Agile Requirements

Agile Consortium Benelux, sep 30, 2009

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Problem Statement

Introduction

Quality improvement needed in many organizations

Business case

- Identification of problem areas
- Selected improvement
- Decision

Quantified

- Costs & benefits
- Lead time to result

Quantification problems

Introduction

Much time needed to gather data

Difficult to measure things

Hard to keep management commitment

Expensive

Required: Business case, with limited but sufficient measurement effort, to gain management commitment and funding

Affiliate Collaboration

Introduction

SEI Pittsburgh, PA:
Software Engineering Measurement & Analysis Group

Ericsson Netherlands:
Market Unit Northern Europe & Main R&D Center

The Software Engineering Institute Affiliate Program provides sponsoring organizations with an opportunity to contribute their best ideas and people to a uniquely collaborative peer group who combine their technical knowledge and experience to help define superior software engineering practices.

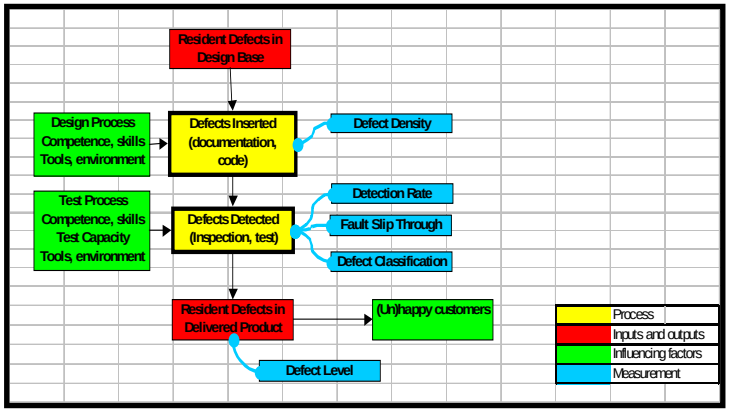
Affiliates: http://www.sei.cmu.edu/collaborating/affiliates/affiliates.html

Two models

Introduction

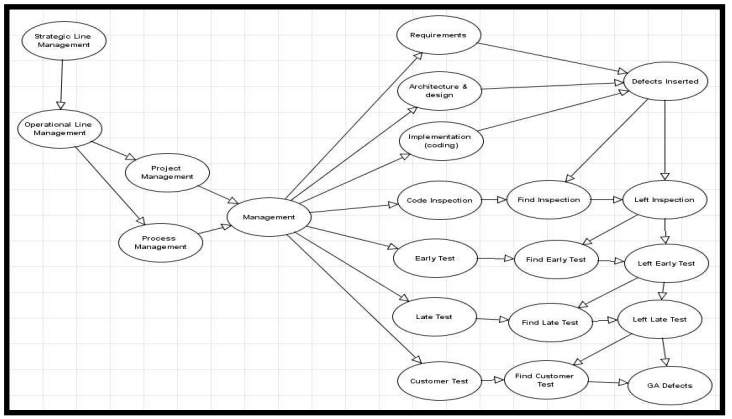
Defect Estimation Model

- Data, tuned with expert opinion
- Estimate Fault Slip Through
- Project/Product Quality



