


High Maturity – Retrospective and Lessons Learned

Common Problems in High Maturity Implementations


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07 July 2010



Agenda

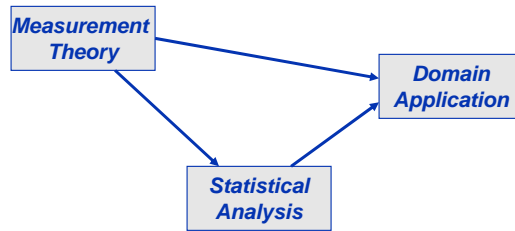
- History of Measurement and Analysis
- High Maturity
- Common Problems and Obstacles
- Summary

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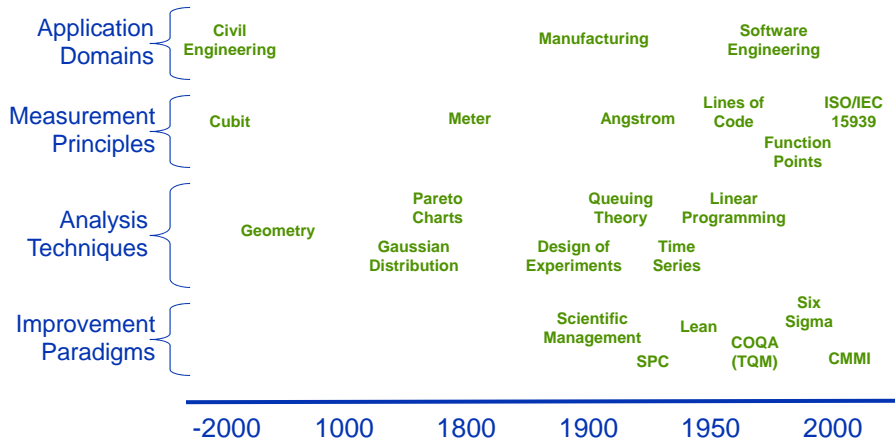


Key Knowledge Components

- Measurement Theory
- Statistical Analysis
- Domain Application (e.g., Software Engineering)



Some Historical Influences



Some Issues

- Many concepts are being introduced “simultaneously” into software engineering – sometimes they get out of order
- Silly arguments about the “best” solution, e.g., size measures – most size measures are highly correlated with each other!
- Statistical expertise is not sufficient for an effective measurement program
- “Normal” statistics often are not appropriate for software engineering data

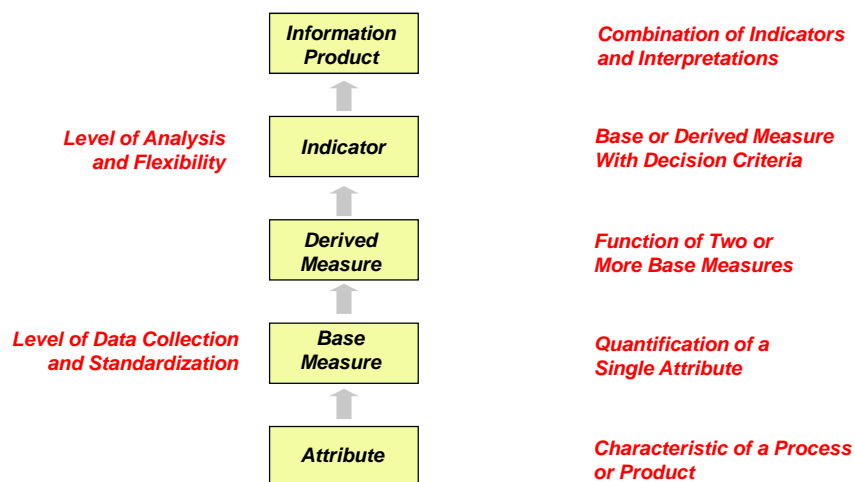
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A Concept in Measurement Theory

