



STAG Software Private Limited

A magnifying glass with a black handle and a silver rim is positioned over the text "Clean Software. Guaranteed." The lens of the magnifying glass is centered on the text, making it appear larger and more prominent. The background behind the magnifying glass is a white circle, which is set against a larger white background with a red horizontal bar above and a grey horizontal bar below.

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Fine-tuning current test process to
move up in TMM - By Nagaraj M C

What is planned?

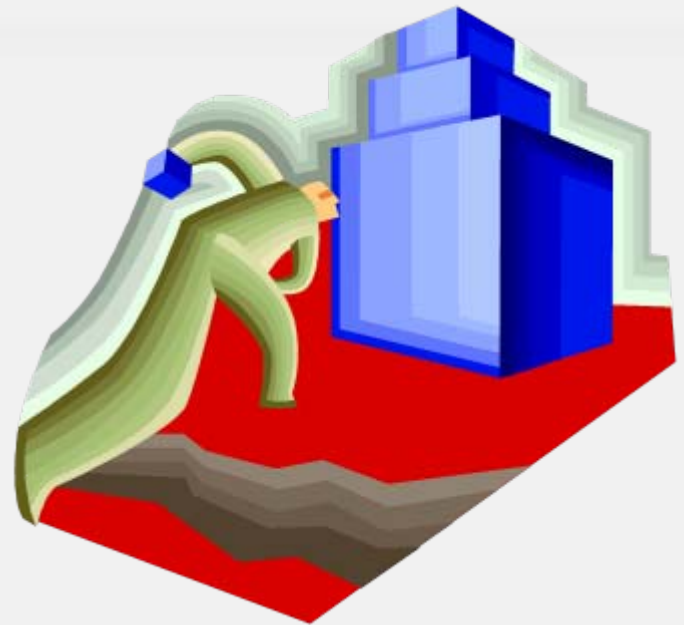


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- Test process improvement
 - Test team organization models
 - Test process : 3 different perspective
- Process maturity quick overview
- TMM overview and Why TMM?
- Level 1 to 5
 - Requirement interpretation
 - Linking your current process activities to TMM
- Do you see gaps in your test process?
- Guidelines to take it forward

Not part of this discussion

- Assessment process
- Assessment tools



Test team models



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- Assemble a team as and when required
- Entry as Test engineer and move later
- Everyone must play a role in testing team for a period
- Testing team to work under Development Manager
- Independent testing team to work under Test Manager

Test Process looked from different perspective



Methodology

What are the key testing methods?

When do we use them?

How do we implement them?

How do we prevent defect migration and improve defect-finding capabilities at all levels?

How can we adapt standard terminologies and test standards?

How do we create meaningful test plans and other critical test deliverables?

How do we identify and prioritize potential software test process improvements?

Test Process looked from different perspective



Technology and tools

- How can we use risk analysis techniques to decide on depth of testing?
- What measurements to collect and analyze to control test process?
- How can we select test tools and vendors?
- How to implement an effective tools program?
- What are the most significant opportunities for automating test process?
- How to get better ROI for investment made on tools?

Test Process looked from different perspective



People

- Do people involved in testing understand the attitude required?
- Do people involved in any form of testing go through formal training?
- Do people believe that the quality of test process determines the success of overall test process?
- Does development team understand their role in testing?
- Do people in the organization feel that test engineers pursue errors not people?
- Do people in the organization feel test engineers are adding value to the projects?
- Does management team support continuous test process improvement?

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- How to take it forward?

Process maturity overview



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- Characteristics of organization at each stage of process maturity
- CMM models quick summary (SEI-CMM, SEI-CMMI)
- Continuous and Staged model

How to check on where we are?



How many of you feel in your organization there are some projects where team commits more than what they can deliver?

Level 1

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Probability of meeting schedule, scope, cost as per target is low

Better planning?

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Learning from the past experience is incorporated and better commitments are made

Level 2



Probability of meeting targets better

Process tailoring at project level?



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Do you see these happening?

- you have learnt to tailor the process based on characteristics of project
- right set of processes are used
- acceptable goals to customer are set

Level 3



Probability of meeting targets set by process tailoring better

Realistic goals, better managed?



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How many of you feel in your organization

- you have the right kind of metrics collected, analyzed ?
- right set of goals are set for projects?

Level 4

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High probability of meeting set targets using organization metrics

Optimized?



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How many of you feel?

