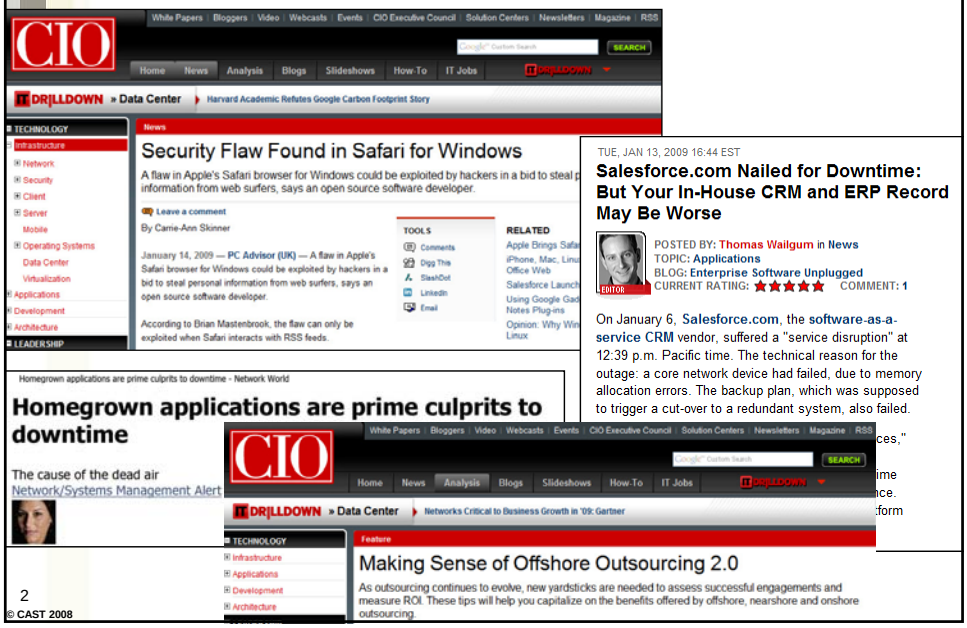
The Challenge of Quality in Multi-Tier, Multi-Language Applications

Dr. Bill Curtis
SVP & Chief Scientist
CAST Software

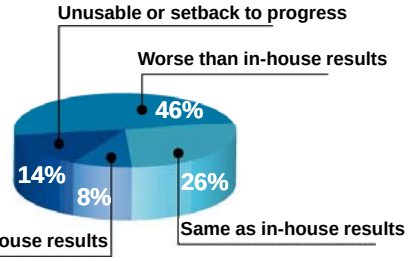
1 Day's Offerings from CIO Online

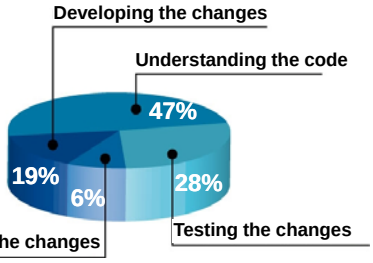


Why Do New Features Take So Long?

What results are you getting from your outsourcers?

Source: Outsourcer Quality Survey Results
Software Development Magazine March 2006





How do maintenance staff spend their time?

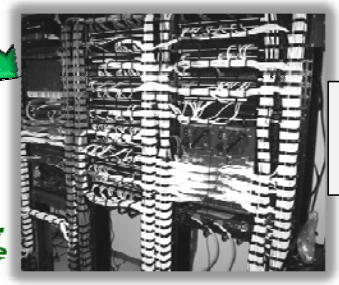
Source: *Software Quality, Producing Practical and Consistent Software*
Mordechai Ben-Manachem

Business Agility Is Limited by App Quality

Ossified, contorted, complex legacy code

- Harmfully complex
- Hard to change
- Easy to hack into
- Costly to maintain

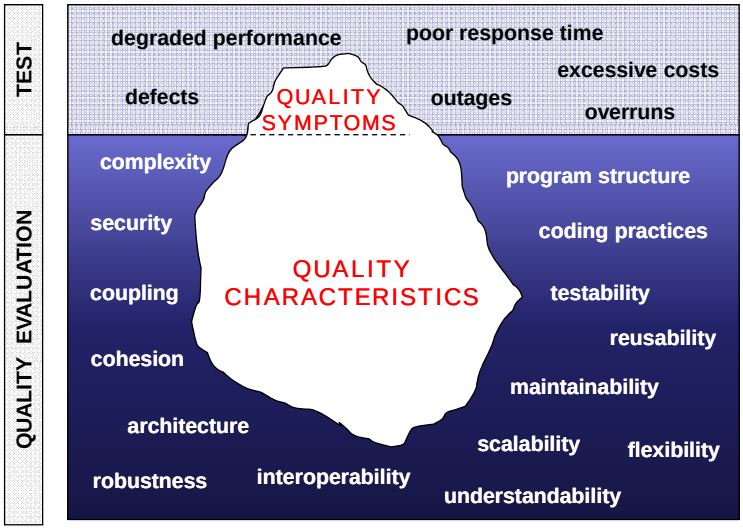
Speed in responding to the market depends on the ease of modifying business applications



