI Version 1.2 development process, which is expected to result in an updated CMMI Product Suite in 2006.

There were 312 change requests created as a result of analyzing approximately 2,200 comments, which reflect 81 percent of the open comments. Each change request covered anywhere from 1 to 30 comments. Of these change requests, 288 applied to model-related issues, 15 applied to appraisal-related issues, and 9 applied to training-related issues. These change requests will be used to guide changes to CMMI products. The comments that are addressed by change requests will not be used for developing interpretive guidance.
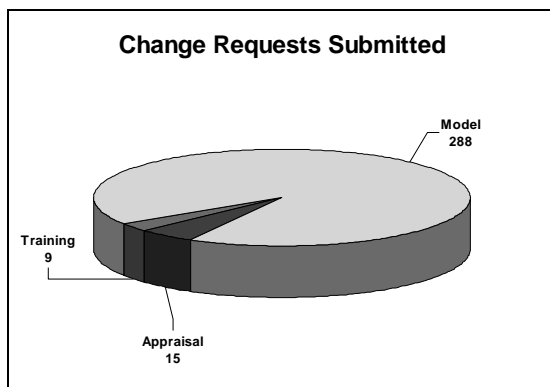
Figure 4: Type and Number of Change Requests Submitted

There were 527 comments, roughly 20 percent, that pertained to understanding and interpreting the CMMI Product Suite. These comments form the basis for creating interpretive guidance materials, which will include papers, frequently asked questions (FAQs), new course materials, and CMMI adoption aids.

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[6]   For more information about the CMMI User Feedback Process, refer to
        http://www.sei.cmu.edu/cmmi/models/change-requests.html.

Figure 5 summarizes the fourteen categories identified in Figure 1.

Number of Comments by Category

Category	Open/Closed values
CMMI Models	
Using CMMI with Other Standards	
CMMI Model Coverage	
Cost of CMMI Adoption	
Process Improvement Guidance	
SCAMPI Appraisals	
CMMI Model Representations	
Benefits Evidence and Case Studies	
CMMI Training Courses	
General Interpretation	
CMMI for Small Organizations	
How to Get Started	
CMMI Marketing and Communication	
High Maturity Guidance	

Figure 5: Number of Interpretive Guidance Comments by Category

The rest of this section contains category summaries presented in order by the number of comments submitted (most to least). Each section contains a description of the comments received, the number of comments received, some sample comments, and SEI activities that address the issues identified.

5.1 CMMI Models

There were 3,458 comments submitted (2,073 closed and 1,385 open) that addressed the content or structure of the CMMI models.

CMMI Models

Open 1385

Closed 2073
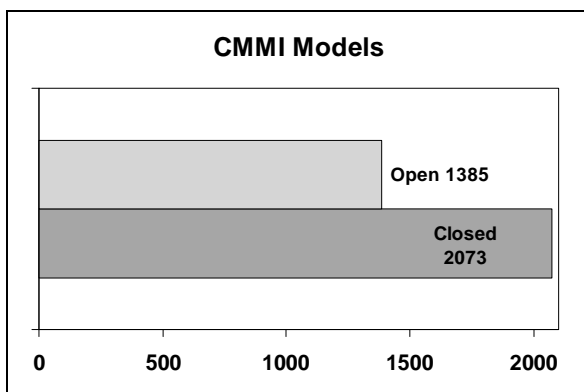
Figure 6: Comments About CMMI Models

These comments identified confusing areas or defects in CMMI models and ranged from requests to provide help in applying generic practice 2.2 to suggestions for combining two specific practices into one in the Project Monitoring and Control process area. There were comments that called for improving the practices related to integrated product and process development (IPPD) to be more concrete and useful. Most of these comments were submitted as change requests for Version 1.2 and are also summarized by process area and generic practice in Appendix B of this report.

Below are a few representative comments provided by participants:

- *I like the organization of level 4 PAs/practices by organization and project, rather than between process and product as in SW-CMM.*

- *So glad that we've moved away from subcontract management to what really happens ... supplier relationships. This also has created a bridge in our organization between the supplier sourcing experts and the CMMI/process improvement teams.*

- *All SPs are useful to my organization. Requirement management is always a big issue in my organization, but we did not do it well before, after adopting CMMI REQM PA, it's really a good reference for us to manage requirements better.*

- *Common features are more for historical interest than of any practical use.*

- *GP 2.2 is confusing and needs much better explanation and interpretation with practical examples.*

- *There is confusion about the interpretations of the relationship between strategic and tactical training needs.*

How the SEI Is Addressing Open Comments

To address open comments, the SEI is doing the following:

- Analyzing the change requests created from comments received as part of this project for the development of CMMI Version 1.2.

- Using comments to guide the selection of information to be published on the CMMI Web site.

- Providing help in applying particular specific and generic practices on the SEI Web site as part of the CMMI FAQs. To review the model-related FAQs, see http://www.sei.cmu.edu/cmmi/faq/grp01-faq.html.

5.2 Using CMMI with Other Standards

There were 761 comments were received regarding using CMMI with other standards (718 closed and 43 open).

Using CMMI with Other Standards

Open 43

Closed 718

| 0 | 500 | 1000 | 1500 | 2000 |
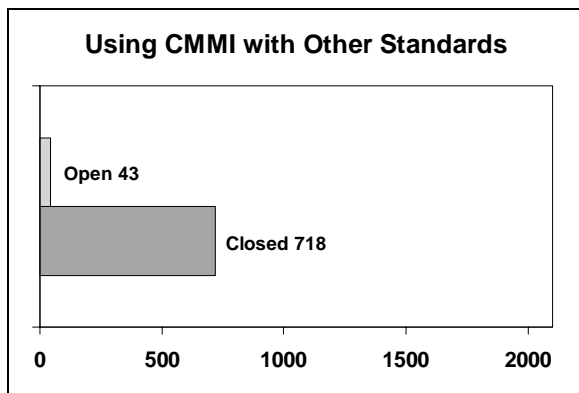
Figure 7: Comments About Using CMMI with Other Standards

In today's market, many organizations use various quality standards and approaches such as Six Sigma, ISO, and PSP/TSP to meet the objectives of their organizations. CMMI must remain flexible to allow these organizations to more easily harmonize their processes with both CMMI and their other standards. Below are a few representative comments provided by participants:

- *We're hoping that the CMMI will reduce the division-specific process improvement efforts encouraged by the various CMMs through the integration of the models.*

- *Other models and standards may be more suitable for specific applications, but not for overall organizational process improvement.*

- *The CMMI integration of systems and services with software has provided the impetus for us to apply formal processes in a wider variety of projects. The integration has made this easier since my part of the organization is not a purely engineering shop, more of a systems integrator. The very much improved Supplier Sourcing has also provided a more pragmatic approach to subcontract management.*

- *We do need to better understand and benefit from agile technologies.*

How the SEI Is Addressing Open Comments

To address open comments, the SEI is doing the following:

- Adding information about using CMMI with other standards or approaches, including comparisons and mappings to other process-related standards, to the SEI Web site as it becomes available.

- Providing a number of presentations and reports on the SEI Web site at http://www.sei.cmu.edu/cmmi/adoption/how-to.html. Most of this information is in the form of presentations created for conferences such as the Software Engineering Process Group (SEPG) conference and the CMMI Technology Conference and User Group.

- Increasing SEI staff participation in the IEEE and International Organization for Standardization (ISO) standards communities.

- Selecting information to add to the CMMI Web site based, in part, on the comments received.

- Planning pilot SCAMPI appraisals that produce dual-outcome appraisal results.

5.3 CMMI Model Coverage

There were 726 comments received (667 closed and 59 open) that suggested that the coverage of CMMI models be expanded to include additional disciplines, a greater part of the product lifecycle, and more.

CMMI Model Coverage

Open 59

Closed 667

0   500   1000   1500   2000
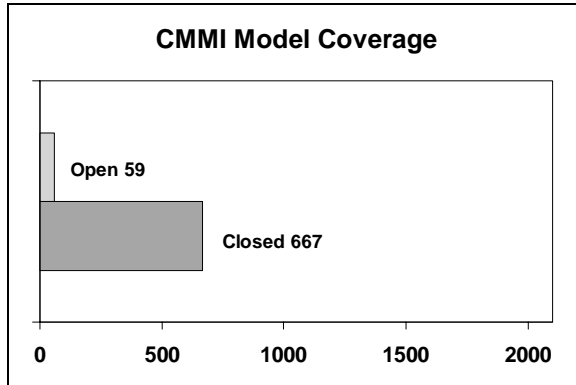
Figure 8: Comments About CMMI Model Coverage

The most commonly mentioned areas for possible expansion included acquisition, services, operations, and hardware. Below are a few representative comments provided by participants:

- *If and when the SA-CMM is also included in CMMI it will be much more beneficial to my organization.*

- *Yes, but it does not cover all types of IT projects or those that do not follow a full lifecycle.*

- *We (the CMMI community) need to include hardware development.*

- *It'd be even better if there was a version of the model that didn't even mention engineering.*

- *Broaden or interpret CMMI SW/SE to include ongoing operations of our other communications systems.*

- *We had hoped the CMMI model would be useful to a non-software development, diversely operational organizational such as ours, but we found it to be too granular, too subjective, and too project-centric.*

How the SEI Is Addressing Open Comments

To address open comments, the SEI is doing the following:

- Analyzing the change requests created from comments received as part of this project for the development of CMMI Version 1.2.

- Considering appropriate expansion areas for CMMI Version 1.2 and beyond. (CMMI Steering Group approval is required for CMMI model expansion.)

5.4 Cost of CMMI Adoption

The team received 613 comments regarding CMMI adoption costs: 451 closed and 162 open.
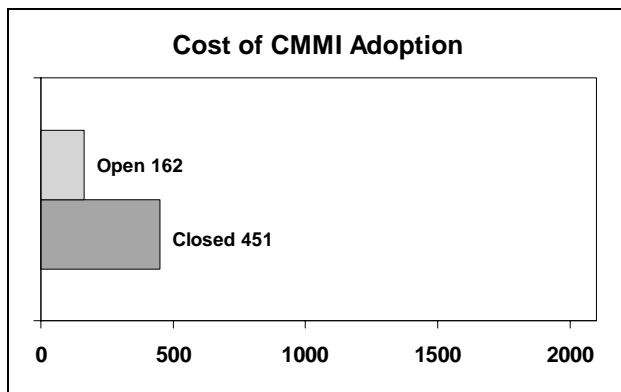
Figure 9: Comments About the Cost of CMMI Adoption

The number of positive comments (e.g., those that believed that the value of CMMI process improvement outweighed appraisal and training costs) and the number of negative comments were nearly balanced. Below are a few representative comments provided by participants:

- *"Considering the cost of not adopting the CMMI, the cost of adoption is not that great."*

- *The cost of adopting CMMI is truly minimal if an organization embraces CMMI fully. It's only when CMMI is an "added" requirement that it is costly.*

- *I believe the clear, specific, and relevant-to-us structure and guidance provided by CMMI will reduce cost of using it compared to less applicable models like ISO.*

- *The cost of the appraisal and evidence collection is staggering. Because we are reaching into more organizations than before, and reaching deeper into their process, there is definitely more cost.*

- *It's not the cost of Process Improvement—that pays for itself—it's the cost of appraisals that slow us down.*

- *Although courses are available, they are cost prohibitive (a deterrent) to the whole effort.*

These comments are difficult to satisfactorily address because some supported while others disputed the existence of a problem with CMMI adoption costs. Further, balancing costs with the quality of products and services must be considered.