- re-work is reduced over time
- right kind of tools in use
- best practices are in place
- team is adaptable to changes

Level 5



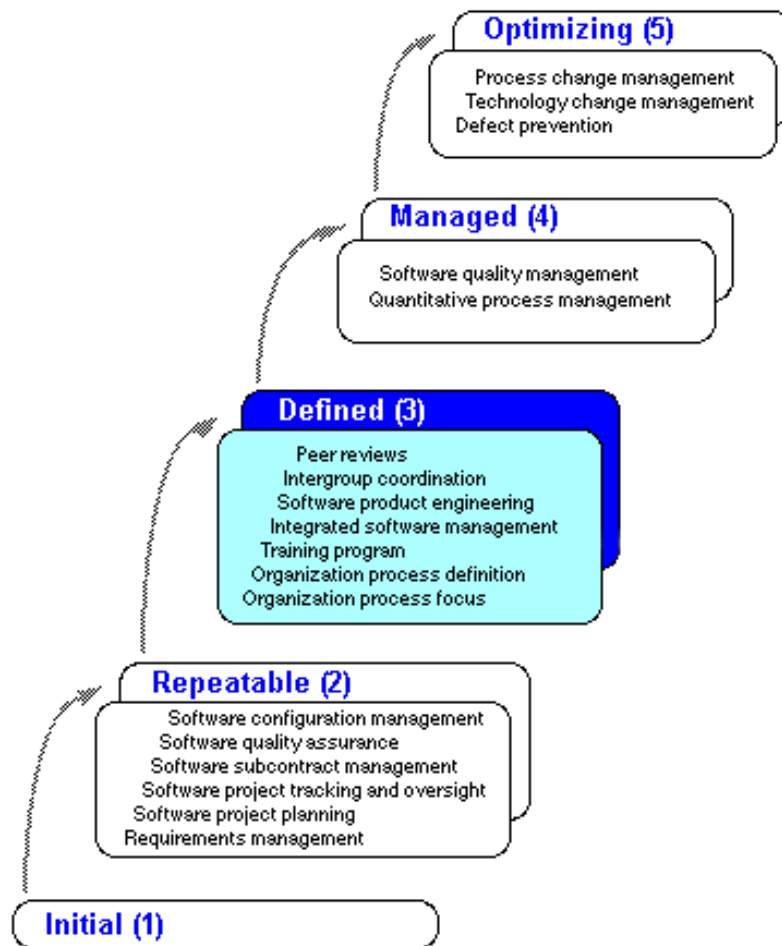
Probability of meeting set targets very high with acceptable variance

SEI-CMM : Capability Maturity Model

Five levels of software process maturity

Benefits

Visibility into Organization performance
 Predictability of results
 Product Quality
 Ability to manage complexity
 Better project performance
 Decreased risk



Process areas in CMMI



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The areas included in CMMI

- Casual Analysis and Resolution (CAR)
- Configuration Management (CM)
- Decision Analysis and Resolution (DAR)
- Integrated Project Management (IPM)
- Measurement and Analysis (MA)
- Organizational Innovation and Deployment (OID)
- Organizational Process Definition (OPD)
- Organizational Process Focus (OPF)
- Organizational Process Performance (OPP)
- Organizational Training (OT)
- Product Integration (PI)

Process areas in CMMI



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Cont'd

- Project Monitoring and Control (PMC)
- Project Planning (PP)
- Process and Product Quality Assurance (PPQA)
- Quantitative Project Management (QPM)
- Requirements Development (RD)
- Requirements Management (REQM)
- Risk Management (RSKM)
- Supplier Agreement Management (SAM)
- Technical Solution (TS)
- Validation (VAL)
- Verification (VER)

Staged models

Maturity level n

Maturity level 3

Process area 4

Process area 5

Process area 6

Maturity level 2

Process area 1

Process area 2

Process area 3

Continuous model



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Process area A
Capability levels

Process area B
Capability levels

Process area C
Capability levels

Generic goals for a level met by set of process areas

What is planned?



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Overview



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- There are three components in TMM

Component 1:

