How Standards Enable Adoption of Project Management Practice

Suzanne Garcia, *Software Engineering Institute*

Standards affect the adoption of project management practices in three areas: deployment of practices in an organization, customer-supplier relationships, and the community of project management practitioners.

My first introduction to formal project management came when I was a young program analyst at the Lockheed Missile and Space Company. I was hired in 1981 to be on a team that would pull data from various sources and create large charts showing the status of different types of transport vehicles carrying assets between locations. To help me understand the requirements for the computer program I was assigned to write, one of the program controls specialists pulled out a roll of thermal computer paper he called the "Dead Sea Scrolls." He carried it with him to every meeting that had anything to do with the transport project. It was a several-feet-long network diagram related to the transport, installation, and servicing of our assets across the country. He kept talking about the critical path, keeping track of the slack, and understanding the lag time between nodes.

I made the mistake of asking how he had calculated what he called the critical path and got my first lesson in PERT (Program Evaluation and Review Technique) networks plus a lecture on the birth of project management in the Navy that lasted a good part of the afternoon. By the time he was finished, I knew what to call the chart I was assigned to produce (a Gantt chart). I understood the basics of using conservative, aggressive, and most likely time estimates for calculating a critical path. And, I knew that the first class I should take from Lockheed's vast technical-training catalog was the one on basic project management.

Twenty-plus years later, the basics of the project management practices that I learned in that class and later in graduate school are pretty much the same (see figure 1). We each carry around a list of practices like this in our heads, our own mental checklist of what we've learned it takes to make our projects successful. My list will be slightly different from yours, based on the types of projects we've been involved in. Whether my list is better than yours is something that we can debate, and neither of us might be inclined to change our own approach. When we escalate that debate into a larger community that's generally involved in the same activity (often termed a *community of practice*), and we can agree on a subset of practices that are beneficial in defined contexts, then we can end

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- Understand the project's goals and the requirements you're expected to meet.
- Know who the project stakeholders are (your customer, the project product user, and others who are affected by the project or can affect it).
- Understand the project's attributes that will help you most to estimate its cost and schedule, and use them to make the best estimates you can at that time.
- Remember your history—every project can leverage at least some aspects of prior projects to inform its estimates, approach, and processes with a reality check.
- Spend "just enough" time planning the project's resources, methods, and milestones.
- Understand the technical and other risks that could cause your project to fail, and plan how you will minimize either their probability or their impact.
- Make sure that you get the right people involved in the project and that they have the knowledge and skills to do what you've asked.
- Support your staff in monitoring the project's progress so that you can course-correct when needed, but not so much or so deeply that you're micromanaging them.
- Establish quality and progress measures that are meaningful for you to gauge project progress without being onerous to collect or analyze.
- Be ready to replan when (not if) requirements, staff, environment, or tools change.
- Know how you will prove to your stakeholders that the project has succeeded.
- Make sure you have your team members' commitment to completing their piece of the project as you've negotiated with them.

Figure 1. Basic project management practices.

up with a standard that we all agree to use. Depending on which community produces the standard, and how far that community's influence reaches within its intended context, the standard might be local to an organization or group, or it could be regional, national, or international.

Why should we even try to normalize how different people approach an activity such as project management? Simply this: most software-intensive systems projects don't finish when they're expected to, they cost more than expected, and they don't do what the customer expected. By finding and codifying good project management practices, as a community we aim to increase future projects' success. The challenge, as with any set of practices, is to get the people who would benefit from using them to learn them and apply them, which is what I call "adopting the practices." Good standards can enable this adoption process.

My definition of standard comes from Merriam-Webster online (www.m-w.com): "something established by authority, custom, or general consent as a model or example." The standards include both those that are produced by an acknowledged standards body of some sort and those that are typically produced by an individual organization and aren't policed by an acknowledged standards body.

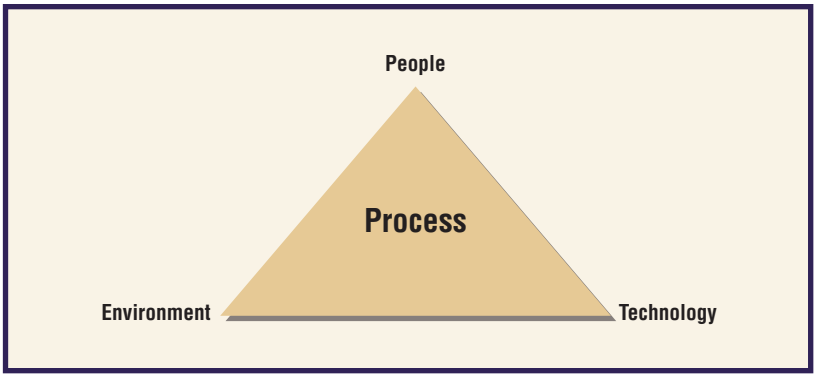

Figure 2. The Garcia model of the role of process in projects and organizations.

