

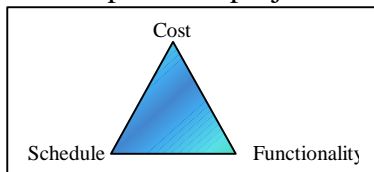
Based on a presentation by Dr. Bill Curtis, Teraquest

**To view the highlights and slides from Dr. Curtis' discussion of the CMM,  
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*How mature is your IT organization? In January, the ISRC welcomed Dr. Bill Curtis, who discussed the importance of understanding how mature your IT function is within your organization. Dr. Curtis discussed how you can answer this question, using the Capability Maturity Model, along with prescriptions for how organizations can mature and use this model to better integrate IT within the business.*

### Introduction

Many IT organizations are crisis-driven, struggling with inaccurate estimates for their projects, volatile baselines that derive from changing requirements and uncontrolled versions, ad-hoc processes, and poorly managed work. The result: projects are late, too costly, and defect-prone. To complete the project on-time, most IT organizations trade off cost or functionality (depicted

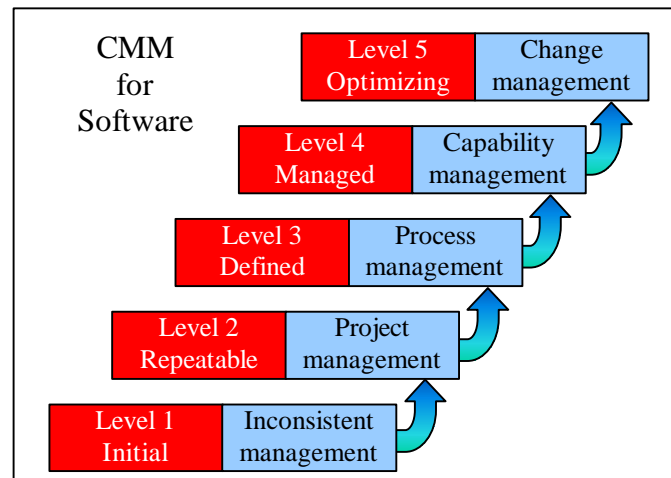


to the left). Once project managers commit to two of the three project planning parameters of cost, schedule, and functionality, the third parameter is already set by default. So, if a project manager decides that the schedule and cost are the most important elements, this will dictate the functionality that will be built.

While these are just the short term implications, there are long-term problems as well. The economics of crisis finds that low maturity organizations spend 30% to 50% of their time and budget doing re-work, in essence, fixing mistakes and retesting the system. But what if there is a better way than being crisis driven? Dr. Curtis argues that that you can optimize your development practices to deliver projects on-time, within budget, and with the desired functionality. Guided by the Capability Maturity Model, IT organizations cannot only become more reliable business partners, but also discover new ways to better integrate IT within the business.

### The Capability Maturity Model

The Capability Maturity Model can be used to determine the of maturity an organization's development processes, moving from an ad hoc, chaotic process to a development capability that is predictable and optimized to achieve targeted business results. The model (depicted in the figure to the right) lays out an improvement path in a



series of stages where the attainment of each stage creates a different organizational capability and builds a foundation for later stages of evolution.

### **The 5 Stages of the Capability Maturity Model**

An overview of the 5 stages in the CMM are:

**Stage 1:**  
**Initial** In the initial phase, project management is inconsistent. Although some project managers may be effective, others do not know the current status of their projects. Many, perhaps most projects have set commitment for schedule, budget, or functionality that they cannot meet. As developers begin rushing against an unachievable schedule, they accelerate the number of mistakes they are making and they do not have time to find them until they enter test, exacerbating rework and schedule slippage.

**Stage 2:**  
**Repeatable** In the repeatable phase, managers begin to take control of their environment by creating a management foundation within their projects. They install a discipline for planning, tracking progress against plans, controlling changes to requirements, and controlling product baselines that provides developers with an environment in which they can repeat development practices that have worked in the past. When projects install a basic project management discipline, they are able to make the tradeoffs needed to achieve their primary planning commitment, usually the delivery date. Projects do not have to use the same development practices, but they do have to provide an environment in which sound practices are not sacrificed to unachievable schedules. One of the first results is a dramatic reduction in the level of rework on the project.

**Stage 3:**  
**Defined** Once projects are able to protect the time needed for development, the organization begins to see which development practices are best suited for the types of applications they are building. In the Defined Phase, the organization integrates these best practices into a common software development process that can be tailored for use with most projects. At this Defined Level a common culture emerges, for the organization now has common practices and common beliefs about their effectiveness. The objective of this phase is to establish standardized organization-wide processes that are used across all projects and begin collecting data on the processes and their effectiveness. Both people and lessons learned can be transferred more rapidly between projects because they are using tailored versions of a common process. At the Defined Level projects are typically able to achieve all three planning parameters—schedule, budget, and functionality—without having to tradeoff one to achieve the others.