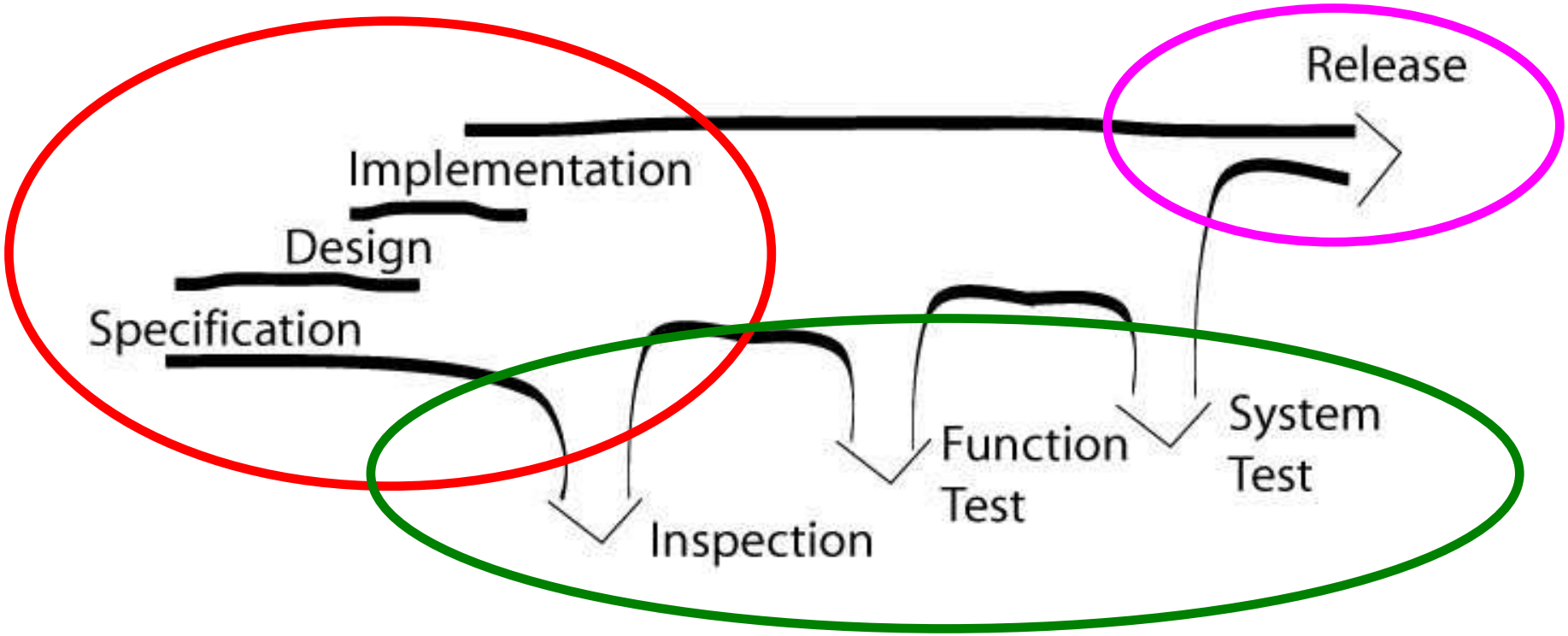
Quality Factor Model

- Expert opinion, extend with data
- Quick Quality Scan
- Prediction Fault Slip Through
- Improvement Areas



Measuring quality

Business Cases



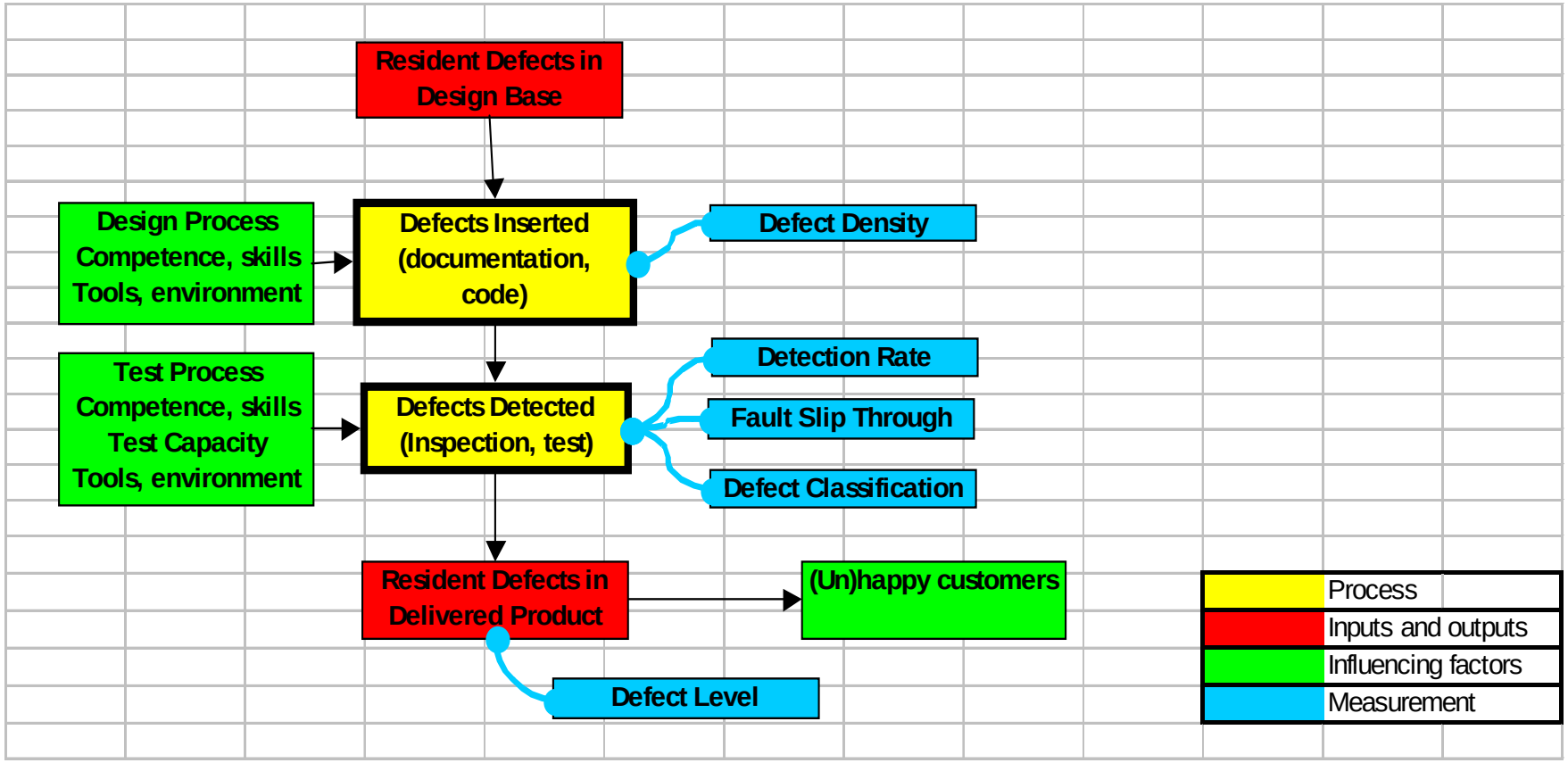
Insertion: Where are defects made? How to prevent?

Detection: Where are defects found? Early/economic removal?

Quality: How many defect are left in the product at release?