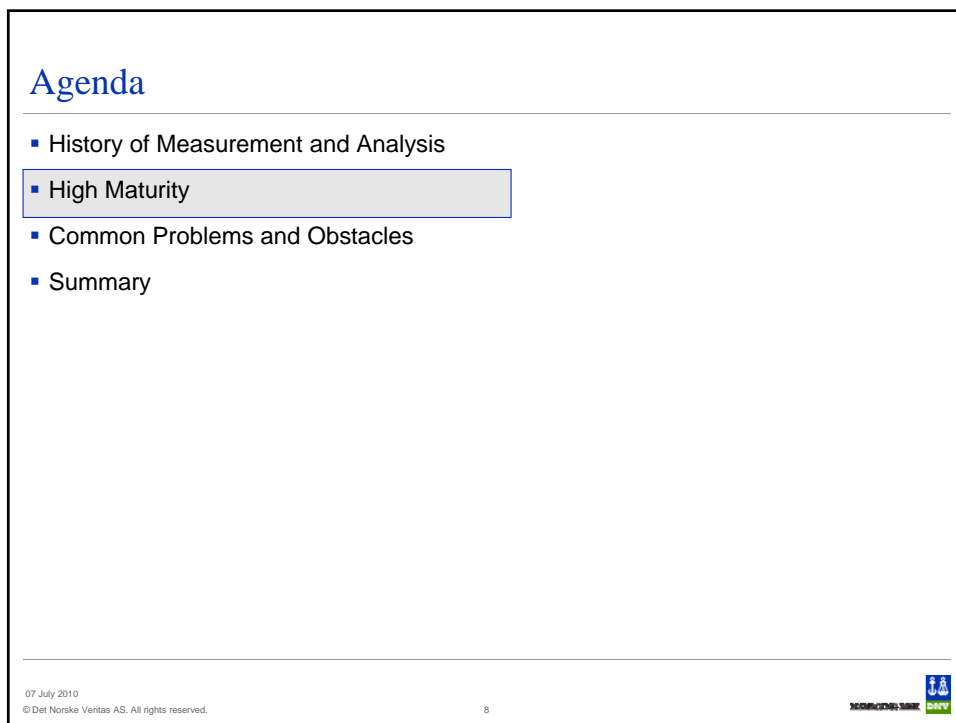
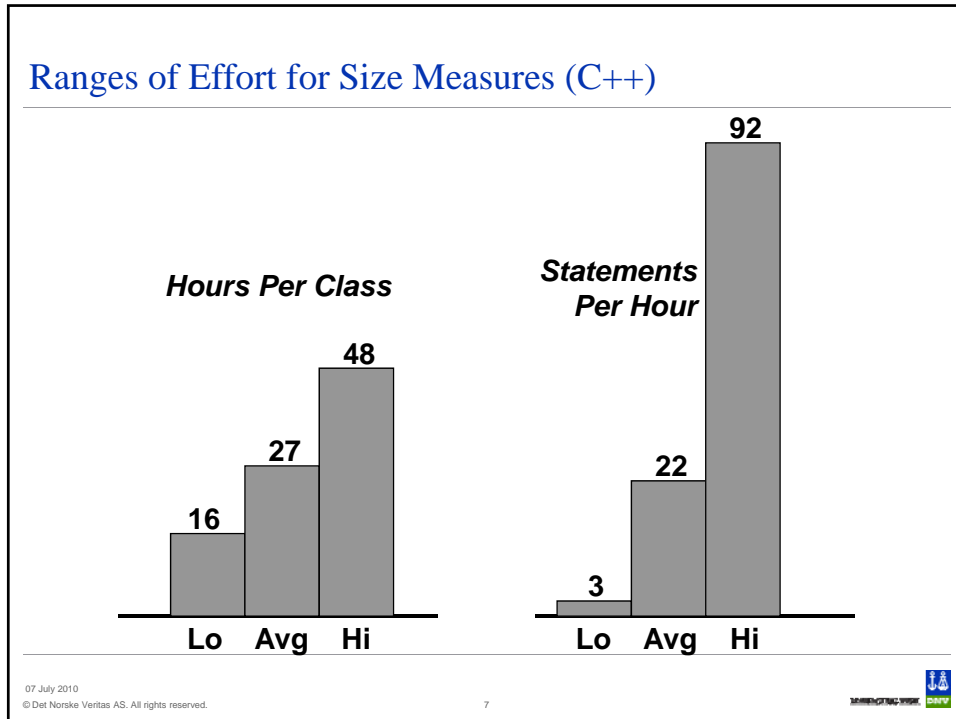


