Experiences Applying the People Capability Maturity Model

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This article introduces the People Capability Maturity Model® (People CMM®), describes key contributions of the People CMM[1], and provides a summary of benefits and lessons learned from its use. The People CMM was first published in 1995 [1]. *Anticipating the emergence of human capital, information technology work force, and work force aging issues* [2, 3], *senior leaders in the Army's Chief Information Office and Office of the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence sponsored development of the People CMM. In the seven years since its first release, the People CMM has successfully guided work force improvement programs in many organizations such as The Boeing Company, Lockheed Martin Corporation, Computer Sciences Corporation, Intel Corporation, Novo Nordisk A/S, Tata Consultancy Services, Infosys Technologies Ltd., Wipro Technologies, the U.S. Army, and the Federal Emergency Management Agency* [4, 5, 6].

The People Capability Maturity Model® (People CMM®) is a road map for implementing work-force practices that continually improve the capability of an organization's work force. The People CMM[1] is a process-based model that assumes work-force practices are organizational processes that can be continuously improved through the same methods used to improve other business processes.

In particular, the People CMM assumes that work-force practices can be improved through the staged process transformations that underpin Humphrey's Process Maturity Framework [7]. The People CMM applies the Process Maturity Framework to develop the work-force capability of an organization. Each successive level of the People CMM produces a unique transformation of the organization's culture by equipping it with more powerful practices for attracting, developing, organizing, motivating, and retaining its work force.

The People CMM establishes an integrated system of work-force practices that mature through increasing alignment with the organization's business objectives, performance, and changing needs. Although the People CMM was designed primarily for application in knowledge-intense organizations, it can be applied in almost any organizational setting with appropriate tailoring.

The practices at Level 3 of any well-formed capability maturity model produce an architecture for a critical aspect of an organization's strategic infrastructure. For instance, Level 3 practices in the Capability Maturity Model® for Software (SW-CMM®) and CMM Integration℠ (CMMI®) produce the architectures of standardized processes that support an organization's software and systems business.

Likewise, the People CMM produces the architecture of work-force competencies an organization requires for executing its business. Achieving Level 3 of the People CMM and either SW-CMM or CMMI will enable an organization to have a standardized architecture for its development processes and a strategically designed work force strong in the domain specialties required to perform them.

The People CMM was designed to achieve four objectives in developing an organization's work force: develop individual capability, build work groups and culture, motivate and manage performance, and shape the work force. Figure 1 depicts how the process areas at each maturity level are organized to support the four primary objectives (represented in the columns) of the People CMM.

Although the People CMM can be represented in the appearance of a continuous model, failure to implement a cohesive system (or bundle) of integrated practices at each level can have harmful consequences. One example of these consequences is often seen in organizations that encourage people to work as teams, while still rewarding them as individuals. Thus, practices in the People CMM should be implemented using a staged, rather than continuous strategy.

Guidance for Improving Work-Force Capability

The Process Maturity Framework was designed to apply to practices that contribute directly to the business performance of an organization, that is, to the organization's capability for providing high-quality products and services. Since the capability of an organization's work force is critical to its performance, the practices for managing and developing them are excellent candidates for improvement using the Process

Figure 1: *Objectives Pursued Across Levels in the People CMM*

People CMM Objectives and Their Supporting Process Areas

Levels	Developing Competency	Building Workgroups and Culture	Navigating and Managing Performance	Shaping the Workforce
5 Optimizing	Continuous Capability Improvement		Organizational Performance Alignment	Continuous Workforce Innovation
4 Predictable	Competency Based Assets Mentoring	Competency Integration Empowered Workgroups	Quantitative Performance Management	Organizational Capability Management
3 Defined	Competency Development Competency Analysis	Workgroup Development Participatory Culture	Competency Based Practices Career Development	Workforce Planning
2 Managed	Training and Development	Communication and Coordination	Compensation Performance Management Work Environment	Staffing