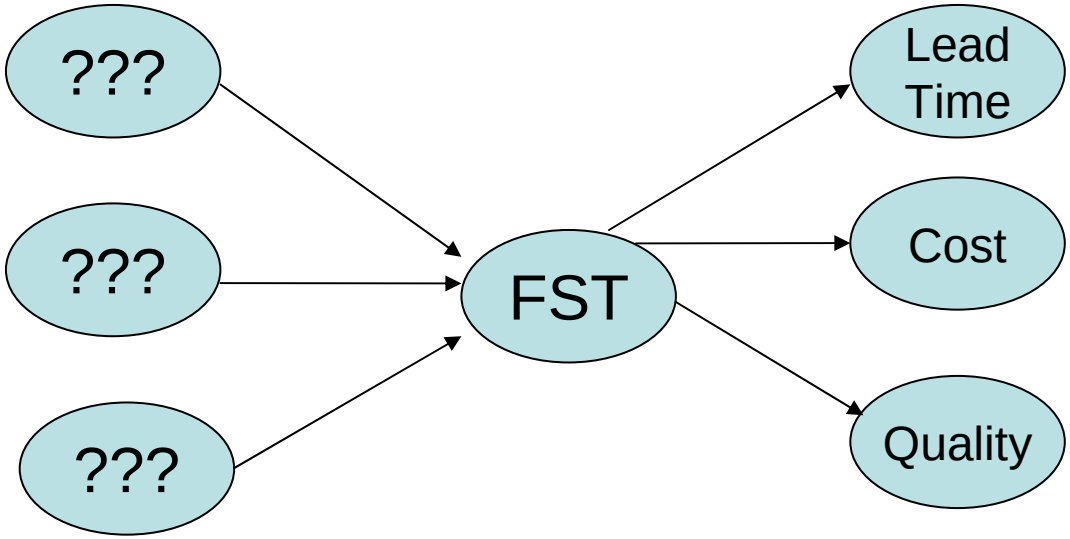
Process View

Business Cases



Fault Slip Through

Business Cases

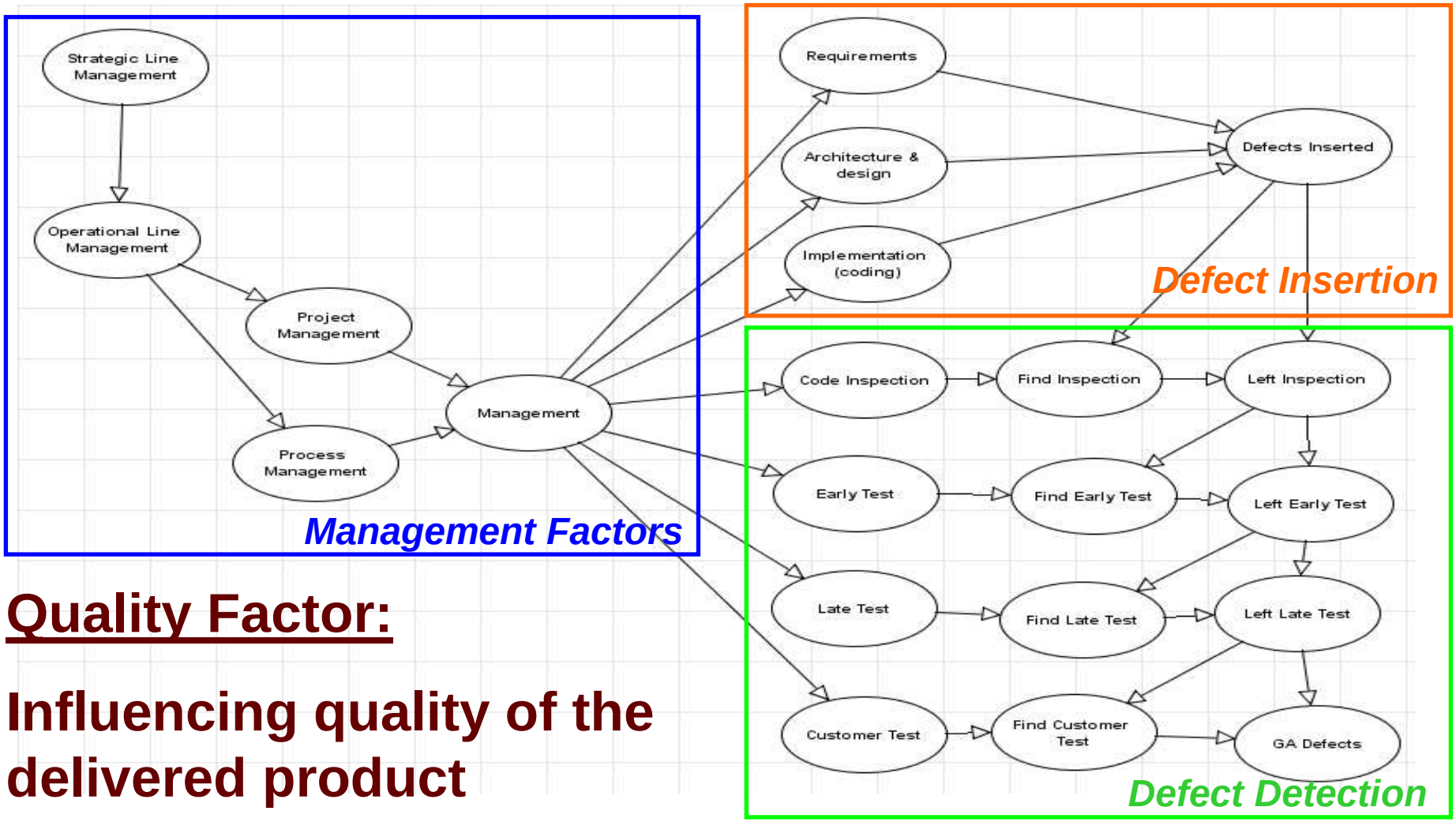


Fault Slip Through = Number of defects detected in integration & customer test that should have been detected earlier

"Should" implies that the defect is more cost effective to find earlier.

