How to Benchmark with CII

October 18-19, 2011
Houston, TX
CII Benchmarking System

Remote Data Entry

CII Database

Project Reports

Industry Analysis
CII Benchmarking Roadmap (Process)

**Company Leadership**
- Make Decision / Commitment to Benchmark as Basis for Improvement

**Project Managers**
- Commit to Project Benchmarking & Improvement
- Select Projects for Analysis & Preload/Initiate Project in CII Database

**Company Benchmarking Associate**
- Commit to Benchmarking Coordination & Attend CII Training
- Conduct Training & Feedback Sessions

**CII Staff, Account Mgrs. & Committee**
- Develop/Improve Metrics, Processes, Policies & Procedures
- Develop Data Collection & Reporting Tools
- Provide Input to Research & Implementation

**Research & Implementation**
- Provide Input to Research & Implementation

**Self-Analysis & Improvement**
- Perform Self-Analysis & Develop Improvement Plan

**Finalize**
- Review and Act on Interim CII On-line Recommendations
- Release Questionnaire to CII
- Complete & Submit Questionnaire at Project Close-out
- Validate Questionnaires

**Initiate**
- Initiate Questionnaire During Project Execution

**Finalize**
- Review and Act on Interim CII On-line Recommendations

**Finalize**
- Complete & Submit Questionnaire at Project Close-out
- Validate Questionnaires

**Finalize**
- Release Questionnaire to CII
Benchmarking Associates
Role & Responsibilities

• Company’s *trained* knowledge resource for CII Benchmarking

• Facilitates selection of projects (representative)

• Expedites completion of questionnaire

• Verifies completeness and accuracy of data

• Assists company with use of CII Benchmarking products
Committee & Staff Functions

• Committee
  ➢ Policy, procedure, & oversight
  ➢ Industry relevance & perspective

• Staff
  ➢ Database management, administration, & security
  ➢ Analysis & reporting
  ➢ Implementation assistance
  ➢ Coordination
Benchmarking & Metrics Committee

Co-Chair
T. Kirk Morrow, Vice President, Construction Services, S&B Engineers and Constructors, Ltd.
Paul N. Woldy, Senior Staff Engineer, Chevron Energy Technology Company

Members
James J. Blaschke, Manager, Cost Estimating, ConocoPhillips
Guadalupe Chiriboga, Regional Quality Manager, Jacobs
Ralph B. Dove, Director, Project Support Services, CH2M HILL
Charles M. Green, Engineering Specialist, Engineering Unit, Aramco Services Company
Kay Harlow, Project Manager, Southern Company
Noe Hernandez-Saenz, International Operations, Burns & McDonnell Engineering
Emmanuel V. Jimenez, Manager, Engineering Best Practices, Abbott
Noah Kahn, National Manager, Project Metrics, Kaiser Foundation Health Plan
Mark O. LaClair, Safety Director, Walbridge
Jerry O. Mason, Director, Project Controls, URS Corporation
Kevin Miller, Feedback Manager, Black & Veatch
James T. O’Connor, C. T. Wells Professor of Project Management, The University of Texas at Austin
Gerald R. Oegema, Project Manager, Alstom Power Inc.
David M. Perkins, Project Engineer, Engineering Solutions, The Dow Chemical Company
Jonathan D. Pitcher, Director, Design Engineering & Project Control, Global Facilities Delivery, Eli Lilly and Company
Jason L. Rose, Senior Cost Specialist, CB&I

Stephen P. Mulva, Associate Director, Construction Industry Institute
Jiukun Dai, Research Engineer, Construction Industry Institute
Hong Zhao, Project Manager, Construction Industry Institute
Account Managers

Role & Responsibilities

• Each company is assigned a CII benchmarking “Account Manager”

• Account managers facilitate communication between CII and participating companies

• Account managers are trained in metrics and use of data collection and reporting system

• Account managers assist companies with implementation of CII benchmarking
Account Managers

Sungjoon Suk
GRA

Sungmin Yun
GRA

Hyeon Yong Park
GRA
CII Benchmarking

- Associate Director
- Research Engineer
- Systems Analyst
- Account Manager
- Benchmarking Associate
- Project Team
- Project Team
- Project Team
- Project Team
- Project Team
Which Questionnaire?

Small or Large?

- TIC $100K-$5M
- Duration ≤ 14 mo.
- Site Wk-Hrs ≤ 100K
- Full-time PM resources not required

Small Project Questionnaire

- TIC ≥ $5M
- Duration ≥ 14 mo.
- Site Wk-Hrs ≥ 100K
- Full-time PM resources required