Standards and processes

What we're really talking about when we build project management standards is finding ways to stabilize the processes that help to mediate three major factors in project and organizational success:

- people and their skills and motivation,
- the technologies used to support them, and
- the environment in which the project exists.

Figure 2 illustrates my view of process as a primary integrator among these three important elements. The power of project management

Technology transition research provides a basis for thinking about the criteria for a good standard.

standards is that they explicitly address the integrator—process.

What makes a good standard?

Although I've been a contributing author or reviewer for more than one standard related to project management, no one ever gave me a set of guidelines on what makes a good standard. From my recent research in technology transition, I've concluded that there are several criteria for when a standard is a good choice for moving the adoption of a technology forward and several criteria that might predict the standard's usefulness in supporting the technology's adoption by its intended audience.

What does technology transition have to do with project management standards? If we consider technology to be the use of technical processes or methods to accomplish a task, then project management practice could easily be considered a technology. The advantage of viewing project management practice in this light is that we can then look at standards as one of the transition mechanisms for project management practices.

A standard is warranted from a technology transition viewpoint when

- consensus exists among acknowledged best-in-class organizations on a reasonable number of best practices,
- those who aren't best-in-class are visibly searching for solutions to their performance problems,
- early adopters of the suggested practices are seeing benefit from them,
- a suitable organization is available to steward the standard's development and sustainment, and
- the other transition mechanisms (such as training, communications, and community support) critical to encouraging adoption by the majority are available.

Technology transition research also provides a basis for thinking about the criteria for a good standard. Such a standard

- is explicit about the context of its intended scope and use,
- makes explicit what an adopting organization needs to change to use the standard successfully,
- clearly states how to evaluate performance against the standard and how to evaluate the results,
- provides elaborations and examples that help to explain the normative clauses (the ones that would be judged in an evaluation of conformance),
- minimizes redefining common language into jargon,
- clearly defines what's being standardized—typically either some product attribute, such as Underwriters Laboratory standards, or some behavior, such as CMMI (Capability Maturity Model Integration)—and
- is appropriate to the topic's depth or breadth.

What's important about current standards?

Table 1 lists the standards that meet my criteria for a good standard and are substantively related to project management. It also summarizes each standard's major contributions toward the adoption of project management practice. (For more on the state of project management standards, see the sidebar "Notes on Standards Relating to Project Management.")

In this table, the only standards that are "pure" project management standards, in that they don't explicitly deal with the work that they're managing, are those from the Project Management Institute (the PMBOK Guide and OPM3), ISO 10006, and IEEE 1058.

These standards have different audiences, a good bit of content and principles in common, and varying language in how they express their view of project management practices. You might be thinking, "Why can't we all agree on a single project management standard and just use that?" Fundamentally, I think it comes down to this. Your experience and context and mine can't be exactly the same, and in looking for best practices to follow, we seek something that looks as close as possible to what we're already doing or thinking about doing. When we read someone else's standard written for some other context, we want one that fits our experience and context better. And if enough people think the way we do, then another standard might be born.

This reflects a fundamental concept of technology transition, that of "mutual adaptation." For an organization to adopt a technology,