Quality Phase Performance

Quality Factors



Quality Factor:

Influencing quality of the delivered product

Management Factors

Quality Factors

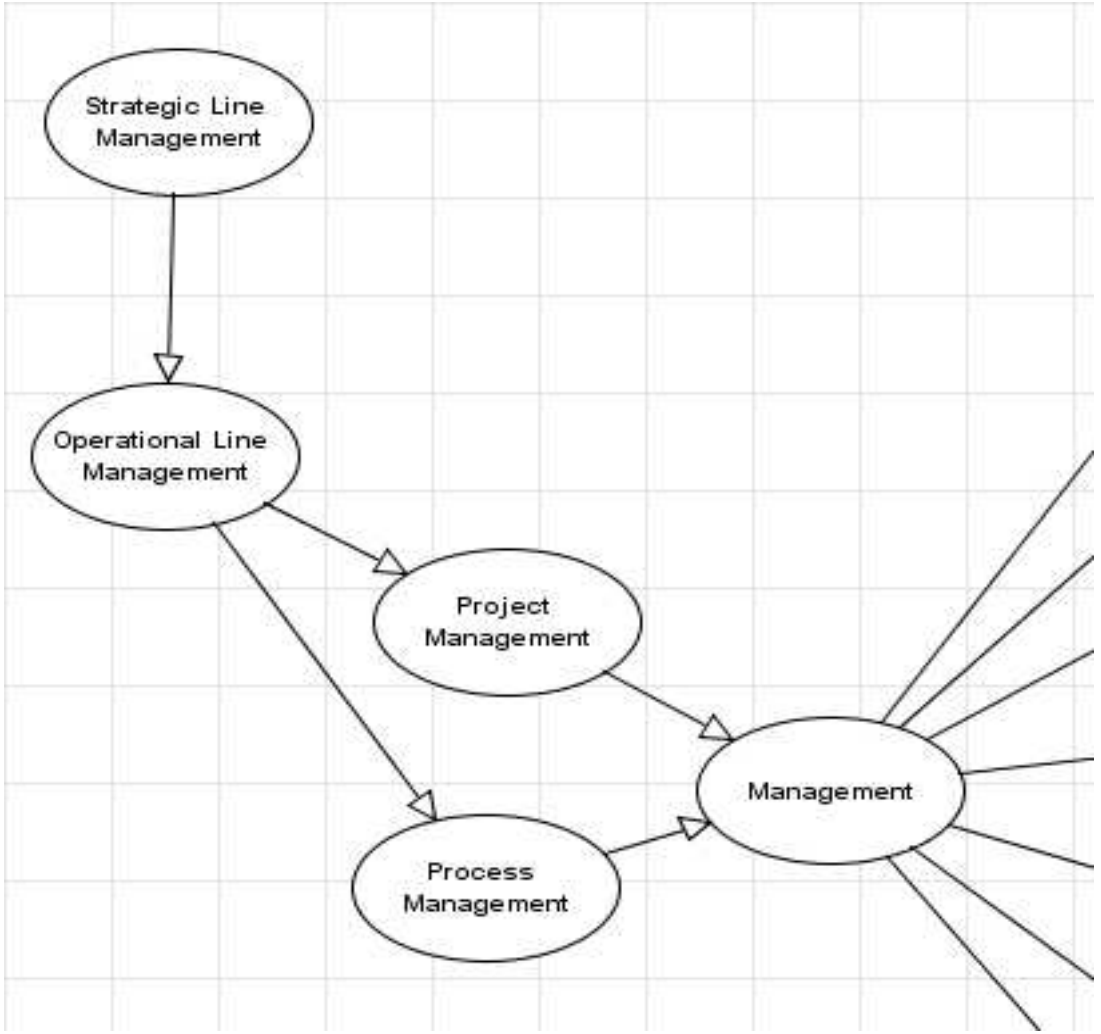
Management Context for Technical Activities

Direct:

- Project Management
- Process Management

Indirect:

