

The Global State of Structural Quality in Business Applications

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CEE-SEC(R)
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Bad Structural Quality Is Expensive

LEGAL/REGULATORY | AUGUST 2, 2012, 9:07 AM | 357 Comments
Knight Capital Says Trading Glitch Cost It \$440 Million
BY NATHANIEL POPPER

3 August 2012 Last updated at 12:38 ET
1.2K Share f t e
RBS to pay out £125m over computer glitch

REUTERS EDITOR: U.S. News & Markets Sectors & Industry
London Stock Exchange crippled by system outage

Online Banking Down at J.P. Morgan for Over 22 Hours
Wednesday, September 15, 2010
By James
Global financial services firm J.P. Morgan Chase & Co. suffered from an electricity outage Monday, inconveniencing millions of customers availing of their online banking services. A spokesman, however, assured that the service became unavailable due to technical reasons and not because of hackers invading their system.
The outage lasted for more than 22 hours, J.P. Morgan Chase Chief Executive said Monday. The bank apologized for the hold off on services during the outage, which affected millions of iPhone users.

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Investors Abandon Reeling Netflix
Amazon's Prof Plunges

THE WALL STREET JOURNAL. PERSONAL TECHNOLOGY
GADGETS & GAMES | JULY 27, 2010
Citi Discloses Security Flaw in Its iPhone App
Article NEW Stock Quotes Comments (18)
Email Print Save This Like + More Text
By SPENCER E. ANTE
Citigroup Inc. said its free U.S. mobile-banking application for Apple Inc.'s iPhone contained a security flaw and advised its customers to upgrade to a newer version that corrects the problem.
In an incident that highlights the growing security challenges around wireless apps, Citi said its iPhone app accidentally saved information—including account numbers, bill payments and security access codes—in a hidden file on users' iPhones. The information may also have been saved to a user's computer if it had been synced with an iPhone.

EUROPE TECHNOLOGY | OCTOBER 11, 2011
BlackBerry Suffers Outage in Europe
Article Stock Quotes Comments (1)
BY LILLY VITOROVICH AND WILL CONNORS
Several European wireless carriers said subscribers on Monday experienced disruptions in BlackBerry service, with some blaming the outage on BlackBerry maker Research In Motion Ltd.
The problems appeared to be limited to accessing the Internet, instant messaging and roaming in Europe, though ...

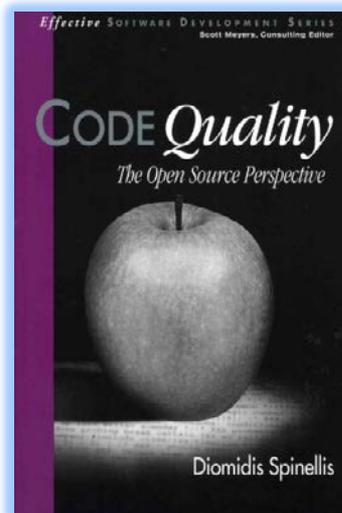
London Stock Exchange
By Daisy Ku and Dominic Lau
LONDON | Mon Sep 8, 2008 1:47pm EDT
(Reuters) - The London Stock Exchange (LSE) suffered its worst systems failure in eight years on Monday, forcing the world's third largest share market to suspend trading for about seven hours and infuriating its users.
The problem occurred on what could have been one of London's busiest trading days.

Testing is Not Enough



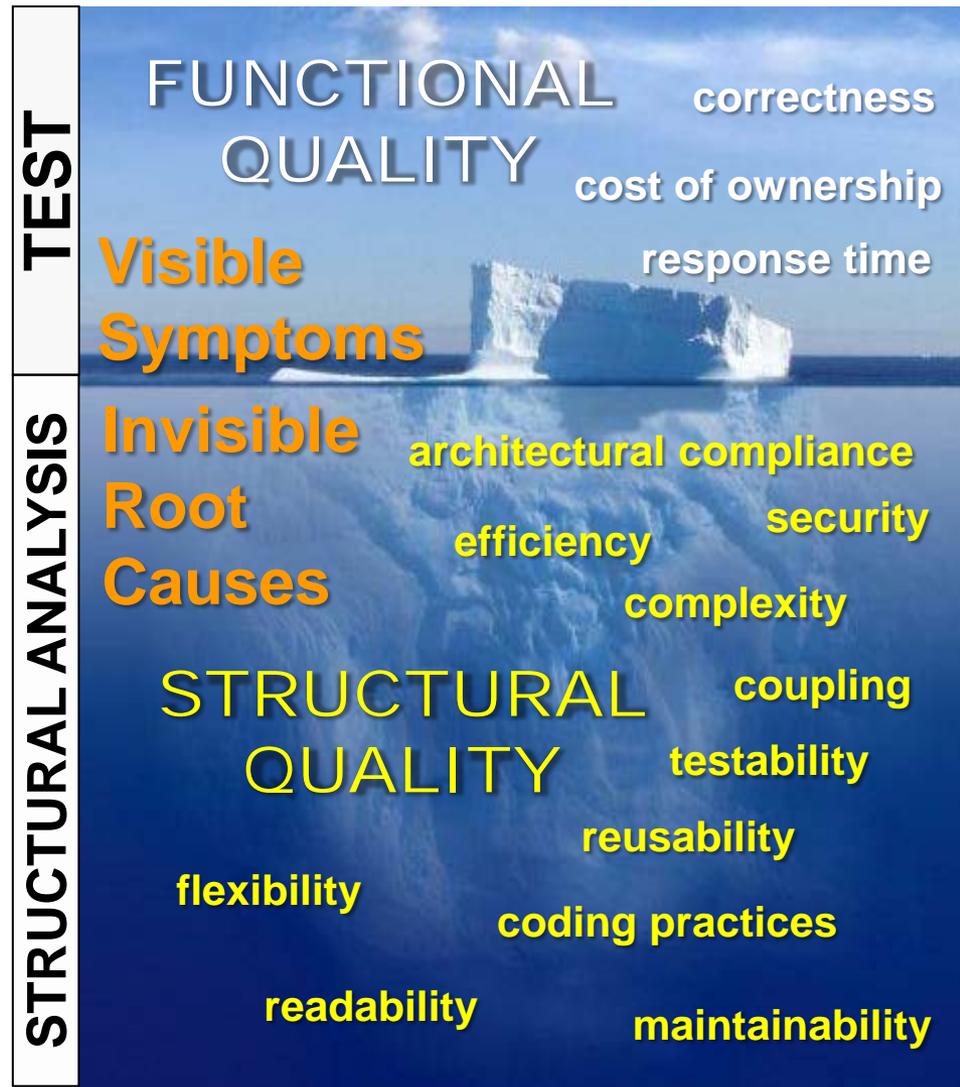
“As higher levels of assurance are demanded...testing cannot deliver the level of confidence required at a reasonable cost.”

“The correctness of the code is rarely the weakest link.”



“...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.”