How the SEI Is Addressing Open Comments

To address open comments, the SEI is doing the following:

- Using comments about the cost of appraisals, course attendance, and licensing as inputs to decision making related to the SEI Partner Network, SEI Education and Training, and the CMMI Initiative.

- Gathering CMMI cost and benefits information that will be periodically reported to the community.[7] Organizations are invited to participate in this effort to document results in multiple ways. The SEI is also coordinating the creation of tracks at multiple conferences where organizations present their CMMI data.

- Providing on the SEI Web site quantitative information regarding adoption costs and benefits as reported in presentations and papers at http://www.sei.cmu.edu/cmmi/adoption/concepts.html.

- Providing other resources, such as the SEI's Software Engineering Information Repository (http://seir.sei.cmu.edu), the CMMI Technology Conference and User Group (http://www.sei.cmu.edu/cmmi/events/cmmi-techconf.html), and the Software Engineering Process Group Conference (http://www.sei.cmu.edu/sepg/) where users can interact with other CMMI adopters and find information and presentations regarding CMMI adoption costs and benefits.

5.5 Process Improvement Guidance

Four hundred twenty-six comments (333 closed and 93 open) addressed process improvement guidance.
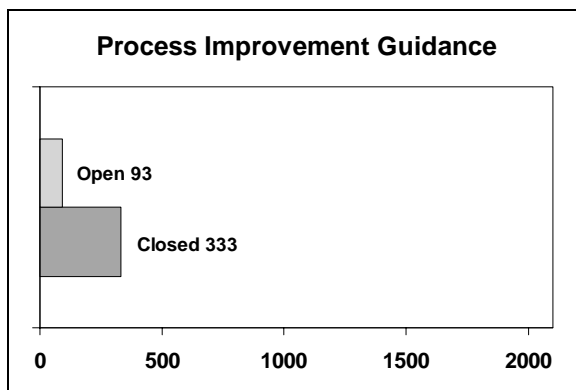
Figure 10: Comments About Process Improvement Guidance

Many respondents felt that the CMMI Product Suite and its supporting materials were adequate for providing process improvement guidance. Below are a few representative comments provided by participants:

- *It is a lot more descriptive than the SW-CMM, and seems to be updated with more knowledge on the current state of software development.*

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7   In 2003, the first report addressing CMMI costs and benefits, *Demonstrating the Impact and Benefits of CMMI: An Update and Preliminary Results*, became available on the SEI Web site at http://www.sei.cmu.edu/publications/documents/ 03.reports/03sr009.html [Goldenson 2003].

- *CMMI is a good reference 'architecture' for process improvement. It also is a good 'media' for communicating between engineering side and management side.*

- *Six Sigma has proven to be a good mechanism for process improvements. This is compatible with the CMMI, not a different approach.*

- *One problem is that process improvement is viewed as an overhead activity.*

- *The model doesn't solve everything, so our organization still needs a general process improvement model. We use an adaptation of Six Sigma and the process improvement circle.*

However, other respondents said that they needed help with process improvement tasks. This type of information is useful to any process improvement program, not just those programs using CMMI for their process improvement.

How the SEI Is Addressing Open Comments

To address open comments, the SEI is doing the following:

- Using comments indicating the need for additional process improvement guidance to guide the development of new products and services to help those conducting process improvement in their organizations.

- Using comments to help determine which questions to add to the CMMI Frequently Asked Questions, published on the SEI Web site at http://www.sei.cmu.edu/cmmi/adoption/ques-ans.html.

- Supporting a Partner Network that assists organizations with their process improvement needs. More information about the SEI Partner Network is available on the SEI Web site at http://www.sei.cmu.edu/collaborating/partners/trans.partners.html.

- Offering several hands-on SEI courses to help those building a new process improvement program or operating an existing one. These process improvement related courses are listed on the SEI Web site at http://www.sei.cmu.edu/products/courses/courses.html#PROC.

- Offering certificate programs that organize SEI courses into a meaningful sequence of learning about broader process improvement. These certificate programs are outlined on the SEI Web site at http://www.sei.cmu.edu/activities/credentials/programs.html.

- Planning a CMMI interpretation/implementation course and using comments indicating the need for additional process improvement guidance to help define the requirements for this course.

5.6 SCAMPI Appraisals

The project received 391 comments regarding SCAMPI Appraisals: 246 closed and 145 open.

SCAMPI Appraisals

Open 145

Closed 246

| 0 | 500 | 1000 | 1500 | 2000 |
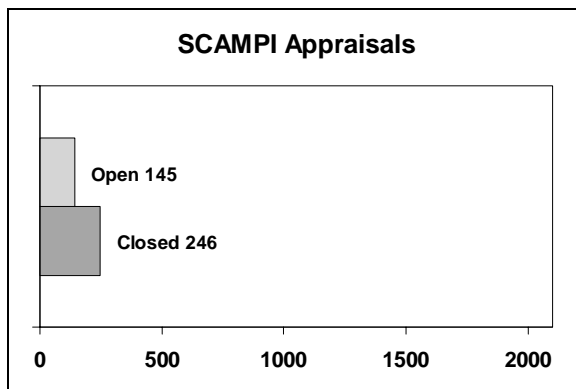
Figure 11: Comments About SCAMPI Appraisals

These comments addressed specific experiences with SCAMPI Class A appraisals. The most frequent comments involved the need to conduct appraisals using a less formalized approach. Other comments included concerns about how to apply particular specific or generic practices to situations in which they did not seem to apply or seemed to overlap with other CMMI process areas. Also received were requests for clarification of particular parts of the appraisal process and requests for additional supporting materials. The team also received positive comments. Below are a few representative comments provided by participants:

- *The methods are suitable. Having Class B and C appraisals function as health checks, which we rely on as a way to gauge progress without the added burden of trying to achieve a rating.*

- *Really like the ability to give project-specific findings*

- *The CMMI appraisal methods provide good guidance to help organisations to find opportunities to improve.*

- *SCAMPI method is expensive, hard to implement.*

- *More guidance is needed for conduct of SCAMPI B and C assessments.*

- *Believe SCAMPI is going to be challenging without automated tool support as amount of data and results to be processed and collated increased greatly.*

How the SEI Is Addressing Open Comments

To address open comments, the SEI is doing the following:

- Analyzing the change requests created from comments received as part of this project for the development of CMMI Version 1.2.[8]

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[8]   Part of Version 1.2 will be updating the Standard CMMI Appraisal Method for Process Improvement (SCAMPI) Method Definition Document (MDD) and Appraisal Requirements for CMMI (ARC) documents.

- Developing and piloting SCAMPI Class B and C appraisals (available for public use in November 2004) guided, in part, by the comments received.[9]

- Providing frequently asked questions (FAQs) on the SEI Web site that answer many of the questions about SCAMPI appraisals These FAQs are found at http://www.sei.cmu.edu/cmmi/faq/grp02-faq.html.

- Providing materials from delivered presentations that describe the experiences of different organizations that have conducted appraisals on the SEI Web site at http://www.sei.cmu.edu/cmmi/appraisals/#getting-started.

- Supporting SEI Partners which conduct SCAMPI appraisals. These Partners are listed on the SEI Web site at http://www.sei.cmu.edu/collaborating/partners/partners-tech.html#SCAMPI.

5.7 CMMI Model Representations

There were 316 comments received that covered the topic of model representations (76 closed and 240 open).
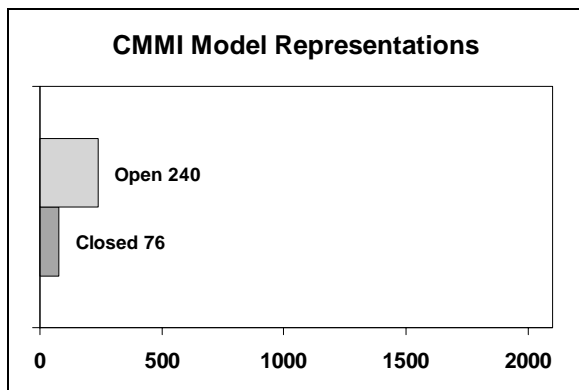
Figure 12: Comments About CMMI Model Representations

Many respondents expressed their desire to have only one model representation instead of two. The problem was that there was no agreement on which representation to remove and which to keep. There were close to fifty comments received in which the respondent wanted only the Continuous representation. Likewise, there were about fifty comments where the respondent wanted only the Staged representation. And there were about fifty comments where respondents didn't care which representation the CMMI Project wanted to adopt as long as there was only one representation supported.

There were 90 other comments that wanted support for both representations to continue but also wanted the differences between the representations to be explained better. Plus, the SEI's adop-

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9 With the release of these appraisal methods, many of the comments received will be addressed. CMMI also allows an organization to develop and use other Class B or C appraisal methods that meet the Appraisal Requirements for CMMI [ARC].

tion statistics show significant use of both representations. Below are a few representative comments provided by participants:

- *It is easier to train from the continuous view, but it is easier to implement from the staged view.*

- *We use the staged representation but our customers use ISO 15504. So mapping/switching is supported by CMMI.*

- *Even though we have not begun CMMI, I believe that having a choice is very beneficial for organizations.*

- *The staged vs. continuous representations are difficult for some to understand.*

- *The staged representation is a moderate improvement on the SW-CMM. The continuous representation is more problematic and opens up issues that the SW-CMM did not have.*

- *The continuous representation is the approach we're using for the moment. But, since we can't get a rating based on it, I have no doubt that external and management pressures will force us to move to the staged approach. Not sure what the real impact to the organization's process improvement efforts will be as a result of our decision.*

How the SEI Is Addressing Open Comments

To address open comments, the SEI is doing the following:

- Analyzing the change requests created from comments received as part of this project for the development of CMMI Version 1.2.

