

# Taking an Agile Organization to Higher CMMI Maturity

**Paul E. McMahon, PEM Systems**

**Abstract.** Many believe the CMMI® [1] and Agile methods [2] are at odds. This article will provide practical techniques to take an Agile organization to CMMI Level 3 without jeopardizing its Agile approach. The phrase “Agile organization” as used in this paper refers to any organization that uses an Agile approach on the majority of its projects. By “Agile approach” we mean the extension of Agile software concepts such as iterative development, daily standup meetings, frequent delivery, customer collaboration, and continual refinement of plan, to include systems engineering and project management.

Actual case study data is shared where the techniques have proven successful. The material is based on a case study described in greater detail in the book, “Integrating CMMI and Agile Development: Case Studies and Proven Techniques for Faster Performance Improvement” [3]. The techniques discussed can actually help any organization implement an effective and efficient CMMI effort whether or not the starting point is Agile. The reason an “Agile organization” is emphasized in the paper is because the techniques described are particularly important to these types of organizations in order to allow them to continue to employ their Agile approach and achieve higher CMMI maturity.

## Background

BOND is an organization that was started by two retired military men. In 2000 I was asked to conduct a gap analysis using the CMM® model to help BOND initiate a process improvement effort. At that time the company had only 25 people and no documented processes. For the next few years the organization attempted unsuccessfully to move its process improvement effort forward. In 2003 they asked me to conduct another gap analysis, this time using the CMMI model. After this gap analysis

they asked me to become more involved helping them move their process improvement program forward. In 2005 BOND achieved a formal CMMI Level 3 in eight of the 18 Process Areas required for a full CMMI Level 3. In 2007 they achieved a formal full CMMI Level 3 in all 18 Process Areas. By the time of the formal appraisal in 2007 the organization had grown to 150 people.

## Challenges Faced

In 2003 when we began the process improvement effort at BOND I was given two key challenges by the organizational leaders. First, add the process discipline required to help them manage their continued planned growth. Second, maintain the successful Agile culture which the leaders strongly believed was key to their success. That “Agile culture” included an emphasis on a close collaborative relationship with their customers, early customer demonstrations, daily standup meetings, and frequent product deliveries. The majority of the projects at BOND utilized a Scrum approach tailored to specific project constraints.

In this article I share key practical techniques used at BOND to help them achieve their goal. Specifically I share three keys to conducting a gap analysis against the CMMI model for Agile organizations, and three key tailoring areas found effective in Agile organizations for running Technical Working Groups (TWGs) to develop CMMI Level 3 compliant processes. The added value the CMMI can bring to a previously successful Agile organization is also shared along with an example of a key technique employed to gain the buy-in for needed changes.

## Fundamental Guidance Employed at BOND

Contrary to popular belief the CMMI is not a set of dictated practices. It is a process improvement reference model intended to help you ask the right questions leading to the best decisions for your organization. For example, the CMMI leads you to ask, “Do you have sufficient resources on your project?” This question is methodology agnostic, and can help any organization including Agile organizations. But using an Agile approach alone will not lead you to ask this question.

This is an example of how the CMMI can help an Agile organization. On the other hand, Agile concepts provide a wealth of potential “how to” approaches that can achieve the intent of CMMI practices. An example is daily standup meetings. But daily standup meetings may not work in all situations, such as when your team is distributed in different time zones. The CMMI is about “what” you must do. Agile techniques provide “potential” how-to options. This is the fundamental guidance we employed in making key decisions concerning process improvement at BOND.

This article will demonstrate how applying this guidance allowed BOND to maintain the Agile values they were experiencing in 2003 when they achieved their CMMI Level 3 in 2007. It will also provide guidance on what you can do in your organization to effectively integrate the CMMI and Agile development given your specific situation.

### Gap Analysis in Agile Organization

A gap analysis is an assessment of an organization based on the CMMI model. The result is a strengths, weaknesses and recommendations report that can be used to plan the road forward toward higher CMMI maturity. When the report is presented to an organization's leaders one should stress that weaknesses identified against the CMMI model are "potential" weaknesses to the organization that we may or may not have to take action to address. Recommendations related to the conduct of a gap analysis in an Agile organization involve three key areas; Gathering accurate data, Reporting results, and Handling "potential" weaknesses. Each is discussed below.

