



White Paper

# **Debunking 3 Common CMMI Peer Review Myths: How Peer Reviews Help Achieve CMMI Compliance and Higher Performance**

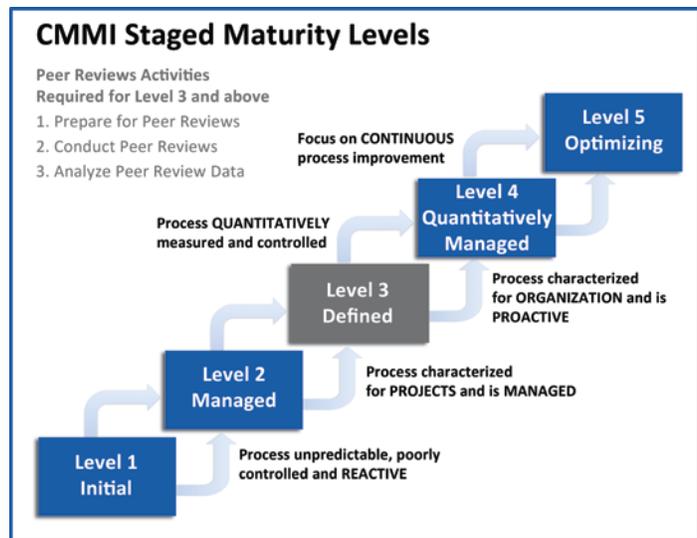
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By Paul E. McMahon

## Executive Summary

Today there are a lot of misunderstandings when it comes to the Capability Maturity Model Integration (CMMI®) [1] and peer reviews. But why should you care? First, peer reviews are an expected practice and required to achieve CMMI compliance. Second, while peer reviews are commonly held today, the way these reviews are often conducted is costing many organizations wasted time and effort, and failing to provide the promised higher performance payback on their investments. In some cases poor peer review practices may result in delaying, or not achieving, CMMI compliance. Recent case study data [2] reveals a major cause of these failures can be traced to the fact that many organizations don't realize the options and flexibility they have to use peer reviews to gain higher organizational performance.

This white paper provides straight talk and advice on what the CMMI really requires with respect to peer reviews, how to get the most value from your peer reviews, and what to look for in peer review software to improve the performance of your organization while achieving CMMI compliance. You will learn techniques to eliminate wasted effort while tuning your team's performance for optimal competitive advantage.



CMMI Stages and associated Peer Review Activities

### More specifically you will learn:

- > Three commonly held myths associated with the CMMI and peer reviews
- > CMMI key facts related to peer review requirements
- > Common peer review best practices used by CMMI mature organizations
- > Three case studies explaining:
  - o What many mistakenly believe the CMMI requires with respect to the way peer reviews must be conducted
  - o How many organizations over-interpret the CMMI requirements with respect to data collection and product reviews leading to wasted effort
  - o How the right software peer review tool set up appropriately can result in higher quality products and more satisfied customers
- > Key checklist items that can help you implement a peer review process optimized to meet the needs of your organization and customers while maintaining CMMI compliance

## CMMI & Peer Review Myths

**H**istorically there has been a tendency for people to read things into the CMMI model that aren't really there creating unnecessary non-value-added work. Understanding three commonly held myths related to the CMMI and peer reviews along with the real facts of what the CMMI requires can help an organization improve its performance and achieve CMMI compliance faster and more effectively.

### ***Myth 1: The CMMI specifies how peer reviews must be performed including who must participate in reviews and when peer reviews must take place***

There is a *common myth* that peer reviews must be run in a formal way, at a specified time, and participants must be software practitioner “peers” inside your own organization. Organizations that succumb to this myth expend unnecessary effort, and often fail to gain the greatest potential benefits from their peer reviews – early critical defect removal and products validated early by satisfied customers.