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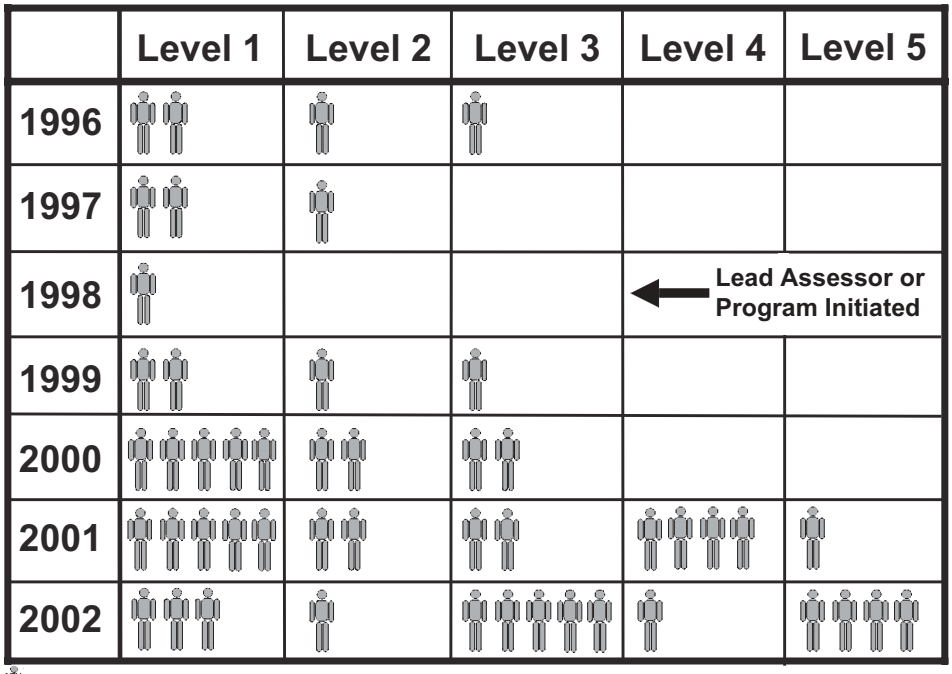


Figure 2: *People CMM Maturity Profile of 49 Organizations Assessed Through November 2002*

Maturity Framework. Thus, the People CMM has been designed to increase the capability of the work force just as the SW-CMM is designed to increase the capability of the organization's software development processes.

The People CMM's primary goal is to guide organizations in improving the capability of the work force. Work-force capability can be defined as the level of knowledge, skills, and process abilities available for performing an organization's business activities. Work-force capability indicates an organization's readiness for performing its critical business activities, its likely results from performing these business activities, and its potential for benefiting from investments in process improvement or advanced technology.

The following paragraphs describe how the People CMM supports growth in work-force capability as the organization matures. At the Initial Maturity Level (Level 1), work-force practices are performed inconsistently or ritualistically and frequently fail to achieve their intended purpose. Managers usually rely on their intuition for managing their people and may not receive guidance on practices unless they are legally mandated.

To achieve the Managed Maturity Level (Level 2), managers begin performing basic people management practices such as staffing, managing performance, and making adjustments to compensation as a repeatable management discipline. The organization establishes a culture focused at the unit level for ensuring that people have the skills and resources needed to meet their work commitments. The fundamental objective of all capability maturity models at Level 2 is to stabilize the local work environment, whether it is a project or some other form of work unit.

By applying the concept of committed work at Level 2, both staffing and performance management activities are integrated into a framework that balances workload and objectives with the resources available for performing the work. These practices control commitments in the same way achieved in other capability maturity models through project planning. Managers ensure that people have the skills needed to perform their work, that they have the information and coordination skills needed to work effectively with others, and that the work environment provides the needed resources and minimizes distractions. At Level 2, units are able to manage the skills and performance needed to accomplish their committed work.

To achieve the Defined Maturity Level (Level 3), the organization identifies and develops the knowledge, skills, and process abilities that constitute the work-force competencies required to perform its business activities. The organization develops a culture of professionalism based on well-understood work-force competencies. A work-force competency is a cluster of knowledge (what must be known to perform skills), skills (what must be done to accomplish work tasks), and process abilities (how skills are to be performed using the organization's standardized processes).

An organization's strategic work-force competencies might include software engineering, systems engineering, manufacturing, and field service among others. It is the process abilities within a work-force competency that enable the organization to integrate its architecture of competencies with its standardized process architectures. These process abilities also provide a formal structure for developing work groups through roles and standard processes that can be tailored. In achieving Level 3, the organization develops the capability to manage its work force as a strategic asset.

