

Project Management Models in IT

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INTRODUCTION

The implementation of formal efficiency procedures is quite new in IT projects. There are different approaches regarding the best practices in the IT project management (Carvalho, Laurindo & Pessôa, 2003; Laurindo, Carvalho & Shimizu, 2003).

Humphrey (1989) identifies maturity levels in the IT project development process, based on the managerial behavior found in companies. The fundamental concepts of the process maturity derive from the belief that the development management process is evolutionary. Paulk, Weber, and Curtis (1995) identify the distinguishing characteristics between immature and mature organizations, as showed in Table 1.

CAPABILITY MATURITY MODEL (CMM)

The CMM (Humphrey, 1989; Paulk et al., 1995; Pessôa & Spinola, 1997) was developed by SEI—the Software Engineering Institute of Carnegie Mellon University—and presents five maturity levels, each corresponding to a set

of structural requirements for key process areas (Figure 1).

Although each project is unique, it could be organized in a process to be applied in other projects. IT project managers used to apply a “methodology,” that is, they established the steps to be followed in order to develop a system. Another singular characteristic is the dynamic technologies breakthrough that demands continuous improvements in the development methods and management of changing process, as described in CMM model, at Level 5, the highest level of maturity.

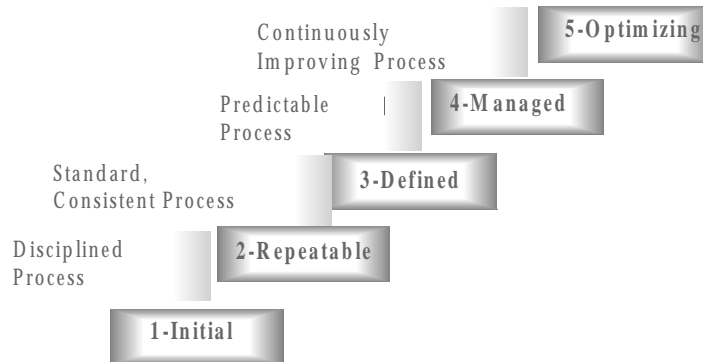
The CMM second level has a consistent project management structure, and the goal of this level is to deliver projects on time. To perform this, the model has several points that must be achieved, like effort and size estimation, strong process control (such as periodic meetings between technical people and managers), and several measures to show project status more clearly.

CMM is not an adequate reference for the assessment of internal methodologies, since it was not conceived to perform this kind of analysis. ISO 15504 (1998) proposed the standard project SPICE as a more appropriate model to evaluate maturity level of specific processes. While CMM level of maturity specifies a set of processes that have to be performed, ISO 15504 establishes maturity levels for each individual process: Level 0—Incomplete; Level 1—

Table 1. Immature organization x mature organization (Paulk et al., 1995)

IMMATURE ORGANIZATION	MATURE ORGANIZATION
<ul style="list-style-type: none"> • <i>Ad hoc</i>; improvised process by practitioners and managers • Not rigorously followed and not controlled • Highly dependent on personal knowledge • Little understanding of progress and quality • Compromising product functionality and quality to meet schedule • High risk when new technology is applied • High maintenance costs and unpredictable quality 	<ul style="list-style-type: none"> • Coherent with action plans; the work is effectively achieved • Processes are documented and continuously improved • Perceptible top and middle management commitment • Well controlled assessment of the process • Product and process measures are used • Disciplined use of technology

Figure 1. Maturity levels (Paulk et al., 1995)



Performed; Level 2—Managed; Level 3—Established; Level 4—Predictable; Level 5—Optimizing. This is a different approach of CMM, since an organization does not perform a maturity level, but has a maturity profile: a maturity level is measured for each specific process. This new approach is very useful to the organization perspective because one can easily measure strong and weak points of their process, and plan improvement activities. Furthermore, from the companies' point of view, it is easier to understand staged levels, as the performed processes are already predefined.

The SPICE approach defined in standard ISO 15504 (1998) had firstly influenced *CMM for Systems Engineering*, published in 1995, and more recently influenced CMMI (CMM-I1; CMM-I2), just published in 2002. CMM-I, the integration model, was enhanced in two dimensions: *scope dimension* and *evaluation dimension*.

In the scope dimension, this new model incorporated other published models and covered all project activities, not only software, as the original software CMM did, but

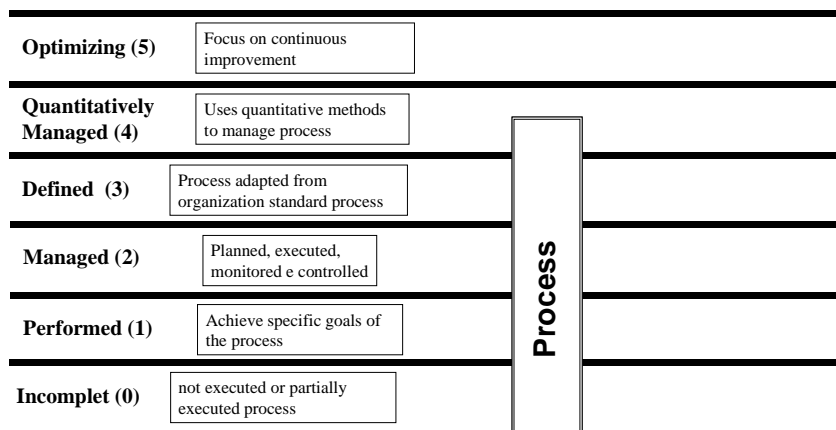
also other engineering fields. In the evaluation dimension, CMM-II incorporated both approaches: the traditional (called staged CMM) and the maturity profile (called continuous CMM). Figure 2 shows the continuous CMM-I representation to be compatible with ISO/IEC 15504 standard.

CMM-I (and software CMM) considers that maturity level is an organizational characteristic and is independent of the professionals involved. Nowadays, there is a strong tendency towards the adoption of CMM-I models, which were sponsored by the Department of Defense (DoD); meanwhile ISO standards are less used.

PROJECT MANAGEMENT MODELS

Project management plays an important role in the competitive scenario and in the '90s achieved the status of methodology. The model proposed by the Project Management Institute—PMI (2000), called PMBoK, provides

Figure 2. Continuous maturity process representation in CMM-I (CMM-II, 2002)



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