DCG Application Intelligence Service: Engineering Review Support

Improve Software Engineering with Data rather than Opinion

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**Health Factors for Module HR Legacy - Date in 31-JAN-08 [31-JAN-08] snapshot**

Assessment of the quality of the selected component. Click on the hyperlinks below to see the application risk factors for the current context - component and snapshot.

<table>
<thead>
<tr>
<th>Health Factors</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transferability</td>
<td>2.85</td>
</tr>
<tr>
<td>Changeability</td>
<td>2.95</td>
</tr>
<tr>
<td>Robustness</td>
<td>2.72</td>
</tr>
<tr>
<td>Performance</td>
<td>2.82</td>
</tr>
<tr>
<td>Security</td>
<td>2.84</td>
</tr>
</tbody>
</table>

**Technical Quality Index**

- 31-JAN-08: 2.82
- 24-JAN-08: 2.62

**SEI Maintainability**

- 31-JAN-08: 3.65
- 24-JAN-08: 3.65

Technical Quality and SEI Maintainability assess the cost and difficulty/ease to maintain an application in the future. Technical Quality is based on 100s of metrics about the source code. SEI Maintainability is based on statistics about 100s of development projects.
Your Teams are producing software for the business every day

Is it unreliable, hard to change, and expensive to maintain...

...or rock solid, malleable, and inexpensive to enhance?

Do your teams have the right visibility into what they (or vendors) are producing and maintaining?
Challenges Software Development Leaders Face Today: Visibility, Value, Facts for decisions

- Complex Development/Production environments
  - Legacy / Objects / 100+1 languages and operating systems
  - Insource / Outsource / Homegrown / third party
  - Server / Web / co-located / Virtual / Cloud / SOA / Middleware / Software everywhere
- 24 x 7 Global operations: There is no tomorrow…
- Economic projections means…
  - Slower growth and tighter IT budgets
  - Competitive survival pressure increases (less food in the forest)
  - Fear replaces reason in driving decisions
- Executive perception is reality…
  - Anecdotal news (bad news travels faster than speed of light)
  - Hard data often lacking to balance opinions
A recognized player, with a solid and growing market presence

<table>
<thead>
<tr>
<th>Analysts Strongly Endorse CAST</th>
<th>Major Service Providers Use and Promote CAST</th>
<th>250+ Global Enterprises Rely on CAST</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Gartner]</td>
<td>[IBM] [CSC]</td>
<td>[at&amp;t] [CREDIT SUISSE]</td>
</tr>
<tr>
<td>[IDC] [FORRESTER]</td>
<td></td>
<td>[Capgemini] [accenture]</td>
</tr>
<tr>
<td>[ovum]</td>
<td></td>
<td>[AIRBUS] [sanofi aventis]</td>
</tr>
<tr>
<td>[CISQ]</td>
<td></td>
<td>[Atos] [Origin]</td>
</tr>
<tr>
<td>[OMG] [Software Engineering Institute]</td>
<td></td>
<td>[Deloitte] [tpi]</td>
</tr>
<tr>
<td>[U.S. Department of Homeland Security]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Quality is more than defect reduction..... A hidden drag on IT and business performance

Unnecessary IT Cost

Management Disconnect from Root Causes

Drag on Business Productivity

Clumsy Construction: Bring back contractors to rework 40% of code and throw more CPU at it

Delayed Launch: Competition got there first

Sub-par Productivity: Maintenance costs out of control; Skills mismatches

Falling Customer Sat: Tele-reps waste time; wait times rise

Poor Resource Allocation: Uncertainty whether cheaper labor is really more productive

Unpredictable Disruptions: Customers move to other online competitors

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Engineering Reviews: AC and BC

Before Code Peer Reviews focus on
- creating consensus on “what” the system will do to fulfill “expectations”
- can find significant “potential defects” during this stage

Before Code
- Requirements
- Design

After Code
- Coding
- Testing

After Code Peer Reviews focus on
- Workmanship issues on “how well” a team translates requirements/design into actual working code
- Defects in testing results that may or may not be connected to workmanship

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...Engineering Reviews need more than opinion they need FACTS

- Every development group defines their own definition of quality
- To transform Engineering Reviews, minimize opinion by focusing on workmanship or software craft facts
- Application Intelligence for Engineering Reviews arms you with factual data to which to drive the right kind of conversations on quality code workmanship

