Centralized Management of Code Quality Standards and Team Performance

Phillip Crenshaw
Vice President & Global Business Engineering Leader, U.S.
CISQ Governing Board Member

June 2018
CGI is a global end-to-end IT and business process services leader

Founded in 1976, CGI is the 5th largest independent IT and business process services firm in the world

73,000 professionals
78% shareholders
400 locations
40 countries
9 /10 client satisfaction score

5,000 end-to-end services clients
$10.8B annual revenue
$21.5B backlog
$17B market cap
150+ IP solutions

All financial information in CAD.
CGI U.S. Highlights

- 12,000 professionals
- 80% Member shareholders
- 40+ IP-based solutions
- 80+ offices
- 9.3/10 Client satisfaction score

- 2 Strategic Business Units
- $3.1B Annual revenue
- 27% CGI’s global revenue
- 4 Acquisitions in 2017
- 7 Onshore Delivery Centers
CGI State of Texas – Selected Clients

- 1,100+ Members in Texas
- State presence since 1995
- Current engagements through 2027
A large acquisition in 2012 facilitated a revamp of our approach to application services as we more than doubled our size & global footprint.

- 31,000 Members
- $4.2 billion in revenue
- 125 offices in 20 countries
- 94% North America

- 41,000 Employees
- $6.2 billion in revenue
- 200 offices in 43 countries
- 96% Europe

- 73,000 Members
- $10.8 billion in revenue
- Presence in 40 countries
- Backlog: $21.5B
- 38% North America
  54% Europe
“What gets measured, gets managed and improved.”

Peter Drucker
Turning the IT black box into a glass box…
Our objectives

• Utilize common quality and performance metrics across the enterprise at the team level
• Use **objective data** driven by **industry standards**
• **Gain greater visibility** into quality being delivered by our teams
• **Drive team performance** for Agile, DevOps, Hybrid
• Reduce risk and better gauge the **size and complexity** of our development efforts
• **Build security into our coding** from the start

And do all of this in an efficient, centralized and automated fashion for the enterprise
CGI utilizes CISQ measurements with the CAST Application Intelligence Platform to bring transparency to quality, security, performance & cost.
CAST Health Factors Map to CISQ Measures

**CAST Health Factors**

- **ROBUSTNESS**
  - Likelihood of outage, data integrity or reliability issues
  - Score: 2.91

- **EFFICIENCY**
  - Resource consumption, scalability and performance issues
  - Score: 2.87

- **SECURITY**
  - Security issues and high likelihood of breaches
  - Score: 2.87

- **CHANGEABILITY**
  - Ease and speed of modifying
  - Score: 2.89

- **TRANSFERABILITY**
  - Ease and speed of learning
  - Score: 3.03

**CISQ Measures**

- **Reliability**
- **Performance Efficiencies**
- **Security**
- **Maintainability**
**Number of Applications**: 40

**Robustness**:
- Score: 2.91
- Range: 1-4

**Efficiency**:
- Score: 2.87
- Range: 1-4

**Security**:
- Score: 2.87
- Range: 1-4

**Changeability**:
- Score: 2.89
- Range: 1-4

**Transferability**:
- Score: 3.03
- Range: 1-4

**Green IT Index**:
- Score: 2.79
- Range: 1-4

**Technical Size**:
- 17.2m Lines of Code

**Functional Size**:
- 59,622 OMG-Compliant Automated FP's

**TQI**
- Since February 2, 2015

**Critical Violations**
- Since February 2, 2015

**Applications Map**
- Size: Lines of Code, Color: Total Quality Index score

**Top 5 Riskiest Applications**

<table>
<thead>
<tr>
<th>Applications</th>
<th>Security</th>
<th>Critical Violations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantlib</td>
<td>2.93</td>
<td>1,843</td>
</tr>
<tr>
<td>Green Energy</td>
<td>3.15</td>
<td>1,506</td>
</tr>
<tr>
<td>Shopizer</td>
<td>2.37</td>
<td>1,391</td>
</tr>
<tr>
<td>WebMapping</td>
<td>2.83</td>
<td>1,151</td>
</tr>
<tr>
<td>ECommerce</td>
<td>2.73</td>
<td>1,121</td>
</tr>
</tbody>
</table>