- A course that combines the concepts from the Staged and Continuous introductory courses into a single course, *Introduction to CMMI (Staged and Continuous)*, is currently under development. Part of Version 1.2 development will be updating all CMMI-related courses, including this new one.

- Explaining and comparing CMMI model representations in a number of places, including the CMMI book published by Addison-Wesley, *CMMI: Guidelines for Process Integration and Product Improvement*, the CMMI Web site, and articles such as *Choosing a CMMI Model Representation*, found on the Web at http://www.stsc.hill.af.mil/crosstalk/2000/07/shrum.html [Chrissis 2003b, Shrum 2000].

- Continuing to support both representations, but packaging the model in Version 1.2 to be in a format similar to the format used in the CMMI book, *CMMI: Guidelines for Process Integration and Product Improvement*.

5.8 Benefits Evidence and Case Studies

There were 270 comments (64 closed and 206 open) were received that were related to CMMI benefits evidence.
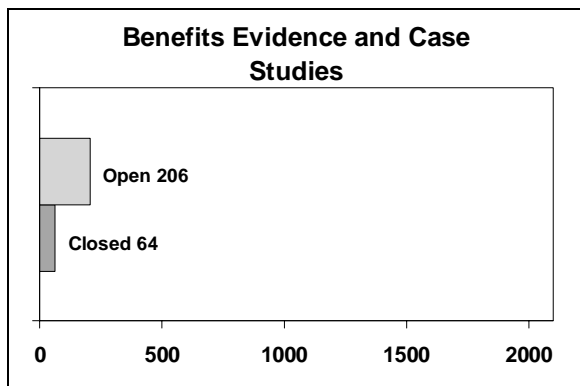
Figure 13: Comments About CMMI Benefits Evidence and Case Studies

Many of the comments described the need for evidence of CMMI benefits, ROI evidence in particular, to help them convince their executives and other influential decision makers that CMMI is a wise choice for process improvement. Many such respondents suggested that CMMI adoption would be easier if such evidence were up to date and easily available. Below are a few representative comments provided by participants:

- *We have been doing so for the past year and notice that the organization is making good returns on the investment. Plus better understanding of the CMMI Model seems to help the projects improve.*

- *It helps but it is not absolutely essential. The marketing aspect of being able to say that one is at level 3, 4 or 5 also carries some weight.*

- *We know we are getting value out of it and we are doing some measures to prove it. If there were other measures, it would help, but it won't drive us to do anything differently.*

- *Absence of ROI evidence is in many cases a barrier when discussing the CMMI with internal organizations.*

- *Adopting CMMI costs tremendous amount money. Any method to measure cost effective analysis will be a key aspect for continuing secure sponsorship from upper management.*

- *I have trouble convincing senior management of the benefits they will receive in implementing CMMI. This results in a lack of support from them.*

Case studies were mentioned time and again as an effective way to communicate benefits evidence. However, there were respondents that felt that external ROI data was unnecessary and they were using their own data to justify the need for and value of CMMI.

How the SEI Is Addressing Open Comments

To address open comments, the SEI is doing the following:

- Collecting CMMI benefits evidence and using the comments received to help better understand the needs of the community. A preliminary report publishing benefit evidence was released in late 2003 after the Interpretive Guidance on-line survey was conducted. This report, *Demonstrating the Impact and Benefits of CMMI: An Update and Prelimi-*

nary Results, is available on the SEI Web site at
http://www.sei.cmu.edu/publications/documents/03.reports/03sr009.html [Goldenson 2003].

- Conducting ongoing data collection and analysis and collaborating with CMMI adopters to facilitate the collection of additional empirical evidence on the cost and benefits of adopting CMMI. As this information is collected, verified, and analyzed, it will provide additional evidence to the public in different forms, including case studies, tutorials, ROI workshops, summary presentations, and reports. A comprehensive technical report is planned to be released in September 2005.

5.9 CMMI Training Courses

There were 267 (153 closed and 114 open) comments received asking for specific improvements to CMMI-related courses.
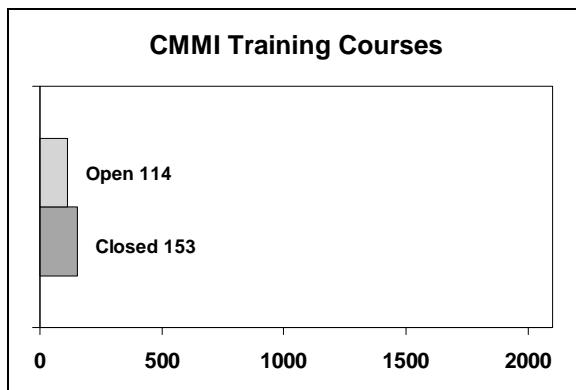
Figure 14: Comments About CMMI Training Courses

A majority of these comments asked that more of an implementation focus be available as part of CMMI training. Some of the comments contained specific suggestions for improving the existing CMMI introductory courses. These comments were converted to change requests and submitted to the team responsible for CMMI Version 1.2 revision efforts. Many other comments contained concerns about training costs. These comments were provided to the SEI Education and Training group. Below are a few representative comments provided by participants:

- *There appears to be adequate classes, seminars, and other organizations that serve as re-sources to gain answers to questions in implementing CMMI.*

- *Existing CMMI Training was excellent. Our organization requirements are not just soft-ware. More is needed.*

- *Relevant technical training should be more emphasized than model training. e.g. process improvement, process definition, although SEI provides those, people tend to focus on model first. SEI should mentor all those who just start SPI.*

- *The CMMI training is still mostly abstract. People need very focused training to under-stand what it means to their organization.*

- *Our organization (and I believe countless others) would benefit from CMMI training that ties roles (e.g., CM, QA, project manager) to process areas, typical artifacts and how it might translate into actions or behaviors.*

- *Unless something has changed over the last year, I feel that the training courses do not provide enough guidance on how to use, implement, interpret, assess, etc. the model.*

How the SEI Is Addressing Open Comments

To address open comments, the SEI is doing the following:

- Analyzing the change requests created from comments received as part of this project for the development of CMMI Version 1.2.

- A course that combines the concepts from the Staged and Continuous introductory courses into a single course, *Introduction to CMMI (Staged and Continuous)*, is currently under development. Part of Version 1.2 development will be updating all CMMI-related courses, including this new one.

- Planning a CMMI interpretation/implementation course. Comments will be used to help define the requirements for this course. This course will concentrate on providing interpretation and implementation guidance that is often asked for by CMMI adopters. It will include more concrete examples and guidance to help organizations begin their adoption of CMMI.

- Using comments to develop other new CMMI courseware.

5.10 General Interpretation

The team received 175 comments (11 closed and 164 open) in which respondents asked for additional information that could help them to interpret CMMI.
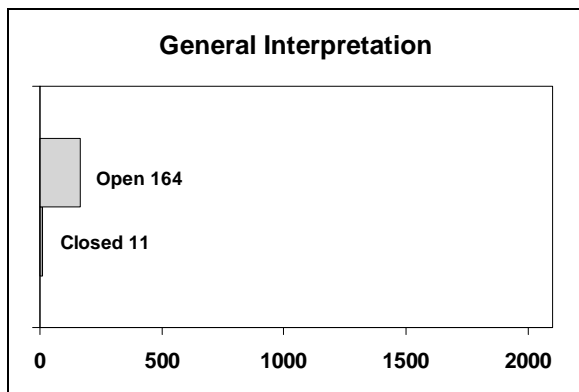

Figure 15: Comments About General Interpretation of CMMI

These comments raise topics ranging from how a particular generic practice relates to a process area to providing a consistent list of roles and activities for each process area. Below are a few representative comments provided by participants:

- *Providing organizations two representations with tailoring options for SW, SE, IPPD, and SS makes developing a system approach to process improvement easier for large, somewhat diverse, organizations.*

- *As a Center we have selected a specific variation that we feel will have the most ROI for our end-users, but the choice between two representations has been of considerable benefit. We're finding that most projects prefer to implement the staged representation in Level 2, as they consider that to implement the basics of a good management infrastructure. An emerging trend then shows them to be switching to continuous representation in Level 3, where they can focus on those elements that would provide the most immediate ROI and benefit to the end-users and sponsors.*

- *The value-added/or reason why to use a certain type of model may need a little more clarification and why an organization should use one or another.*

- *It would be nice to have a cross reference that identifies every time a given role has a responsibility. For example, QA has a role in most process areas. It would be helpful to have a list for comparison of what we've already have documented, against what the CMMI says QA should be doing without having to search through every page.*

- *Just like with any model, people forget that it is a model and they strive to implement everything contained in the model and exactly as described in the model. This tends to focus on things other than process improvement. And since the CMMI is more complex than other models it is easy for people to lose focus.*

- *CMMI provides a general set of best practices within the scope of its discipline coverage, but is not adequate in defining how it may be applied for use in specific situations.*

How the SEI Is Addressing Open Comments

To address open comments, the SEI is doing the following:

- Analyzing the change requests created from comments received as part of this project for the development of CMMI Version 1.2, including CMMI models and CMMI training courses.

- Continually updating the CMMI Web site with information to help organizations adopt, use, and interpret CMMI. For more information, see http://www.sei.cmu.edu/cmmi.

- Planning a CMMI interpretation/implementation course. Comments will be used to help define the requirements for this course. This course will concentrate on providing interpretation and implementation guidance that is often asked for by CMMI adopters. It will include more concrete examples and guidance to help organizations begin their adoption of CMMI.

5.11 CMMI for Small Organizations

There were 52 comments that raised the issue that CMMI does not adequately meet the needs of organizations that are small in size. (There were no closed comments for this category.)