Application Intelligence

Robustness

Performance

Security

Transferability

Changeability

Effort Metrics
  Function Points
  Work Effort Estimation
  Maintainability Index
Automated Engineering Review Map provides politically neutral guidance…

- Language Analyzers are best practice compilers providing machine feedback
- 800+ Best Practice Programming Rules from SEI, ISO and other standard bodies provides “far away” industry critique reducing “family” criticism
- The Machine becomes the focus of any emotional response encouraging better team relational dynamics

Effective Engineering Review Elements
- Expertise
- An Objective Basis for Evaluation
- Comprehensive Coverage
- Reliable
- Precise Guidance
- Measurable Improvement
- Low Cost

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DCG CAST AI Automates the Expertise

Effective Engineering Review Elements

- Expertise
- An Objective Basis for Evaluation
- Comprehensive Coverage
- Reliable
- Precise Guidance
- Measurable Improvement
- Low Cost
Application Quality Intelligence

1. Application value vs. risk mapping
2. Project risk, progress and evolution
3. Root causes of possible disruptions
4. Application health diagnostics
5. Key application attributes
Consistent, Objective Quality Metrics

<table>
<thead>
<tr>
<th>Quality Metrics Subset (facts)</th>
<th>Quality Indicators</th>
<th>Health Factors</th>
<th>Application Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>SQL Complexity Distribution</td>
<td>Complexity</td>
<td>Performance</td>
<td>Immediate Impact</td>
</tr>
<tr>
<td>Class complexity (Inh. depth)</td>
<td>Architectural</td>
<td>Robustness</td>
<td>On-Going Impact</td>
</tr>
<tr>
<td>Class complexity (Inh. width)</td>
<td>Programming</td>
<td>Security</td>
<td></td>
</tr>
<tr>
<td>Artifacts having recursive calls</td>
<td>Practices</td>
<td>Transferability</td>
<td></td>
</tr>
<tr>
<td>Method complexity (control flow)</td>
<td>Naming</td>
<td>Changeability</td>
<td></td>
</tr>
<tr>
<td>Multiple artifacts inserting data on the same SQL table</td>
<td>Conventions</td>
<td>Maintainability</td>
<td></td>
</tr>
<tr>
<td>Coupling Distribution</td>
<td>Package naming</td>
<td></td>
<td></td>
</tr>
<tr>
<td>File conformity</td>
<td>Class naming</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dead code</td>
<td>Interface naming</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Structuredness</td>
<td>Package comment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Controled data access</td>
<td>Class comment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Empty code</td>
<td>Method comment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modularity</td>
<td>Documentation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Encapsulation conformity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inheritance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Package naming</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class naming</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interface naming</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Package comment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class comment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Method comment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Package size</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class size (methods)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interface size</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

800+ architectural and language-specific code checks

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An Automated Engineering Review Map – Comprehensive Coverage

Effective Engineering Review Elements

- Expertise
- An Objective Basis for Evaluation
- Comprehensive Coverage
- Reliable
- Precise Guidance
- Measurable Improvement
- Low Cost
An Automated Engineering Review Map – Comprehensive Coverage

Effective Engineering Review Elements

- Comprehensive Coverage

Enterprise Applications
- SAP
- Business Objects
- Oracle
- Siebel
- PeopleSoft

Middleware
- Web Services
- CICS Connector
- Batch Shell Scripts

Legacy Applications
- CICS Monitor (Cobol)
- Tuxedo Monitor (C)

Web / Client Server Applications
- ASP/JSP/VB/.NET
- Application Logic
  - Java, C++, …
  - Frameworks Struts MVC, Spring

Presentation Tier

Business Logic Tier

Data Tier

Data Management Layer
- EJB – Hibernate - Ibatis

Files
- Databases

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…Engineering Review Map details provides precise guidance...

Effective Engineering Review Elements
- Expertise
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- Precise Guidance
- Measurable Improvement
- Low Cost

- Health factors to measure overall application technical quality
- Technical inventory
- Functional weight estimates
Drill down to the high risk areas and potential root causes and defect risk probabilities...