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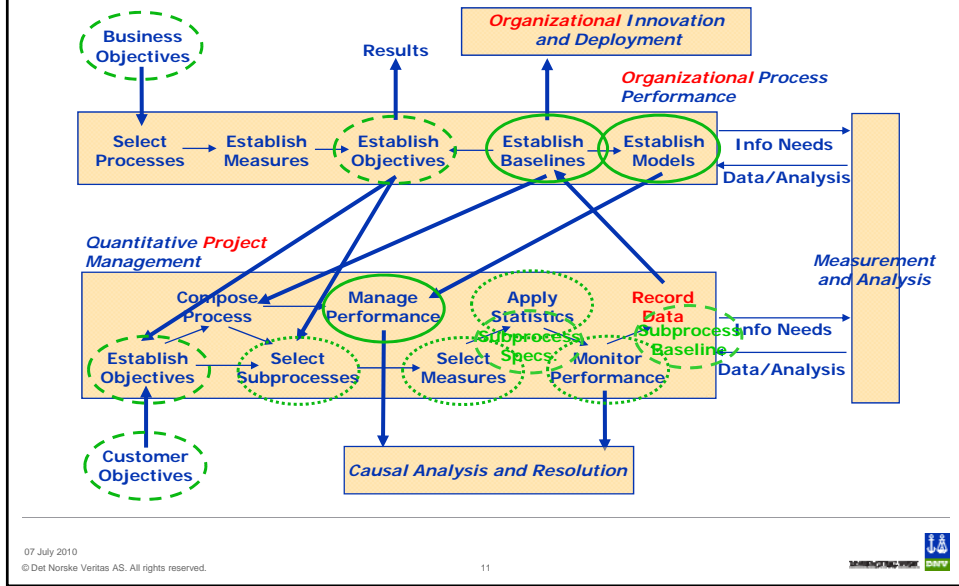
What is High Maturity?

- Four process areas in the CMMI
- Focus on controlling project processes and improving organizational processes over time
- A cultural and conceptual change in thinking about measurement
- May incorporate Lean and Six Sigma techniques

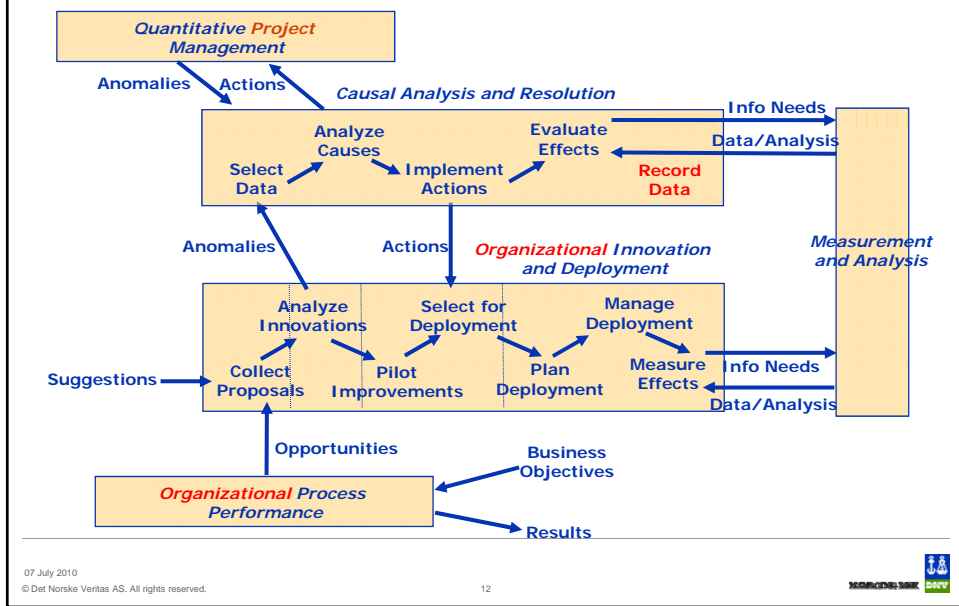
Changing Concept of Measurement

- CMMI Levels 2 and 3 require measurement for *project management* and *product engineering*
 - Focus on “workload” management, e.g., earned value, or product quality attributes, e.g., TPMs
 - Methods of performing work assumed to be stable
 - Measured outcomes typically influenced by changing allocation of resources or product requirements
- CMMI Levels 4 and 5 require measurement for *process management*
 - Focus on understanding and managing key performance factors and assumptions, e.g., productivity
 - Methods of performing work not assumed to be stable
 - Measured outcomes typically influenced by planned and unplanned departures from “normal processes”

L4 Process Area Structure



L5 Process Area Structure



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Recent High Maturity Experience