**Stage 4: Managed** At the Managed Level projects begin to use their data to manage and control their outcomes in a statistically predictable way. The organization begins building statistical baselines that characterize the capability of their various development processes. Projects use these baselines for planning and evaluating whether their processes are performing at their full capability. Project managers and staff use the data off the continuing stream of project events such as inspections, module completions, etc. to predict whether they are still on track to achieve targeted end results. Projects are able to predict their results with considerable accuracy because they have statistical control over the performance of their development activities.

**Stage 5: Optimizing** Once projects have established statistical knowledge on the capability of their development practices, they are able to identify which practices exercise the greatest control over important development outcomes such as time to delivery, cost, and quality. At the Optimizing Level the organization proactively identifies improvements that could be made to those processes whose improvement presents the greatest opportunity to achieve targeted business goals. This process of proactive improvement against known capabilities continues indefinitely. The organization also establishes disciplined procedures for deploying advances so that change management becomes an ordinary and standard business process.

The 5 levels, characteristics of these levels, and the results of being in the levels can be found in the table below.

Level	This level is characterized by...	The result of being in this level is...	The median time required to achieve this level is...
Level 1: Initial	Heroes and overtime	Inconsistency and a lot of rework	
Level 2: Repeatable	Control of commitments and baselines	Achievable schedules and less turnover	23 months
Level 3: Defined	Common practices, shared experiences, and comparable data	Joint achievement of cost, function, and schedule targets; increased productivity and quality	22 months
Level 4: Managed	Statistically stable processes and greater prediction accuracy	Predictability, reuse of components, and quality management	28 months
Level 5: Optimizing	Continuous improvement of processes and product	Business control and change management	17 months

## **Process Improvement Pays Off!**

During the introduction, it was stated that there would be a number of benefits that could be derived from becoming more mature. While the benefits discussed thus far are theoretical, a number of corporations have found the process improvement to be very beneficial. Consider the following:

- Raytheon found that the quality of their projects improved (the costs dropped from 40% to 4%) and that their costs of rework dropped dramatically as they moved up the levels
- Siemens found cost reductions across all levels
- Hewlett Packard found that productivity increased by three-fold in four years
- Motorola discovered that each level increased their quality by a factor of 2

Thus, your corporation should investigate their current level and how to improve.

## **A Profile of a High Maturity Organization**

With the stages and benefits in mind, let us now turn to a profile of high maturity organizations. According to Dr. Curtis, high maturity organizations:

1. Cannot get paid on time and material contracts and, thus, prefer fixed price contracts
2. Can underbid time and materials competitors, yet still make higher margins
3. Will use quantitative process management techniques to ensure service level targets
4. Run software development like a business, using the CMM for guidance, and
5. Have an IT organization that can now tell business that they are the Transfer some of their development practices to solve analogous problems in business processes.

## **Lessons Learned for IT**

As IT organizations begin to achieve a Level 3 capability with standardized processes and a consistent level of performance, the business begins realizing that inconsistency in its business processes and the inability to state consistent requirements for automating these processes is the primary problem limiting their ability to use IT effectively. IT is now in a position to assist their business partners in the same process transformations that have steadily improved IT's capability to meet its commitments.

As IT matures it can teach the business about process consistency and the results that can be achieved from standardizing processes. IT can also teach the business the lessons we have learned about configuration management and process release management. For instance, business partners want to know that their business process diagrams, supporting information systems, the training they receive, and the forms they use all match—a problem of configuration management for which a mature IT organization can provide solutions. In addition, rather than struggling under a continuous barrage of changes, business people would like receive a bundle of changes at one time and have time to adopt and master them before being inundated with more changes—a problem of release management for which a mature IT organization can also provide

solutions. The result: high maturity organizations that are handling their software development using the CMM have found that a business process is a lot like software process and can benefit from the same improvement disciplines. Thus IT can become better integrated within the business and truly become a leader of change management and business process improvement within the organization.

## Conclusions

How mature is your IT organization? The January session revealed the importance of understanding this question. Failing to determine, understand, and change your maturity level has serious consequences for both you as an IT organization and the future of your firm. By using the CMM, IT organizations can answer these questions and begin to improve themselves and better integrate themselves into the business.

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## For More Information on Capability Maturity Models:

Mark C. Paulk, Charles V. Weber, Bill Curtis, and Mary Beth Chrissis, *The Capability Maturity Model: Guidelines for Improving the Software Process*, ISBN 0-201-54664-7, Addison-Wesley Publishing Company, Reading, MA, 1995.

Bill Curtis, William E. Hefley, and Sally A. Miller (2002). *The People Capability Maturity Model: Guidelines for Improving the Workforce*. ISBN 0-201-60445-0, Addison-Wesley Publishing Company, Reading, MA, 2002.

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