CMMI for Small Organizations

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Open 52

Closed 0

   0        500      1000      1500      2000
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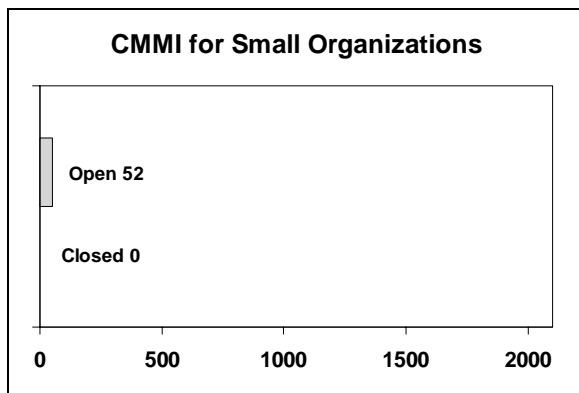
Figure 16: Comments About CMMI for Small Organizations

The belief is that CMMI is best used by large organizations, and that additional guidance for small organizations would be helpful in enabling the translation of CMMI best practices to the environment of the small organization. As an aside, the August 2004 CMMI Process Maturity Profile[10] showed that 38.5% of the reported SCAMPI appraisals were from organizations with 1 to 100 employees and 10.4% were from organizations with 25 or fewer employees. Below are a few representative comments provided by participants:

- *The model fits large scale development very well. However, we must be creative when adapting the model to small or medium scale projects or maintenance projects. This can be done by considering alternate practices and carefully evaluating the risk involved when comparing the alternate practice to the specific practice in the model.*

- *There have been numerous process improvement methodologies over the years. CMMI is probably an improvement as it has leveraged/slightly morphed a number of them, but considerable work needs to be done to make it applicable to small businesses. In its current form, it is not possible to apply it in that kind of environment. And guidelines for doing so are sparse.*

- *Difficult to implement in small teams. Too much information to absorb.*

- *CMMI is very detailed down to the point of being nearly procedural. However, it is difficult to interpret for small project work in a mainly production support environment especially for the Engineering PAs. Examples and typical work products do not always help in this environment.*

- *Certainly the idea of process improvement can be applied, but small businesses could use a "cookbook" to get the basics down.*

- *Provide more guidance on how to adopt the CMMI on small projects (10 or less people) with short deadlines (3-9 months).*

How the SEI Is Addressing Open Comments

To address open comments, the SEI is doing the following:

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[10]   The CMMI Process Maturity Profile is available at http://www.sei.cmu.edu/sema/profile_CMMI.html.

- Studying the use of CMMI in small organizations to help guide their research and reporting of results. The needs of small organizations and how CMMI can be applied successfully in these organizations is being studied. A presentation describing this research, is available at http://www.sei.cmu.edu/ttp/presentations/sm-bus/. Additional information can be found at http://www.sei.cmu.edu/ttp/presentations/breaking-barriers/break-barriers.pdf.

- There are various presentations available that address the issue of applying CMMI to small organizations on the SEI Web site at http://www.sei.cmu.edu/cmmi/adoption/extensions.html.

- The Personal Software Process[SM] (PSP[SM])and Team Software Process[SM] (TSP[SM])were developed and can, in addition to improving teams within large organizations, directly help small organizations. More information about PSP and TSP can be found at http://www.sei.cmu.edu/tsp/.

5.12 How To Get Started

The team received 34 comments about getting started with CMMI (1 closed and 33 open).

How to Get Started

Open 33

Closed 1

| 0 | 500 | 1000 | 1500 | 2000 |
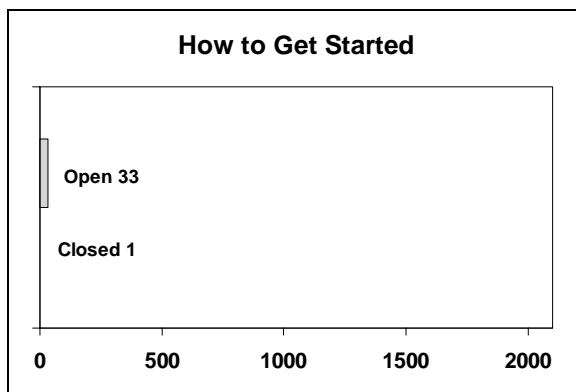
Figure 17: Comments About How to Get Started Adopting CMMI

Respondents asked for guidance in what to do first, how to proceed, and what to expect. Respondents felt that more guidance was needed up front to help them. Below are a few representative comments provided by participants:

- *The CMMI is much more descriptive and complete than the SW-CMM. The model itself is a good reference for process improvement, however is insufficient as the sole 'guide' for process improvement (i.e., does not eliminate the need for the IDEAL[SM] model).*

- *An organization needs to be conscious of whether it is using the CMMI to build a set of processes from the ground up, or whether it is using it to map an existing set of processes and identify areas for improvement. If there is confusion about the approach to using the model, it may not be an adequate guide.*

[SM]   Personal Software Process, PSP, Team Software Process, TSP, and IDEAL are service marks of Carnegie Mellon University.

- *Organizations need to understand that CMMI is not the "end all". The organization's business model is the capstone model and CMMI (and other models) are to support increased maturity and quality in the business model. Unfortunately, many businesses use CMMI as the ad hoc business model which (I think) is incorrect. Also, the word "guiding" is probably appropriate. The CMMI is not a PI process in itself; most businesses already have an improvement process and the CMMI provides key practices / initiatives to guide the improvements to be implemented.*

- *CMMI in itself is not sufficient. While CMMI provides guidance on the desirable traits to move towards, it does not provide guidance on how to implement and institutionalize change across an organization. It tells you the "what" but not "how" to achieve the what.*

- *[What is needed is] a guideline for those who are just beginning to bring CMMI into their organizations. Such as templates for start-up plans, charters, schedules, order of activities and time and people estimates. This type of guideline can be written based on the experiences of those organizations that have achieved CMMI success.*

- *Many cultural and people issues are also involved. CMMI is a good guide, but it needs to be complemented with methods for technology transfer, gaining and sustaining organizational commitment (and resources), and a good marketing plan.*

How the SEI Is Addressing Open Comments

To address open comments, the SEI is doing the following:

- Providing a Web page designed to help organizations get started with CMMI at http://www.sei.cmu.edu/cmmi/adoption/cmmi-start.html. Updates to this *Getting Started* Web page will be guided, in part, by the comments received.

- Offering the Mastering Process Improvement course, which provides students a head start in beginning their process improvement programs. More information about this course is available at http://www.sei.cmu.edu/products/courses/master-process-improve.html.

- Designing an integrated process improvement approach for incorporating TSP with CMMI, along with performance measurement, to accelerate the process improvement journey and greatly improve the results.

5.13 CMMI Marketing and Communication

Twenty-five comments were received regarding marketing and communication (7 closed and 18 open).
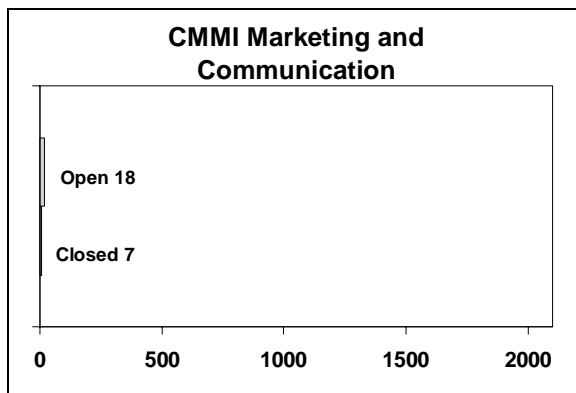
Figure 18: Comments About CMMI Marketing and Communication

The respondents commented that if CMMI were more publicized, the concept would be known by managers and executives. If decision makers knew about CMMI, it would make convincing them to adopt CMMI much easier. Some respondents suggested that the SEI actively market CMMI to executives to increase their awareness of what CMMI is and how it can help organizations succeed. Others simply wanted CMMI to be more recognizable by everyone. Below are a few representative comments provided by participants:

- *You need to roadshow this thing - like Rational has done with CMM / RUP. Set up Webinars like Rational does. They like the razzle-dazzle, and the high-level overviews around here. They like Whitepapers. Advertise in Computerworld. Offer Whitepapers via Computerworld. The brighter and more fashionable the "peacock", the more they'll give it a look.*

- *Promote CMMI as means not dedicated to software but can be widely used for any discipline in an organization.*

- *Greater marketing in the industry especially across in Europe. People still think this is an extremely expensive thing to do, just look at the 700 pages and the size of evaluation teams. Smaller companies can use the model but just can't accept the cost involved and in any case they can't see or don't understand the advantages. It is still considered to be something that 'Defense' organizations do!!*

- *Publicize. Our biggest hurdle is that none of our board directors have heard about it. They tend to treat suggestions from engineering with suspicion, especially where money is involved. Perhaps getting articles/presentations/seminars aimed at these people is a good step forward.*

How the SEI Is Addressing Open Comments

To address open comments, the SEI is doing the following:

- Developing a short CMMI overview to specifically target executives and their concerns. Comments will be used as input when developing this new CMMI overview.

- Continually looking for opportunities to educate the public about CMMI. Increasingly there are articles published about CMMI in well-known business publications. Industry analysts recommend CMMI in their reports. Some large scale tool environments, such as

the Rationale Unified Process (RUP), have indicated publicly that they support CMMI adoption.

- Providing related presentations and papers on the SEI Web site at http://www.sei.cmu.edu/cmmi/adoption/concepts.html. Some of these can be used by process improvement champions in presentations to senior management. There are also increasing numbers of books available about CMMI. For more information about CMMI books, see http://www.sei.cmu.edu/cmmi/adoption/books.html.

5.14 High Maturity Guidance

The team received 13 comments (all remained open) wanting more guidance for organizations pursuing maturity levels 4 and 5.
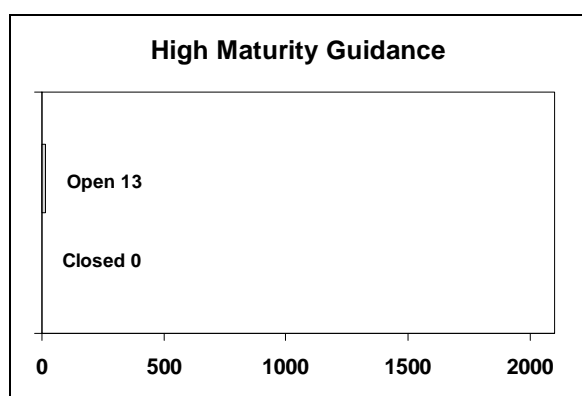
Figure 19: Comments About High Maturity Guidance for CMMI

Respondents wanted more examples of high maturity practices. Below are a few representative comments provided by participants:

- *In my experience with the model, it seems to provide good guidance to build on to cover most situations I have encountered. I think Level 2 and Level 3 offer more practical advice (from my perspective) than Levels 4 and 5, but I can see the value in working toward achieving them.*

- *Because the CMM frameworks are based on best practices, they are consistently following the pack in terms of innovation. Our organization must constantly be looking for the potential breakthroughs in terms of technology, processes and resources. We bring value to our customers by leading the pack, not just being a part of the pack.*

- *We are supplementing CMMI with Six Sigma for high maturity organizations.*

- *High maturity areas need more clarification.*

- *Develop training materials for levels 4 and 5. Provide an appraisal tool set.*

- *Information on levels 4/5 is lacking.*

How the SEI Is Addressing Open Comments

To address open comments, the SEI is doing the following:

- Analyzing the change requests created from comments received as part of this project for the development of CMMI Version 1.2, including CMMI models and CMMI training courses.