A set of levels that defines a testing maturity hierarchy

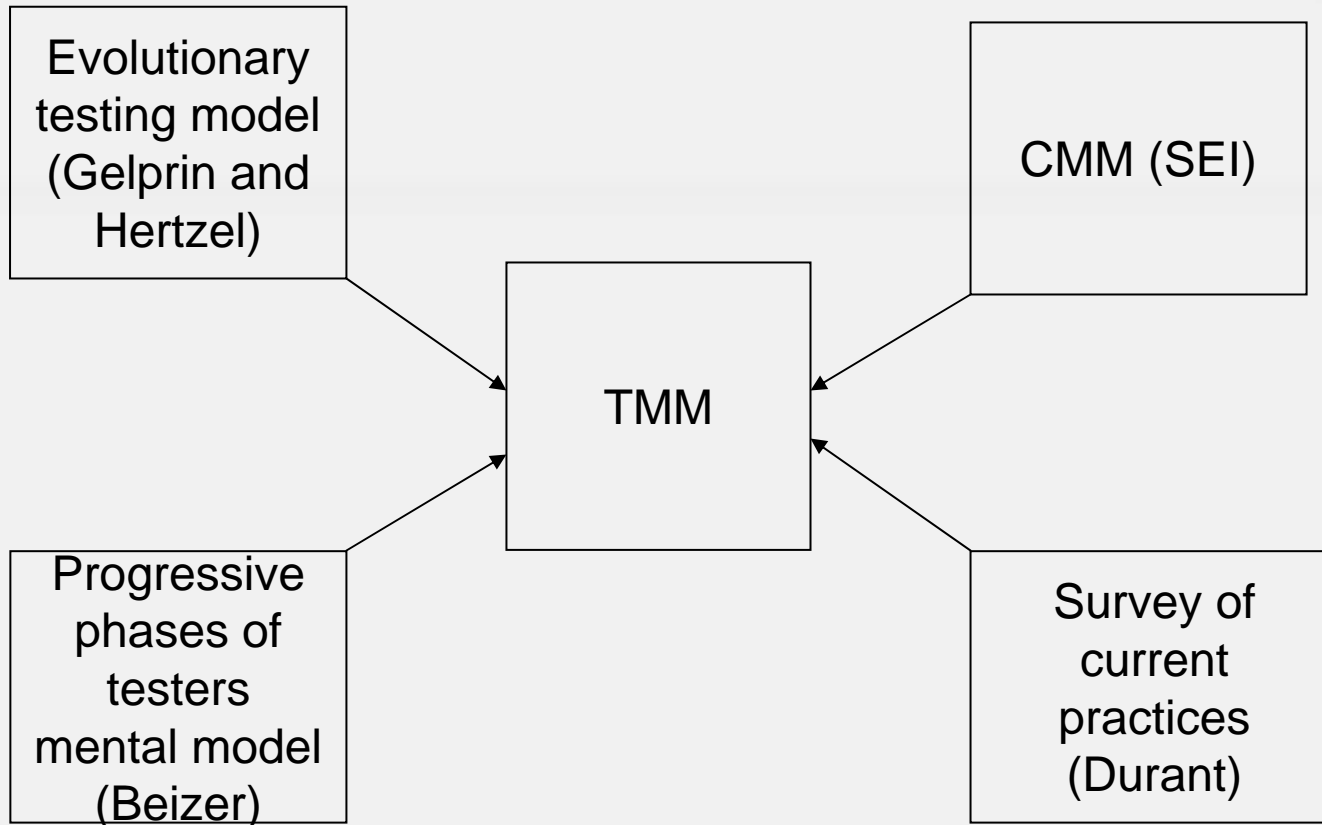
Component 2:

A set of maturity goals and sub goals for each level starting at level 2

Component 3:

An assessment model

Inputs to TMM



TMM levels

Level 5: Optimization/Defect Prevention and Quality Control

Test process optimization
Quality control
Application of process data for defect prevention

Level 4: Management and Measurement

Software quality evaluation
Establish a test measurement program
Establish an organizationwide review program

Level 3: Integration

Control and monitor the testing process
Integrate testing into the software life cycle
Establish a technical training program
Establish a software test organization

Level 2: Phase Definition

Institutionalize basic testing techniques and methods
Initiate a test planning process
Develop testing and debugging goals

Level 1: Initial

Internal structure of TMM



Missing focus in other models



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- The concept of test process maturity is not addressed
- Attention paid to the high-quality testing low
- Testing issues are not adequately addressed in many of the KPA
- Quality related issues not satisfactorily addressed
- Advanced testing practices not described in sufficient detail

There is a constant attempt to address these in every new versions of standards in some models

Who should use TMM?



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- An internal assessment team
- Upper management team to initiate a TPI
- SQA engineers to develop and implement TPI plans
- Development/testing team to improve testing effectiveness
- Users/Clients to define their role in test process

Summary – Why TMM?



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Testing has a very important role in software process and product quality

There are limitations in existing process assessment models

TMM helps to address these limitations (Developed at Illinois Institute of Technology lead by Ilene Burnstein)

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Level 1

Level 5: Optimization/Defect Prevention and Quality Control

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Level 1: Initial

Level-1



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- Testing is a chaotic process
- Not distinguished from debugging
- Documented set of specification not available
- Tests are developed in ad-hoc way after coding is completed
- The objective of testing is to show that software works



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Level 2

Level 5: Optimization/Defect Prevention and Quality Control

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Level 1: Initial

Level 2 – Phase Definition



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Goal 1: Develop testing and debugging goals

Goal 2: Initiate test planning process

Goal 3: Institutionalize basic testing techniques and methods



Critical Views



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Managers

- ✓ Task forces, policies, standards
- ✓ Planning
- ✓ Resource Allocation
- ✓ Support for education and training
- ✓ Interact with users/clients

Developers/Testers

- ✓ Apply black and white box techniques
- ✓ Assist with test planning
- ✓ Test at all levels
- ✓ Train and mentor
- ✓ Participate in task forces
- ✓ Interact with users

Users/Clients

- ✓ Specify requirements clearly
- ✓ Support with operational profile
- ✓ Participate in usability test
- ✓ Participate in acceptance test

What you can see in L2 organization?