- Strategic & Operational Line Management

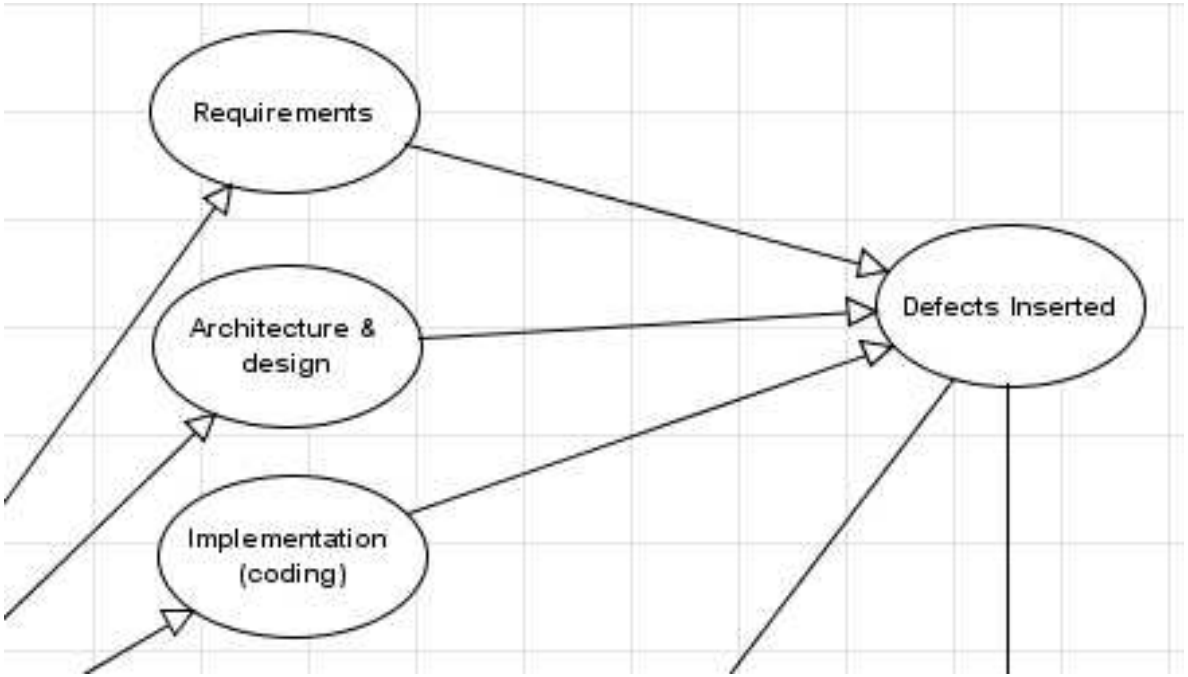


Defect Insertion

Quality Factors

Technical Activities where defects inserted

- Root Cause Analysis
- Defect Prevention



Defect Detection

Quality Factors

Technical Activities where defects detected

- Early Detection
- Economy of Test
- Release Quality

Reduce Defect Slippage

Quality Factors - Requirements

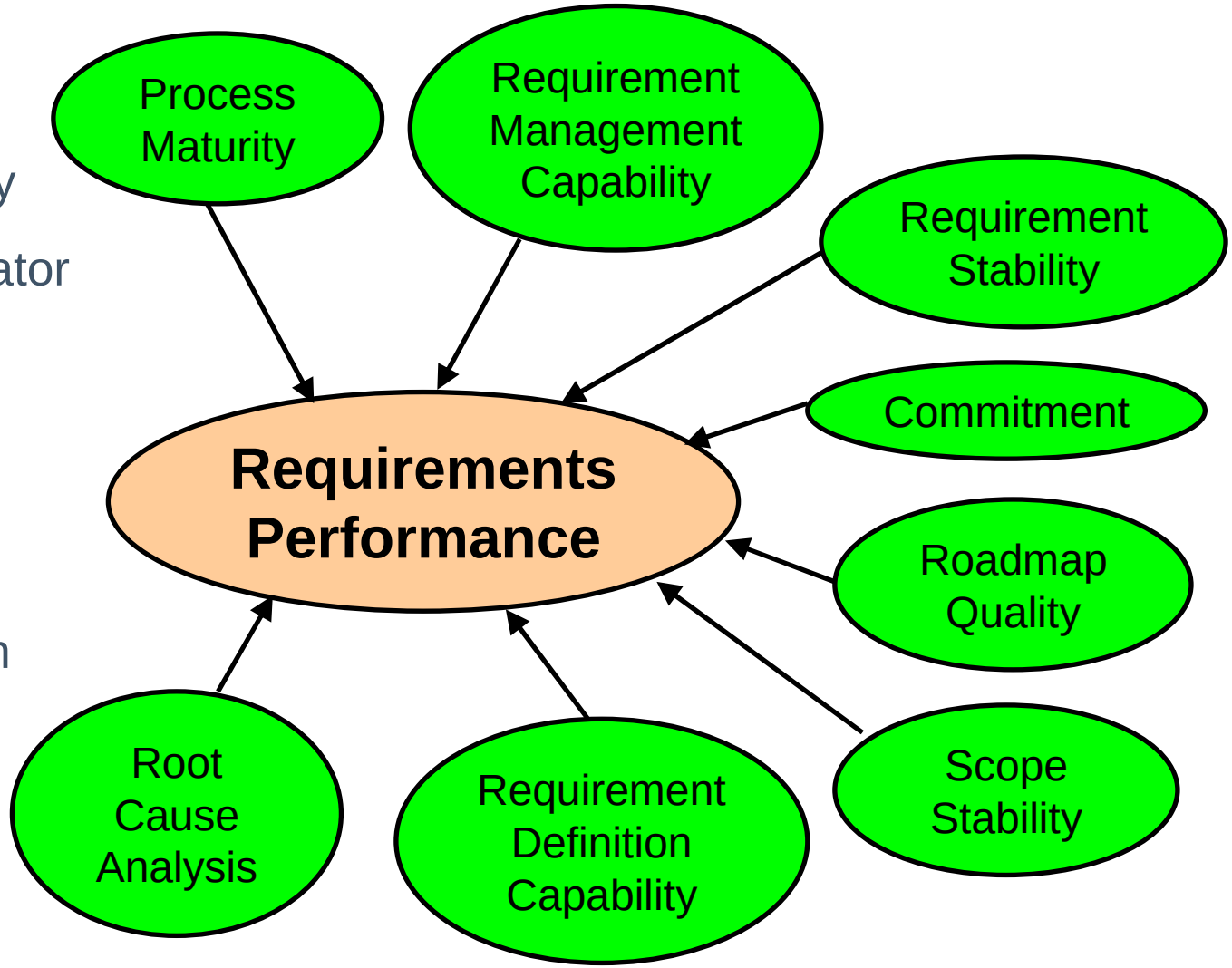
Quality Factors

Purpose

- Predict Quality
- Leading indicator

Sources

- Research
- Expert opinion
- Experience



Quality performance assessment

Agile Req.