- Using comments to guide the development of new products to help organizations reach maturity levels 4 and 5.

- Planning a CMMI interpretation/implementation course. Comments will be used to help define the requirements for this course. This course will concentrate on providing interpretation and implementation guidance to address many of these comments.

- Offering a course called High Maturity with Statistics. For more information, see http://www.sei.cmu.edu/products/courses/high-maturity-statistics.html. The SEI also offers Process Measurement and Analysis courses. For more information, see http://www.sei.cmu.edu/products/courses/p49.html.

- Offering Personal Software Process (PSP) and Team Software Process (TSP) to help high maturity organizations. These technologies address process improvement, including implementation of the higher maturity practices that are described in CMMI. More information about PSP and TSP can be found at http://www.sei.cmu.edu/tsp/.

6 Conclusion

The interest in contributing to and the results from the Interpretive Guidance Project affirmed the SEI's confidence in CMMI as an excellent tool for process integration and product improvement. The valuable input from those organizations and individuals who participated in this project will help guide the SEI in providing the most appropriate products and services and conducting the most needed research that will support the CMMI user community.

Ongoing SEI activities that are addressing comments received by the Interpretive Guidance Project include the following:

- developing SCAMPI B and C appraisal methods
- collecting and publishing cost and benefit information about CMMI adoption, including ROI data
- maintaining CMMI FAQs on the SEI Web site
- studying the needs of small organizations and how CMMI can be applied successfully in these organizations
- coordinating contributions from CMMI adopters to conferences, publications, and Web sites that describe how they have adopted CMMI
- developing a single Introduction to CMMI course that addresses both staged and continuous representations
- planning for a new intermediate-level interpretation course for CMMI adopters

As a result of this project, interpretive guidance will be developed in the following three areas:

1. helping organizations familiar with legacy process improvement models that wish to upgrade to CMMI

2. providing guidance for addressing overlaps in CMMI models, specifically the overlap between generic practices and process areas

3. providing guidance for implementing generic practices

Finally, the comments received during the Interpretive Guidance Project are an important input to the CMMI Version 1.2 development effort. Of the approximately 7,500 total comments received, approximately 2,700 are open and approximately 2,200 will be analyzed by the Version 1.2 CMMI Product Development Team to improve CMMI models, appraisal methods, and training. This input will help to create better products for current and future CMMI users.

Appendix A: Responses to General Questions in the Interpretive Guidance Questionnaire

This appendix contains a summary of the responses to general questions about CMMI. These charts summarize only the responses from the questionnaire since BOF activities were less structured than the questionnaire and did not seek the answers to these specific questions during each event. The questions were administered between May 1, 2003 and June 1, 2003. More information about the respondents, the responses themselves as well as these figures, is available in the companion report *CMMI Interpretive Guidance Project: Preliminary Report* [Chrissis].

Global Issues Q1: Adequacy of CMMI

In your opinion, is CMMI adequate for guiding process improvement?

Response	Percent
Didn't Respond	0%
Don't know	10%
Rarely if ever	1%
Sometimes	12%
More often than not	42%
Almost always	35%

Total Respondents = 587

Percent of Respondents
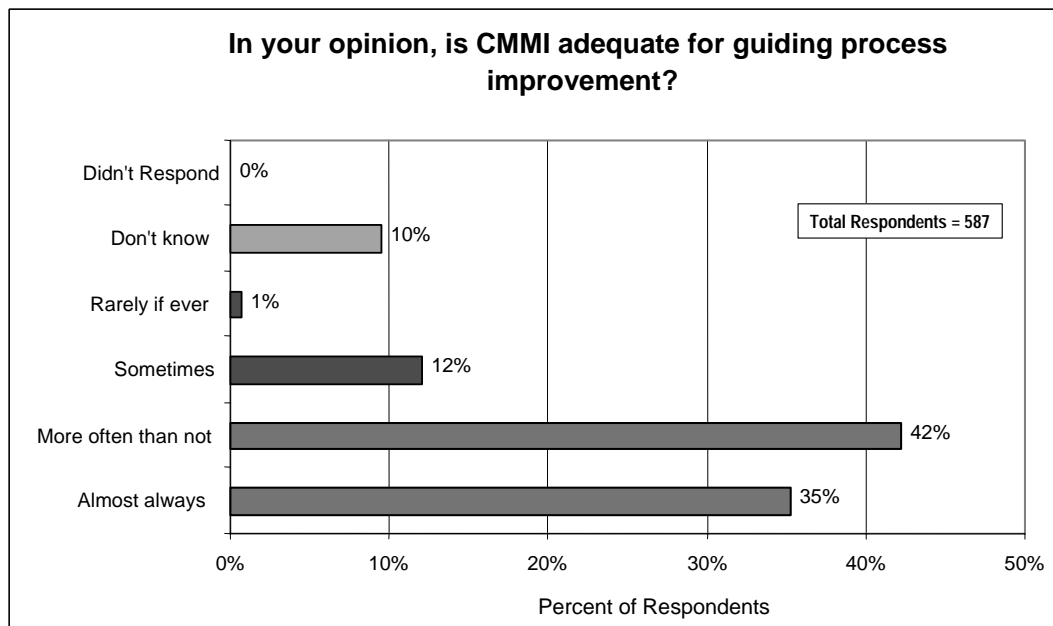
Figure 20: Global Issues Q1: Adequacy of CMMI

Global Issues Q4a: Leveraging Earlier Investments

Adopting CMMI will help us to leverage our earlier investments in process improvement.

Response	Percent
Didn't Respond	4%
Don't Know	13%
Strongly Disagree	1%
Disagree	6%
Agree	47%
Strongly Agree	29%

Total Respondents = 587

Percent of Respondents
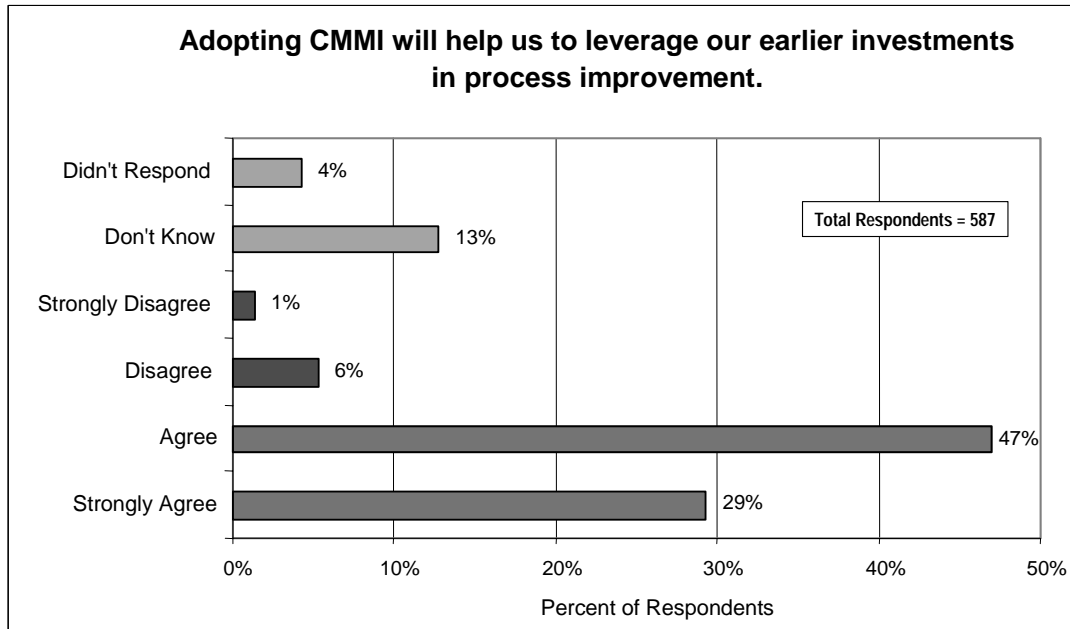
Figure 21: Global Issues Q4a: Leveraging Earlier Investments

Global Issues Q4b: Adequacy of Training, etc.

Existing CMMI training courses, guidance documents, Web resources, and other process assets are adequate for our purposes.

Response	Percent
Didn't Respond	5%
Don't Know	15%
Strongly Disagree	6%
Disagree	17%
Agree	48%
Strongly Agree	9%

Total Respondents = 587

Percent of Respondents
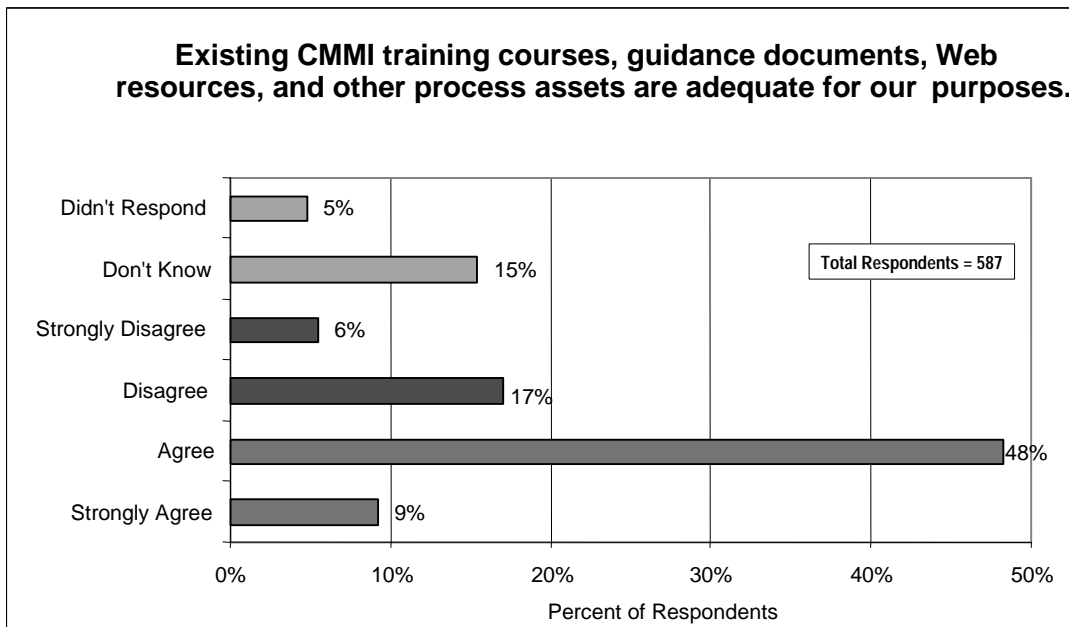
Figure 22: Global Issues Q4b: Adequacy of Training, Etc.

Global Issues Q4c: Appraisals

Existing CMMI appraisal methods are suitable for our organization's needs.