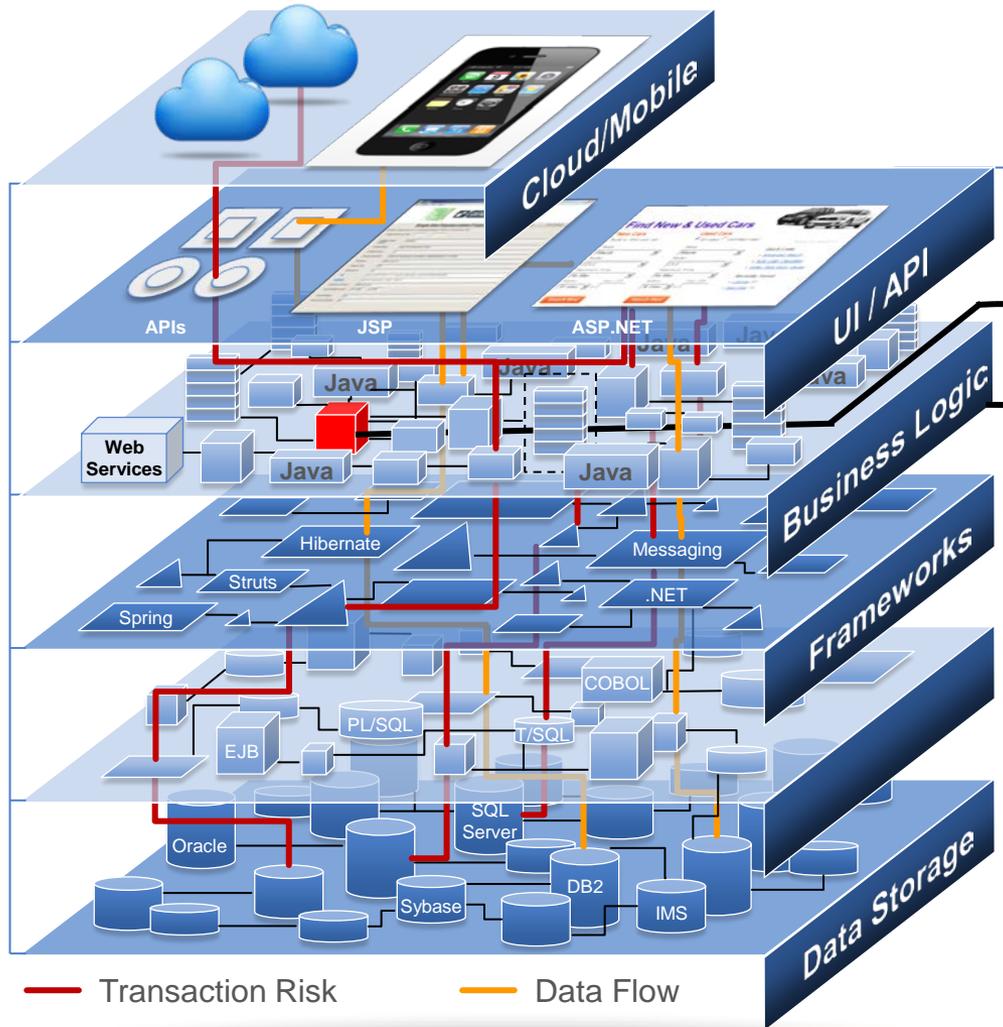
Software Quality Iceberg



Source: Code Complete, Steve McConnell

3 Levels of Structural Quality Analysis

Architecture Compliance



1 Unit Level

- Code style & layout
- Expression complexity
- Code documentation
- Class or program design
- Basic coding standards
- Developer level

2 Technology Level

- Single language/technology layer
- Intra-technology architecture
- Intra-layer dependencies
- Inter-program invocation
- Security vulnerabilities
- Development team level

3 System Level

- | | |
|----------------------------|-----------------------------------|
| ▪ Integration quality | ▪ Function point, |
| ▪ Architectural compliance | ▪ Effort estimation |
| ▪ Risk propagation | ▪ Data access control |
| ▪ Application security | ▪ SDK versioning |
| ▪ Resiliency checks | ▪ Calibration across technologies |
| ▪ Transaction integrity | ▪ IT organization level |

Software Engineering's 4th Wave



What: Architecture, Structural Quality, Reuse
When: 2002→
Why: Ensure software is constructed to standards that meet its lifetime demands



What: CMM/CMMI, ITIL, PMBOK, Agile
When: 1990-2002
Why: Provide a more disciplined environment for professional work using best practices



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



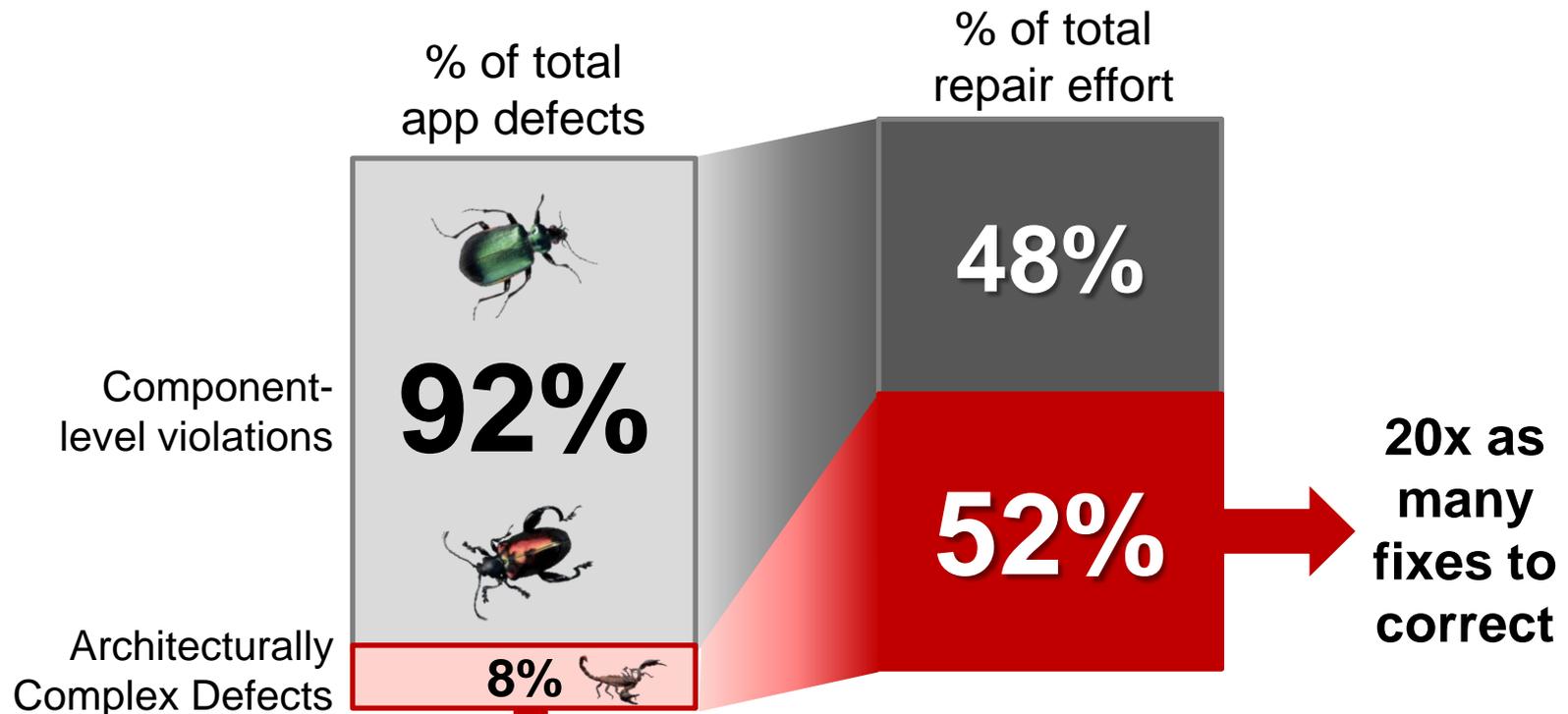
What: 3rd & 4th generation languages, structured programming
When: 1965-1980
Why: Give developers greater power for expressing and understanding their programs



