

Fundamentals of S/W Engineering

Capability Maturity Model (CMM)

F19 CS5800

Raman Aravamudhan

<http://www.cs.uiowa.edu/~aravamud>

Dept of Computer Science

University of Iowa

Fundamentals of S/W Engineering

Capability Maturity Model (CMM)

Introduction

For the sake of simplicity we will first look at the original CMM and not the latest version.

To determine an organization's current state of process maturity

A Model for S/W process improvement

Based on product quality principles in existence for over 60 years

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Introduction

One of the motivations : to identify quality contractors for DOD

Overall goal is Customer Satisfaction

Initial release of CMM 1991 – 1992

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Introduction

Very good model

Doesn't mean it solves everything

Doesn't address all areas

application domain area expertise

HR recruitment, retention, motivation

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Why Process

Smart People & Advanced Technology

Matured Process

Myths:

Process = Paper Work

Not required for Agile Technology

Only for large projects

Slows down work; costs too much

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CMU Software Engg Institute (SEI)

Created this Framework

Does not certify companies at maturity levels

<http://www.sei.cmu.edu/cmm>

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Capability Maturity Model (CMM)

Capability versus Performance

Process Capability

Indicates the results expected by following a process.

Process Performance

Actual results achieved from following a process.

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CMM Structure

Process Maturity Levels indicate
process capability
potential for growth in capability
consistency with which it is applied
in projects

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CMM Structure

Levels of Process Maturity

Contains

- Key Process Areas (KPA)**
- Common Features (CF)**
- Key Practices (KP)**

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CMM Structure

Key Process Areas (KPA)

Identify a set of activities

**Achieve Goals considered important for
attaining process maturity**

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CMM Structure

KPA contains Common Features (CF)

CF Addresses Implementation

CF is a Grouping for organizing key practices

Commitment to Perform – describes the actions to take to ensure that the established process will endure

Ability to perform – describes the preconditions that must exist

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CMM Structure

Common Features (CF)

Activities performed – describes the activities performed to implement

Measurement & Analysis

Verifying implementation

CF contains Key Practices (KP)

Describe Activities which contribute to implementation.

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Process Maturity Levels

Level 1: Initial

Few Processes are defined. Ad-hoc

Performance depends on individual effort

Unpredictable results

Products may work but expensive ,delayed

**During crisis, planned process is
abandoned**

Key Process Areas: None

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Process Maturity Levels

Level 2. Repeatable

Basic ‘project management’ processes are defined.

Software project management processes are documented and followed.

Repeat earlier successes on projects with similar applications.

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Level 2. Repeatable

KPA (6) addresses proj mgmt issues

Requirements Management

Project Planning

Project Tracking and Oversight

Subcontract Management

Software Quality Assurance

Configuration Management

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Level 3. Defined

This level builds on the software project management foundation.

Both management and ‘engineering’ activities are defined.

All projects use documented and approved processes

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Level 3. Defined

KPA (7) addresses proj and Org issues across projects

Organization Process Focus – Establishes an organizational responsibility for s/w process activities

Organization Process Definition – Define and maintain a usable set of process for use across projects

Training Program

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Level 3. Defined

**KPA (7) addresses proj and Org issues
across proj**

Integrated Software Management (Integrate
Management & Engineering activities)

Peer Reviews

Inter-group Coordination

Software Product Engineering

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Level 4. Managed

Both process and products are quantitatively measured and controlled

Detailed measures of process and product quality are collected

Apply the principles of statistical process control

Address special causes of process variation

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Level 4. Managed

**Management is able to predict
performance within quantified bounds**

KPA(2)

**Quantitative Process Management
Software Quality Management**

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Level 5. Optimizing

Identify and eliminate chronic causes of poor performance.

Continuously improve the software process by quantitative feedback from the process and from testing innovative ideas and technologies.

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Level 5. Optimizing

KPA(3)

Process Change Management

Technology Change Management

Defect Prevention

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Acquiring Maturity level

Processes at higher maturity levels may be performed, although perhaps ineffectively, even by organizations at initial level.

Process capability is built in stages.

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SW-CMM Vs CMM Integrated (CMMI)

- Waterfall Vs Iterative**
- Peer Review intensive**
- Besides Software**
- Traceability is not the primary aim**
- Final product focus**
- CMMI focuses on Architecture**
- CMMI manages Risks**

But the original concepts are a foundation; we will concentrate on those principles