### **What the CMMI really requires**

One of the goals of the CMMI Verification Process Area is to perform peer reviews. However, the CMMI doesn't dictate “*how*” peer reviews must be conducted, nor does it dictate the degree of formality. There is also nothing in the CMMI that specifies who the reviewers must be, or when the reviews must take place. A common best practice in many CMMI mature organizations is to provide guidelines on “*how-to*” options to conduct peer reviews, including recommended stakeholders to involve in the different types of peer reviews that make sense for your organization.

### **Summary CMMI Benefits <sup>[4]</sup>**

- > 33% decrease in the average cost to fix a defect - *Boeing, Australia*
- > 30% increase in software productivity - *Lockheed Martin M&DS*
- > 15% improvement in internal on-time delivery - *Bosch Gasoline Systems*
- > 20 +/- 5 defects per KLOC - *Northrop Grumman*
- > \$2 million in savings from early detection and removal of defects - *Sanchez Computer Associates, Inc.*
- > Increased focus on quality by developers - *Northrop Grumman*

## Peer Review Best Practices of Successful CMMI Companies

- > Customize their peer review process based on company and customer needs
- > Carefully document alternative review processes & options
- > Provide guidelines on stakeholders to involve, including outsiders such as customers
- > Detail the types of peer reviews specific to each business

### Case Study 1 - "I thought the CMMI required that...?"

When your goal is to achieve CMMI compliance, start by talking to the practitioners in your organization. As they tell you how they do their job eventually they will get to the products they produce. Then ask: *"Does anyone else look at these products?"* Anticipate a common response heard today in many organizations just starting a new CMMI effort: *"We don't do formal peer reviews."*

A CMMI lead appraiser who I worked with many years ago taught me to--in these cases-- always ask the intent question. From a tip in the CMMI guidelines we learn the intent of peer reviews is "to identify defects for removal and to recommend other changes that are needed." This leads to a new question that should be asked: *"How do you identify defects for removal?"*

When I asked this question at BOND, one of my client organizations seeking to become CMMI Level 3, I heard: *"We demonstrate our products to the customer early and often, and they give us feedback."* And *"We meet daily with our team and discuss our products"*, and *"We check our code into a library daily and encourage our teammates to review and give us feedback—and they do."*

What we realized was when those practitioners at BOND said, *"We don't do formal peer reviews,"* they meant there wasn't a set time everyone went into a room to provide a list of defects found in their work products. But we also realized they were achieving the intent of peer reviews through a different *"how-to"* option.

In today's collaborative environments customers often operate as teammates providing feedback early through demonstrations as we saw at BOND. Customer feedback can be a great way to find defects early and help validate that your products will meet your customer's needs. BOND had a history of producing high quality low defect products. When BOND explained this to their CMMI Lead Appraiser she had no difficulty accepting this "alternative" peer review process that was achieving the goal-- or "intent"-- of the CMMI peer review expected practice. We documented the process and trained it just like BOND was carrying it out, and it helped the BOND organization achieve their CMMI Level 3 goal.

In the next myth and case study we examine more closely "how-to" options, and give the reader some guidance in deciding which ones are right for their organization.

## ***Myth 2: The CMMI specifies what data must be collected in peer reviews and what products must be peer reviewed***

There is a common myth that every defect reported in peer reviews must include information related to the type and cause of the defect. There is also a common myth that certain types of products must always be peer reviewed on every project. Organizations that succumb to this myth often find themselves expending significant cost and effort without the accompanying performance payback.

### **What the CMMI really requires**

The CMMI expects you to analyze data from your peer reviews, but it doesn't tell you what data you need to collect and analyze, nor does it tell you what products you need to review.

So how does an organization determine what data should be analyzed, and what products should be reviewed? To answer these questions, first ask yourself: *"What are our measurement objectives?"* Establishing your measurement objectives is an expected practice in the CMMI model. Then ask yourself: *"What data should we collect from our peer reviews that supports our objectives?"*

With respect to which products to peer review, ask yourself, *"What products does our customer require us to produce?"* Then ask, *"What products do we know we need to produce to ensure we have satisfied customers?"*

The right data to be analyzed from peer reviews, and the right products to be peer reviewed for an organization depends on that organization's specific business domain, their specific measurement objectives, and their customer's needs. A best practice in many CMMI mature organizations is to provide documented criteria that help project owners make these decisions given their specific project situation.

