New CISQ/OMG Automated Source Code Technical Debt Standard

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What is CISQ?

CISQ is chartered to define automatable measures of software size and quality that can be measured in the source code, and promote them to become Approved Standards of the OMG®
What Is Technical Debt?

“Shipping first time code is like going into debt. A little debt speeds development so long as it is paid back promptly with a rewrite…Every minute spent on not-quite-right code counts as interest on that debt.”

- Ward Cunningham, OOPSLA, 1992

Although the Agile Alliance describes defects as “Quality Debt”, industry most often treats defects and sub-optimized design jointly as ‘Technical Debt’ because they incur a corrective maintenance cost.

Strategic tradeoff

The cost of shipping sub-optimal code versus the business benefit derived

Industry Use

The correction costs and interest related to flaws that must be removed
Technical Debt — future cost of fixing severe architectural and coding flaws in released software, part of cost of ownership

- **Business Risk**
  - Opportunity cost
  - Liability from debt

- **Technical Debt**
  - Interest on the debt
  - Principal borrowed

  **Opportunity cost** — benefits that could have been achieved had resources been devoted to new capabilities rather than retiring technical debt

  **Liability** — business costs related to outages, breaches, corrupted data, etc.

  **Interest** — continuing IT costs attributable to the flaws causing technical debt, i.e., greater developer effort, greater resource usage, etc.

  **Principal** — cost of fixing architectural and coding flaws in released code that must be removed

What IT Management Wants

- Predict corrective maintenance costs
- Identify troubled applications
- Guide repair-or-replace decisions
- Evaluate team capability

Technical Debt measure
CISQ/OMG Measure Standards

- Automated Function Points
- Reliability
- Performance Efficiency
- Security
- Maintainability

OMG

Approved Standards

ISO Fasttrack

Deployment Workshops

CISQ Exec Forum
## Content of CISQ Measures

### CISQ Quality Characteristic Measures

<table>
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<tr>
<th>Category</th>
<th>Measures</th>
<th>Example architectural and coding weaknesses composing CISQ measures</th>
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| **Security**      | 22 weaknesses (from Top 25 CWEs) | • SQL injection  
                    |                                                                | • Cross-site scripting  
                    |                                                                | • Buffer overflow  
                    |                                                                | • Empty exception block  
                    |                                                                | • Unreleased resources  
                    |                                                                | • Circular dependency  
| **Reliability**   | 29 weaknesses                   | • Expensive loop operation  
                    |                                                                | • Un-indexed data access  
                    |                                                                | • Unreleased memory  
| **Performance**   | 15 weaknesses                   | • Excessive coupling  
                    |                                                                | • Dead code  
                    |                                                                | • Hard-coded literals  
| **Efficiency**    |                                 |                                                                |
| **Maintainability**| 20 weaknesses                  |                                                                |
Reliability

Performance Efficiency

Security

Maintainability

Technical Debt

Correlate of effort to fix structural quality problems that must be addressed

Large component of cost of quality
**CISQ Technical Debt Calculation**

1. **Application Technical Debt**
   - Sum total hours of all four quality characteristics

2. **Quality charac. Technical Debt**
   - Sum total hours of weaknesses in a quality characteristic

3. **Specific weakness Technical Debt**
   - Sum adjusted values for the instances of the weakness

4. **Default hours to fix a single instance of a specific weakness**

**Adjustment factors**
- Structural complexity
- Call graph exposure
- Language diversity
- Weakness concentration
- Threshold gap
Automated Function Points

Measure both functional and non-functional code segments

Automated Enhancement Points

Add future effort to fix defects into current productivity baselines

Quality-Adjusted Productivity

Estimate the correction costs in future releases

Automated Technical Debt

Four Quality Characteristic Measures

Extensions to Embedded Software

Measure both functional and non-functional code segments
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Consortium for IT Software Quality

The Consortium for IT Software Quality™ (CISQ™) is an IT industry leadership group comprised of IT executives from the Global 2000, system integrators, outsourced service providers, and software technology vendors committed to introducing computable metrics standards for measuring software quality & size. CISQ is a neutral, open forum in which customers and suppliers of IT application software can develop an industry-wide agenda of actions for improving IT application quality to reduce cost and risk.

Register for the Jan 16 Technical Debt Webinar with Dr. Bill Curtis

Access the Cyber Resilience Summit Knowledge Repository here

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