Architecturally Complex Defects

Architecturally Complex Defect

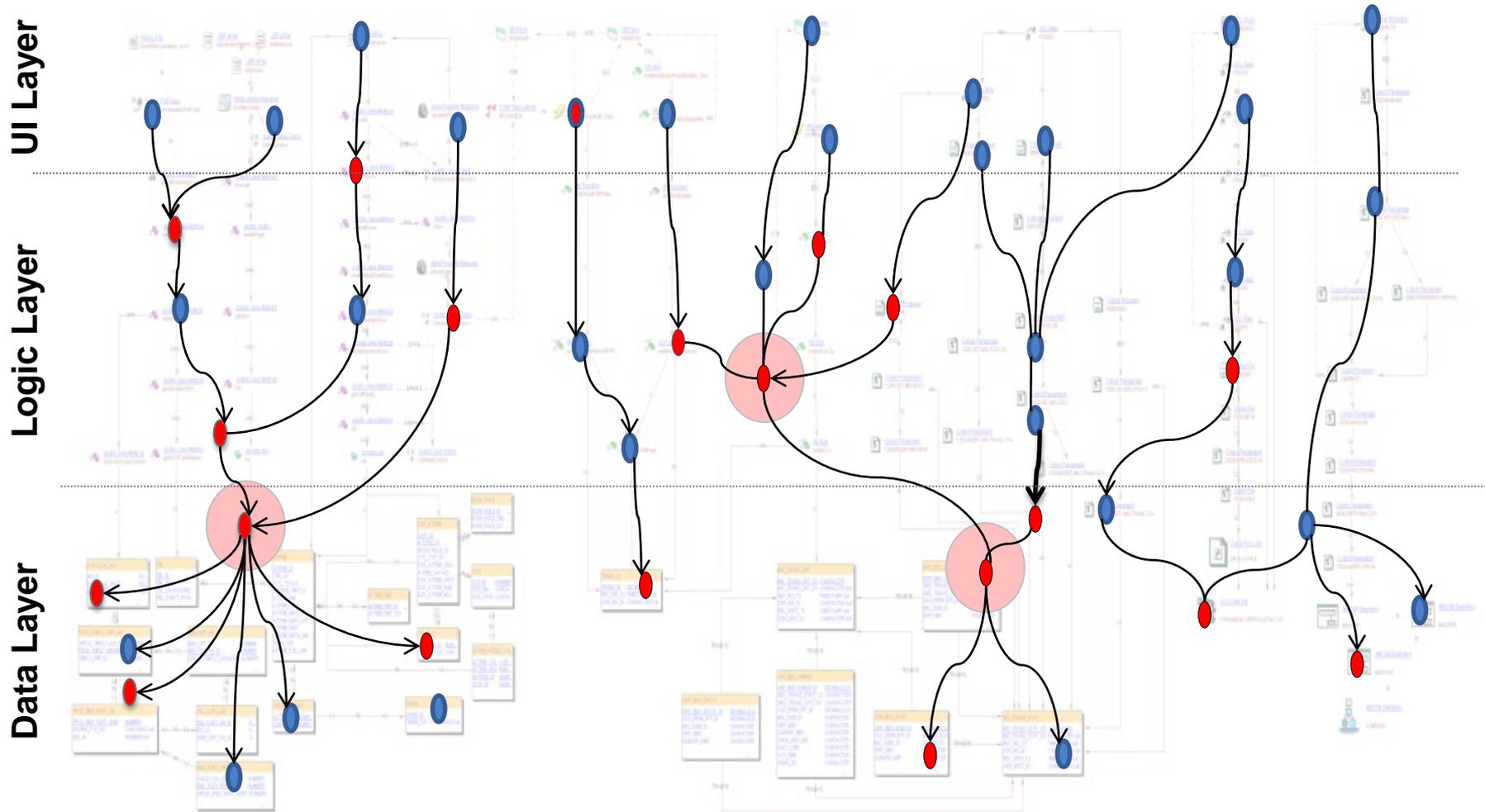
A structural flaw involving interactions among multiple components that reside in different application layers



80% of architecturally complex defects touch an **Architectural Hotspot**—a badly designed component causing problems

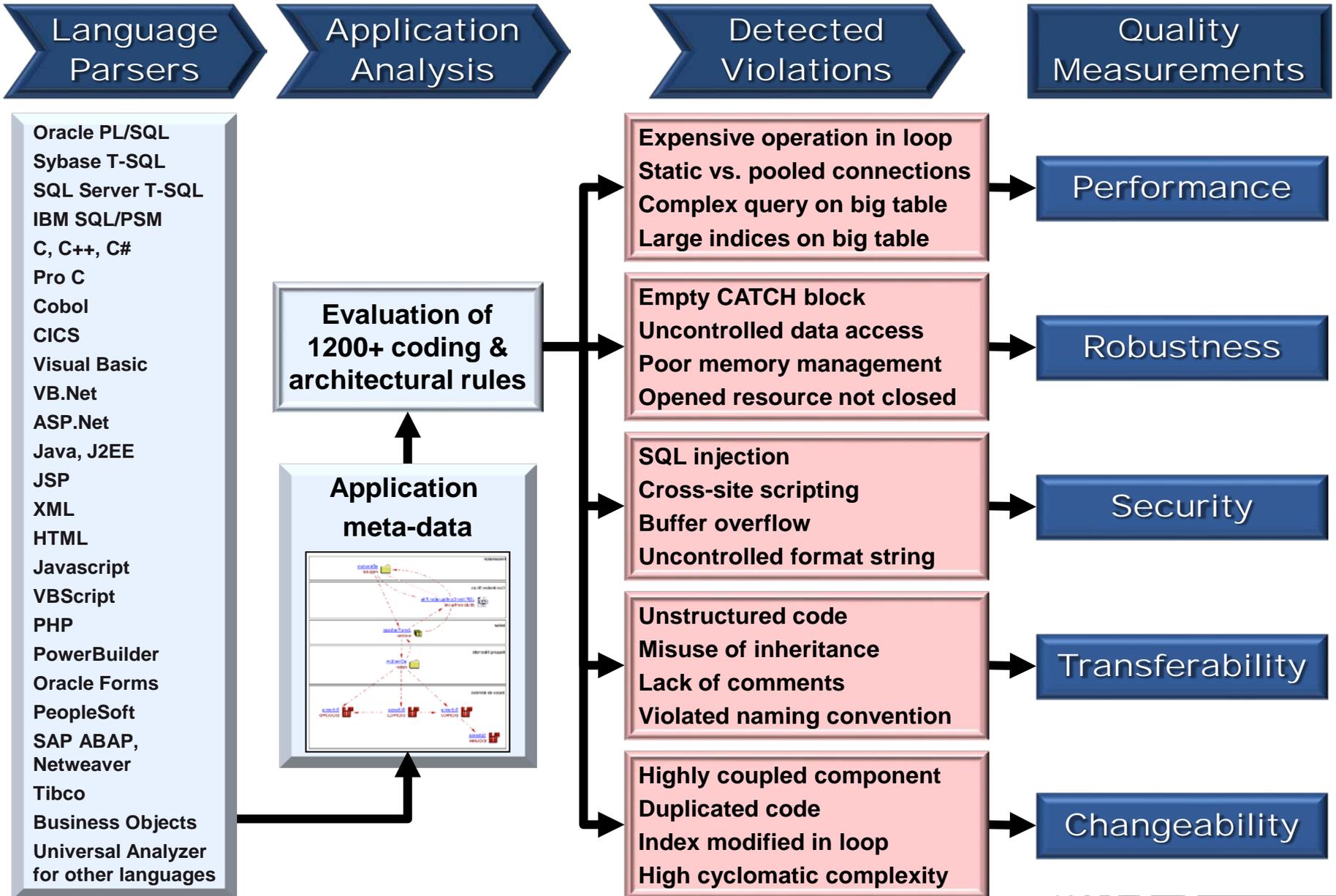
Architectural hotspots provide a roadmap for remediating the worst risk, rework, and cost drivers