### Gathering Accurate Data

There are multiple possible approaches to conducting a gap analysis against the CMMI model. A common approach is to focus on the documentation (existing processes and products produced), and supporting this review with a few interviews. For Agile organizations it is recommended to switch the primary focus to the interviews, and conduct the interviews one-on-one, as opposed to group interviews, which is often done with formal CMMI appraisals. It is also recommended to use no CMMI terms. Ask simple questions and encourage the person being interviewed to just talk about how they do their job. Then listen, and take plenty of notes. The rationale for this approach is based on the fact that our goal is to gain the most accurate picture of how the people operate in the organization today providing a starting point for the process improvement effort.

### Reporting Results

It is recommended for gap analysis reports to go much deeper than traditional gap analysis reports and they should be based on specific objective data heard in the interviews, or seen in documentation reviews. The rationale for this is based on the fact that specifics are usually needed for management to buy-in to the changes that the organization requires for higher CMMI maturity. Too often results are raised up to an abstract level due to fear of "attribution." This is understandable, as we do not want findings to be attributed to individuals. However, we have found a more effective way to handle this by only reporting "potential" critical specific patterns that have been uncovered by hearing the information in two or more interviews. This addresses the individual attribution concern, and also helps us achieve buy-in for the value-added changes the organization needs.

### Handling "Potential" Weaknesses

Handling "potential" weaknesses can best be described through an example. When you are conducting a gap analysis interview eventually you will get around to the products produced by the worker. Then ask, "Does anyone else look at these products you produce?" Often, in Agile organizations, the answer is, "We do not do formal peer reviews."

When you hear this just note it as a "potential" weakness recognizing we will need to come back later and dig deeper to find out what is really going on. You could alternatively just report it to management as a weakness that needs to be fixed. You could say, I heard you do not do peer reviews, and you need to do peer reviews because they are an expected practice within the CMMI model. While this would be the easiest thing to do, it would also add the greatest risk to the goal of maintaining the successful Agile culture. Later in this paper we will explain how to handle these "potential" weaknesses. Next we discuss the recommendations to move forward after a gap analysis through TWGs.

### TWGs

The TWG is the next step after the gap analysis. The traditional responsibilities of a TWG are to develop and document processes, and address weaknesses identified in the previous gap analysis. The members of the TWG should be the subject matter experts that use the processes being developed. There are three areas recommended to tailor the traditional responsibilities of a TWG for Agile organizations; Training processes, rationale for "stretches," and approach to "potential" weaknesses. Each is discussed below.

### Training Processes

It is recommended to hold TWG members responsible for training—at least the first round of roll-out training to the organization. The reason for this is because there is no one better able to explain why decisions were made than those who developed the processes during the TWG effort. Too often TWGs are disbanded after they develop the processes, and as a result this all-important training aspect does not get the attention it deserves.

### Rationale for "Stretches"

Stretch areas are areas where we are asking personnel in the organization to change their behavior. It is recommended to require TWGs in all process roll-out training to focus on "stretch" areas and always provide the rationale for each stretch. This is done for two reasons. First, it helps to ensure we are mitigating the risk of hindering the existing successful Agile culture. By requiring the TWG to do the training and to provide the rationale for anything in the new processes that is a "stretch", we ensure the TWG members thoroughly think-through what they are requiring in the new processes.

Too often when TWG members think their job ends once they have developed the process documentation they do not take the impact of their decisions on the organization serious enough. It is also recommended to let TWG members know, "because the CMMI says so" is never a valid reason by itself to include a new "stretch." The CMMI is a reference model that helps us ask the right questions leading to the right practices for our organization. It is not a set of dictated practices, which is too often the way the model has been applied in the past.

