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# The Capability Maturity Model

CO3095, CO7095, CO7508

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# Steve Jobs meets Joseph Juran



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# Process Improvement in Software Engineering

- Software development relies on more than just a suitable process.
  - No “one size fits all”
  - Need to be tailored to domain, team, organisation, etc.
- Widespread acknowledgement of need to incorporate “process improvement” into software development
- Led to development of numerous “Software Process Improvement” frameworks.
  - CMMI, SPICE, MBNQA,...

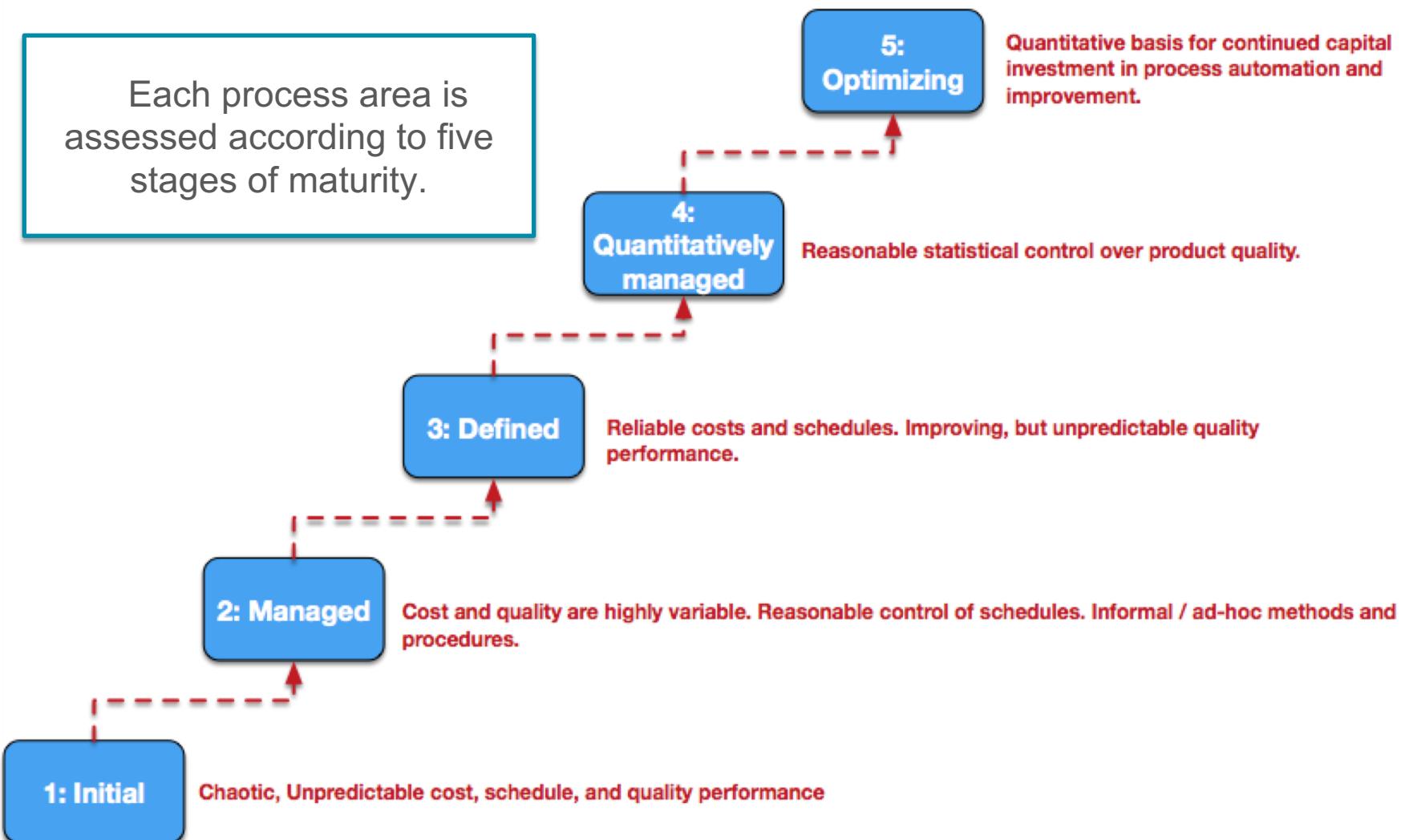
# The Capability Maturity Model (CMM)

- Developed at Carnegie Mellon University in the early 90s.
- Heavily inspired by principles of Total Quality Management.
- Intended as a tool to assess the “maturity” of the software development process within an organisation.
- Certification required by many large software procurers.
  - Notably by the US Department of Defence
  - Been used to assess thousands of organisations.
- Evolved into CMMI over the years (currently version 1.3)
  - The ‘I’ stands for “integration” - integrating the various previous versions.

# Process Areas

Category	Core Process Area	Level
Process Management	Organizational Process Definition (OPD)	3
	Organizational Process Focus (OPF)	3
	Organizational Training (OT)	3
	Organizational Process Performance (OPP)	4
	Organizational Performance Management (OPM)	5
Project and Work Management	Requirements Management (REQM)	2
	Project Monitoring and Control (PMC)	2
	Project Planning (PP)	2
	Integrated Project Management (IPM)	3
	Risk Management (RSKM)	3
Support	Quantitative Project Management (QPM)	4
	Configuration Management (CM)	2
	Measurement and Analysis (MA)	2
	Process and Product Quality Assurance (PPQA)	2
	Decision Analysis and Resolution (DAR)	3
Engineering	Causal Analysis and Resolution (CAR)	5
	Product Integration (PI)	3
	Requirements Development (RD)	3
	Technical Solution (TS)	3
	Validation (VAL)	3
	Verification (VER)	3

# Levels of Maturity



# Certification

- Every level of maturity is associated with a large selection of “yes/no” questions.
  - Some of these questions are designated *key questions*.
- To be certified for a given level, an organisation must answer at least 80% of the questions in the affirmative.
  - Including 90% of the key questions.

# Downsides to CMMI Certification?

- Changing a process requires a lot of **time** and **effort**
  - Retraining, upheaval of adjustments
  - Could be invested into other, more immediately profitable activities
- Harder for **smaller organisations**
  - Harder to delegate responsibilities for different process areas.
  - Can easily become too thinly-spread.

# Why did you not adopt CMMI?

Reason	Number	%
<b>Small organisation</b>	17	43
<b>Too costly</b>	14	35
<b>No time</b>	10	25
<b>Using other SPI</b>	8	20
<b>No clear benefit</b>	4	10
<b>Potential benefits not wanted</b>	3	8
<b>No customer demands</b>	2	5
<b>Not applicable to our projects</b>	2	5
<b>Already know gaps</b>	2	5
<b>Risk of poor certification damaging business</b>	1	3

Staples et al., 2007



# Summary

- Software process improvement builds directly upon established techniques such as TQM.
- CMM(I) is especially popular
- Large investment required for certification wrt. time and effort.
- Often (perceived to be) unsuitable for small companies.