Table 1

Important contributions of different project management standards

Standard	Contribution toward adoption of project management practices
Organizational Project Management Maturity Model	OPM3 goes beyond other "binary" project management standards (either you do it or you don't) by showing a nominal evolution of project management practice as explicit improvements occur. It includes a self-assessment questionnaire that you can use to find gaps in practice with relation to OPM3.
Guide to Project Management Body of Knowledge	The PMBOK Guide provides an understandable view of basic project management practices' scope and context. It provides the foundation for the Project Management Institute's project management practitioner certification test.
Capability Maturity Model Integration	CMMI puts project management practices on a par with the other areas of the model. It provides an evolutionary path toward improved project management rather than a single set of best practices that are all considered of equal weight.
ISO/IEC 12207, Standard for Information Technology—Software Life Cycle Processes	This standard integrates project management practices with other lifecycle processes. ISO/IEC 12207 Annex B defines a reference model that's compliant with and usable by those adopting ISO 15504, Information Technology—Software Process Assessment. This standard provides guidance on conducting reliable, consistent software process assessments against a broad array of IT organization contexts.
ISO/IEC 15288, Systems Engineering—System Life Cycle Processes	This standard has an entire category devoted to project management processes, emphasizing the importance of project management in the context of systems engineering. It explicitly recommends that the rigor and formality of the practices included in the standard be adapted on the basis of the project's risk and complexity. ISO 15288 is the first of the ISO lifecycle standards to use the concept of process outcomes as a way to establish the goals associated with performing a process. This was added to ISO 12207 as Annex B and is the construct that makes it feasible to use these standards as reference models for ISO 15504.
ISO 10006, Quality Management—Guidelines to Quality in Project Management Practices	This standard is a supplement to ISO/IEC Q9004-1 and is framed as a set of guidelines to support organizations that have adopted the Q9000 series of quality management standards. In addition to typical project management activities, this standard also includes a section on strategic project processes. This section emphasizes the management commitment and infrastructure necessary to ensure sustainment of effective project management practices. Those familiar with the PMBOK Guide will recognize similarities with many of the ISO 10006 practices, although they're organized differently. ISO 10006 acknowledges the PMBOK Guide as one of its seed documents.
IEEE Standard 1058-1998, IEEE Standard for Software Project Management Plans	This standard was one of the early IEEE software standards supporting process plans. It has been updated three times, including meeting the requirement to harmonize with IEEE/EIA 12207.0-1997. It supports project management's planning function.

Notes on Standards Relating to Project Management

During the last 20 years, a major shift in project management has occurred in the US. Project management standards have changed from several detailed government standards to primarily industry standards. However, some government standards have been transformed, with some modification, into industry standards. Mil-Std-498, for example, became J-Std-016-1995. In the mid 1990s, organizations were responding to a fairly large number of industry standards. Sarah Sheard's article "The Frameworks Quagmire"[1] highlighted the difficulty that standards proliferation was causing in organizations subject to multiple standards and frameworks.

In addition, not all standards related to project management declare themselves as project management standards. In several cases, project management is one aspect of a larger standard dealing with an engineering or information technology domain. This makes sense when you realize project management is about organizing and managing some type of work—it isn't a substitute for the work itself. So, a standard about "the work," whatever it happens to be, will probably need to talk about standards for organizing and managing the work.

Reference

1. S.A. Sheard, "The Frameworks Quagmire," *Crosstalk: J. Defense Software Eng.*, vol. 10, no. 9, 1997.

either the organization or the technology will need to be adapted to optimize the technology's fit to its adoption context. If the organization must adapt too much, then it's common to construct a variation of the technology to make its adoption easier.[1]

Standardization and deploying the practices

How do standards affect the deployment of project management practice in an organization?

On the positive side, a good standard

- can reduce the time to deploy new practices because it provides a common reference point for those developing the infrastructure to support the standard, and
- tends to reduce arguments about which practices to focus on.

On the other hand, if the standard doesn't appear to fit well with the organization's context, then there will be serious difficulties in getting the standard accepted within the organization.[2]

In the case of adopting project management standards, more isn't necessarily better. One standard might reduce argument, but applying multiple standards in the same organization could cause confusion and conflict. However, in reality, many organizations operate in a market environment where they must respond to multiple standards to remain competitive. One result of organizations' attempts to conform to more than one standard is that some organizations are adopting a principle of *transparency*. They set up a group of experts in the different standards to do the arguing about which practices fit where, and they embody the results of this analysis into some mapping document. This group then translates their shared understanding of how to respond to the relevant standards into the organization's internal standard for project management practices. This *organizational* standard is the one that's actually deployed. When practitioners use the organization's standard, they don't have to worry about which external standard they're responding to—the expert group has done all the mapping and synthesizing for them.[3]

Another effect of standardization is the creation and sustainment of a market for tooling support for project management practices. Without standards to reference, vendors of project management support tools usually have a more difficult time convincing customers that their product will be compatible with the customer's practices. If the vendor's toolset explicitly supports one or more standards, then customers following those standards are more confident that the tooling will fit their practice context. Like good standards, effective tooling is an important transition mechanism for a technology. So, vendors who reference standards in their products are providing an implementation support mechanism for project management practices that also leverages another implementation support mechanism—project management standards.

Standardization and customer-supplier relationships

Standardization's major visible effect on customer-supplier relationships is the growth of supplier evaluation activities. A customer organization finds a standard that's relevant to finding better suppliers. It then uses the standard as part of an independent evaluation program to weed out possible suppliers who don't conform to the standard.

This strategy has become popular, especially with customers who use outsourcing to reduce cost. However, overreliance on suppliers' conformance to project management standards can lead to risks. For example, the *CIO* article "Bursting the CMM Hype" addresses the risks of overreliance on software process assessment.[4] Although that article is about CMMs, the principles can equally apply to process evaluations using other standards.