## Approach to “Potential” Weaknesses

The first rule recommended to give TWG members is, “Always start with the intent question.” This is a rule I learned from a CMMI lead appraiser I worked with many years ago. What she meant was, whenever you are dealing with a potential weakness, ask yourself, “What is the intent of this practice in the CMMI model which as we are reading it right now we believe this organization may not be doing?” Then ask, “Are we achieving the intent. If so, how?”

This may lead to an alternative practice, or a different “how-to” approach. Keep in mind that the CMMI focuses on “what” you must do, and you have many options related to “how” you do it. Agile approaches provide potential “how to” options [2]. Stress here the word “potential” because what can be a good “how to” in one organization may not be a good “how to” in another. Your “how to” options are not dictated by the CMMI model [1]. Those decisions should be made by your people based on your business needs.

Another good question to ask is, “Is there a problem in the organization because this practice does not seem to be done?” If the answer is no, then tell your TWG members to keep digging because they are likely to uncover a “local” practice. A “local” practice is something that is often not documented and is taken for granted in organizations, but is achieving the intent of a CMMI practice. An example of a “local” practice at BOND is something we referred to as “doorway” risk management. Risk management was ingrained in everything BOND did, which was part of the reason for their success. When a project leader had a risk he did not wait for a formal risk board meeting. He was in the “doorway” of his manager’s office strategizing the risk mitigation immediately. We did not change this process, but we did document it and train it. Such “local” practices are common in many successful Agile organizations—and usually deserve more attention than they often get [3].

If, on the other hand, there is a problem in the organization, then the next discussion item for the TWG is to decide if they agree this organization needs to “stretch” by changing their behavior to resolve the problem right now. This is a very important discussion because you need to be sensitive to your organization’s specific business needs and each time we agree to stretch it is critical that we know the problem we are solving with the stretch.

It is also critical to convey this rationale to the personnel in the organization that are affected so they understand why they are being asked to change their behavior. Behavior change is the hardest part of process improvement, but by providing solid rationale we can move the organization forward more rapidly and more effectively.

Discussing and agreeing to “stretch” areas and the rationale, and digging for “local” practices that we then document once found are the biggest differences in how we run an Agile TWG from a traditional TWG.

It is worth pointing out that an Agile approach was used to develop and roll out the processes at BOND incrementally and based on priority as identified in the gap analysis.

## Added Value the CMMI Can Bring an Agile Organization

What has been described so far is how we go about documenting and deploying processes that are CMMI compliant in an Agile organization. But if your Agile organization is already successful, why go through all this effort?

The answer is because even successful Agile organizations have areas they need to improve and where behavior change is needed. We next describe a few examples from the BOND case study where behavior change was required, how we addressed this need, and how we achieved the buy-in from the software practitioners in the organization.

## More About BOND

Successful organizations often start out as the brainchild of just a few individuals, and often those leaders keep a great deal of information inside their heads. This was the case at BOND. The leaders at BOND also took on a great deal of responsibility that would have typically been spread across many individuals in traditionally structured organizations. BOND’s success led to rapid growth, which in turn led to a need to delegate. But this led to a problem.

## The Delegation Problem at BOND

At BOND, in order to help maintain the successful Agile culture, it was decided to grow new leaders from the inside, rather than hire from outside. While this decision did help to maintain the desired Agile culture, it created a new problem. The new leaders were unsure of just what their new responsibilities entailed, and they were concerned because they were not being relieved of their previous responsibilities. This is an example of the type of critical information that came out from conducting the gap analysis with a focus on letting the people just talk about their job openly. This kind of information would not have been found by focusing on documentation alone, which is the common traditional approach to a gap analysis.

To address the delegation problem, as we extracted the management processes from the heads of the leaders at BOND and documented them, we also documented roles and responsibilities and were careful to keep both aligned. This led to tailored project lead training, which did not previously exist in the organization.

## Tailored Project Lead Training

I emphasize here the word tailored because this training was not traditional project management training that you could purchase off-the-shelf. The focus of this training was on the “stretch” areas that the TWGs had agreed to. Keep in mind that if we agreed we could not see the value to change based on the TWG analysis it did not become a “stretch” and we did not do it. These cases did require some discussion during the formal appraisal, but since the rationale for decisions had been captured our lead appraiser understood and they caused no difficulty during our formal appraisal.