Detecting Architectural Hotspots



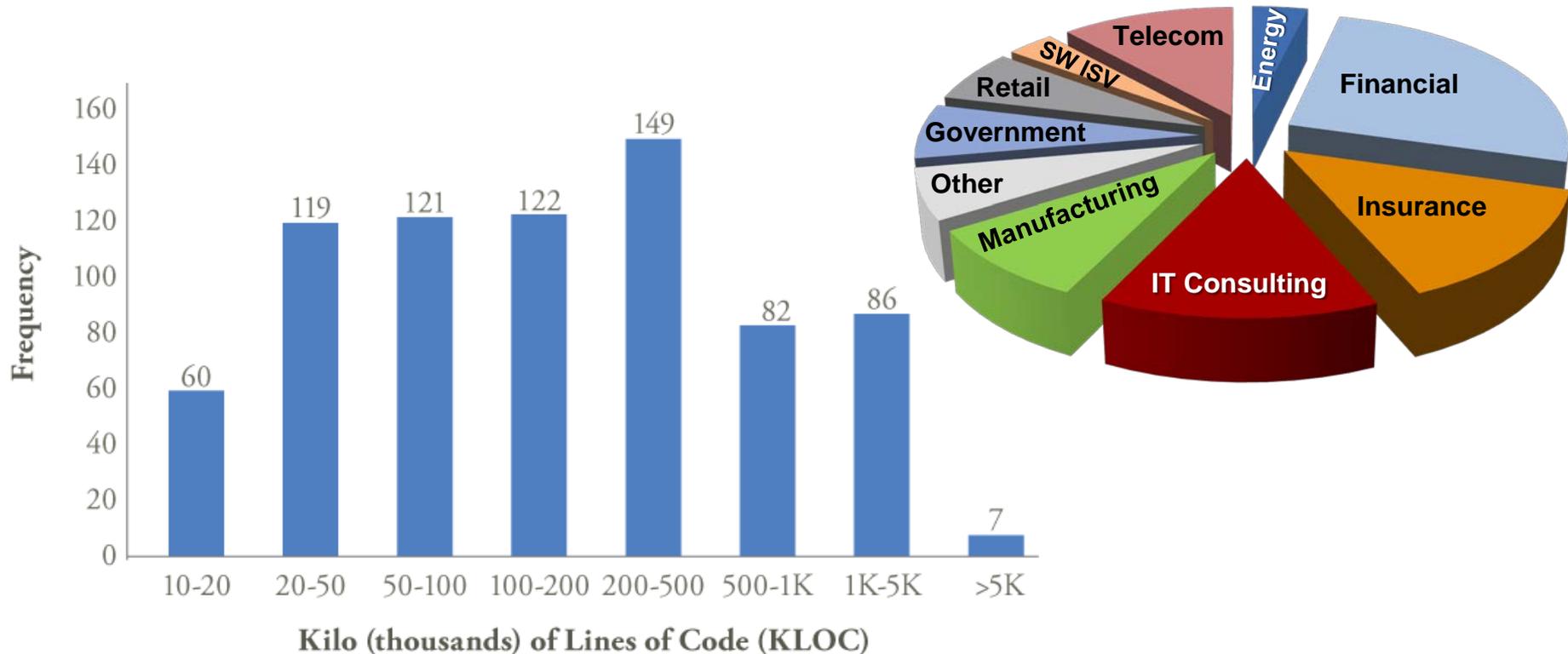
System Level analysis allows detection architectural hotspots