One thing that can drive the use of supplier evaluations is industry or government policy. Sometimes an industry association adopts a policy that its members should adhere to a particular standard. In other cases, a national or regional government will establish supplier requirements related to one or more project management standards. Without useful standards, such policies have no meaning. However, as with any other measurement standard, applying a standard to a particular supplier base can have unintended consequences. If the standard isn't a good fit for the suppliers' context, then they will have to make significant adaptations to conform. To ensure competitiveness, some organizations set the goal of conforming to the standard, regardless of the

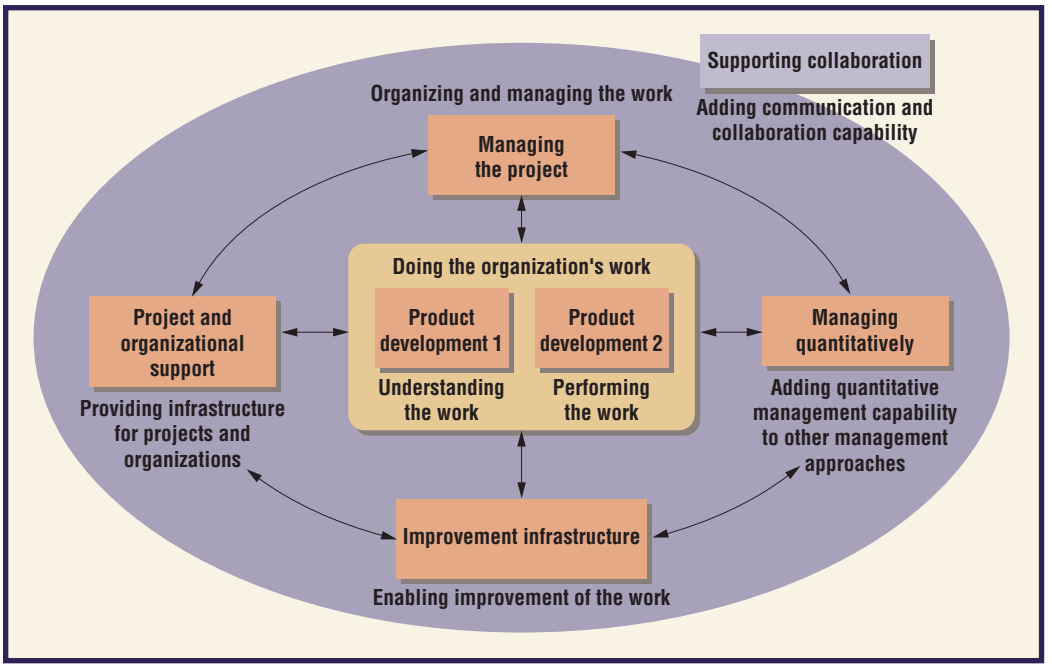

Figure 3. A conceptual model of the contents of Capability Maturity Model Integration v1.1.[6]

fit to their other business goals and context. When this happens, adoption of the standard tends to be fragile; as soon as the conformance requirement goes away, standard-related practices are likely to regress.

Standardization and the practitioner community

The emergence of communities of practice is a major effect of standardization. They support the increased knowledge and skills of their members, and influence the organizations that develop and steward project management standards. Communities of practice are usually defined as self-organizing, self-sustaining groups of practitioners who act as a catalyst for evolving the area of practice they're concentrating on.[5] These practitioners form both core and peripheral communities to maintain skill and knowledge in the particular area.

The Internet has facilitated the emergence of a worldwide project management community of practice. One example of this is www.gantthead.com, a Web-based community of project management practitioners in the information technology domain that has more than 150,000 members worldwide.

Another example of this community's growth is the PMI. As of this writing, the PMI also has over 150,000 members in more than 125 countries (not all members are involved in software-intensive or engineering projects). It also has thousands of certified *project management professionals* who have demonstrated knowledge of the Project Management Body of Knowledge (PMBOK) adequate to be considered professionals in applying project management practices. In addition, CMMI continues to gain momentum in the software-intensive-systems community and is beginning to influence engineering services and more traditional IT sectors. More than 30,000 individuals have taken the CMMI introductory course, which covers the model's project management content. Although CMMI is only four years old, there are already more than 350 authorized lead appraisers (who apply standardized appraisal methods to evaluate conformance to the model) and more than 250 authorized instructors for the introductory course.

The bottom line

So, where are standards helping project management adoption?