To achieve the Predictable Maturity Level (Level 4), the organization quantifies and manages the capability of its work force and their competency-based processes, in addition to exploiting the opportunities afforded by defined work-force competencies. Level 4 of the Process Maturity Framework has traditionally been limited to quantitative management of the organization's standard processes. Results and observations of high maturity organizations during the past decade indicated that they were implementing more than just quantitative management. Level 4 software organizations were implementing a range of practices such as software reuse and structured mentoring that were enabled by having a defined Level 3 process, and that had the effect of reducing variation through means other than quantitative management.

The People CMM incorporates process areas at Level 4 that extend beyond the traditional quantitative management focus, but remain within the philosophy of reducing variation and performing predictably. The organization creates a culture of measurement and exploits shared experience. At Level 4, the organization has the capability to predict its performance and capacity for work.

To achieve the Optimizing Maturity Level (Level 5), everyone in the organization is focused on continuously improving their capability and the organization's work-force practices. The organization creates a culture of product and service excellence. At Level 5, the organization continuously improves its capability and deploys rapid changes for managing its work force.

Where Has the People CMM Been Adopted?

Early adoption of the People CMM has occurred primarily in organizations that have already adopted the SW-CMM. Not surprisingly, among the earliest adopters were aerospace companies such as The Boeing Company, Lockheed Martin Corporation, and GDE Systems (now BAE

Systems). Government agencies such as the Federal Emergency Management Agency are adopting the People CMM to address the government's objective of raising the performance and capability of the federal work force. The strongest adoption has occurred in many Indian software companies. The maturity profile of reported People CMM assessments during the last seven years is displayed in Figure 2.

Although many companies were using the People CMM to reduce the high employee turnover rates endemic during the late 1990s, the three main reasons for adoption in the Indian software industry were more complex. First, India's interest is a natural outgrowth of their belief that their highly skilled work force is their greatest natural asset. As Narayana Murthy, chairman of Infosys Technologies Ltd., said, "Every night all my assets walk out the gate."

Thus, the People CMM provides Indian software companies with a road map for investing in their most valuable asset. Based on software companies' success using the People CMM, the Confederation of Indian Industries is now engaged in a vigorous campaign to extend the adoption of the People CMM to all industries in India.

Second, the People CMM allows Indian software companies, especially those in the outsourcing business, to address one of their customers' most important concerns. The outsourcing business has been plagued by deals that transferred all of one company's software people to another company, only to see decades of application knowledge disappear as many of these people leave the outsourcer within a few years. Even if no developers are transferred to an outsourcer, which is often the case with outsourcing arrangements between U.S. firms and India-based service providers, the clients consider their business with the outsourcer to be an investment in the outsourcer's employees who are learning the client's applications.

Thus many Indian companies are using the People CMM to demonstrate that they have implemented work-force practices that maximize their ability to retain the staff serving their clients. Since the client sees the outsourcer's staff as a critical resource in which they have invested heavily, the People CMM provides an assurance that their investment in application knowledge will be retained. Otherwise, the client may pay for the development of the outsourcer's application knowledge many times over.

Third, the People CMM has been used as a means for sustaining the capability achieved in a high-maturity environment.

Company	Initial Turnover	Level 2 Turnover
Boeing BRS	1998	1999
	7%	5%
Novo Nordisk	1996	2000
	12%	8%
GDE Systems	1996	1998
	7.8%	7.1%

Table 1: *Annualized Voluntary Turnover*

By the late 1990s, excessive turnover among many Indian software companies was threatening their ability to sustain the performance and capability of their high-maturity practices and their achieved capabilities. The People CMM not only addressed turnover, but also implemented a system of practices that builds a work force capable of achieving the performance levels that most benefit from quantitative management. These practices supplement and are complementary with those of other CMMs [8].

Not surprisingly, the recent People CMM assessments reporting attainment of Level 4 and Level 5 capabilities all emerged from India. The implementation of structured mentoring, reusable assets and experiences, empowered work groups, and quantitative analysis of the effect of work-force practices on process performance reinforced and supported the practices implemented through SW-CMM and CMMI. Comments from students in the "Introduction to the People CMM" course indicate that they better understand and appreciate the intent of SW-CMM and CMMI at higher maturity levels when they understand how high maturity work-force practices contribute to the organization's capability.

What Benefits Have Been Achieved?

