Software Engineering

CAPABILITY MATURITY MODEL

(CMM)

CMM

- Launched at SEI
- Maturity of an organization measured in terms of the degree to which the outcome of the software development process can be predicted

CMM

- Predicts:
  - amount of time required
  - resources required
  - cost (also a resource, actually)

- Look at:

  www.sei.cmu.edu/cmm/cmm.html

Levels of Maturity

- Initial
  - Unpredictable and poorly controlled
- Repeatable
  - Can repeat previously mastered tasks
- Defined
  - Process characterized, fairly well understood
- Managed
  - Process measured and controlled
- Optimizing
  - Focus on continuous process improvement

Level 1: Initial

- Software process appears to be behaving with (sometimes chaotic) ad-hoc effects, and is unpredictable
- Frequent cost and schedule overrun
- Success depends on individual effort

return

Level 2: Repeatable

- Cost, schedule, and functionality are managed
- Controls, QA, baseline management are in place
- Commitments made only after a thorough review
- Probability of repeating the level of performance of past projects is high

Level 2: Key Process Areas

- Requirements management
  - clear scope of software effort requirements and their changes incorporated into software plans, products, and activities in an orderly manner
- Software project planning
  - includes documents to track software activities

Level 2: Key Process Areas

- Software project tracking and oversight
  - actual results and performance tracked against documentation
  - corrections when necessary
- Subcontract management
  - standards and procedures for subcontractor comply with prime contractor's commitments

Level 2: Key Process Areas

- SQA management
  - aware of problems (if any) of software product and process
- Configuration management

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Level 3: Defined

- Documented, standardized, and integrated software project processes for both management & engineering
- SQA monitors compliance with standards, empowered to intervene
- Outcomes more predictable
- All projects use organization's standard

Level 3: Key Process Areas

- Weaknesses of software process in organization is understood and addressed
- A standard software process
- Software process is recorded and analyzed
- Staff is using the work environment

Level 3: Key Process Areas

- Software projects are planned and managed based on the standards (engineering)
- Data from past projects is available
- SE tools and methods are used
- Project groups work as a team (intergroup cooperation)
- Defects are identified early in life cycle

Level 3: Key Process Areas

- Peer reviews
- Training program

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Level 4: Managed

- Quality and productivity goals set for each step
- High predictability for each step
  - the standards are stable
- Measurable goals and priorities for product quality are established and maintained for each software project

Level 4: Managed

- Interaction with users, development teams

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Level 4: Key Process Areas

- Software quality management
- Quantitative process management

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Level 5: Optimizing

- Process refined constantly
- Data is collected to identify problems in the process
- Causes of error are analyzed
  - to eliminate inherent problems
- The organization orderly selects and transfers new technology

return to levels of maturity
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Level 5: Key Process Areas

- Process change management
- Technology change management
- Defect prevention

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CMM Key Process Areas

Level	Software	Acquisition
5 - **Optimizing**	• Process change management • Technology change management • Defect prevention	• Acquisition innovation management • Continuous process improvement
4 - **Managed**	• Software quality management Quantitative process management	• Quantitative acquisition management • Quantitative process management
3 - **Defined**	• Peer review • Intergroup coordination • Software product engineering • Integrated software management • Training program • Organization process definition • Organization process focus	• Training program • Acquisition risk management • Contract performance management • Project performance management • Process definition and maintenance
2 - **Repeatable**	• Software configuration management • Software quality assurance • Software subcontract management • Software project tracking/oversight • Software project planning • Requirements management	• Transition to support • Evaluation • Contract tracking and oversight • Project management • Requirements development/management • Solicitation • Software acquisition planning
1 - **Initial**	• Ad hoc • Competent people and heroics	• Ad hoc • Competent people and heroics

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