CAST's Application Intelligence Platform

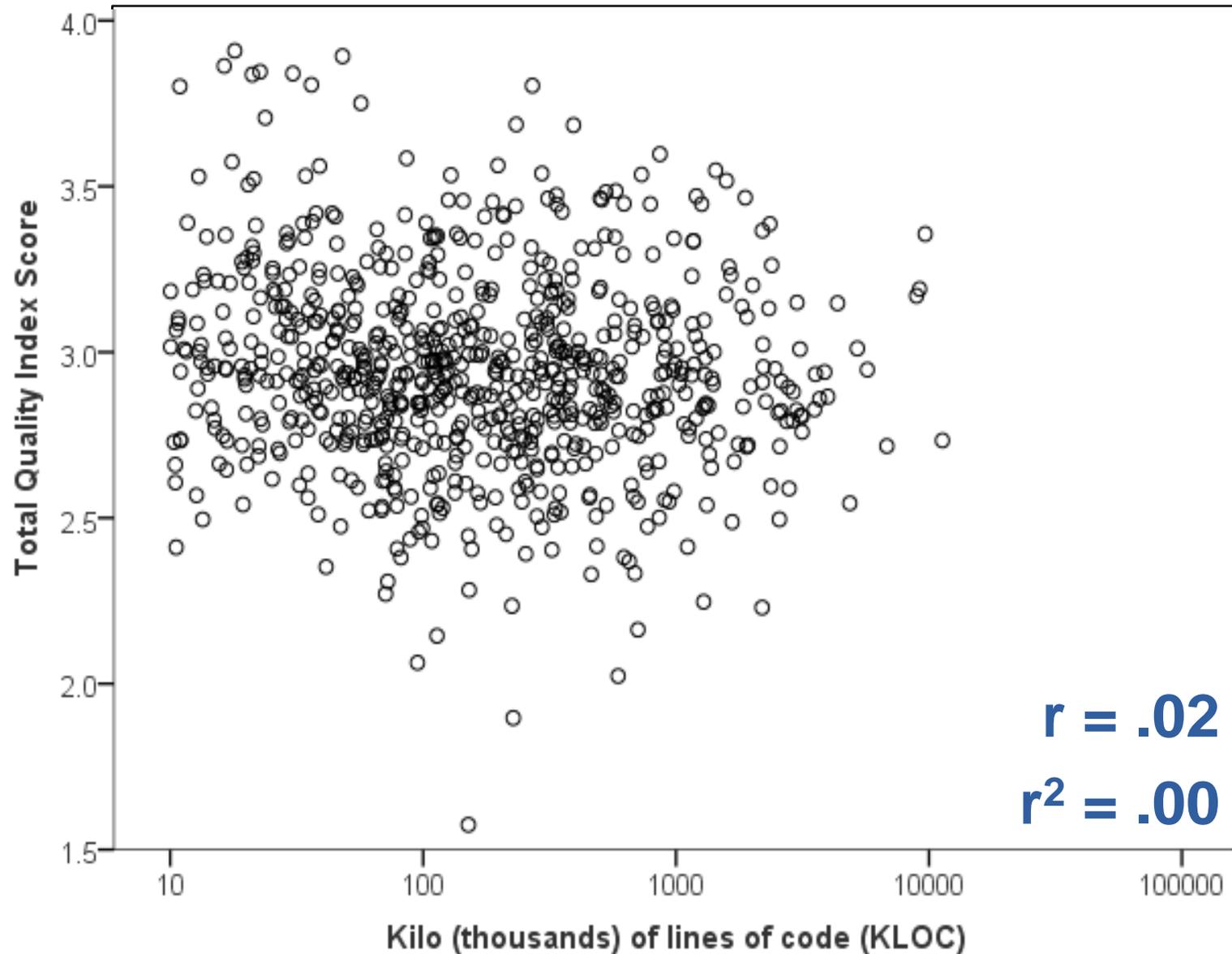


Appmarq Structural Quality Repository

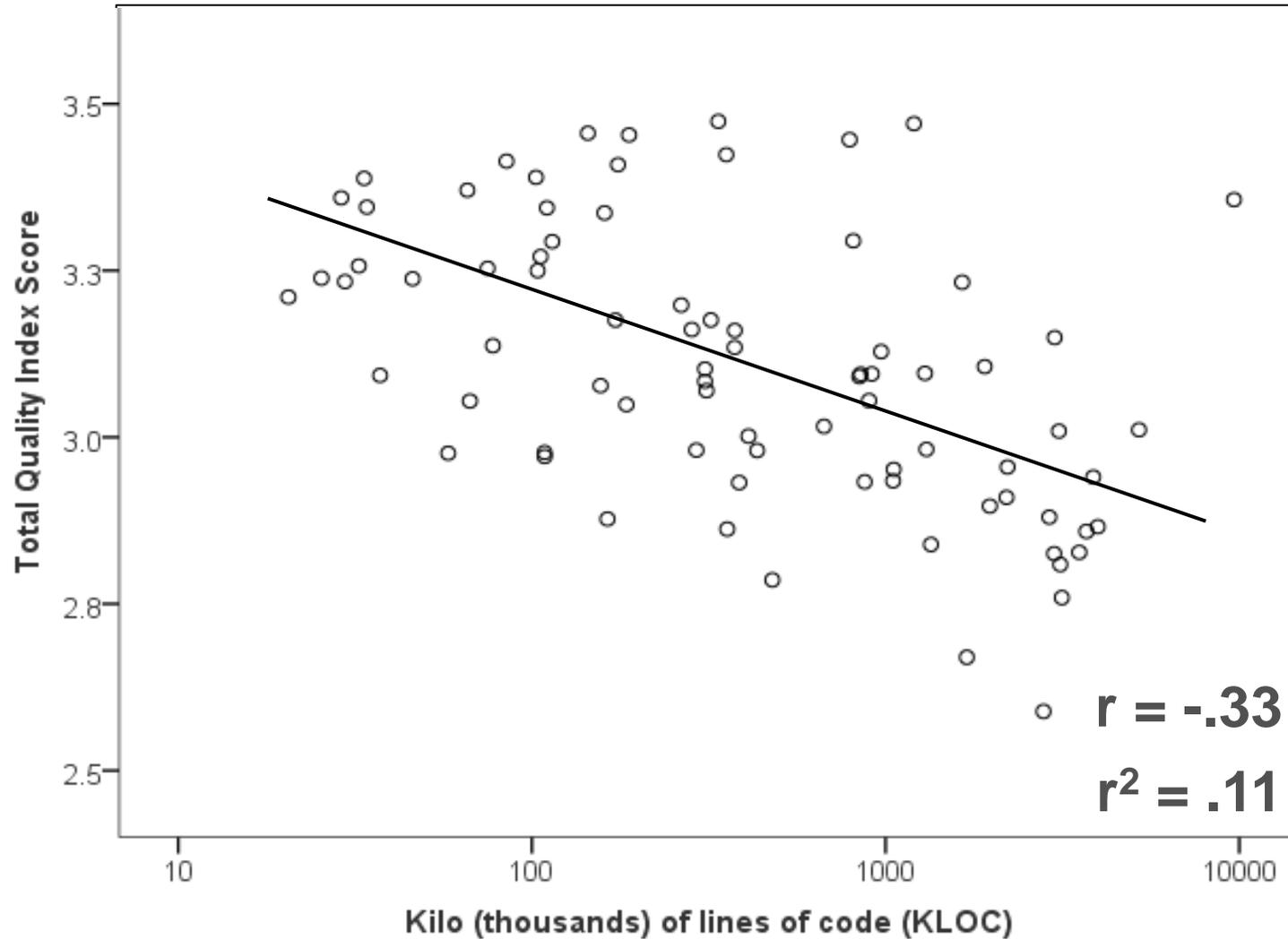
- CAST's repository of structural quality data
 - 745 Applications
 - 160 Companies, 14 Countries
 - 321,259,160 Lines of Code; 59,511,706 Violations