<table>
<thead>
<tr>
<th>Child Metric Weight</th>
<th>Critical contribution</th>
<th>Child Metric Name</th>
<th>Child Metric Status</th>
<th>Child Metric Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>No</td>
<td>Programming Practices - Error and Exception Handling</td>
<td>Low Risk</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>No</td>
<td>Architecture - Multi-Layers and Data Access</td>
<td>High Risk</td>
<td>2.25</td>
</tr>
<tr>
<td>5</td>
<td>No</td>
<td>Efficiency - Memory, Network and Disk Space Management</td>
<td>Very High Risk</td>
<td>1.44</td>
</tr>
</tbody>
</table>

Robustness metrics for entire application, shown in order of their impact on overall score
…down to the module and LOC to turn insight into action

- Examine a specific quality metric (e.g., architecture)
- Detailed issue identification and action items

<table>
<thead>
<tr>
<th>Child Metric Weight</th>
<th>Critical contribution</th>
<th>Child Metric Name</th>
<th>Child Metric Status</th>
<th>Child Metric Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>No</td>
<td>Avoid having multiple artifacts inserting data on the same SQL table</td>
<td>Very High Risk</td>
<td>1.5</td>
</tr>
<tr>
<td>8</td>
<td>No</td>
<td>Avoid having multiple artifacts updating data on the same SQL table</td>
<td>Very High Risk</td>
<td>1.57</td>
</tr>
<tr>
<td>7</td>
<td>No</td>
<td>Avoid having multiple artifacts deleting data on the same SQL table</td>
<td>Low Risk</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>No</td>
<td>PL-SQL: Triggers should not directly modify tables, a procedure or function should be used instead</td>
<td>Very High Risk</td>
<td>1</td>
</tr>
</tbody>
</table>

**Metric grade 1.5**

**Name**
Avoid having multiple artifacts inserting data on the same SQL table

**Rationale**
One main source of data corruption within applications comes from lack of compliance to application. These rules are usually related to the use of specific procedures for update/that is fully tested to maintain data integrity. The creation of new, different update/insert not make use the existing tested code is at origin of many data corruption cases.

**Description**
This metric detects tables having too many ways to insert data into them. It retrieves table having more than X ways inserting these tables, where X a configurable parameter.

**Output**
This report lists all SQL tables having too many ways to update them. It provides the following information:

<table>
<thead>
<tr>
<th>Object Name</th>
<th>Value</th>
<th>New Violation?</th>
<th>Changed Numerical Value?</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;TOURS.CORP.CASTSOFTWARE.COM&quot;.HR_DB.DEPT</td>
<td>6</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>&quot;TOURS.CORP.CASTSOFTWARE.COM&quot;.HR_DB.MSG_IN_TRAY</td>
<td>4</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>&quot;TOURS.CORP.CASTSOFTWARE.COM&quot;.HR_DB.PROJECT</td>
<td>4</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>&quot;TOURS.CORP.CASTSOFTWARE.COM&quot;.HR_DB.ACTIVITY</td>
<td>3</td>
<td>Yes</td>
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<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>&quot;TOURS.CORP.CASTSOFTWARE.COM&quot;.HR_DB.EMP_PROJ.ACT</td>
<td>3</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

**Detailed description of violation and solution**

**Map the issue all the way to the source code**
Figure 1. Contents of a peer review process.

- **Process Overview**
- **Risk Assessment Guidance**
- **Review Procedure**
- **Other Review Procedure**

**Review Forms**
- typo list
- inspection summary report
- issue log
- lessons learned questionnaire

**Work Aids**
- moderator’s checklist
- defect checklists

**Measurements**
- data items
- computed metrics
- data storage
- data reporting
...Measurement for Improvement...

Effective Engineering Review Elements

- Expertise
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- Low Cost

Different Applications in a Bank

![Graph showing Anti-patterns vs Defects for different applications.]

Same Application in a Bank

![Graph showing Anti-patterns vs Defects for same application.]

Same Application in System Integrator

![Graph showing Anti-patterns vs Defects for same application in system integrator.]

