



A Good Idea Still Requires a Good Implementation

David P. Quinn
National Security Agency

No matter how good an idea may be, a poor implementation may lead people to believe it is a bad idea. The Capability Maturity Model (CMM)SM is no exception. Many organizations have not had success implementing the CMM and believe it to be a bad idea. To help organizations in their implementation of the CMM, this article presents different implementation approaches and the organizational situations where they are most appropriate.

Warren Keuffel recently criticized the CMM in “Coding Cowboys and Software Processes” (*CROSSTALK*, August 1997). He spoke of his unsuccessful implementation of the CMM as part of a Software Engineering Process Group (SEPG). On the basis of this failed attempt, he assumes that the model is flawed and is a bad idea.

This is a common problem that I see while working with software organizations. Despite success that numerous organizations have had with the CMM, many believe the model is a bad idea because it did not work for them. They need to step back and look at whether the fault lies with the model or with their method of implementation.

There are a variety of ways to define and deploy usable processes in software organizations. The challenge is to find the right combination of definition and deployment for your organization. This article discusses ways to define and deploy usable processes to build an organization standard software process (OSSP).

Defining Usable Processes

The appropriate way to define usable processes depends on the organization's culture or situation. Each method below includes examples of appropriate organizational culture or situations.

Process for Hire

One way to define usable processes is to buy the processes from a vendor, much like buying a set of encyclopedias. The organization can buy the entire set or buy the processes one volume (one key

process area) at a time. Of course when you buy the process, you will need to buy additional services like training, templates, and other associated assets. The organization's improvement investment is primarily financial.

Although many mature organizations warn that you must grow your own processes, Process for Hire can be successfully implemented in two situations. The first is when a new organization has just been formed; there is no culture to fight at this point, and people are likely to welcome a defined direction. The second circumstance is when the organization is given a mandate to achieve a certain maturity level by a pre-defined time or lose a critical customer or financing. The organization must change quickly or it will disappear.

No matter which circumstance the organization faces, the organization must break the purchased processes down,

make alterations for their particular environment, and put the processes back together. This procedure ensures that the process will work in the given environment and that the organization takes ownership of the process.

The Ivory Tower

Also known as the “Ten Commandments” approach, this method isolates a handful of experts in a workspace to develop all the processes for the organization to follow. When they are finished, they bring the processes down from their “tower”—possibly written on stone tablets for effect—and expect the organization to follow them as written. They impart their collective experience to the organization and expect it to be accepted solely on faith.

This method works well when the organization has a large number of junior engineers who lack the experience to

Table 1. *Methods of definition.*

Method	Characteristic	Culture/Situation
Process for Hire	Using another organization's processes.	Start-up organizations. Process improvement is mandated.
Ivory Tower	Team of senior experts.	Informal culture. Junior workforce.
Process Action Teams	Hands-on expertise.	Long-term process improvement approach.
Bubble Up	Working processes submitted.	Strong process improvement resistance.
Self-Selection	Processes are nominated.	Pockets of good process exist.
Shadowing	SEPG follows projects and documents them.	Too busy to improve.

Capability Maturity Model and CMM are service marks of Carnegie Mellon University.

develop usable processes. It is especially effective in an organization that prides itself on its informal atmosphere. By selecting senior experts to define the processes, the organization uses the people who probably forged that informal culture and can best alter it to a more mature environment.

However, the organization must be cautious when using this method, especially when the senior experts have not been technically involved in software development for some time. The “experts” could develop processes that do not match the current working environment or culture. This method therefore requires constant communication with the workers to ensure they understand how the process was developed.

Process Action Teams

The Ivory Tower method should not be confused with the use of Process Action Teams (PATs). PATs focus on one process area or one thread of software engineering that covers multiple process areas, whereas the Ivory Tower approach addresses the entire process improvement effort. PATs are composed of hands-on technicians with up-to-date expertise in the area being defined. They define the process based on current practices, then create additional processes that fill specific CMM key process area requirements.

This is the most common approach to define processes, and is usually used to implement improvements incrementally in organizations that view process improvement as a long-term investment. It requires the SEPG to handle the institutionalization aspects and track the interfaces between process areas.

Bubble Up

Nothing breeds success like success. This method requires SEPG members to document how successful projects operate, then use those processes to form the OSSP. The key to making this method work is to define the environment in which the process was successful.

This method works well in organizations that are resistant to process improvement, i.e., project teams that will likely fight processes that have not been

used in practice. The knowledge that successful projects have used the process makes buy-in more likely. However, these processes may be incomplete according to the CMM and may need adjustment in the future. Unfortunately, this method focuses on creating documented processes, complete or not.

The challenge comes in how to define a successful project. The organization cannot only look at *whether* the project achieved its goals, but *how* it achieved them. Before implementing this method, the organization must define a successful project in terms of its business goals and engineering needs.

Self-Selection

This method requires that project members submit processes they believe are worthy for the organization to use. They know that the processes work and believe that other projects could successfully use them. Management also may draw on these people’s experiences and submit processes they believe other projects could use.