***"The CMMI leaves the decision up to each organization to decide what work products to peer review... create criteria to help a project leader make more dynamic "real time" decisions with respect to peer reviews..." [5]***

### **Peer Review Best Practices of Successful CMMI Companies**

- > Establish organizational measurement objectives based on your business needs
- > Collect and analyze data based on your company's established objectives-- not the CMMI
- > Provide criteria based on your company and customer needs to help your people make better decisions on what products to peer review
- > Simplify the defect reporting process as much as possible to maximize participation

## Case Study 2 - "Don't we need that data for the CMMI appraisal?"

LACM is a CMMI level 3 organization that undertook a process improvement effort to streamline its processes. The peer review process at LACM required a great deal of data to be collected about each defect identified and it required certain documents to be produced and reviewed on every project. The process also required periodic analysis of the collected data. When we looked close we found that practitioners were entering all the data about each defect because the company peer review software tool required it, but we also found no one was going back and analyzing this data.

We also discovered that some of the documents that were being produced and peer reviewed on every project the customer didn't require and no one in the LACM organization was using them. On further investigation we found the reason the data and those documents were required was because someone inside LACM wrongly thought the CMMI required them. Practitioners also told us that because the peer review software tool was so difficult to use it actually had discouraged practitioners from entering real defects found.

After streamlining the process, peer review software, and related training the company found the CMMI implementation was strengthened because the people were now following the peer review process with greater discipline. This improvement in process adoption occurred because the peer review software and process were easier to use and the practitioners in the organization could now see the benefit of their effort<sup>[3]</sup>

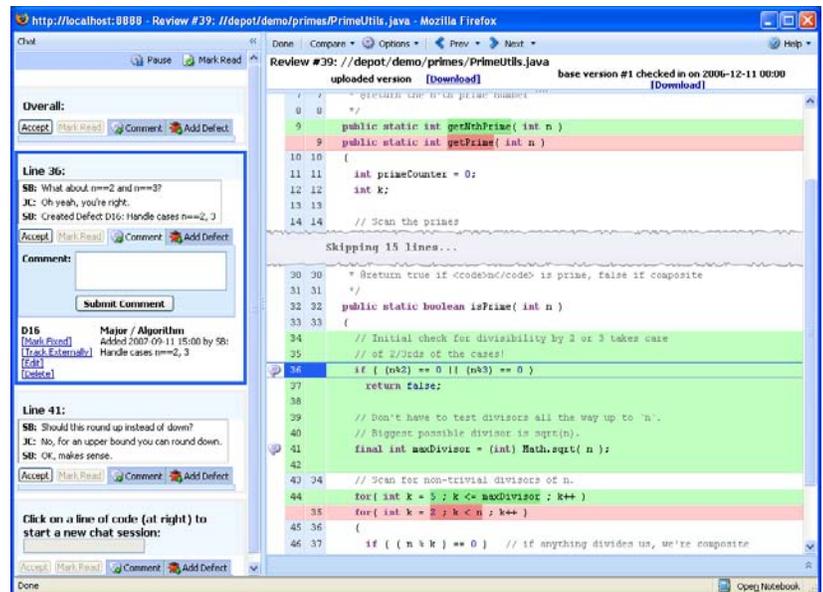
In the next section we examine how software tools can simplify peer reviews and help with CMMI appraisals.

### Myth 3: The CMMI doesn't specify that software should be used for peer reviews, so a software tool can't be helpful

It is true that the CMMI doesn't specify that software should be used for peer reviews. But organizations that succumb to the myth that peer review software can't be helpful often end up making the effort of producing a quality product more difficult for their practitioners and find themselves trailing the competition.