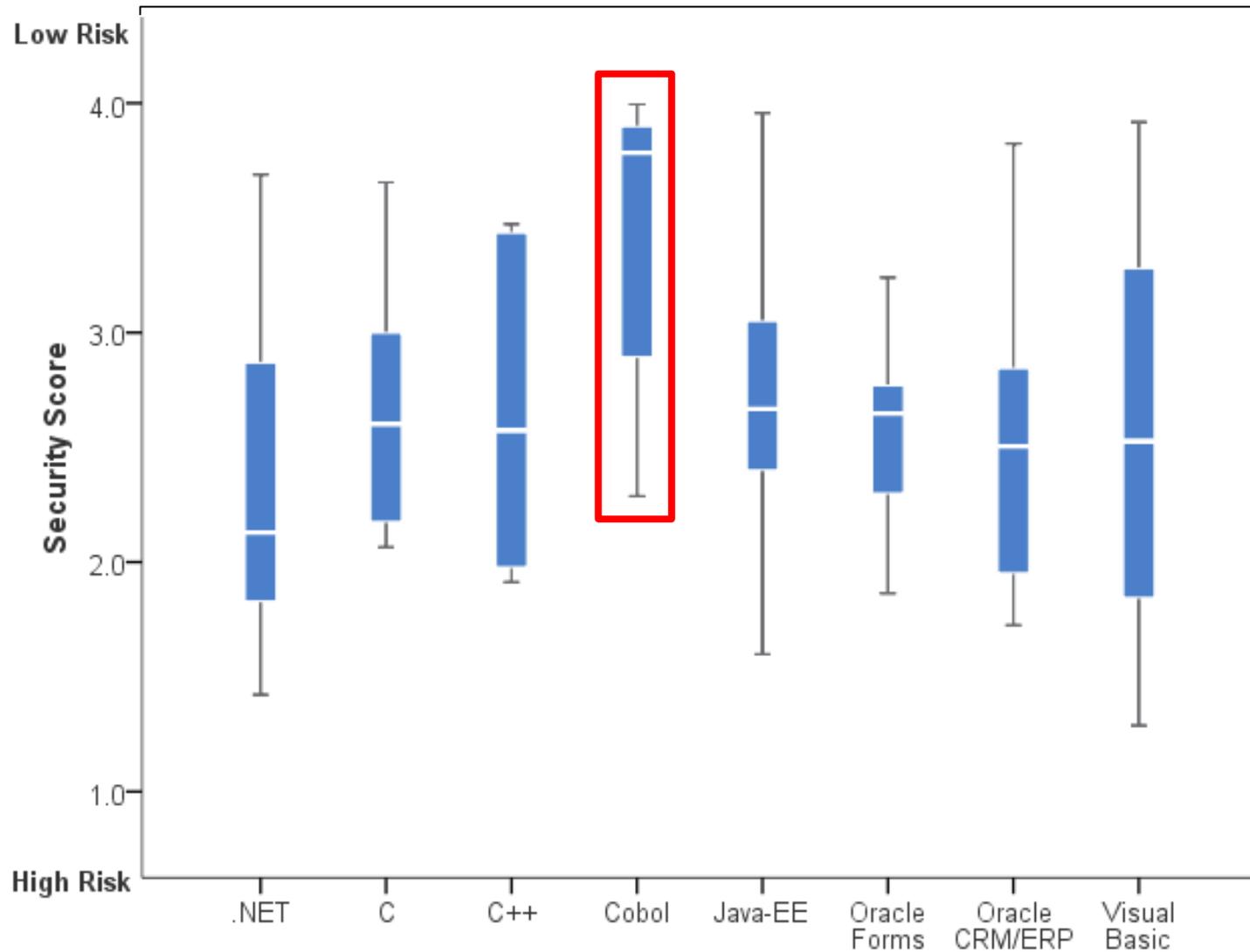
Structural Quality Unrelated to Size



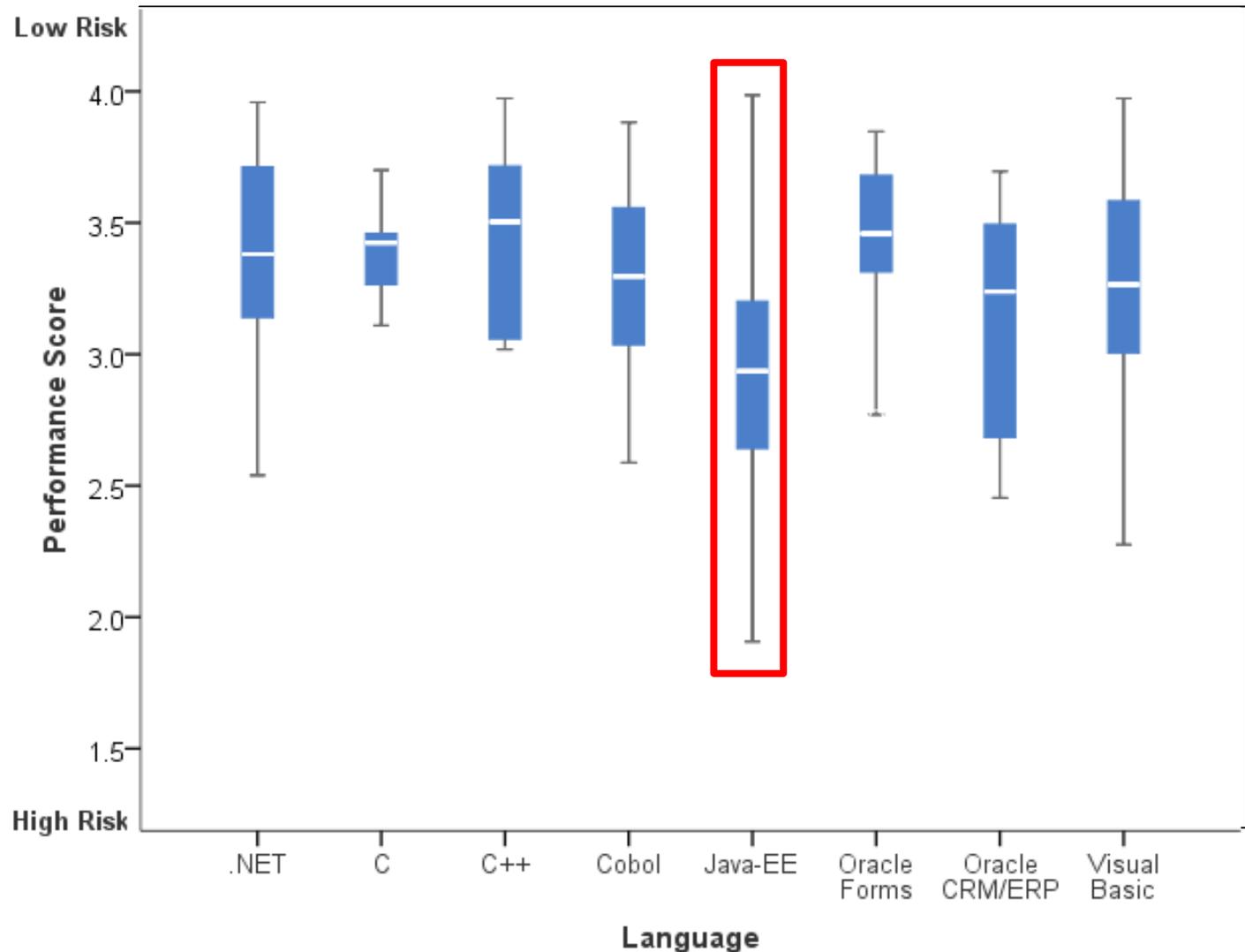
...Except for COBOL



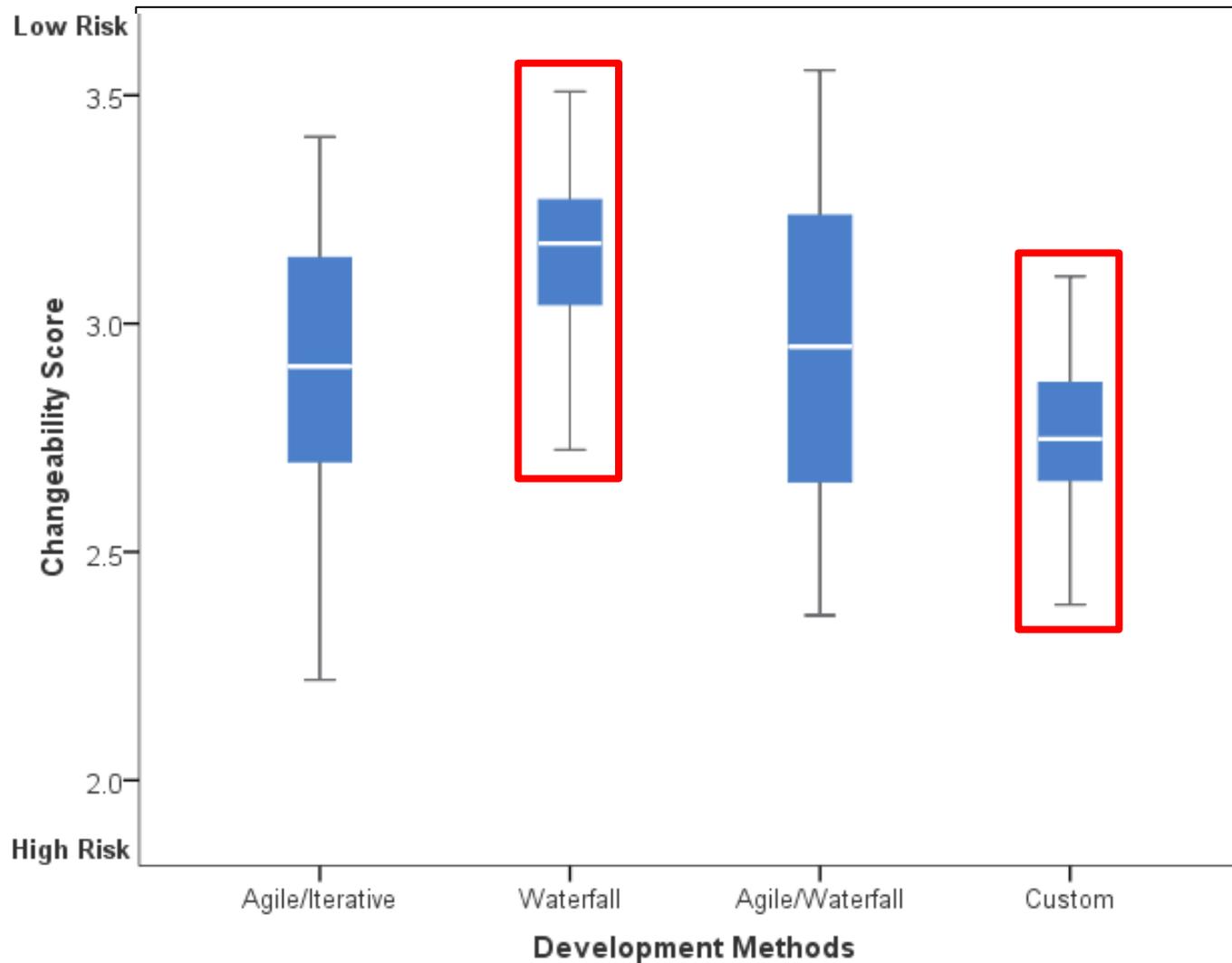