- Secure and robust
- Easy to change
- Cheap to maintain
- Faster to build

Well-engineered, high-quality code

Application Software Quality Iceberg



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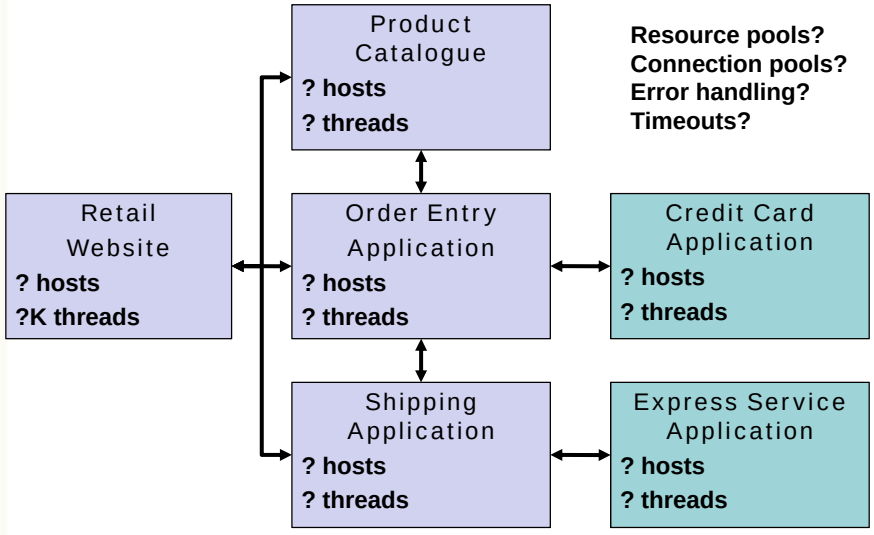
Steve McConell (1993), *Code Complete.*

Godot's Gotta Be in There Somewhere



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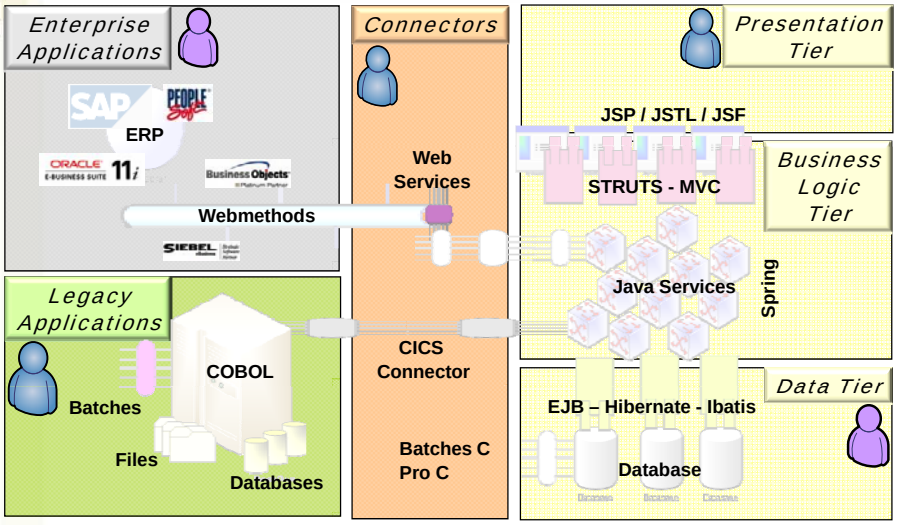
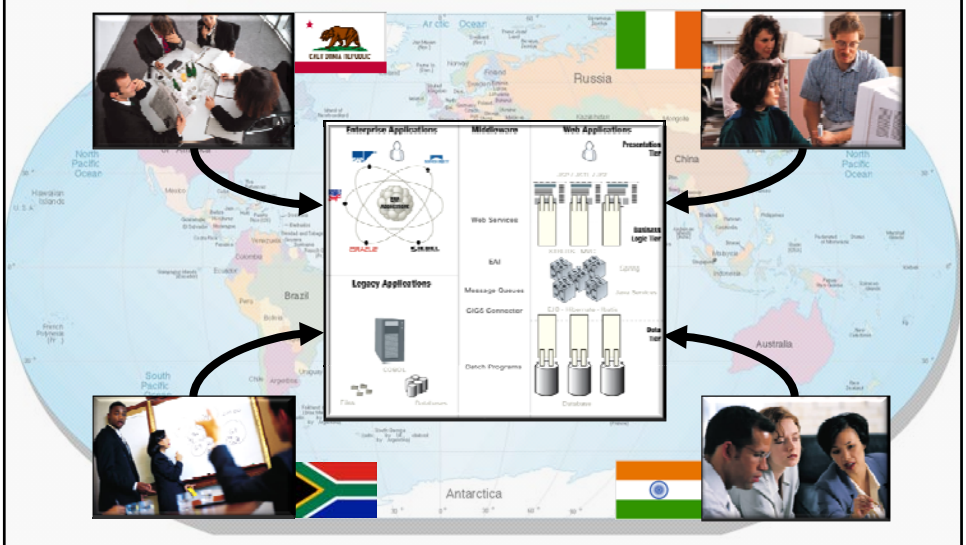
Siloed Developer Skills