- There is a clear separation between debugging and testing phase
- It is a planned activity in project plan
- Plan starts after coding is complete
- Basic testing techniques in place
- Testing is multi-leveled



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Level 3

Level 5: Optimization/Defect Prevention and Quality Control

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Level 1: Initial

Level 3 – Integration



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Goal 1: Establish a software test organization

Goal 2: Establish a technical training program

Goal 3: Integrate testing into the software life cycle

Goal 4: Control and monitor the testing process



Critical Views



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Managers

- ✓ Leadership role in status meetings
- ✓ Developing test plans
- ✓ Selecting and analyzing measurements
- ✓ Presentations at status meetings
- ✓ Test summary reporting
- ✓ Build testing team
- ✓ Adopt V model

Testers

- ✓ Develop test plans
- ✓ Participate in status meeting
- ✓ Introduce effective tracking
- ✓ Contribute in building test teams
- ✓ Contribute in test process improvements
- ✓ Perform testing activities throughout life cycle

Users/Clients

- ✓ Attend milestone meetings
- ✓ Report problems
- ✓ Interact with testing staff
- ✓ Support development of user profile and usability test plans

What you can see in L3 organizations?



- There is an established test organization
- Testing is integrated to SDLC
- Test plan is developed, tracked and controlled (Integrated with project plan)
- Test engineers drive test process improvement
- Users/clients attend milestone meeting
- User/clients support in developing usability test plans



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Level 4

Level 5: Optimization/Defect Prevention and Quality Control

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Level 4 – Management and Measurement



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Goal 1: Establish an organization-wide review program

Goal 2: Establish a test measurement program

Goal 3: Software quality evaluation



Critical Views



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Managers

- ✓ Support and training for measurement and review program
- ✓ Set quality goals for projects
- ✓ Support action plan based on measurement
- ✓ Effective review process

Testers

- ✓ Participate in measurement program
- ✓ Attend review training
- ✓ Serve as review leaders & participate
- ✓ Develop checklists
- ✓ Develop review summary reports

Users/Clients

- ✓ Provide input consensus on quality attributes and quality requirements for project
- ✓ Provide approval of quality requirements at acceptance test
- ✓ Attend appropriate review sessions

What you can see in L4 organization?



- Review program is effective
- Reviews are planned activity in project plan
- Measurements collection and analysis process effective
- Quality attributes of a product are well-defined and measured

Level 5



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Level 5: Optimization/Defect Prevention and Quality Control

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Quality control
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Develop testing and debugging goals

Level 1: Initial

Level 5 – Optimization/Defect Prevention and QC



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Goal 1: Application of process data for defect prevention

Goal 2: Quality control

Goal 3: Test process optimization

Application of process data for defect prevention



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- Collect data relevant to problem area
- Develop appropriate Pareto diagrams
- Work on root cause analysis for vital few issues (80:20 rule)

Quality control



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- Set control limits using data collected for many projects
- R- Charts (a graph of the range for a sample set over time) are used or
- Xbar charts (a graph of the average of each sample set over time) are used
- Variation due to special cause or common cause?

Test process optimization



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- Process definition
- Process change management
- Technology Insertion
- Process Evaluation
- Training
- Process Asset Support
- Process Assessment

What you can see in L5 organization?



- Data from all projects are collectively analyzed
- Critical defects types are analyzed thoroughly
- Quality control concepts are adopted
- Right tools are inserted progressively

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Do you see a gap?



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- List down the expected behavior of organization at a level
- Let sample of people representing managers, developers/testers, user/client rate their findings (1-low to 5 -high)
- Average less than 3 indicates more effort required to improve

Example. For Level 2

- User/Client understand the importance of defining requirements clearly
- There is a clear separation between debugging and testing phase
- Testing and debugging are planned activity in project
- Plan for testing starts after coding is complete
- People use basic testing techniques
- Organization is supporting multi-leveled testing
- User/Client participate in user acceptance test

What is planned?



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- ✓ Do you see gaps in your test process?
- How to take it forward?

How to take it forward?

Quick fix



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- Testing team to understand goals, sub-goals
- Understand ATR to achieve these sub-goals
- Plan and implement the tasks which are not in practice (gaps fixing)
- Understand assessment process to do internal assessment
- Work to fix the gaps observed

Ideal way



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- A task team formation for Test Process Improvement
- Awareness session about TMM to all
- Task team needs to understand in depth the goals, sub-goals and ATR's
- Assessment team to be formed
- A training about TMM assessment process
- Internal assessment and action items to move forward

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Thank you