**Technical Debt**
- $74.5m

**Evolution**

**Robustness**
- Since February 2, 2015

**Efficiency**
- Since February 2, 2015

**Security**
- Since February 2, 2015

**Green IT Index**
- Since February 2, 2015

**Technical Debt**
- Since February 2, 2015

**Applications Fast Facts**
- 13 applications not reanalyzed
- 27 applications added
- 3 applications with 1% more critical violations
- 20 applications with 5% more lines of code
- 2 applications with a 2% efficiency decrease
Source code

No violation bookmarks or details are available on this violation, object source code will be displayed instead when applicable.

Code added and violation added since the last snapshot analysis

```
c:\cas\ms80\custom_bdi\deploy\php_demo\pack1\app\webroot\js\lib\highstock\exporting-server\java\highcharts-export\highcharts-export-web\src\main\webapp\WEB-INF\pages\demo.jsp
```

```xml
1  <!-- taglib uri="http://java.sun.com/jsp/jstl/core" prefix="c" -->
2  <!-- taglib prefix="spring" url="http://www.springframework.org/tags" -->
3  <!-- page language="java" contentType="text/html; charset=UTF-8" pageEncoding="UTF-8" -->
4  <!DOCTYPE html>
5  <html>
6  <head>
7  <meta http-equiv="content-type" content="text/html; charset=UTF-8">
8  <title>Highcharts export server</title>
9  <link rel="stylesheet" type="text/css" href="resources/css/demo.css" />
```
CGI’s Approach for Centralized Management of Code Quality Standards and Team Performance

**Global Center of Excellence**
- Fully staffed and operational
- Includes CAST and Sonar
- US, Europe SMEs
- Global delivery support

**Global Implementation**
- 8 Strategic Business Units
- 60 Business Units
- >300 projects to date
- 2,000 projects by 2020

**Delivery Methodologies**
- Waterfall
- Agile
- DevOps
- Hybrid / bimodal IT

**Road Map**
- CGI IP
- Client applications
- New business
- M&A
# CGI Software Quality and Performance Center of Excellence

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Description</th>
<th>Key facts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Program Oversight</strong></td>
<td>Provide oversight at the executive level on quality, security, productivity and technical debt to drive risk and cost reduction</td>
<td><em>300+</em> applications analyzed</td>
</tr>
<tr>
<td><strong>Improve software and team performance</strong></td>
<td>Reduce complexity and cost of application portfolios by measuring software and team performance at each Agile sprint</td>
<td><em>350+</em> projects in the program</td>
</tr>
<tr>
<td><strong>Enable software quality capabilities</strong></td>
<td>Equip application services resources with advanced insight into their software applications leveraging deep analytics and common metrics</td>
<td><em>220+</em> million lines of code assessed</td>
</tr>
<tr>
<td><strong>Educate and Train on software quality</strong></td>
<td>Provide training on software improvement through multiple channels</td>
<td>Global team supporting CGI and our customers</td>
</tr>
</tbody>
</table>
Creating the IT “Glass Box” using CISQ quality, performance and security measures with CAST through our COE

Macro Visibility
• Health checks at the management level
• Objective measurements for quality and quantity
• Insights to drive better estimates
• Reduction of project margin leakage
• Improved investment analysis and monitoring

Micro Visibility
• Violations and technical debt
• Corrective actions
• Transactions and their risk
• Visual call flows
• Team output measurements
• Security vulnerabilities
Using Application Analytics to **Drive Team Quality, Performance, Security and Cost**