### Why Focus on Stretches During Training?

People know how to behave the way they are behaving today in an organization. When new people come into an organization they learn quickly by observing what others are doing. This is not to say we ignored existing desired behavior in our training. We did highlight it, but we did not have to focus on it. On the other hand, the focus of our training was on “stretch” areas and related rationale because change takes time, and people respond best when they understand why they are being asked to behave differently.

### Is Training With Focus on Stretches All That Was Required?

Changing behavior is the hardest part of process improvement. At BOND we used multiple approaches to address this challenge. First, because you cannot rely on people learning from their peers when you are trying to change an organization's current behavior, you do need training with rationale. However, training with rationale alone is insufficient because even when people understand the reason for change, when they return to their work environment human nature often leads them to first behave as they have been behaving in the past. As a result, at BOND we also instituted what we called “Sustainment” training which was short sessions often conducted as brown-bag lunch-time seminars where we provided reminder tips for areas we knew the organization was having trouble. We also instituted “coaching” to help with specific situations where people did not understand how to apply new expected practices.

### How Did We Know Where BOND Needed Sustainment and Coaching Help?

In order to know where BOND personnel needed reminders during sustainment training, and additional coaching we need feedback mechanisms. These were provided through two sources; Product and Process Quality Assurance (PPQA) checks, and interactive workshops. When we initiated the process improvement program there were no independent quality checks happening in the organization. This is common in Agile organizations.

### PPQA and Interactive Workshops

Some misunderstand the purpose of PPQA. A common myth is the belief that because “quality” is engineering's responsibility nothing else is needed. The purpose of PPQA is to provide “objective insight”. There are multiple “how to” options to institute PPQA in an Agile organization. While some organizations use a “police force” approach, at BOND an approach was used where project personnel were rotated through the quality role providing more of a mentoring and sharing culture.

The training sessions where we focused on “stretch” areas were also conducted as interactive workshops. Besides being a time when practitioners learned about the company processes and the expectations with respect to stretch areas, they also became an opportunity for practitioners to share with each other issues and lessons.

The feedback from the PPQA audits and the interactive workshops was used to help focus lunch-time sustainment training sessions, and to improve processes and future training sessions.

The interactive workshops at BOND served multiple purposes. Typical Agile approaches do not address sharing across the organization, and training people in critical skill needs such as estimating, collaborating and handling sensitive issues, such as a difficult sub-contractor or customer. These were all topics that at times became a focus of the interactive workshops.

### The Results

The purpose of this paper was to explain key techniques that were successfully employed to take a growing Agile organization to CMMI Level 3 while maintaining the organization's successful Agile culture. Feedback from both the leaders at BOND and their customers indicated noticeable improvement in cost and schedule management which can be attributed largely to the tailored project management processes and training focusing on the “stretch” areas. While there was concern at the start of the improvement project that the added effort required due to the CMMI would negatively impact team velocity, no noticeable impact was actually observed. In fact, the reverse was observed as on-time deliveries to customers actually improved. Surveys from developers taken during training workshops also indicated minimal impact was observed to their Agile approach (e.g. Scrum ). When they were asked to behave differently they understood the rationale and why it was important to support the continued growth of the company.

It is also worth noting that the team felt the value to the organization was worth the minimal added effort and they felt the added tasks did not cause significant compromise or loss of Agile values. Key to achieving this result can be traced back to applying effectively the fundamental guidance in using the CMMI model described in the beginning of this paper. This guidance is critical to effectively integrating CMMI and Agile approaches in a way that does not cause the often-heard “non-value-added record-keeping” that too many organizations suffer from when implementing the CMMI the wrong way. Our success at BOND can also be attributed to three critical areas; the way we conducted the gap analysis, the way we ran the TWGs, and the way we achieved buy-in to needed changes.