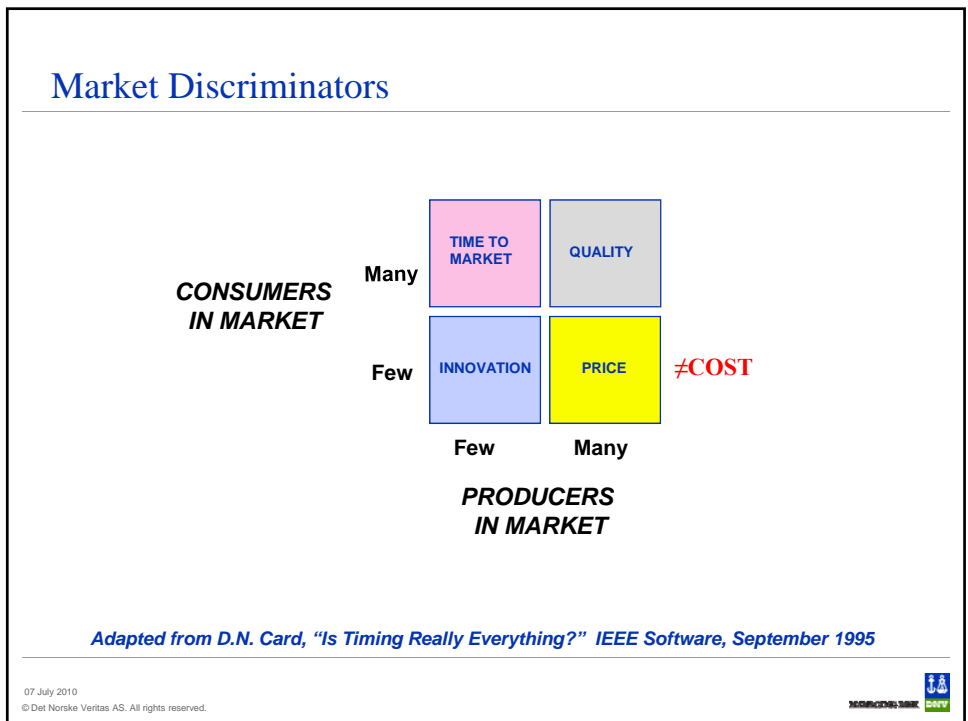
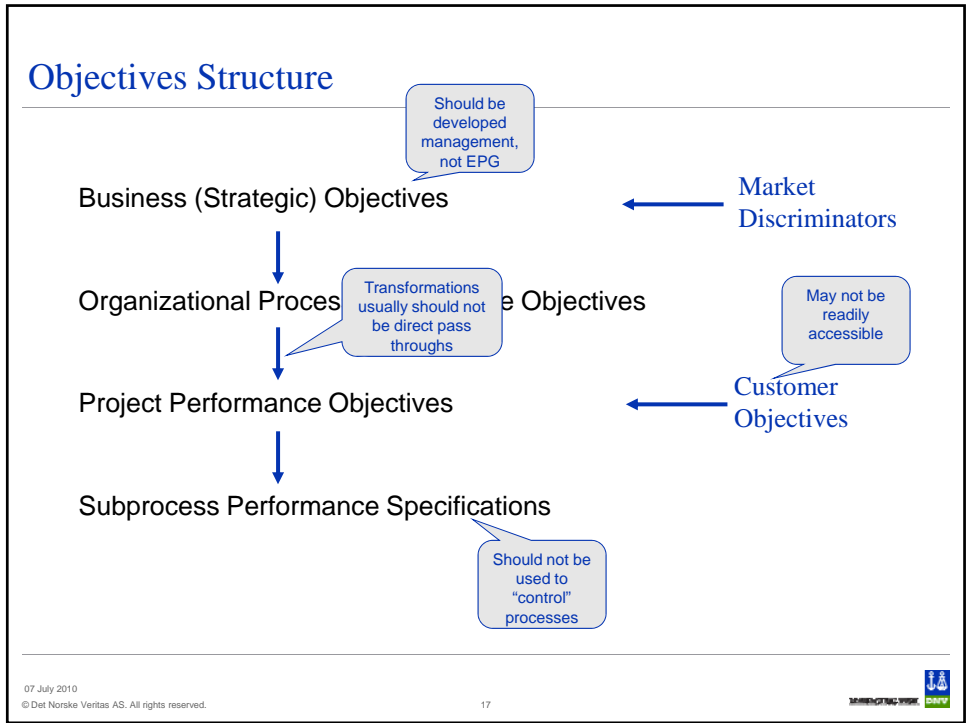
- 3 organizations previously rated at Level 5
- 2 organizations rated at Level 3 and moving up
- Many questions and discussions