This method is especially useful when groups have independently established mature practices, without waiting for the rest of the organization to improve. This method also speeds up the adoption process, since the processes are known to work in the organization. The SEPG’s job is to determine whether the processes are complete or need to be expanded to cover CMM practices.

The self-selection method can cause problems if projects view it as a form of self-congratulation. As with the Bubble Up method, self-selection requires that acceptance criteria be in place to ensure the submitted processes are truly worthy for use across the organization.

Shadowing

Project workers do not always have the time or ability to document how they perform their processes. Shadowing helps this type of project. The SEPG follows the project and documents its processes. Project members then review what the SEPG has written to confirm that the description reflects their processes. The project now has its processes documented, and the SEPG has a candidate process for its OSSP.

In addition to creating documented working processes, this method supports the waiver process needed for process improvement. If a particular project needs to use processes outside the norm, or if project members merely want to try something different, the SEPG can shadow the project to document the differences and determine whether they are improvements.

This method best fits an organization that resists process improvement or claims to be too busy to improve. With a minimal investment, the process can be documented, and once documented, it can be improved based on the CMM process descriptions.

Deploying Usable Processes

Defining usable processes is only half the fun. Once they are defined and determined to be good enough for other projects, the SEPG must find ways to deploy them. This again depends on the current organizational culture and situation.

Starting Monday

This method relies on a mandate that the entire organization begin to use the same process on a certain day or date, usually a Monday or the first of the

Table 2. *Methods of deployment.*

Method	Characteristic	Culture/Situation
Starting Monday	Mandated start date.	Immediate conformance.
Test the Water	Pilot testing process.	Proven processes before immersion.
Fill in the Gaps	Provide missing practices.	Too busy or process improvement resistance.



Web Addition

This article can be found in its entirety on the Software Technology Support Center Web site at <http://www.stsc.hill.af.mil/CrossTalk/crostalk.html>. Go to the "Web Addition" section of the table of contents.

Achieving Information Superiority

Lt. Gen. Ronald T. Kadish

Commander, Electronic Systems Center, Hanscom Air Force Base, Mass.

In a speech given at the Air Force Information Technology Conference in September 1997 at Standard Systems Group, Montgomery, Ala., Lt. Gen. Kadish describes the new framework to be employed by Air Force in its quest to achieve information superiority. Included in the strategy are an acquisition cycle time of 18 months, seamless connections between classified and unclassified systems, and commercial-off-the-shelf applications that are open system, based on standards.

month. There is no transition period and no choice. The organization must begin to use the process on exactly that date—or else.

This method is commonly used when there is an extreme need for conformity. For instance, if the organization is building safety-critical systems, it cannot continue to use a flawed process. Or perhaps the organization may be attempting to re-baseline measures in its process database. The data must be consistent, so conformance to the process is mandated.

With a short suspense date for implementation, the SEPG must quickly train the technical staff to be successful. They must be prepared for a tremendous number of trouble calls for help with the process. Automation may lag behind but should eventually catch up.

Testing the Water

Processes do not always work right the first time, so they are tested through the use of pilots—much like testing the water with your toe. The process is tried in selected areas to see if it is good enough for organization-wide use. If the water feels right and the process works, the entire organization will jump into the water.

This is the most common deployment method for process improvement. Most organizations want to make sure a change will be an improvement before exposing the entire organization to it.

This builds confidence in the process and fosters automation of the process.

The SEPG should also train the organization in any new method in several training sessions for different groups. The overall amount of training is based on whether the rest of the organization is going to jump into the water at once or ease into the water one part at a time.

Fill in the Gaps

Projects usually have practices in place that, for the most part, are successful; members only need to fill in the gaps between what they are doing and what needs to be done. As gaps are found, they are filled based on the organization's defined processes. By making minor adjustments to their current practices, project members incorporate process improvement into their ongoing product development. With time, the project has all the gaps filled and works according to the organization's defined processes.

This method works well when projects claim to be too busy to implement improvement. The changes are incremental and meaningful and based on current practices. The project improves without team members having to concede that they are actively working on process improvement.

The SEPG's job is more complicated in this method because they are constantly doing gap analyses. The relationship with the projects is more detailed and drawn out. Improvement takes

longer but is likely to have greater buy-in and be institutionalized without as much verification.

Conclusion

Poor implementation of a good idea does not make it a bad idea. No matter how wonderful an idea is at its inception, its implementation will determine whether it continues to be good. The CMM is no exception. It has been proven to be an excellent tool for improvement, but it must be implemented in a way that matches the organization's culture and present circumstances. Process improvement requires different approaches to process definition and deployment. The organization must find the right combination of definition and deployment to benefit from the CMM. ♦

About the Author

David Quinn is technical director of the Software Engineering Knowledge-Based Center at the National Security Agency. He has over 14 years software development and maintenance experience. He spent the last four years working on software process improvement as a process consultant. He is certified by the Software Engineering Institute as a lead assessor for CMM-Based Appraisals for Internal Process Improvement. He also is a member of the CMM Advisory Board.

National Security Agency
9800 Savage Road, Suite 6639
Ft. Meade, MD 20755-6639
Voice: 301-688-9440
Fax: 301-688-9436
E-mail: dpqsr@romulus.ncsc.mil