The benefits of implementing the People CMM differ by the maturity level attained. Organizations achieving the People CMM Level 2 uniformly report increases in work-force morale and reductions in voluntary turnover. Table 1 presents a sample of the voluntary turnover reductions for companies that reported achieving Level 2. These results are not surprising since years of research have shown that one of the best predictors of voluntary turnover is employees' relationship with their supervisors. The primary change at Level 2 is to get unit managers to develop repeatable practices for managing the people who report to them and to ensure the skill needs of their units are met.

Organizations that achieve Level 3 experience productivity gains associated with developing the work-force competencies required to conduct their business activities. For instance, Figure 3 (see page 12) compares the level of competency among the members of a software development project at Infosys (shown as the overall competency index) with the project's cost of quality (rework). Infosys reports a significant correlation of 0.45 ($p<0.05$) between these variables, indicating that 21 percent of the variation in the cost of quality can be accounted for by the collective competency of the team. That is, the more competent that the members of a development team are in the knowledge and skills related to the technology and application on a project, the less rework the project will experience.

These results are consistent with results obtained by Boehm and his colleagues in calibrating the productivity factors in COCOMO [9, 10]. These data are an example of the quantitative analyses of work-force capability implemented at Level 4 from an Infosys site that has recently reported attaining People CMM Level 5. Infosys was recently assessed at the People CMM Level 5 and uses data such as these for evaluating the effectiveness of its work-force management practices.

At Level 4, an organization begins to achieve what Deming [11] referred to as *profound knowledge* about the impact of its work-force practices on its work-force capability and on the performance of its business processes. This knowledge enables management to make trade-off decisions

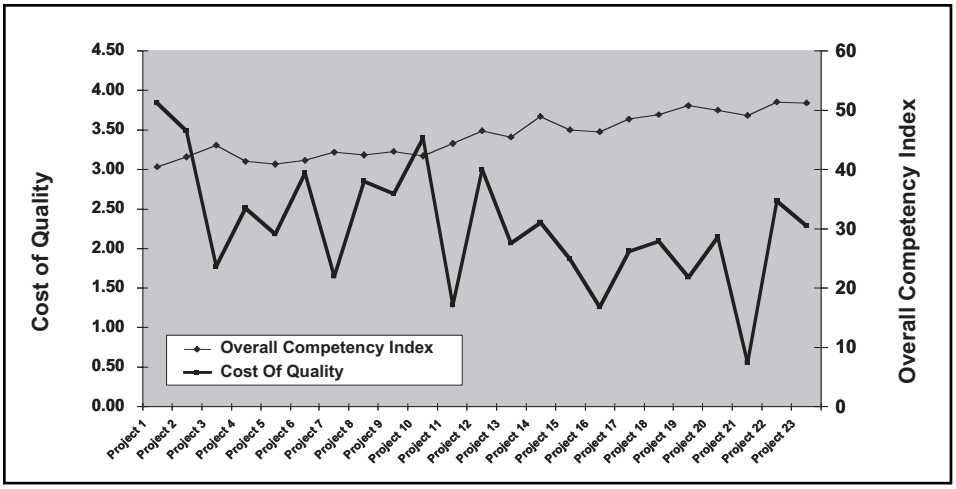


Figure 3: *Correlation of Competencies With Cost of Quality at Infosys*

regarding investments in work-force practices. For instance, Figure 4 presents a comparison developed by Tata Consultancy Services regarding the percent of time spent in training and its correlation with criteria such as defects per person-hour, review efficiency, effort, and rework.

The trends in Figure 4 are all in a favorable direction with various measures of effort and quality decreasing, and review efficiency increasing as training time increases; however, data are needed through more quarters to determine the absolute strength of these relationships. Once the strength of these relationships is understood, and asymptotes or other important trends have been determined, then management is armed with a powerful quantitative tool to make decisions regarding the optimal investment in training. Similar mentoring data identified trade-offs regarding sending senior people on overseas assignments versus using them as mentors at sites in India. High-maturity organizations are able to adjust their work-force practices to achieve targeted performance objectives using their work force.

Lessons Learned in Applying the People CMM

People CMM-based improvement programs should be conducted as part of an overall organizational improvement strategy. Human resources professionals have stressed that a program based on the People CMM model should not be treated as just a human resources initiative. Rather, it should be presented as a program for operational management to improve the capability of its work force. Professionals in human resources, training, organizational development, and related disciplines have unique expertise that can assist operational managers in improving their work-force practices. Nevertheless, the responsibility for ensuring that an organization has a work force capable of performing current and future work lies primarily with operational management.