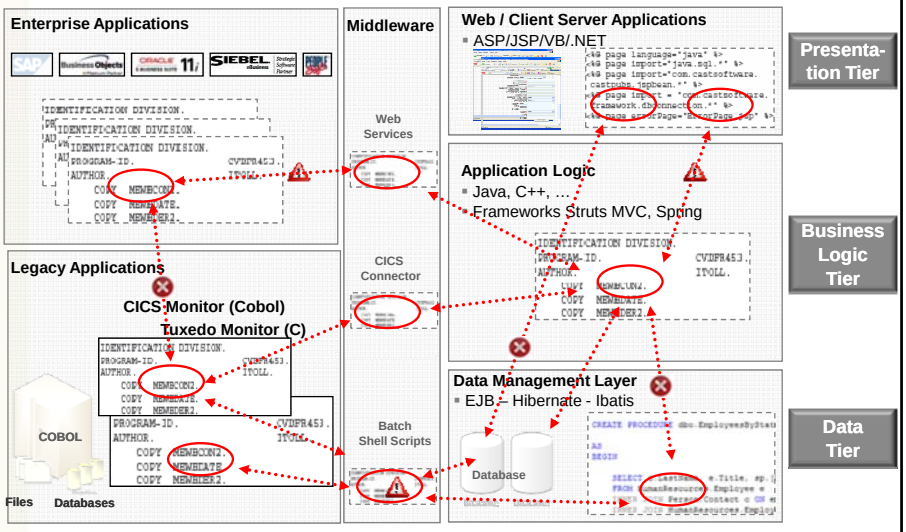


Much of the complexity and risk of applications occurs at the interface between technologies — beyond the comprehension of siloed skills