With respect to the gap analysis keys to our success tied to our close attention to first gathering accurate data related to how people operated at the start of the effort, reporting clearly to the sponsors the potential specific patterns in the organization that needed to be addressed, and the approach used to handle potential weaknesses during the gap analysis.

With respect to the TWGs, the key to success was tailoring of the traditional TWG responsibilities to include training, requiring rationale for “stretches”, and our approach to handling potential weaknesses in the TWG by digging for “local” practices when we could not uncover a related problem in the organization.

With respect to buy-in to needed changes keys to success tied to the focus of training on the rationale for “stretches”, gaining feedback through a listening/mentoring PPOA culture, and follow up sustainment training and coaching in support of continual process improvement.

It is also worth noting that the main value of the CMMI effort from the customer perspective was more consistent product deliveries. Prior to the CMMI implementation, while customer satisfaction was generally good, there were specific cases of missed commitments due to the unexpected loss of key personnel, and the organization having no backup plan. Agile methods heavily rely on team members meeting their commitments. CMMI adds a focus on the organization providing improved support for trained resources that can be accessed across multiple projects in parallel, if necessary. This proved valuable at BOND as the organization grew and more projects needed to be managed in parallel.

The practical techniques described in this paper helped the BOND organization not only achieve a full CMMI Level 3 while maintaining their successful Agile culture, but also institute critical improvements the organization needed to help it continue to succeed as the organization continued to grow.<sup>1</sup>

## Conclusion

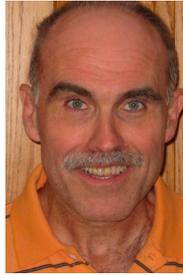
This article focused on a single case study of a small growing Agile organization moving to CMMI Level 3. If you are facing similar challenges as the BOND organization and you are now wondering how to get started transitioning your organization to the CMMI, then you have missed a key point. As stated in the beginning of this paper, the CMMI is not a set of dictated practices. It is not something you should be “transitioning” your organization to. What you should do is start with a gap analysis and conduct it following the three keys outlined for conducting a gap analysis in an Agile organization. Then develop your process improvement plan with priorities established based on your gap analysis findings. Next get your TWGs going in the right direction by giving them the key rules for running TWGs in an Agile organization provided in this paper. If you use the CMMI as recommended you can effectively integrate the CMMI and Agile Development as BOND did gaining the benefits of the CMMI and maintaining your Agile values. In this brief article we cannot possibly answer all the questions you are likely to have. If you would like more detailed information on the BOND Case Study refer to [3].

For more information on how to integrate the CMMI and Agile Development in other situations, including organizations who are struggling to implement Agile approaches effectively and high maturity organizations seeking to increase their agility, refer to the additional case studies in the author’s book [3]. ♦

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## ABOUT THE AUTHOR



**Paul E. McMahon**, Principal, PEM Systems, helps large and small organizations as they move toward increased agility and process maturity. He has taught Software Engineering at Binghamton University, conducted workshops on Engineering Process and Management, and published more than 40 articles. Paul is the author of two books, *Integrating CMMI and Agile Development: Case Studies and Proven Techniques for Faster Performance Improvement* and a book on collaborative development, *Virtual Project Management: Software Solutions for Today and the Future*. Paul is a certified Lean Six Sigma Black Belt and a Certified ScrumMaster.

**Website:** <<http://www.pemsystems.com>>

**E-mail:** [pemcmahon@acm.org](mailto:pemcmahon@acm.org)

## REFERENCES

1. Chrissis, Konrad, Shrum, *CMMI for Development: Guidelines for Process Integration and Product Improvement*, Third Edition. Boston, Pearson Education, Inc., 2011.
2. Cockburn, Alistair, *Agile Software Development: The Cooperative Game*, Second Edition, Boston, Addison-Wesley, 2007.
3. McMahon, Paul E, *Integrating CMMI and Agile Development: Case Studies and Proven Techniques for Faster Performance Improvement*, Addison-Wesley, 2011

## NOTES

1. For more information on the BOND Case Study refer to Chapters 4 and 5 in “Integrating CMMI and Agile Development: Case Studies and Proven Techniques for Faster Performance Improvement”