Category	Percent
Didn't Respond	5%
Don't Know	26%
Strongly Disagree	4%
Disagree	15%
Agree	39%
Strongly Agree	11%

Total Respondents = 587

Percent of Respondents
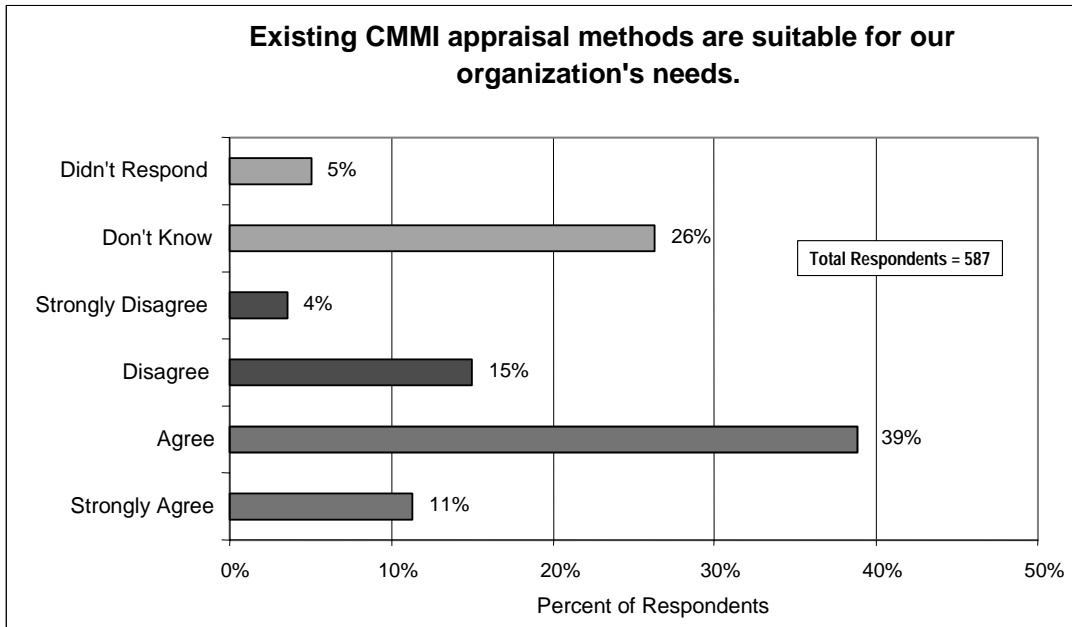
Figure 23: Global Issues Q4c: Appraisals

Global Issues Q4d: Cost

The cost of adopting CMMI is impeding the adoption of CMMI in our organization.

Category	Percent
Didn't Respond	6%
Don't Know	11%
Strongly Disagree	8%
Disagree	32%
Agree	27%
Strongly Agree	16%

Total Respondents = 587

Percent of Respondents
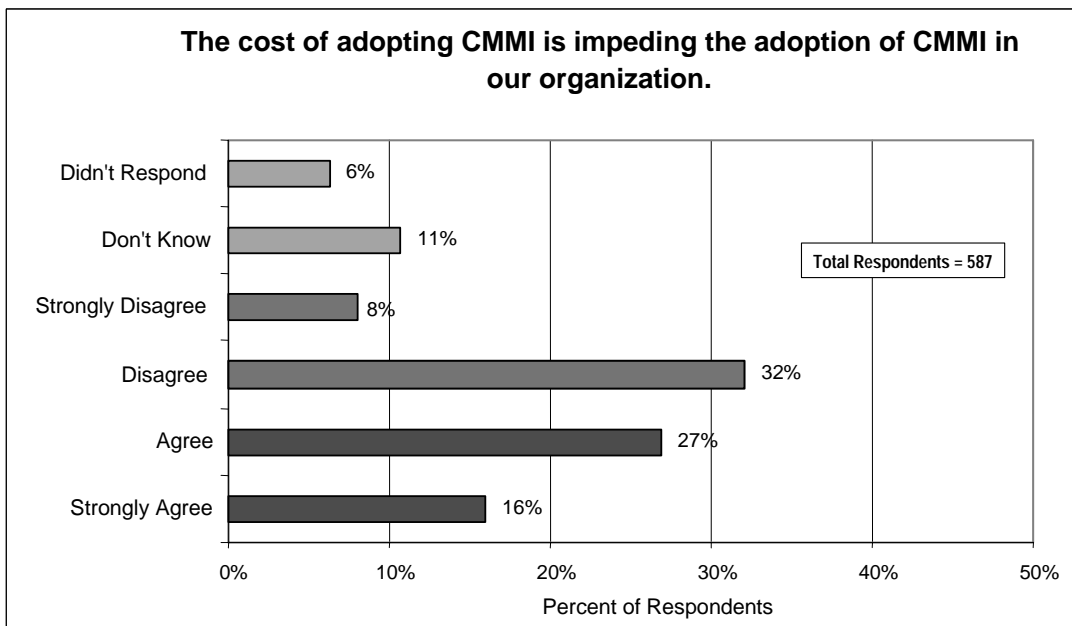
Figure 24: Global Issues Q4d: Cost

Global Issues Q4e: Systems and Software Combined

Including both systems engineering and software in a single model has been a help for us.

Response	Percent
Didn't Respond	6%
Don't Know	15%
Strongly Disagree	5%
Disagree	10%
Agree	31%
Strongly Agree	33%

Total Respondents = 587

Percent of Respondents
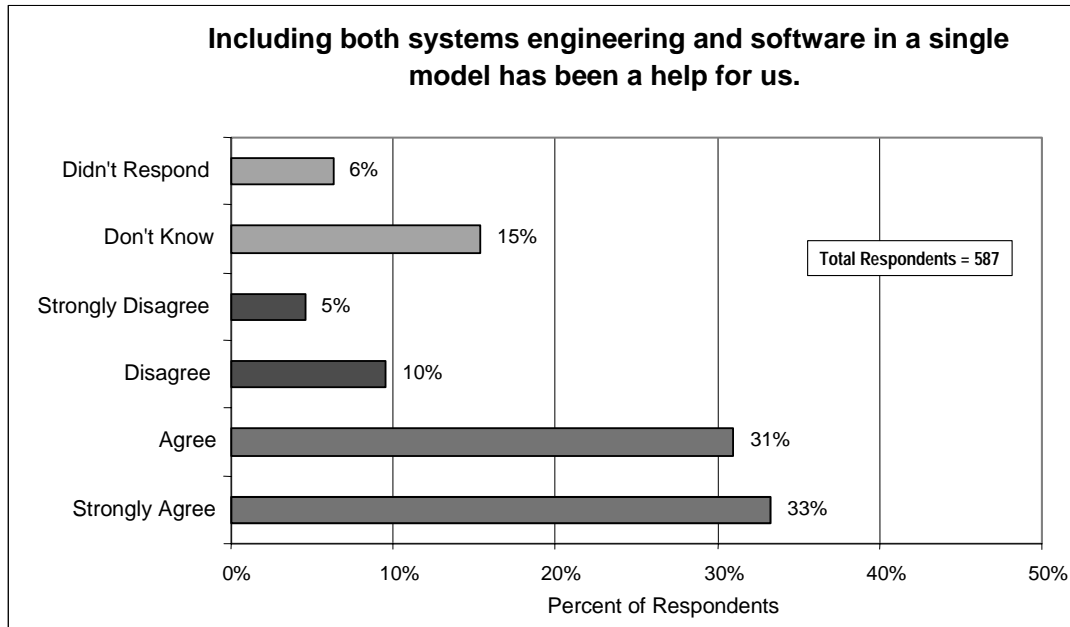
Figure 25: Global Issues Q4e: Systems and Software Combined

Global Issues Q4f: Mapping Processes

We have had difficulty in mapping our processes to the CMMI.

Response	Percent
Didn't Respond	7%
Don't Know	16%
Strongly Disagree	18%
Disagree	41%
Agree	15%
Strongly Agree	3%

Total Respondents = 587

Percent of Respondents
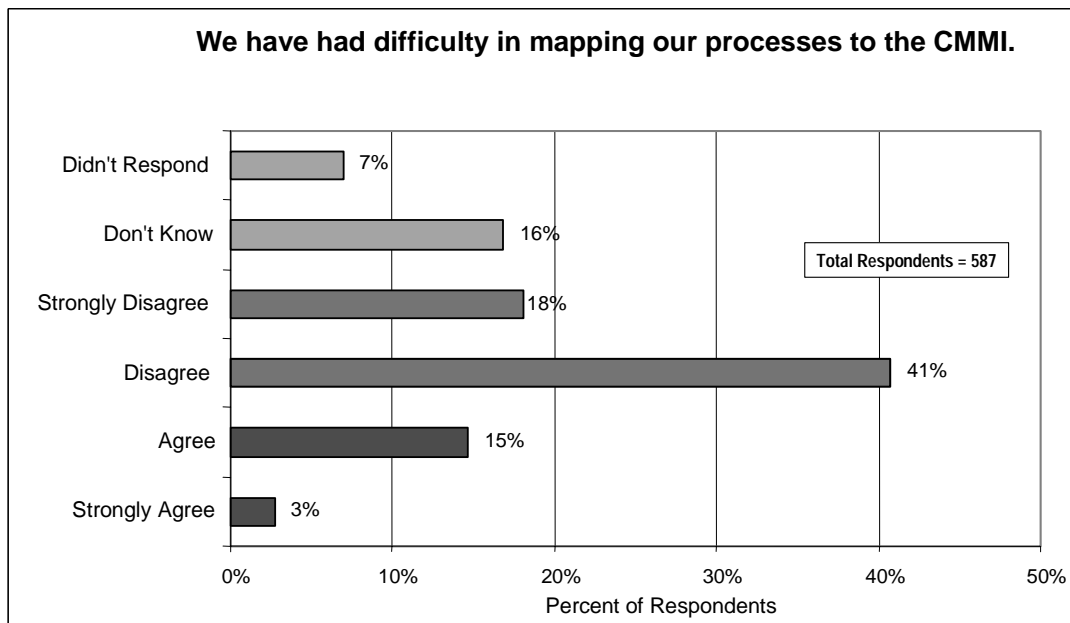
Figure 26: Global Issues Q4f: Mapping Processes

Global Issues Q4g: Tracking Changes

We have had difficulty tracking the changes and additions from models that we have previously used.