To focus this question, I think in terms of the model we use at the SEI to teach CMMI (see figure 3). At this model's center is the organization's work. It could be producing a product, running a hotel, or developing a new franchise opportunity for a restaurant. Regardless, some set of work goes on to produce something that the organization or its customers want or need. All the other blocks

Additional Reading on Project Management Standards and Technology Transition

- B. Boehm and R. Turner, *Balancing Agility and Discipline*, Addison-Wesley, 2003.
- S. Garcia, "The Many Sources of Technology Transition Wisdom," *Proc. Systems & Software Technology Conf. 2003*, STC Press, pp. 17–18.
- *ISO/IEC 12207, Standard for Information Technology—Software Life Cycle Processes*, Int'l Standards Org., 1997.
- *ISO/IEC 15288, Systems Engineering—System Life Cycle Processes*, Int'l Standards Org., 2002.
- G.A. Moore, *Crossing the Chasm*, HarperCollins, 1991.
- *Organizational Project Management Maturity Model*, Project Management Inst., 2003.

around the center are things that make doing the work easier, more efficient, more effective, or more predictable. Two of those blocks, *Managing the project* and *Managing quantitatively*, represent the main areas that would normally be part of project management.

Where standards help

Figure 3 shows that project-management-related standards help in organizations that understand what their work is and find it useful to organize that work around the concept of projects. (The PMBOK Guide defines *project* as a temporary endeavor undertaken to create a unique product or service.[7]) In these types of organizations, the reasons for using good project management practices are usually evident to the organization's leaders, and the commitment to improve is relatively easy to achieve. That doesn't mean that incorporating project management practices based on a standard will be easy.

The first and often overriding issue is, "Which standard?" The key to making a low-risk choice is the fit between the organization's climate and the standard's assumptions related to organizational issues such as sponsorship needed, values, skills, and strategy. When an organization selects a standard that fits its context well, and plans the adoption thoughtfully, it's most likely to achieve the standard's advertised benefits. Keep in mind that one relevant aspect of context could be "we have to adopt this to be able to compete in our market." If all the other organizational climate issues indicate good fit, then using this criterion for standard selection won't likely be harmful.

Where standards don't help

When an organization has selected a standard that doesn't match its context well or has not planned and implemented the standard in a way that accounts for adoption risks, it can be in worse condition after adopting the standard.

An organization that hasn't figured out how to fruitfully organize its work into projects will likely run into problems with many of the project-management-related standards, because this is an immediate fit conflict between the standard and the organization's context. Trying to force-fit a standard without resolving how the organization will define projects is likely to negatively affect both the staff and the organization's performance.

I'm not saying that nontraditional environments can't effectively adopt project management practices. In one case of information technology service management on which I worked a few years ago, the company treated each service level agreement (the internal contract between the IT department and each user organization that it supported) as a project. Reported incidents that would take longer than a certain time to correct were grouped together into "time box" projects—projects defined by the amount of time that they would run. Each time-box project produced a unique product—a new release of software with a specified set of modifications, so the projects actually fit the definition of a project quite well. However, for the stakeholders to accept and use this approach, a change in the management mind-set was necessary, which was a significant organizational adaptation.

In your own organization, the decision to adopt project management standards will likely center around four questions:

- Do I need to respond to this standard as a requirement for market entry or staying in my intended market?
- Do I have the problems that the practices in the standard are intended to solve?
- Can I afford or am I willing to invest the cost of appraisal, infrastructure development and maintenance, and deployment that this standard implies?
- Does the standard fit with my organization's strategy, current work practices, and organizational climate?

Organizations that answer yes to the first two questions won't necessarily answer yes to the next two. That's the dilemma in adopting project management standards. Even though they might be necessary to stay in a particular market and they might solve the problems that you're dealing with, most of them are neither trivial nor inexpensive to adopt, and you might not have an organizational situation that minimizes the risk of introducing them. A standard under consideration might be worth adopting, but being aware of the organizational risks associated with adapting to that standard is one way to set realistic expectations for the adoption's timing and effects.[2] Our work at the SEI on *readiness and fit analysis*, a technique for investigating a technology's fit and the intended adoption context, is progressing and has been piloted in several areas with different technologies. It provides one approach to explicitly addressing adoption risks.

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About the Author

Suzanne Garcia is a senior member of the technical staff at Carnegie Mellon University's Software Engineering Institute. She works in the Technology Transition Services Directorate, primarily on enhancing the adoptability of key SEI products and services into various communities of interest. She received her MS in systems management from the University of Southern California. Contact her at the Software Eng. Inst., Carnegie Mellon Univ., 4500 Fifth Ave., Pittsburgh, PA 15213; smg@sei.cmu.edu.