Dispersed Development



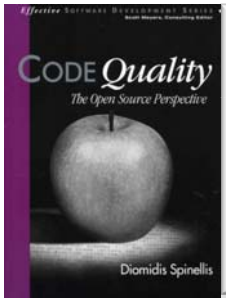
The Devil Is in the Interface



Internal Quality Is Often Overlooked

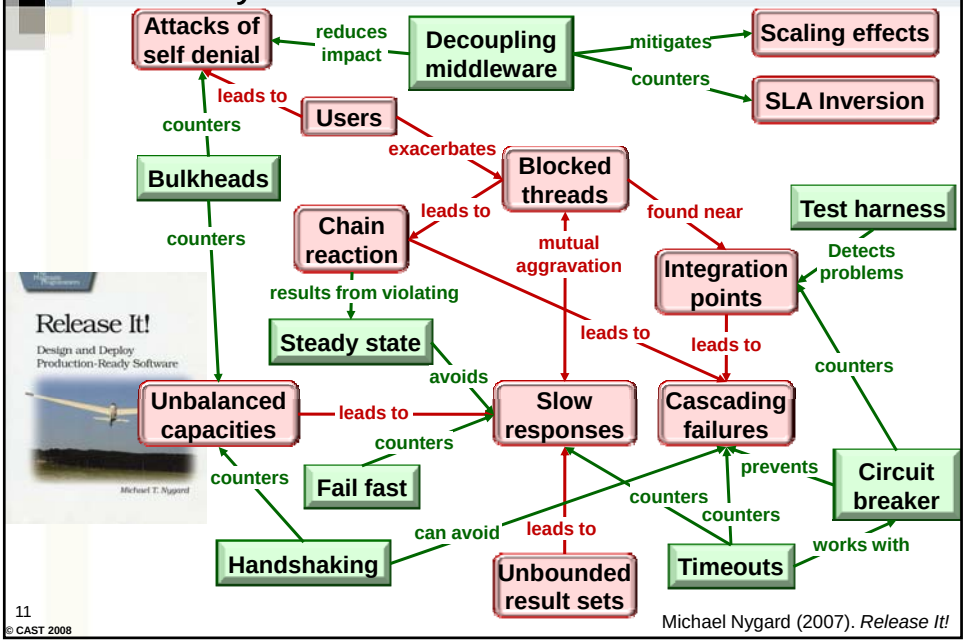
Quality ~~The degree to which a product meets its specified requirements~~

Problem—**Customers struggle to state functional requirements. They do not understand non-functional requirements.**



"…a failure to satisfy a non-functional requirement can be critical, even catastrophic…non-functional requirements are sometimes difficult to verify. We cannot write a test case to verify a system's reliability…The ability to associate code to non-functional properties can be a powerful weapon in a software engineer's arsenal."

Stability Anti-Patterns and Patterns



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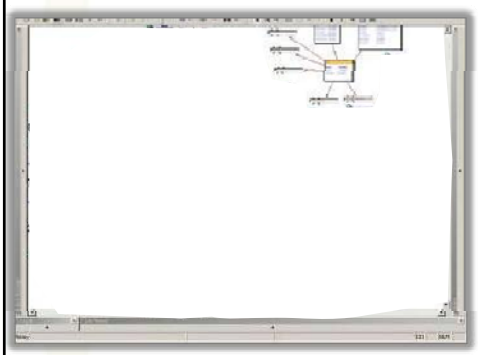
Michael Nygard (2007). *Release It!*

Application Quality vs. Code Quality



Application Quality

Application quality <u>also</u> measures how well the individual components work together to make up the overall business system

Code Quality

Code quality is the measure of individual components for compliance with standards and best practices in the context of a specific language

Good code quality ≠ Good application quality

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Supplementing Mature Processes

Application Quality Engineering supplements CMMI to unlock even more business value from applications

- CMMI focus – **process improvement – *Six Sigma***
- AQE focus – **product improvement – *Design for 6σ***

INNOVATE	**Goal-driven improvements**
QUANTIZE	**Statistical quality mgt.**
STANDARDIZE	**Tailorable quality processes**
STABILIZE	**Project quality practices**

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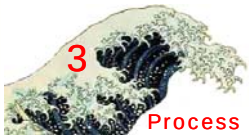
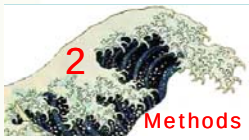
The 4th Wave in Software Engineering

What: Architecture, Quality characteristics, Reuse
When: 2005➔
Why: Ensure software is constructed to standards that meet the lifetime demands placed on it



What: CMM, ITIL, PMBOK, Agile
When: 1990-2005
Why: Provide a more disciplined environment for professional work incorporating best practices



What: Design methods, CASE tools
When: 1980-1990
Why: Give developers better tools and aids for constructing software systems

What: 3rd & 4th generation languages, structured programming
When: 1965-1980
Why: Give developers greater power for expressing their programs

How Do We Get to Dependable Software

National Research Council
Software for Dependable Systems

"As higher levels of assurance are demanded…testing cannot deliver the level of confidence required at a reasonable cost."

"The cost of preventing all failures will usually be prohibitively expensive, so a dependable system will not offer uniform levels of confidence across all functions."

"The correctness of the code is rarely the weakest link."