Observations

- High Maturity Audit Criteria (12 items) actually do a good job of identifying where organizations typically experience problems
- Organizations tend to focus on satisfying the criteria rather than mastering the underlying concepts of which the criteria are indicators
- CMMI terminology remains overloaded, non-standard, and confusing, e.g., Process, Baseline, Capability
- Intended interactions of process areas are not understood – tendency to develop “stand-alone” implementations
- Many people don’t understand Statistical Process Control as well as they think they do (e.g., capability analysis)
- Need for cultural change often not addressed – measurement as performance feedback rather than incentivized targets
- Basic measurement theory often ignored – not mastered!

The Difficult High Maturity Challenges

- Establishing and maintaining an effective objective structure
- Making organizational baselines too complex
- Developing meaningful Process Performance Models
- Selecting useful subprocesses to control
- Defining and measuring subprocess alternatives
- Performing effective Causal Analysis



Organizational Baselines

- A snapshot of organizational performance at one point of time
 - Descriptive statistics for key planning measures
 - May be segmented by application type, business line, etc.
- Trends over time may be analyzed
- Not used to control project performance (except in special situations)

Process Performance Model

- Not a recognized “statistical technique” – many approaches possible
- Controllable “process” factors often confused with non-controllable factors
- Usually contains a “size” factor – not controllable
- Not enough focus on how the project will use the PPM to make decisions
 - Model has to be understood by the decision-maker
 - Opportunities for decision-making have to exist
 - Model has to predict something important!

Ideal Characteristics of Subprocess for Control

- Specific entry and exit criteria
- Executed multiple times
- Well-defined activity (sequence of steps)
- Short duration
- Important to success
- Source of risk, uncertainty, or waste

Subprocess Performance Specifications describe the desired performance of a subprocess – derived from project process performance objectives

Subprocess Performance Baselines describe the historical performance of a subprocess – calculated with control charts

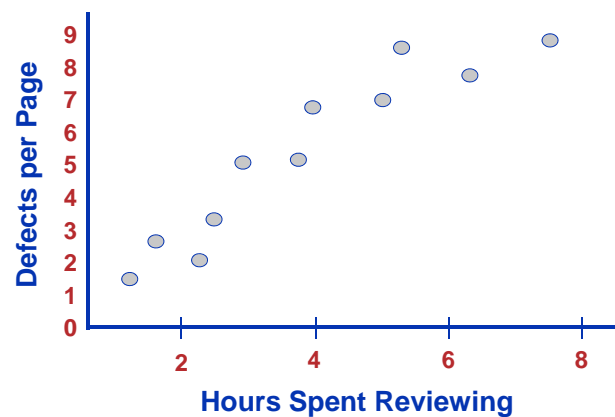
Subprocess Alternatives

- Organizational process definition typically allows “tailoring”, often the result is “red-lines”, not repeatable variations (alternatives) of a subprocess
- Different alternatives should exhibit different performance characteristics – alternatives that are not significantly different are probably not meaningful
- Different process definitions do not necessarily result in different behaviour and different performance
- Selection of alternatives for a project must be based on data and analysis
 - It takes time to collect data about each variation
 - More variations means more data
- Define alternatives where it matters and not where it doesn't!

Concept of Causality

- Conditions of causality
 - *Cause* and *effect* must demonstrate association or correlation
 - *Cause* must precede the *effect* in time
 - Mechanism by which the cause produces the effect must be identified
- Assignment of cause in a “human-intensive system” always includes a significant element of subjectivity

A Causal Relationship?



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Achieving High Maturity Takes Time

- March 2005 report from SEI on CMM
 - More than 1940 appraisals since 2000
 - 8% at Level 4, 5% at Level 5
 - 25 months (median) to move from Level 3 to Level 4
 - 13 months (median) to move from Level 4 to Level 5
- Transition from Level 3 to Level 4 is the longest step on the CMM path
- Similar relationship expected for CMMI

Why Does Level 4 Take So Long?

- It's about behavior (culture)
- It requires initiative and creativity, not just process definition and conformance
- It involves a new paradigm and new skills (similar to Six Sigma)
- The organization, as whole, has to change behavior
- Weaknesses at Level 2 and 3 often affect the ability to adopt Level 4 practices – dependencies
- Many aspects of high maturity intent are not well-understood

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