Survey based upon Quality Factors

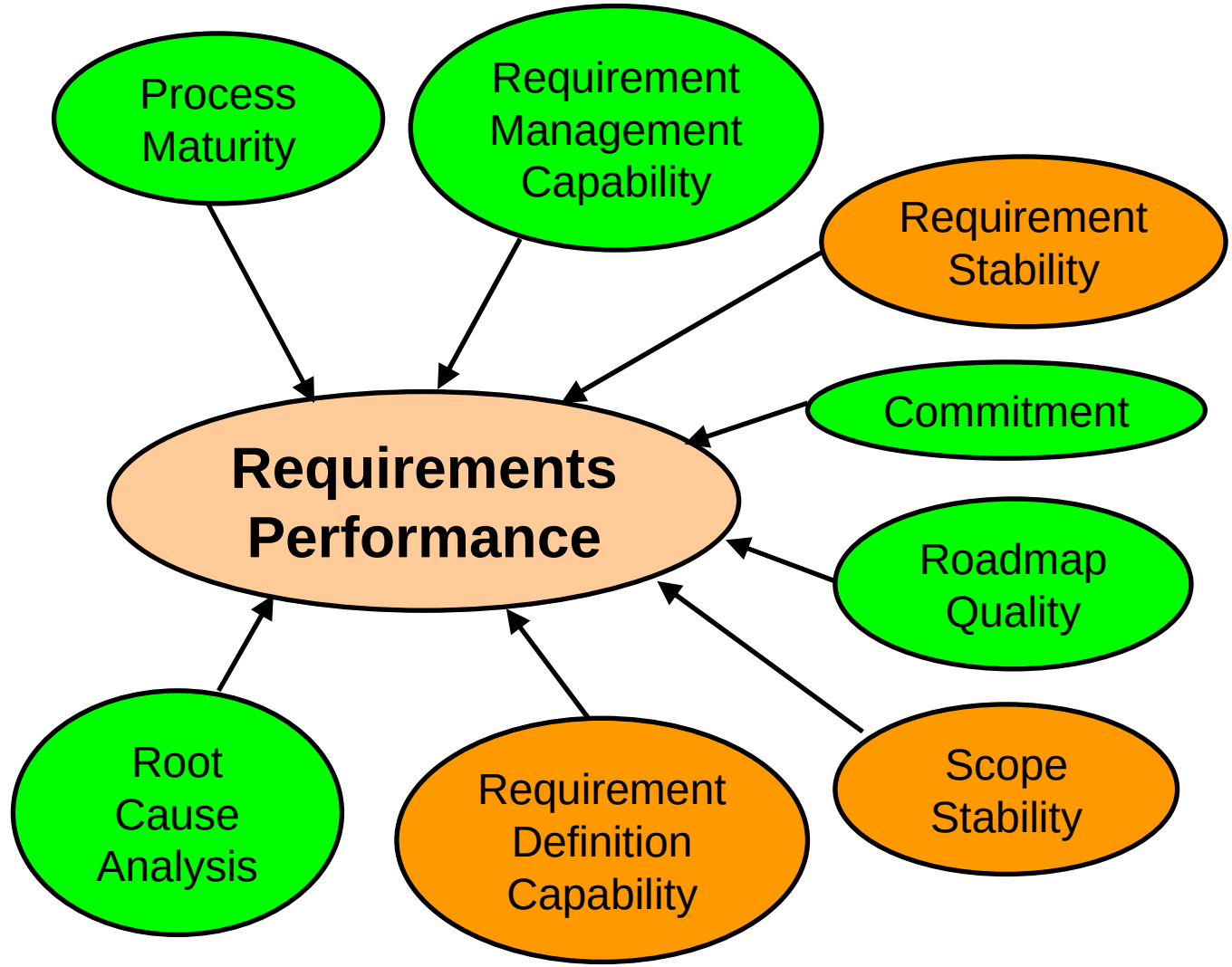
- 34 respondents from management & technical roles
- 4 management areas & 7 technical areas

2 sub questions for each quality factor:

- How relevant is the factor when we want to improve quality?
  “little if any,” “moderate,” “substantial,” or “extensive,”
- How well are we doing currently?
  “poor,” “fair,” “good,” and “excellent.”

Findings Requirements

Agile Req.



Pilot “Business Case for Quality”

Agile Req.

Context:

- Process management
- Quality steering
- Starting with Agile

Pilot: Agile for Requirements

- Calculate value of process change
- Run the pilot
- Evaluate the result

Improve: Requirements Stability

Agile Req.

Requirements Stability – Inverse of the amount of requirement changes over time. (The less changes, the higher stability.)

Agile deployment

- Backlog with Prioritized User Stories
- Product manager as Product Owner
- (Pre-) Planning game
- Architecture team
- Stand up meetings

Improve: Scope Stability

Agile Req.

Scope Stability – Impact of major changes in projects that are related to changes in the product roadmap, including stability of the products to be developed, development teams involved in projects, and major changes in project funding or delivery dates.

Agile deployment

- Backlog
- Responsibility of Agile teams and Product Owner
- (Pre-) Planning game
- Retrospectives

Improve: Requirement Definition Capability

Agile Req.

Requirements Definition Capability – The skill and experience level of the people doing requirements definition (e.g., product managers).