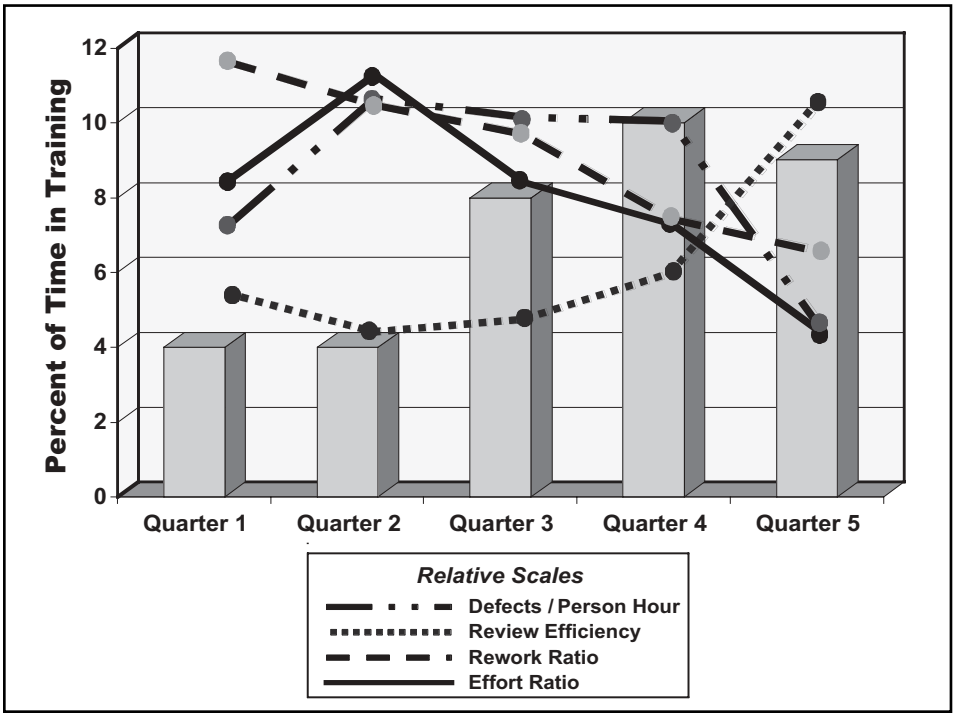
When introducing multiple improvement programs, the organization needs to assess the amount of change it can reasonably absorb and adjust expectations and schedules accordingly. This is especially acute at Level 2, where the individuals absorbing the majority of the changes are project- and unit-level managers. In order not to overload these managers with change, the organization should stage the introduction of improvement programs. Under many circumstances, project managers should first master project management skills (SW-CMM or CMMI). After acquiring these skills, managers can then undertake improvements guided by the People CMM to supplement their project management activities.

Many People CMM improvement programs start with performance management. While some managers may not have open positions requiring staffing activities, and others may not be involved in compensation decisions, all are involved in managing performance. Implementing improvements guided by the performance management process area have the added advantage of focusing on the relationship between managers and those who report to them, which is critical for retaining employees.

Performance management is also the process area at Level 2 most likely to have near-term effects on productivity, quality, and efficiency, at least at the unit level. Performance management, and especially handling unsatisfactory performance, is typically one of the weakest areas in low maturity organizations. Therefore, improvements in conducting performance management activities often yield benefits for the organization, while getting the entire management team engaged in the launch of a People CMM-based improvement effort.

When an organization achieves Level 3 or higher on SW-CMM or CMMI, it is easier to integrate the People CMM activities simultaneously with process improvements, since many of the higher level process issues have been incorporated into People CMM practices. As organizations progress with multiple capability maturity models, they find that they are able to develop interlinked architectures for both their business processes and the work-force competencies

Figure 4: *Relationship of Percent Time in Training to Various Performance Baselines at TCS*



required to perform these processes. When implemented effectively, these architectures enable effective execution of the organization's business strategy.◆

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Notes

1. The People CMM is available as both a technical report from the Software Engineering Institute and as an Addison-Wesley book. For more information, see <www.sei.cmu.edu/publications/documents/01.reports/01mm001.html> and <www.awprofessional.com/catalog/product.asp?product_id={2699E666-10C7-4865-B5DA-01C678D54988}>.

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