### What the CMMI really requires

While the CMMI doesn't specify anything about tools, the model does expect each organization to analyze data from peer reviews. A common best practice found in many CMMI mature organizations is to establish a standard approach to the data that is collected and analyzed. This can help project practitioners in carrying out their responsibilities and help organizations determine where they need improvement to stay ahead of their competition.



Peer review software being used for review of software code.

### Peer Review Best Practices of Successful CMMI Companies

- > Create a standard approach to data collection and analysis using peer review software
- > Customize peer review software to the process-- not the other way around
- > Increase adoption by using software that makes the actual peer review easy and unobtrusive
- > Assign and train personnel responsible for data collection and analysis
- > Centralize reporting across projects to identify continuous improvement opportunities and simplify CMMI appraisals

### Case Study 3 - "How can peer review software help?"

When we talked to software practitioners at one of our clients about peer reviews we heard: “*Sure, we do peer reviews.*” But we weren’t getting a warm-feeling this was true because we could find no objective evidence to back it up and their customers had been complaining about latent defects. At the time they used no peer review software, nor required any related peer review documentation.

We put a simple peer review tool in place requiring minimal data collection, and periodic analysis. The tool helped us maintain records that were utilized as evidence during the CMMI formal appraisal. During the CMMI appraisal our interviews – which included multiple software practitioners – revealed that before the tool was installed and used the practitioners often cut corners and skipped peer reviews when pressed for time. They told us this was easy for them to do since no records were kept.

They also told us when the peer review software started to be required they knew there would be a record, and it helped discipline them to follow the process even when they were pressed for time. Once people started using the tool regularly, they realized that their products had fewer latent defects, and customer satisfaction increased noticeably. Using peer review software helped this company more rapidly prepare for the CMMI appraisal process and ultimately achieve Level 3 compliance.

### Summary

The CMMI doesn’t dictate “*how-to*” conduct peer reviews, nor what products you need to peer review, nor what data you need to collect, or who needs to participate in these reviews. However, it does expect each organization to make all of these decisions based on its own business needs, document its decisions, and train its people in their established peer review process.

The CMMI doesn’t dictate the use of peer review software, but the right peer review software set up with the right data specific to business needs has proven to help many organizations achieve their CMMI goals of improving the quality of their products and code, increasing their software productivity, and saving money by finding and fixing defects earlier in the process. This allows CMMI compliant organizations to continuously optimize their processes, be high performing and ultimately keeping them ahead of the competition.

## CMMI Peer Review Software & Best Practices Checklist

Use the following checklist to help determine the right peer review process, data, and software for your organization.

Checklist Item	Don't forget...!	Yes	No	?
<b>People and Processes</b>				
<i>Have your practitioners been trained in your peer review process and software?</i>	The CMMI does expect you to train your personnel			
<i>Does your peer review process identify criteria for how your projects and personnel decide what work products must undergo a peer review?</i>	The CMMI expects you to peer review work products, but it does not dictate what the products need to be. You decide.			
<i>Does your peer review process provide guidance as how to select the stakeholders for a peer review?</i>	The CMMI expects you to involve stakeholders in peer reviews			
<i>Does your process identify the minimum data items that must be entered related to a peer review?</i>	The CMMI doesn't dictate what data to collect. Each organization should make this decision based on business needs			
<i>Does each required peer review data item support a defined measurement objective in your organization?</i>	All required data collected in the peer review process/tool should support your defined measurement objectives.			
<i>Has the person or role who is responsible for data analysis been identified and assigned?</i>	The CMMI does expect you to assign resources to analyze data			
<b>Peer Review Software</b>				
<i>Is your peer review software customizable to align your data requirements with your organization/s peer review process?</i>	Software tools should be flexible to supporting an organization's process.			
<i>Is your software flexible enough to support peer review comments that come from varied sources, such as, collaborating teammates &amp; customers?</i>	Peer reviews can be implemented in different ways. The CMMI doesn't dictate the "how to."			
<i>Does your peer review software &amp; process provide helpful hints to aid your people making better peer review decisions?</i>	Practitioners need reminders to help make the best decision with respect to peer reviewing products			
<i>Does your peer review software &amp; process help your practitioners collaborate and communicate defects in a non-intrusive way?</i>	The primary intent of peer reviews is to identify defects for removal and to recommend changes that are needed.			
<i>Does your peer review software &amp; process support peer review of appropriate artifacts such as images, requirements documents, schematics, and code.</i>	Peer reviews can be applied to multiple types of artifacts. The CMMI does not dictate which artifacts need to be reviewed.			
<i>Is the peer review data centralized and easily available for analysis and reporting?</i>	The CMMI does expect you to analyze peer review data.			