Response	Percent
Didn't Respond	8%
Don't Know	26%
Strongly Disagree	11%
Disagree	43%
Agree	10%
Strongly Agree	2%

Total Respondents = 587

Percent of Respondents
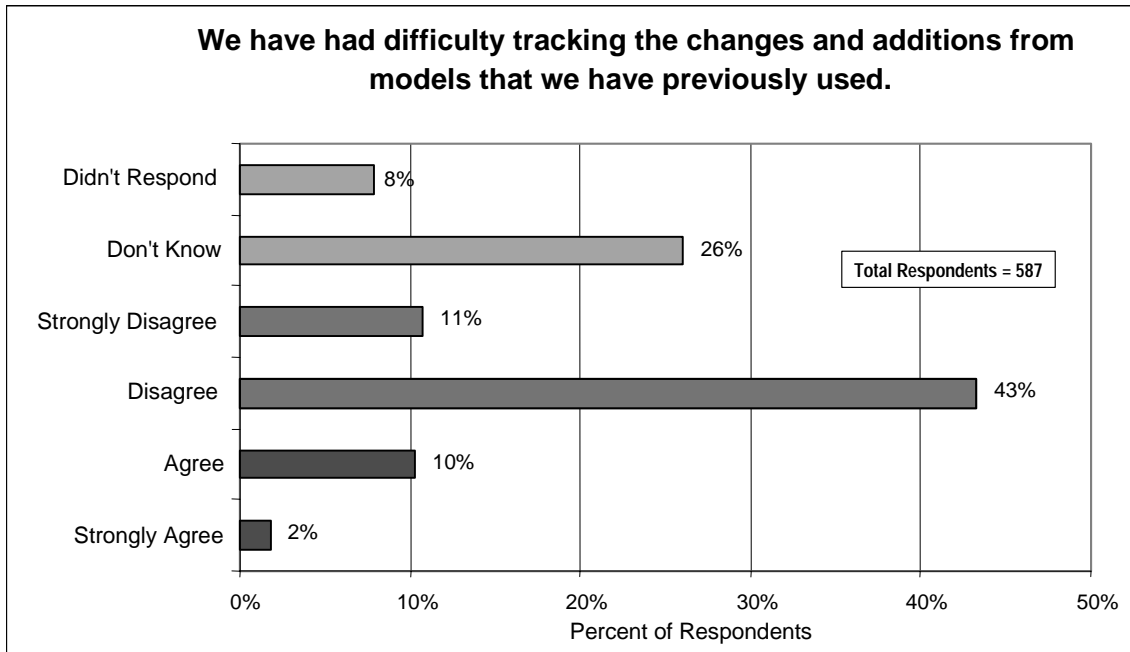
Figure 27: Global Issues Q4g: Tracking Changes

Global Issues Q4h: Two Representations

Having a choice between the two model representations (staged or continuous) and variations (SW, SE, IPPD, SS) has been helpful for us.

Response	Percent
Didn't Respond	8%
Don't Know	20%
Strongly Disagree	6%
Disagree	17%
Agree	35%
Strongly Agree	14%

Total Respondents = 587

Percent of Respondents
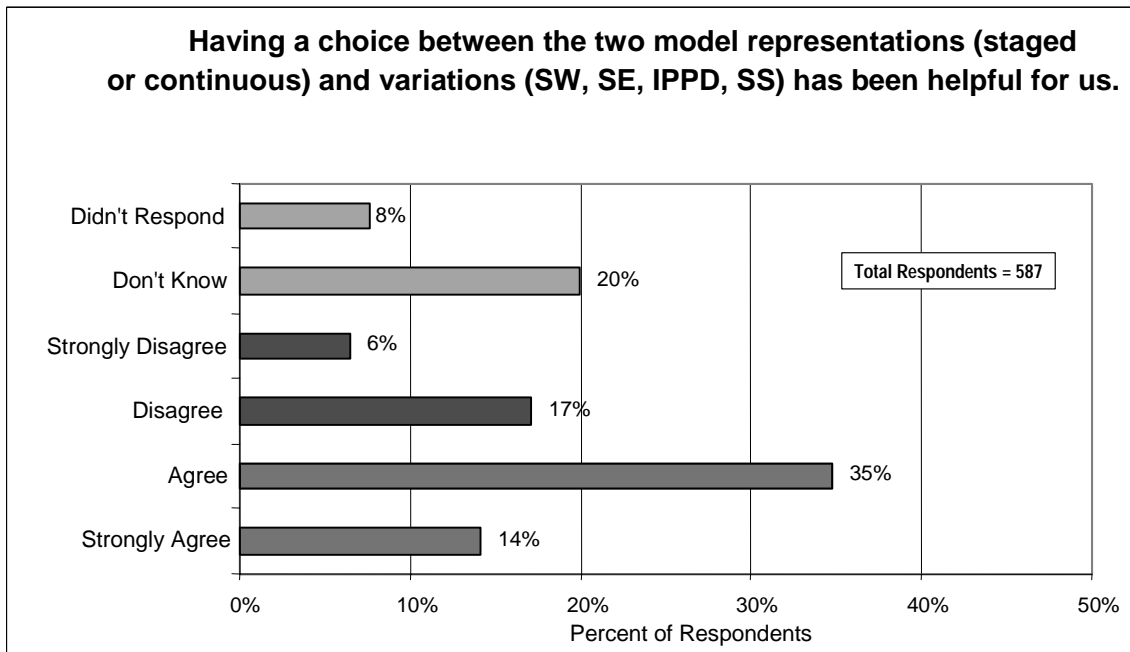
Figure 28: Global Issues Q4h: Two Representations

Global Issues Q5: Return on Investment

Does your organization need ROI or other quantitative evidence to help make the business case for adopting CMMI?

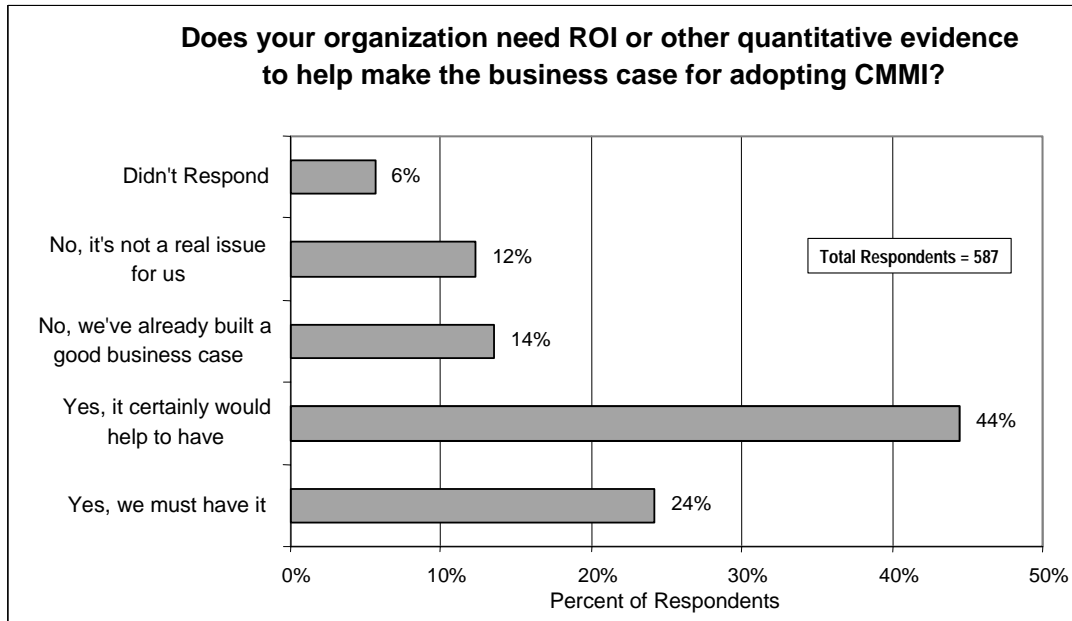| Response	Percent
Didn't Respond	6%
No, it's not a real issue for us	12%
No, we've already built a good business case	14%
Yes, it certainly would help to have	44%
Yes, we must have it	24%

Total Respondents = 587

Percent of Respondents

Figure 29: Global Issues Q5: Return on Investment

Appendix B: Summary of Comments by Process Area and Generic Practice

Process Areas

Figure 30 illustrates the number of comments received by CMMI process area. Process area abbreviations are in Appendix B of any CMMI model found at http://www.sei.cmu.edu/cmmi/models/models.html#models.
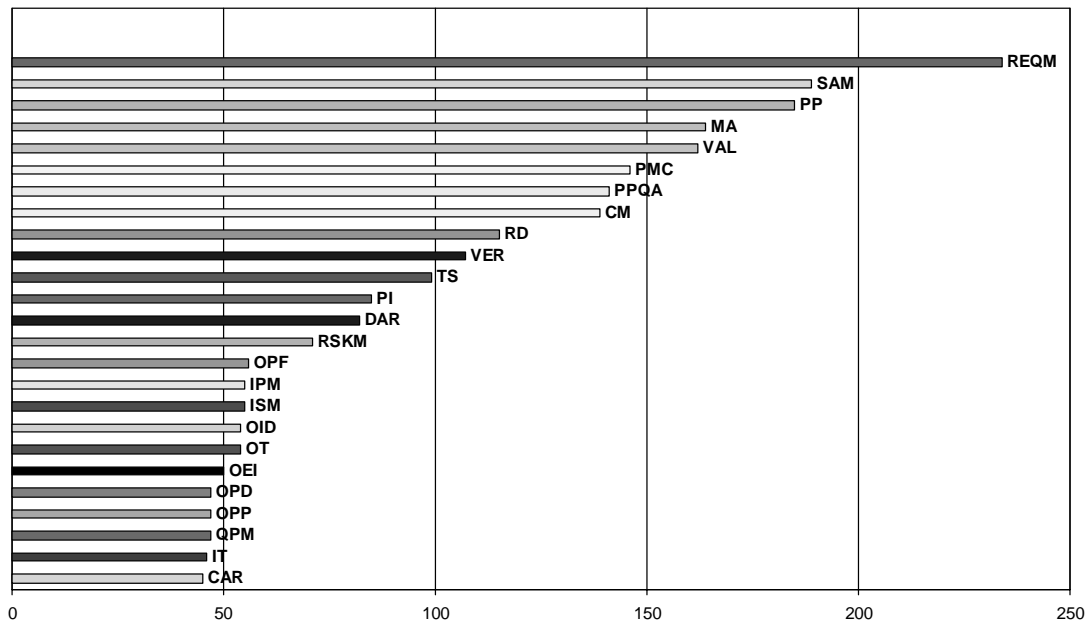
Total Comments by Process Area