Jackson, D. (2009). Communications of the ACM, 52 (4)

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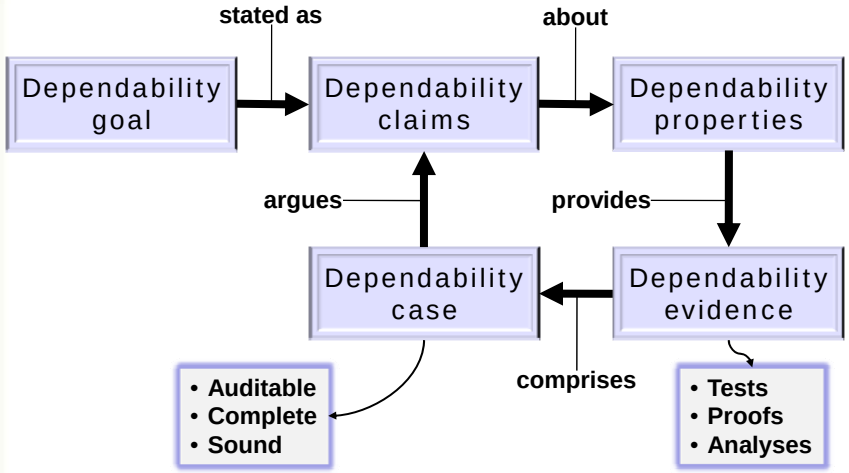
Presenting Dependability Cases

Objective Provide direct evidence that a system satisfies its dependability requirements



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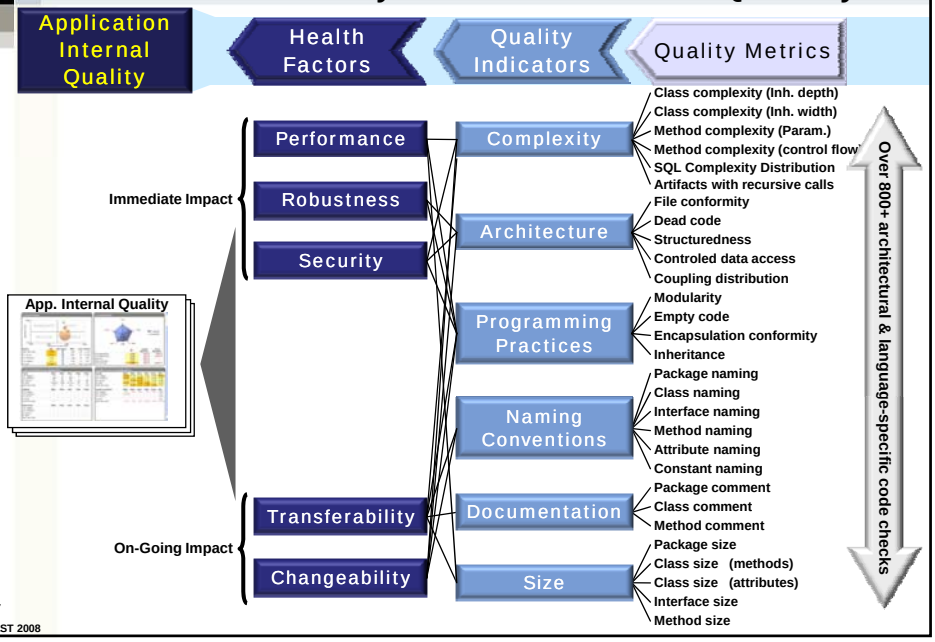
Structural Analysis of Software Quality



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Allianz Austria's Maintainability Results

Business Need: Reduce the application management costs of Allianz Austria's insurance management system – 300 RFCs and 700,000 lines of code modified every year – used to serve 10 million customers and process 8 million claims a year.

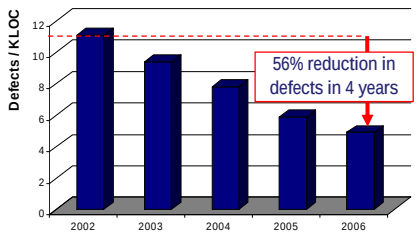
Allianz

Solution

- Enforce Allianz specific application quality rules to stabilize maintainability score
- Automatically assess and monitor the quality and maintainability of applications
- Provide standard enforcement reports to help AD teams remediate problems faster
- Integrate application quality processes into Allianz' Quality Management System

Benefits

- Maintainability stabilized despite a 40% increase in code volume over 4 years
- Improved delivery on new functionality by 230% while reducing application maintenance costs by 20% over 3 years
- 56% reduction in defects in four years