<table>
<thead>
<tr>
<th>Delivery Team (or Vendor)</th>
<th>Total Quality Index</th>
<th>Robustness</th>
<th>Performance</th>
<th>Security</th>
<th>Transferability</th>
<th>Changeability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team 1</td>
<td>2.59</td>
<td>3.16</td>
<td>2.34</td>
<td>3.01</td>
<td>1.99</td>
<td>2.44</td>
</tr>
<tr>
<td>Team 2</td>
<td>2.81</td>
<td>2.78</td>
<td>2.78</td>
<td>3.12</td>
<td>2.34</td>
<td>3.03</td>
</tr>
<tr>
<td>Team 3</td>
<td>2.39</td>
<td>1.67</td>
<td>1.54</td>
<td>2.98</td>
<td>1.76</td>
<td>2.99</td>
</tr>
<tr>
<td>Team 4</td>
<td>3.06</td>
<td>3.12</td>
<td>3.11</td>
<td>2.79</td>
<td>3.11</td>
<td>3.15</td>
</tr>
<tr>
<td>Team 5</td>
<td>2.83</td>
<td>2.56</td>
<td>2.88</td>
<td>3.03</td>
<td>2.56</td>
<td>3.03</td>
</tr>
<tr>
<td>Team 6</td>
<td>3.11</td>
<td>3.76</td>
<td>2.89</td>
<td>3.07</td>
<td>2.85</td>
<td>2.63</td>
</tr>
</tbody>
</table>

- Enforces focus on structural risk and Total Cost of Ownership
- Provides business a means to measure deliverables to assess both risk and cost of work (Quality Gates)
- Based on industry standard, objective measurements of quality and quantity for IT delivery
Team or Vendor Performance – Monitor Quality and Cost Over Time

**CODE QUALITY LEVEL**

<table>
<thead>
<tr>
<th>Team</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team 1</td>
<td>3.0</td>
<td>2.5</td>
</tr>
<tr>
<td>Team 2</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Team 3</td>
<td>2.5</td>
<td>3.0</td>
</tr>
<tr>
<td>Team 4</td>
<td>3.5</td>
<td>4.0</td>
</tr>
</tbody>
</table>

**COST PER FUNCTION POINT**

<table>
<thead>
<tr>
<th>Team</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team 1</td>
<td>$3,000</td>
<td>$2,500</td>
</tr>
<tr>
<td>Team 2</td>
<td>$2,000</td>
<td>$1,500</td>
</tr>
<tr>
<td>Team 3</td>
<td>$2,500</td>
<td>$2,000</td>
</tr>
<tr>
<td>Team 4</td>
<td>$3,000</td>
<td>$2,500</td>
</tr>
<tr>
<td>Team 5</td>
<td>$2,000</td>
<td>$1,500</td>
</tr>
<tr>
<td>Team 6</td>
<td>$1,000</td>
<td>$1,500</td>
</tr>
</tbody>
</table>

TQI Score: 1.0 1.5 2.0 2.5 3.0 3.5 4.0

Cost per FP: $1,000 $1,500 $2,000 $2,500 $3,000
With CISQ measures and CAST, we drive higher performance and quality leading to **lower IT costs and less downtime**

**Banking Application**
- 88% Reduction in Critical Violations
- 92% Reduction in Re-Work

**Insurance Application**
- 84% Reduction in Critical Violations
- 75% Reduction in Defects
- 30% Increase in Total Quality Index

**Capital Markets Application**
- 30% Increase in Total Quality Index
- 50% Reduction in Defects
- 3.5% increase in engineering capacity

### Banking Application
- Critical Violations Count
- Rework Count

### Insurance Application
- Chart showing Violations, Defects, Tickets with Code Change, and Total Quality Index

### Capital Markets Application
- Table showing:
  - Area
  - Original Assessment (days)
  - Effort Savings %
  - Effort Savings (days)
  - Actuals
  - Estimate (1%)
  - Impact Analysis (3%)
  - Reviews (15% of CUT efforts)
  - Coding standard related rework (15% of CUT)
  - Memory issues related rework (1%)  
  - Scalability issues related to SQL (3%)
  - Total

Confidential
CGI Contacts

Chris James
Senior Vice President
CGI U.S. Southwest
Business Unit Leader
Christopher.James@cgi.com

Phillip Crenshaw
Vice President
CGI Global Business
Engineering Leader, U.S.
Phillip.Crenshaw@cgi.com

Paul Rainey
Director
Software Quality &
Performance COE
Paul.Rainey@cgi.com
Questions?