Security Scores by Language



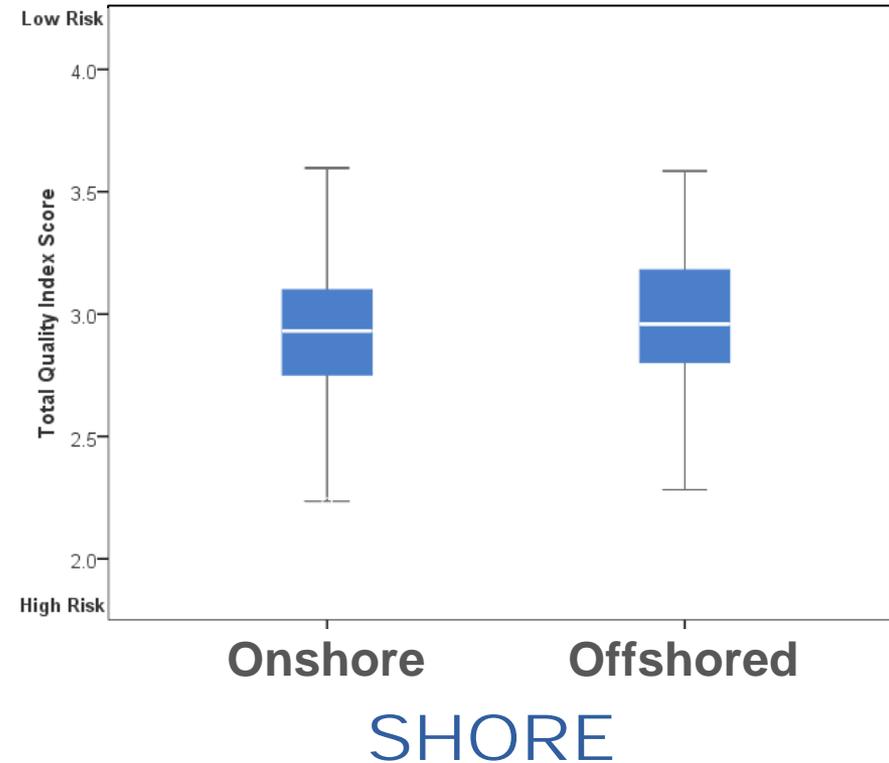
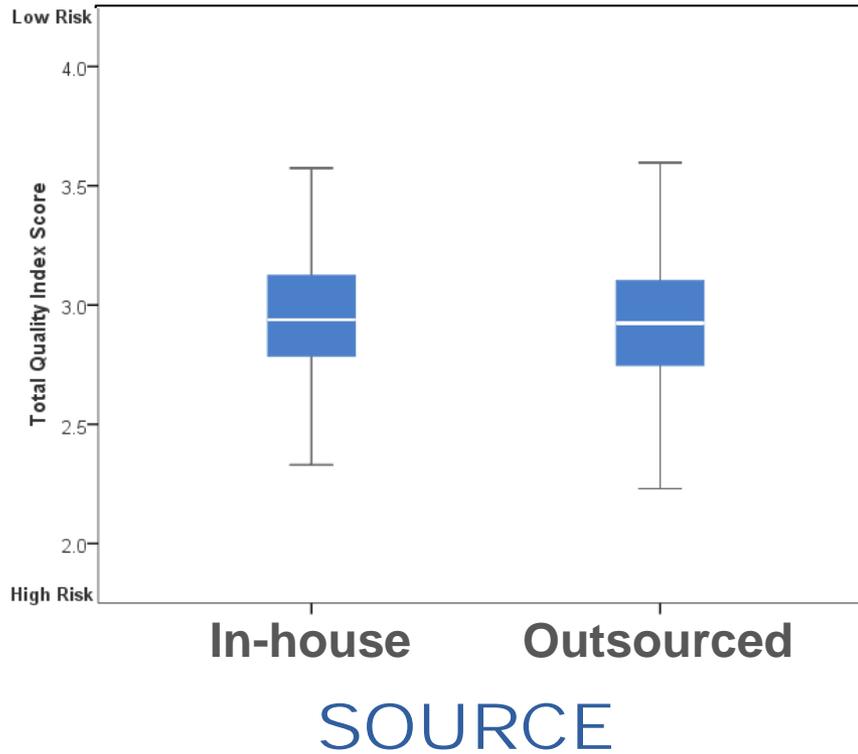
Performance Scores by Language



