# Lec 3 Quality assurance standards

**Objectives**

- [ ] Introduction to Guidelines to drive quality related decisions

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**Software Quality** → The degree to which a **software product meets established requirements**; however, quality depends upon the degree to which those established requirements accurately represent stakeholder needs, wants, and expectations (IEEE 730).

**Quality Assurance (QA)** → describe the **systematic efforts** taken to **ensure** that delivered products meet established requirements.

- Objective → **prevent defects**

**Quality Control (QC)** → **set of activities** aim at **checking** that a product meets established requirements

- Objective → **detect/fix** defects

**Quality Assurance Standards** → define processes or *process area components* as a set of activities that must be performed

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**CMMI: Capability Maturity Model Integration** → improve process improvement and encourage productive, efficient behaviour that decrease risks in software, product & service development.

- Staged or continuous representation
- Capability levels
- Maturity levels
- Process area components
- Generic goals and practices
- Specific goals and practices

**Grouped in:**

- Process Management
- Project Management
- Engineering
- Support

**Relative priority of PA** can be defined by assessing the current and target:

- **Capability level** → each organisation is free to choose a subset of PAs
- **Maturity level** → PAs are prescribed according to the target maturity level

**Maturity & Capability levels associated to:**

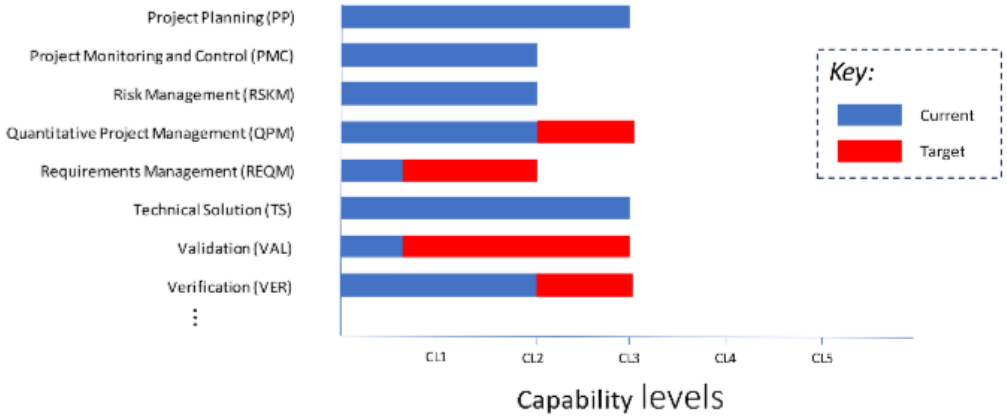
- **Continuous representations** → uses capability levels
- **Staged representations** → uses maturity levels

**Capability level** → Used to appraise an organisation's performance and process improvement.

1. Define expected work products
2. Define specific goals satisfaction criteria
3. Apply capability level assessment

- **LV0 (Incomplete)** → inconsistent performance and an "incomplete approach to meeting the intent of the practice area"
- **LV1 (Initial)** → Organisations start to address performance issues in a specific practice area, but there is not a complete set of practices in place.
- **LV2 (Managed)** → Progress is starting to show and there is a full set of practices in place that specifically address improvement in the practice area.

- **LV3 (Defined)** → Focus on achieving project and organisational performance objectives and there are clear organisational standards in place for addressing projects in that practice area.
- **LV4 (Quantitatively Managed)** → is a **LV3 Defined** process that is controlled using statistical and other quantitative techniques. Quantitative Objectives for quality and process performance are established and used as criteria in managing the process.
- **LV5 (Optimising)** → is a **LV4 Quantitatively managed** process, based on an understanding of the common causes of process variation inherent in the process. It focuses on continually improving process performance through both incremental and innovative improvements.




**Maturity level**

- LV1 (initial)
- LV2 (Managed) → PAs with level 2 are assessed at level 2 or higher
- LV3 (Defined) → PAs with level 2&3 are assessed at level 3 or higher
- LV4 (Quantitatively Managed) → PAs with level 2&3&4 are assessed at level 3 or higher
- LV5 (Optimising): PAs with level 2&3&4&5 are assessed at level 3 or higher

**Importance of process component vs. product**

- Improving the process is expected to improve the product quality and/or team productivity
- Improving the maturity/capability level is expected to lower the quality cost and /or improve productivity

**Technical Solutions and Requirement Development are interleaved**

- Requirements from user needs
- Requirements derived from design
- Requirements due to regulations and application domain specificities

Requirements decomposition, allocation, traceability

- **Objective** → every requirement is satisfied and functions are not introduced if they don't contribute to a requirement satisfaction

Requirements analysis and validation

- Necessary and sufficient requirements (and requirements decomposition)
- Priorities and trades-off identification
- Early validation with MVPs, demos, etc

**CMMI Pros**

- More emphasis on management
- Takes the onus(duty) of performance off the developer or even team
- Consistency → across projects, across organisation, historically
- Learnt information is not lost → processes are improved

- Bus factor → only to a certain point
- Figuring out root cause of problem
- Emphasises reflection, self-evaluation, monitoring, critiquing, continual improvement

**CMMI Cons**

- Risk averse
- Level hunting/ level up
- Individual/team development
- Process heavy
- Standards/process does not automatically equate to quality
- No guarantee that project will be developed using these processes

**Appraisal**

**Objectives:**

- To communicate
- Increase customers' confidence
- To see what level a business is at
- To get feedback on how to improve

Must be done by certified appraisers

SCAMPI - Standard CMMI Appraisal Method for Process Improvement

- Class A, B, C

**Immaturity Models**

**LV0 (Negligent)** → All problems are perceived to be technical problems

**LV1 (Obstructive, Counter Productive)** → Processes are rigidly defined and adherence to the form is stressed

**LV3 (Undermining, Sabotage)** → Conscious discrediting of peer organisations software process improvement efforts.