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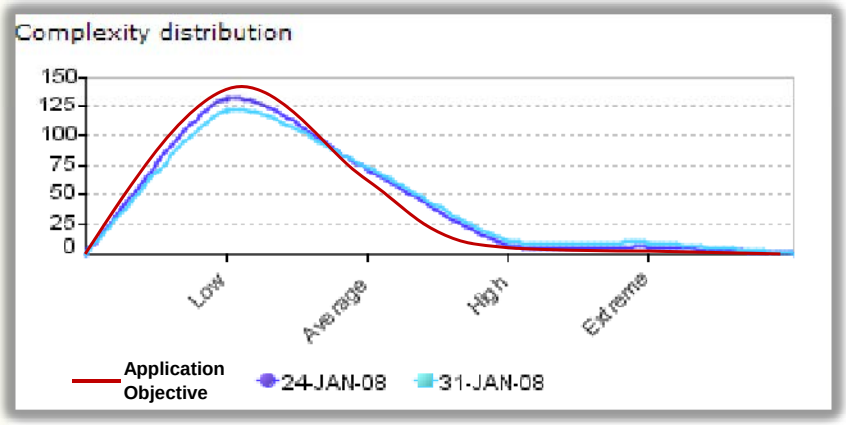
Using Measures to Control Quality



Measures should be managed as distributions

Beware arbitrary thresholds—derive them statistically

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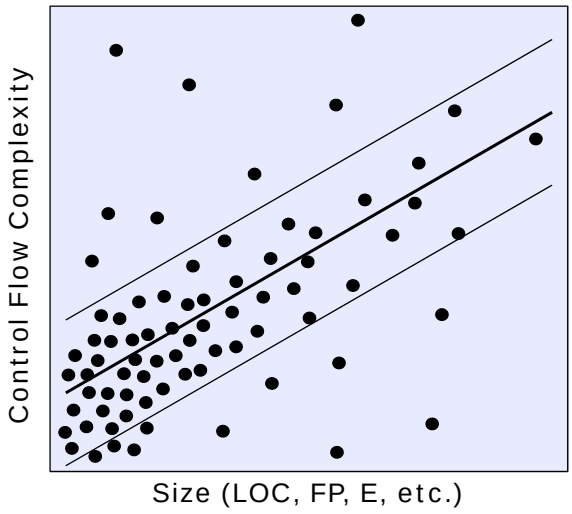
Using Measures Diagnostically



Departures from statistically derived relationships among the attributes of a component indicate the possibility of code pathologies

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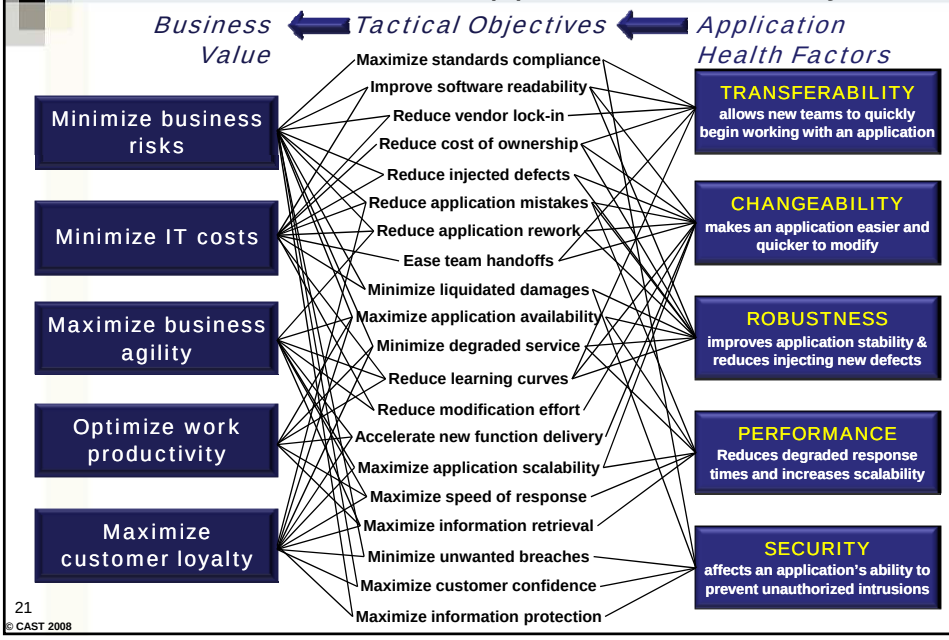
Business Value & Application Quality



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Consortium for IT Software Quality

CISQ

IT organizations, Outsourcers, Agencies, Experts

IT & AD Executives

Technical experts

Carnegie Mellon Software Engineering Institute

OMG OBJECT MANAGEMENT GROUP

Define industry issues
Drive standards adoption
Buildappraiser program

→

Create quality standard
Developer certification
Integrate with standards

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