## Author Bio

**Paul E. McMahon**, Principal, PEM Systems ([www.pemsystems.com](http://www.pemsystems.com)), helps large and small organizations as they improve their technical and management processes and move toward increased agility and process maturity. He has taught Software Engineering at Binghamton University, State University of New York; conducted workshops on Engineering Process and Management, and published more than 35 articles on software and systems development and management. His experience, insights, and recommendations he shares with his clients reflect 24 years of engineering and management experience working for such companies as Link Simulation and Lockheed Martin, and 14 years of independent consulting. Paul is the author of two books, *Integrating CMMI and Agile Development: Case Studies and Proven Techniques for Faster Performance Improvement* (August, 2010) and a book on collaborative development, *Virtual Project Management: Software Solutions for Today and the Future* (CRC Press, 2000).

## Endnotes

- [1] CMMI® stands for Capability Maturity Model Integration – CMMI is a process improvement reference model developed by the Software Engineering Institute (SEI) and is required for contractors to bid on many U.S. Department of Defense contracts.
- [2] McMahon, Paul E, “Integrating CMMI and Agile Development: Case Studies and Proven Techniques for Faster Performance Improvement”, Addison-Wesley, August 2010
- [3] For more detailed information on the BOND and LACM Case Studies and Peer Reviews refer to [2].
- [4] Demonstrating the Impact and Benefits of CMMI: An Update and Preliminary Results (<http://www.sei.cmu.edu/reports/03sr009.pdf>)
- [5] McMahon, Paul E, “Integrating CMMI and Agile Development: Case Studies and Proven Techniques for Faster Performance Improvement”, Addison-Wesley, August 2010

## About SmartBear

SmartBear Software provides software developers, quality assurance engineers and IT professionals with powerful, affordable, and easy to use tools that make people more productive and help develop better software. Our [code review](#), [automated testing](#), [performance profiling](#), and [development management tools](#) have helped more than 100,000 professionals build some of the best software applications and websites in the world.

SmartBear's peer review software, [CodeCollaborator](#), helps companies successfully use peer reviews to reach their CMMI Level 3 and above goals. CodeCollaborator is an enterprise-level software solution that helps standardize and expedite peer reviews with team members no matter where they are located, capturing the review metrics required for CMMI audits, and helping to improve overall product quality.

Reach your teams' CMMI goals more quickly using CodeCollaborator to:

- > Quickly implement the standardized and documented peer review processes required for CMMI
- > Accelerate and simplify the CMMI audit review process with centralized reporting
- > Enable continuous process improvements to get the most from CMMI and peer review

To learn more about how CodeCollaborator can support your team's peer review needs and CMMI goals visit <http://www.smartbear.com> and sign up for a [free trial of CodeCollaborator](#)

### ***About SmartBear Software***

SmartBear Software provides enterprise-class yet affordable tools for development teams that care about software quality and performance. Our collaboration, performance profiling, and Testing tools help more than 100,000 developers and testers build some of the best software applications and websites in the world. Our users can be found in small businesses, Fortune 100 companies, and government agencies.

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