App Versions

- 5.3.07
- 5.7.0.1
- 5.11.0.7
Reduced Development and Maintenance Costs

CUSTOMER EXAMPLE

- **Industry:** Technology/Services
- **Application Analyzed:** Global, comprehensive tracking system of requests from the first receipt of the credit request to the final approval of the request by the appropriate parties.
- **Technologies:** J2EE, DB2

![CAST Violations vs. Actual QA Defects](image)
~10x Reduction in Cost of Fixing Defects

CUSTOMER EXAMPLE

- **Industry:** Financial Services
- **Applications:** 75 supported application/functions run by the Business Groups and Batch Operations
- **Very complex technology environment,** grown over last 15 years (J2EE, .NET, COBOL, Oracle, DB2)

![Cost of Defects per 100 Resource Hours](chart.png)
Fact Driven Engineering Review

Benefits:

After Code

• Coding
• Testing

Benefits include:

- Colleague’s are partners not critics—Social dynamics change for better
- External expertise from industry best practices leveraged --- “You know more than you knew”
- Engineering Review Process accelerated for any size system --- Time is spent on reviewing facts (risk/defect probabilities) found by Application Intelligence Analyzers NOT ON MANUALLY INSPECTING EVERY LINE OF CODE
DCG Engineering Review AI Support Services...

CAST Application Intelligence Platform™
- Application Intelligence Studio
- Knowledge Base
- Over 800 Rules and best practices

Effective Engineering Review Elements
- Expertise
- An Objective Basis for Evaluation
- Comprehensive Coverage
- Reliable
- Precise Guidance
- **Low Cost**

Optional 3rd party code analyzers

Application Analyzers

Delivered Source Code:
- Cobol, CICS, IMS, Cobol, DB2...
- J2EE, .NET and all Major RDBMS
- Web Apps, BI, EAI...
- PSFT, SIEBEL, SAP, OBS, AMDOCS...

PM, QA, Architects...
- Std enforcement
- Early ID of violations
- Drill down to root cause

Dev Teams, Suppliers
- Remediation plans
- Documentation

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DCG Engineering Review AI Support Services…Accessible, Low Cost

- Use once, use many times
- Use before
  - first release to testing
  - release to production
  - outsourcing contract
- No software purchase required
- Pricing per Lines of Code or project portfolio
- Inside or outside your firewall
- Optional Engineering Review Process Coaching

CAST Application Intelligence Platform™
- Application Intelligence Studio
- Knowledge Base
- Over 800 Rules and best practices

Optional 3rd party code analyzers

Delivered Source Code:
- Cobol, CICS, IMS, Cobol, DB2, ...
- J2EE, .NET and all Major RDBMS
- WebApps, BI, EAI, ...
- PSFT, SIEBEL, SAP, OBS, AMDOCS...

PM, QA, Architects…
- Std enforcement
- Early ID of violations
- Drill down to root cause

Dev Teams, Suppliers
- Remediation plans
- Documentation

use once, use many times
use before
  ✓ first release to testing
  ✓ release to production
  ✓ outsourcing contract
no software purchase required
pricing per lines of code or project portfolio
inside or outside your firewall
optional engineering review process coaching
250+ Global Customers
David Consulting Group web site: www.davidconsultinggroup.com

These slides and this webinar recording will be available at the end of the week, through the “Solutions” page at http://www.davidconsultinggroup.com/solutions/

Click on Application Code Review…

- Tony Timbol - t.timbol@davidconsultinggroup.com
  - 904-287-0294

Let's take some questions…
CAST Software is a recognized provider and DCG partner.

Analysts Strongly Endorse CAST

Major Service Providers Use and Promote CAST

250+ Global Enterprises Rely on CAST
CAST Application Intelligence Platform

- Automated analysis of entire applications
- Immediate, unbiased quality assessment
- Executive level of synthesis & trending
- Drill down to root cause in the source code
Automated Application Intelligence: Technical Quality of Applications

Application Quality

Application Risk Factors
- Transferability
- Changeability
- Robustness
- Performance
- Security
- Maintainability Index

Cost Savings

Application Compliance

- Compliance with programming standards
- Compliance with architectural standards
- Custom organizational compliance rules
- Security compliance
- Detailed default correction list

Risk Management

Application Structure

- Application e-Blueprint engine

Structural Metrics
- Technical inventory
- Functional weight

Visibility
Insight for the whole organization

Division CIO and VP, Apps Delivery
- Visibility into delivery capacity
- Objective discussion of status and performance of teams
- Evolving health of apps
- Organizational KPIs & trending

Project Managers, Architects and Quality Assurance
- Track architectural compliance
- Proactive SW quality management
- Metrics – quality, quantity, technical
- Objective KPIs for management

Internal and Outsourced Teams
- Mobility, as apps improve
- Understand impacts between components
- Opportunity to apply SE best practices