Figure 30: Total Number of Comments Received by Process Area

Figure 31 illustrates the number of open comments about each of the CMMI process areas.
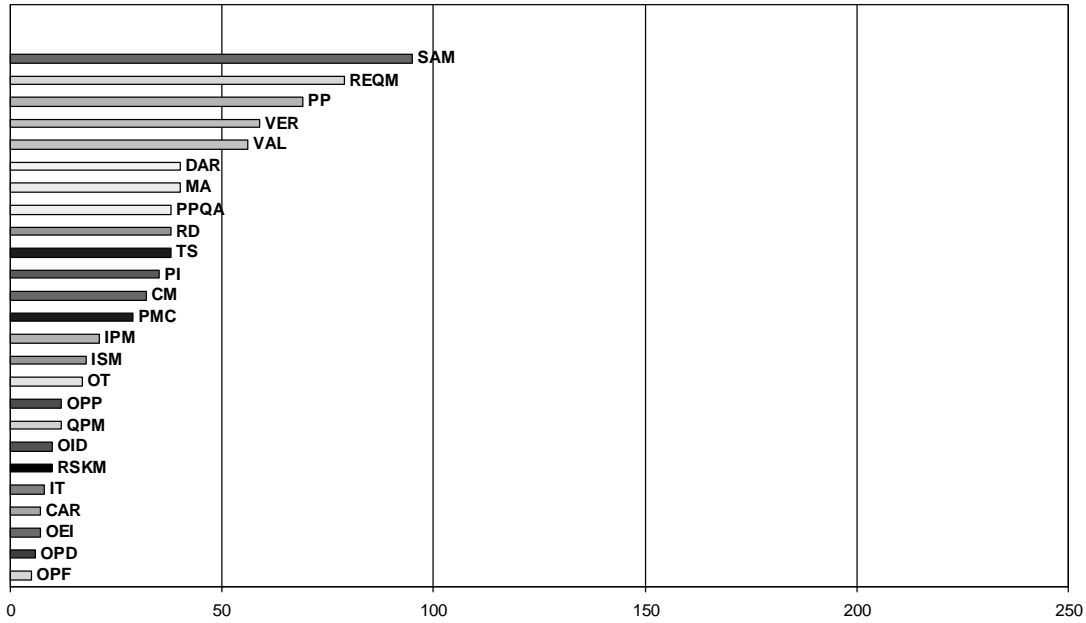
Open Comments by Process Area

Figure 31: Number of open comments by process area

Generic Practices

Figure 32 indicates the number of comments received on each of the CMMI generic practices. There were 50 comments that made general suggestions about CMMI generic practices and 15 comments about generic practice common features.
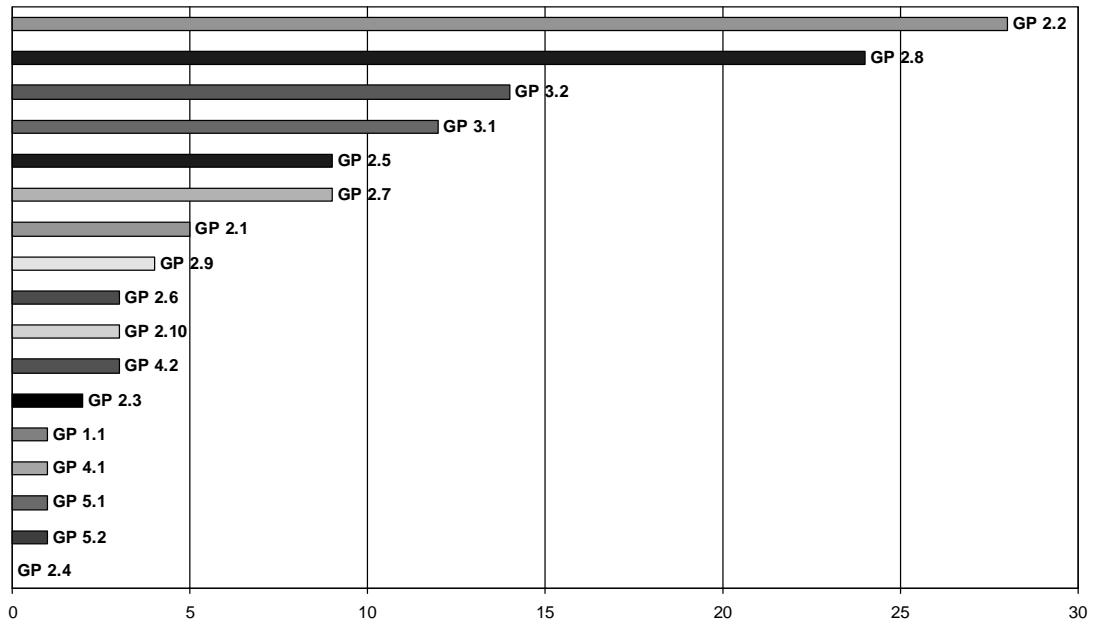
Total Comments by Generic Practice

Figure 32: Total number of comments received by generic practice

Figure 33 indicates the number of open comments about each of the CMMI generic practices.
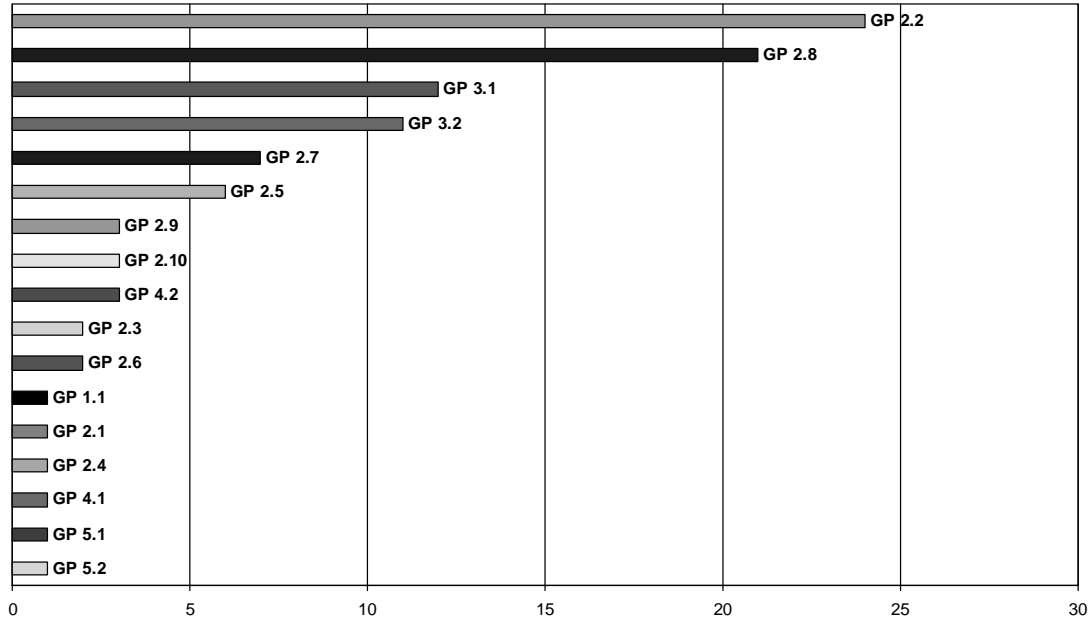
Open Comments by Generic Practice

Figure 33: Number of open comments received by generic practice

References/Bibliography

URLs are valid as of the publication date of this document.

[Chrissis 2003a]   Chrissis, Mary Beth; Wemyss, Gian; Goldenson, Dennis; Konrad, Mike; Smith, Kenneth; & Svolou, Agapi. *CMMI Interpretive Guidance Project: Preliminary Report* (CMU/SEI-2003-SR-007). Pittsburgh, PA: Software Engineering Institute, Carnegie Mellon University, October 2003. http://www.sei.cmu.edu/publications/documents/03.reports/03sr007.html

[Chrissis 2003b]   Chrissis, Mary Beth; Konrad, Mike; & Shrum, Sandy. *CMMI: Guidelines for Process Integration and Product Improvement*. Boston, MA: Addison-Wesley, 2003. http://www.sei.cmu.edu/cmmi/publications/cmmi-book.html

[Goldenson 2003]   Goldenson, Dennis R. & Gibson, Diane L. Demonstrating the Impact and Benefits of CMMI: An Update and Preliminary Results (CMU/SEI-2003-SR-009). Pittsburgh, PA: Software Engineering Institute, Carnegie Mellon University, October 2003. http://www.sei.cmu.edu/publications/documents/03.reports/03sr009.html

[Shrum 2000]   Shrum, Sandy. "Choosing a CMMI Model Representation." CrossTalk, (July 2000). http://www.stsc.hill.af.mil/crosstalk/2000/07/shrum.html

[SEI 2002a]   CMMI Product Team. CMMI® for Systems Engineering/Software Engineering/Integrated Product and Process Development, Version 1.1, Staged Representation (CMMI-SE/SW/IPPD/SS, V1.1, Staged) (CMU/SEI-2002-TR-012). Pittsburgh, PA: Software Engineering Institute, Carnegie Mellon University, 2002. http://www.sei.cmu.edu/publications/documents/02.reports/02tr012.html.

[SEI 2002b]   CMMI Product Team. CMMI® for Systems Engineering/Software Engineering/Integrated Product and Process Development/Supplier Sourcing, Version 1.1, Continuous Representation (CMMI-SE/SW/IPPD/SS, V1.1, Continuous) (CMU/SEI-2002-TR-011, ADA339818). Pittsburgh, PA: Software Engineering Institute, Carnegie Mellon University, 2002. http://www.sei.cmu.edu/publications/documents/02.reports/02tr011.html.

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Mary Beth Chrissis, Mike Konrad, Sandy Shrum, Kenneth Smith, and Gian Wemyss

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ABSTRACT (MAXIMUM 200 WORDS)

This report summarizes the results of the Capability Maturity Model Integration (CMMI) Interpretive Guidance Project. It summarizes and analyzes the 7500 comments received regarding CMMI adoption that were reported by CMMI users and potential users. It also describes the actions being taken by the Software Engineering Institute (SEI) to address the issues identified by Interpretive Guidance Project participants.

Although the initial goal of the project was to develop interpretive guidance, after data gathering and analysis the team realized that most respondents' issues did not require interpretive guidance. Based on a relatively small number of comments, interpretive guidance was planned, including papers, frequently asked questions (FAQs), and new CMMI courses. However, participant comments clearly showed CMMI interpretive guidance to be less of an adoption issue than suspected.

Some comments covered issues already being addressed as part of SEI activities, including the development of Standard CMMI Appraisal Method for Process Improvement (SCAMPI^SM) Class B and C methods, the collection of cost and benefit information, and the creation and improvement of CMMI training courses. The majority (approximately 80%) of the actionable comments received were best handled as change requests to help guide the ongoing improvement of the CMMI Product Suite.

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