Agile deployment

- (Pre-) Planning game
- Stand up meetings
- Collaborative Culture
- Retrospectives

Steering Agile Quality

Agile Req.

- Estimate latent defects after demo (planning game)
- Collect defects during test (after demo).
- Classify defects:
  - “introduction phase“
  - “should have been detected phase”
- Root cause analysis: Prevention
- Decide improvement actions and communicate
- Re-estimate and predict release quality.

Results Agile for Requirements

Agile Req.

- **Very low number of requirement defects**
- **Previous projects also had a low number**
- **Based upon the data no conclusion could be drawn**

Root Cause Analysis:

- understanding requirements increased:
  planning game & stand-up meetings.
- Improvements from retrospectives increased cooperation
  between development team and product owner.

Requirements quality performance increased!

Conclusions

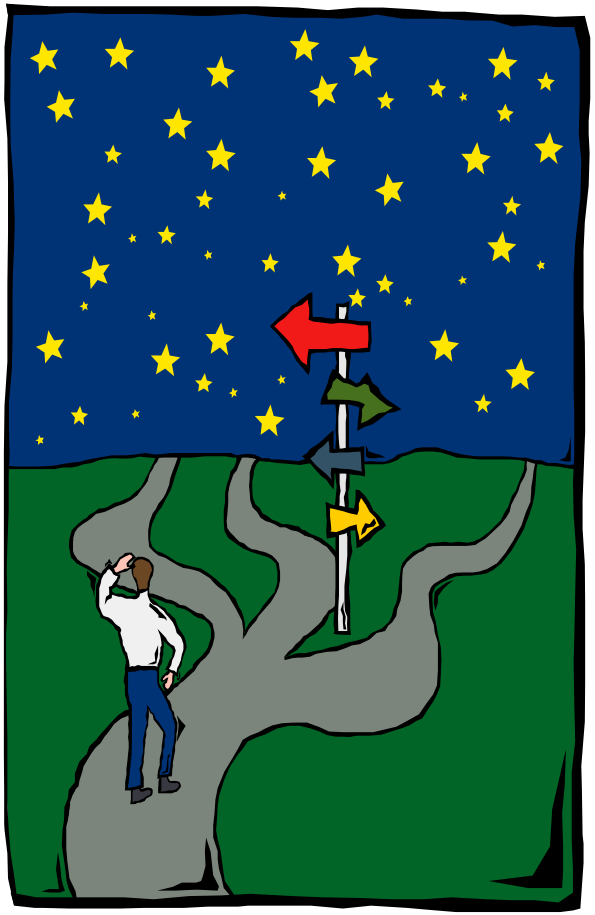
Conclusions

Quicker Business Case:

- Quality Factors/Performance
- Fault Slip Through
- Combining data and expert opinion

Improved Requirements Performance

- Agile increased requirements quality
- Less defects after release
- Increased flexibility and collaboration



More information

Conclusions

Publications:

- *Building Process Improvement Business Cases*
  SEI Technical Note: http://www.sei.cmu.edu/library/abstracts/reports/09tn017.cfm
- *Controlling Project Performance by Using the Project Defect Model*
  in proceedings PSQT West Conference 2005
- *The Business Benefit of Root Cause Analysis*
  in proceedings SM/ASM conference 2003
- SPI, the agile way!
  To be presented at the SPIder conference, october 2009
  www.spiderconferentie.nl

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Backup Slides

Solution

Introduction

Technologies

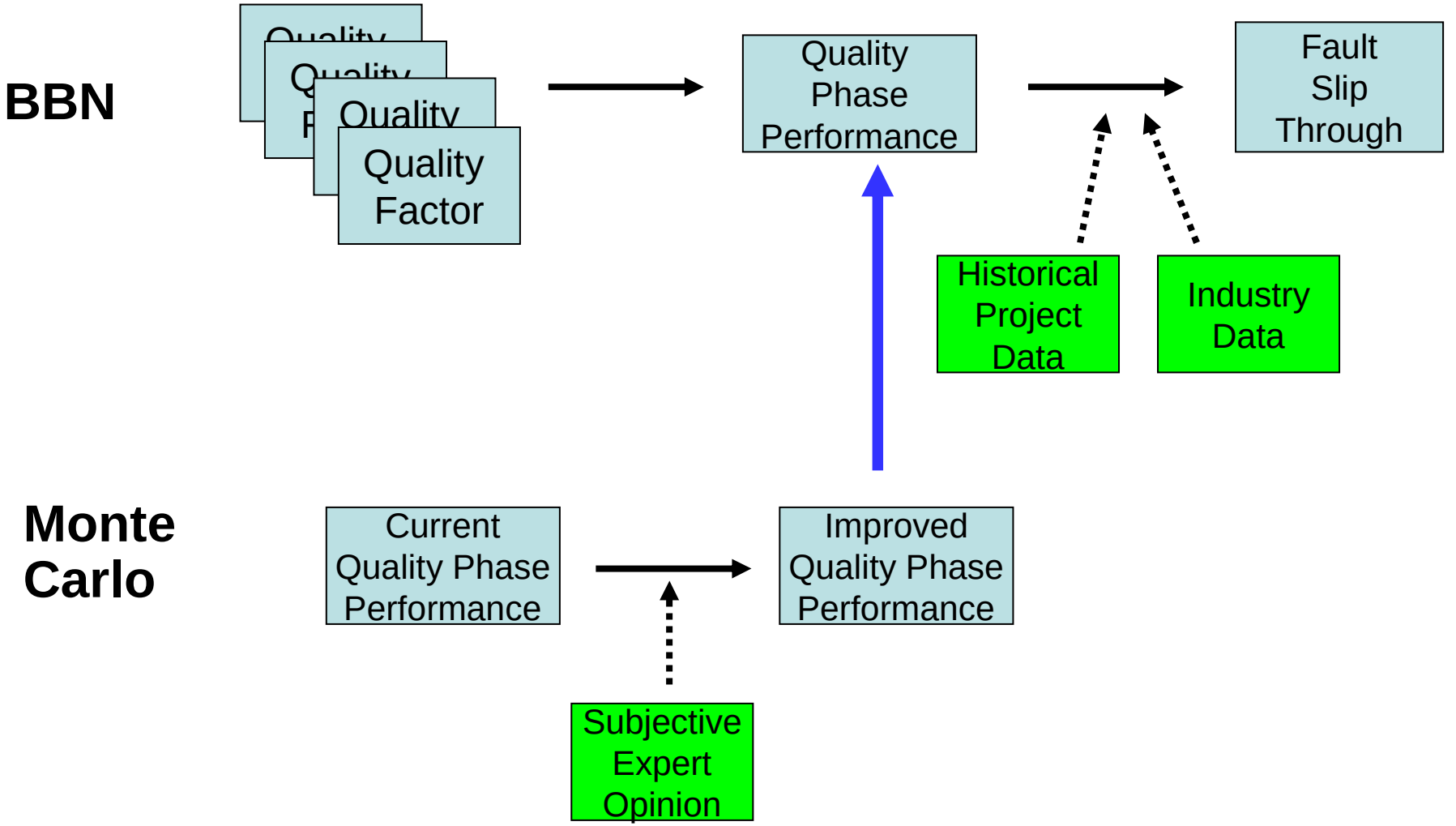
- Bayesian Belief Networks (BBN)
- Monte Carlo Simulation
- Root Cause Analysis
- Cost of Quality, Defect Slippage