Changeability Scores by Method

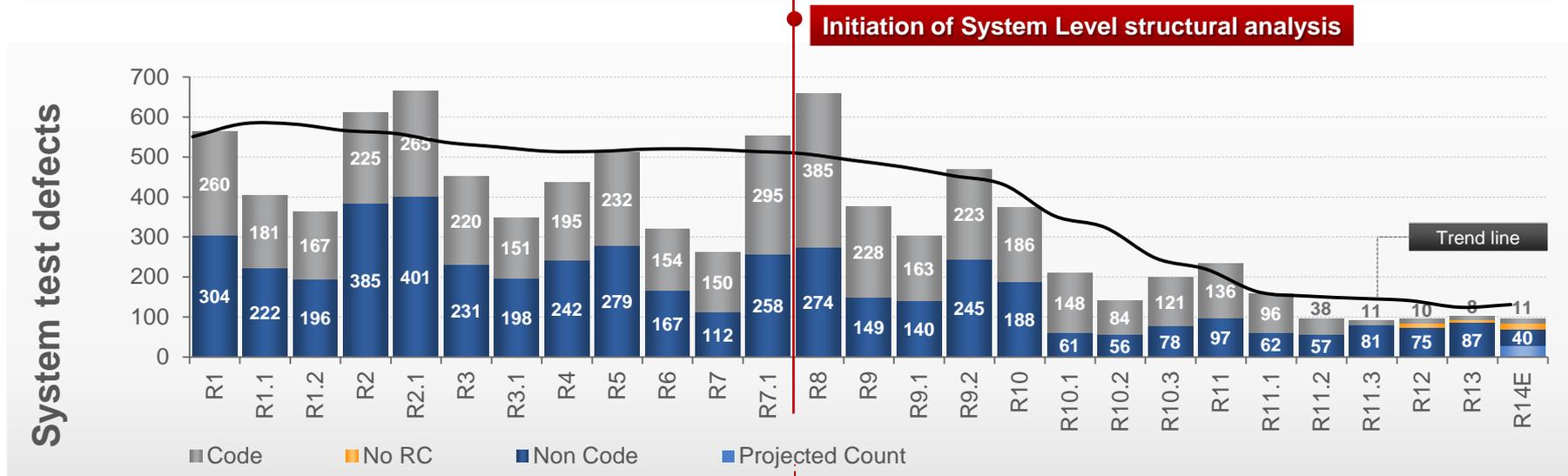
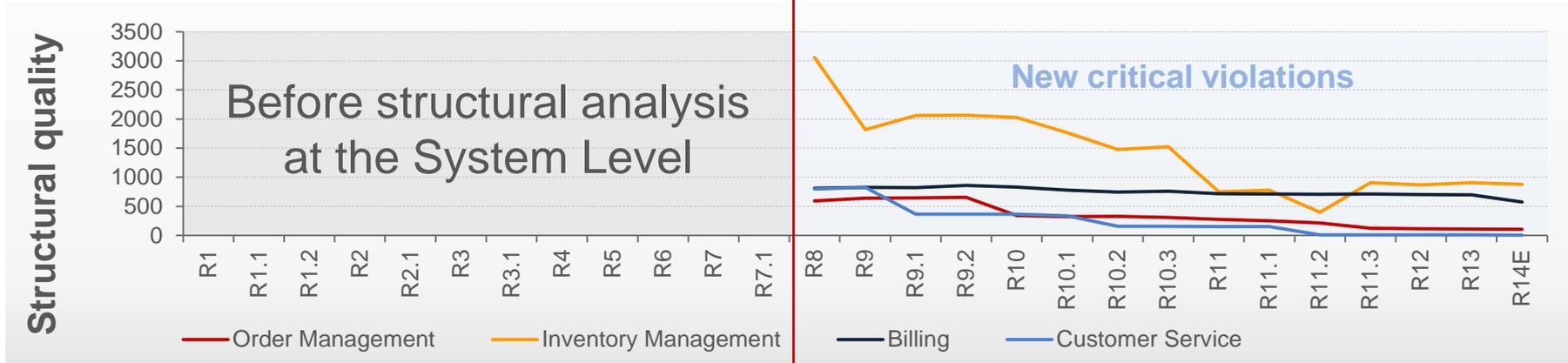


No Differences by Source or Shore

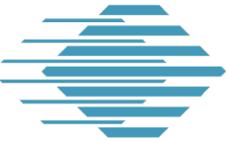


Structural Analysis Reduces Risks/Costs

TELECOM CLIENT STUDY OVER 24 MONTHS



Consortium for IT Software Quality



Carnegie Mellon
Software Engineering Institute



Co-sponsorship

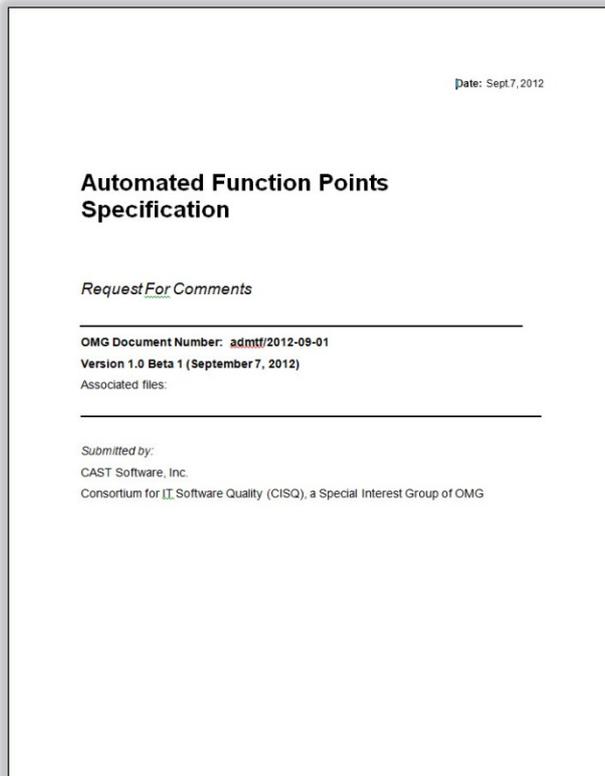
IT
Executives

CISQ

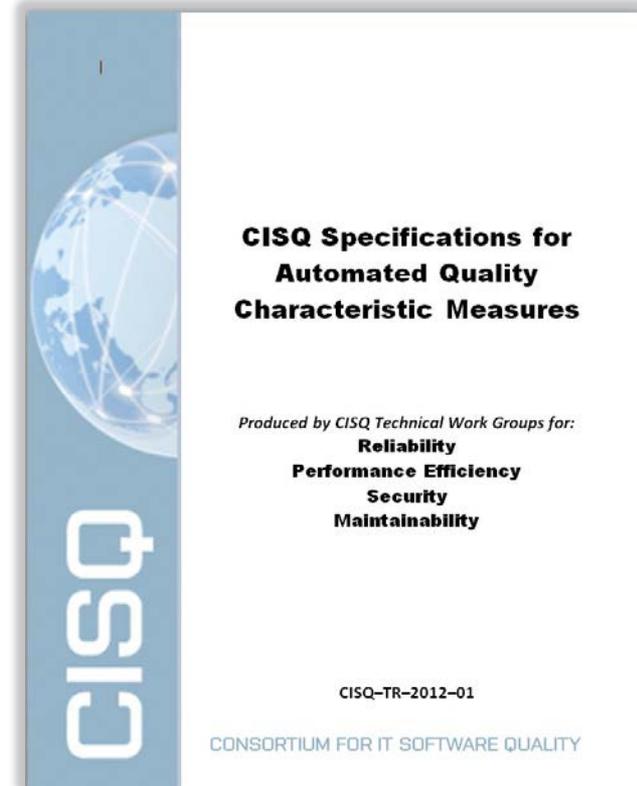
Technical
experts



Recent CISQ Events



OMG Architecture Board approved the Automated Function Point spec for a 3-month public review leading to final approval at the Dec. OMG meeting



On 9/12 CISQ released specifications for automated measures of Reliability, Performance Efficiency, Security, and Maintainability

Global Trends

- Reducing operational risk is valued over reducing cost of ownership
- Code produced with Agile methods could have higher cost of ownership
- Sourcing and shoring choices do not affect structural quality
- Structural quality measures are being used as Service Level Agreements in contracts

But.....

- **STRUCTURAL QUALITY MUST IMPROVE**