Six Sigma DMAIC Approach

- Modeling Business Cases
- Research Quality Factors & quantify Quality Improvement
- Validate “Business Case for Quality”

Building a business case

Business Cases



Bayes Belief Network (BBN)

Business Cases

- Probabilistic graphical model, to model uncertainty
- Diagnose and explain why an outcome happened
- Predict outcomes based on insight to one or more factors

Used:

- Modeling Quality Factors
- Predicting Quality Phase Performance
- What if Scenario

Monte Carlo Simulation

Business Cases

- Compute a result based on random sampling
- Modeling distributions of data
- Can make uncertainty visible

Used:

- Calculate value of process changes

Quality Prediction

Business Cases

Current Model: Estimation

- Extrapolate past performance
- Based on inserted/detected defects
- Plan & track

Wanted: Prediction

- Causes of defects
- What if Scenarios
- Decision taking

All models are wrong

Some models are useful

Deming

Step 2: Defect Prediction

Business Cases

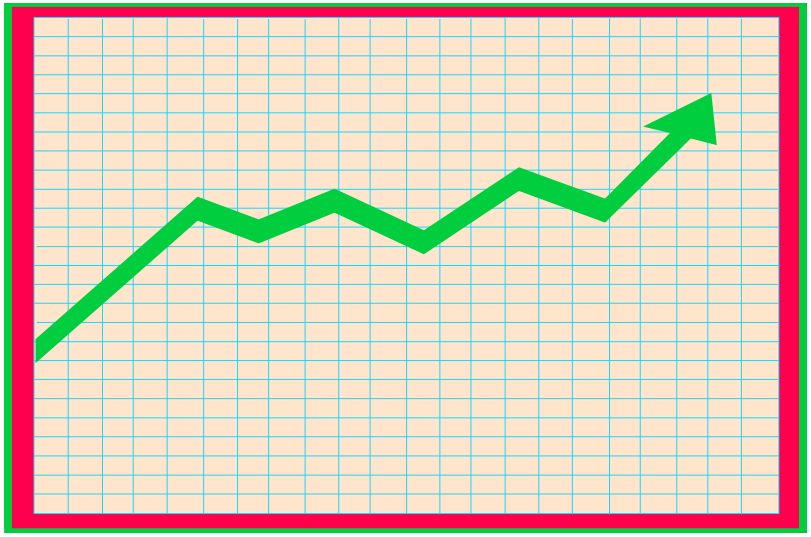
Fault Slip Through

Defect found in a (later) test phase that should have been found earlier

"Should": More Cost effective (economical)

Predict Defect Reduction

- Determine process impact
- Simulate quality change
- Predict savings



Pilots

- Agile
- Model Driven Development

Quantify Quality Improvement

Quality Factors

Connect defect data with Quality performance

- Maximum quality factor => Industry best in class
  Published industry data from various sources
- Distribution: Linear (keep it simple)

Extend BBN to calculate remaining defects after each phase

Result: Model for “what if scenario’s”

- Calculate defects in release products, when quality performance improves
- Cost of Quality data to calculate savings

Monte Carlo: Quality performance

Quality Factors

Monte Carlo simulation

- Input from 5 experts
- Estimated chance of occurrence and impact on FST (1-5 scale)
- Simulation done to calculate impact on quality factors
- Result used in BBN model to calculate effect on defect slippage

Expected result:

- Reduced number of requirement defects introduced
- Increased effectiveness of late testing phases
- Less defects in products shipped to customers
- Cost saving:
  - Limited saving in the project
  - Major saving during maintenance