Large Project Questionnaire
## Small Project Questionnaire

<table>
<thead>
<tr>
<th>General Project Info</th>
<th>Practices</th>
<th>Engineering Productivity</th>
<th>Construction Productivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Description</td>
<td>Front End Planning</td>
<td>Instructions</td>
<td>Instructions</td>
</tr>
<tr>
<td>Project Information</td>
<td>Detail Design</td>
<td>Engineering Team &amp; Workhours</td>
<td>Concrete</td>
</tr>
<tr>
<td>Project Scope</td>
<td>Procurement</td>
<td>Concrete</td>
<td>Structural Steel</td>
</tr>
<tr>
<td>Project Management Team</td>
<td>Construction</td>
<td>Structural Steel</td>
<td>Electrical-Part1</td>
</tr>
<tr>
<td>Contract Type &amp; Alliance</td>
<td>Start-up and Commissioning</td>
<td>Electrical</td>
<td>Electrical-Part2</td>
</tr>
<tr>
<td>Project Participants</td>
<td>Organization</td>
<td>Piping</td>
<td>Piping-Part1</td>
</tr>
<tr>
<td>Performance</td>
<td>Work Processes</td>
<td>Instrumentation</td>
<td>Piping-Part2</td>
</tr>
<tr>
<td></td>
<td>Project Controls</td>
<td>Equipment - Part1</td>
<td>instrumentation</td>
</tr>
<tr>
<td></td>
<td>Safety, Health and Environment</td>
<td>Equipment - Part2</td>
<td>Equipment-Part1</td>
</tr>
<tr>
<td></td>
<td>Technology Use &amp; Integration</td>
<td>Direct Hire/Contract/Off-Shore</td>
<td>Insulation</td>
</tr>
<tr>
<td></td>
<td>PDRI</td>
<td></td>
<td>Scaffolding</td>
</tr>
</tbody>
</table>
## Large Project Questionnaire

<table>
<thead>
<tr>
<th>General Project Info</th>
<th>Performance</th>
<th>Practices</th>
<th>Engineering Productivity</th>
<th>Construction Productivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Description</td>
<td>Budgeted &amp; Actual Project Costs</td>
<td>Front End Planning</td>
<td>Instructions</td>
<td>Instructions</td>
</tr>
<tr>
<td>Project Information</td>
<td>Planned &amp; Actual Project Schedule</td>
<td>Alignment</td>
<td>Concrete</td>
<td>Concrete</td>
</tr>
<tr>
<td>Project Scope</td>
<td>Achieving Facility Capacity</td>
<td>Partnering</td>
<td>Structural Steel</td>
<td>Structural Steel</td>
</tr>
<tr>
<td>Project Management Team</td>
<td>Project Outcomes</td>
<td>Team Building</td>
<td>Electrical</td>
<td>Electrical-Part1</td>
</tr>
<tr>
<td>Union Site Construction Workforce</td>
<td>Work Hours &amp; Safety Data</td>
<td>Project Delivery</td>
<td>Piping</td>
<td>Electrical-Part2</td>
</tr>
<tr>
<td>Engineering Deliverables</td>
<td>Project Impact Factors</td>
<td>Constructability</td>
<td>Instrumentation</td>
<td>Piping-Part1</td>
</tr>
<tr>
<td>Contract Type &amp; Alliance</td>
<td></td>
<td>Risk Assessment</td>
<td>Equipment - Part1</td>
<td>Piping-Part2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Change Management</td>
<td>Equipment - Part2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Zero Accident Techniques</td>
<td>Instrumentation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Benchmarking</td>
<td>Equipment-Part1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Planning For Start Up</td>
<td>Direct Hire/Contract/Of-Off-Shore</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Technology Use</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Project Process Legend:**
- Not Started
- In Progress
Targeted Industry Metrics

Downstream Oil & Gas
* Sulfur Recovery Units
* Coker Units
* Hydrotreaters

Upstream Oil & Gas
* Component based
* Hulls
* Fixed Structures
* Topsides
* Pipelines
* Onshore receiving terminals

COAA (Alberta Oil Sands)
* Productivity
* Indirects
* Pipelines

Pharma/Biotech
* Bulk Mfg.
* Secondary Mfg
* Laboratory

Healthcare
* Hospitals
* Medical Office Buildings
* Central Utility Plant
* Parking Structures
* etc.

Large Project Supplements

Future: Metals and Mining, Power.
CII Database

- 1,947 projects
- Worth > $194 Billion
- Large & Small Projects Combined
CII BMM Database

The bar chart shows the number of projects in different industry groups:

- **Heavy Industrial**: 690 projects (Owner) and 425 projects (Contractor)
- **Light Industrial**: 385 projects (Owner) and 73 projects (Contractor)
- **Buildings**: 191 projects (Owner) and 51 projects (Contractor)
- **Infrastructure**: 80 projects (Owner) and 52 projects (Contractor)
CII BMM Database

The bar chart shows the number of projects categorized by cost for both Owner and Contractor roles. The categories are:

- <= $5MM
- $5MM - $15MM
- $15MM - $50MM
- $50MM - $100MM
- > $100MM

The number of projects for each category is as follows:

- <= $5MM: Owner 310, Contractor 252
- $5MM - $15MM: Owner 245, Contractor 164
- $15MM - $50MM: Owner 274, Contractor 226
- $50MM - $100MM: Owner 114, Contractor 84
- > $100MM: Owner 138, Contractor 140

The chart indicates a significant number of projects fall in the <= $5MM and $15MM - $50MM categories, with a notable increase in projects as cost increases above $50MM.
CII BMM Database

![Bar chart showing the number of projects for different nature of projects: Addition, Grass Roots, Moderization, Maintenance, and Others. The chart compares the number of projects between Owner and Contractor.]
CII BMM Database

![Bar chart showing the number of projects by location and owner/contractor type. The chart indicates significantly more domestic projects than international projects.]

- **Domestic**
  - Owner: 836 projects
  - Contractor: 736 projects
- **International**
  - Owner: 245 projects
  - Contractor: 130 projects

Legend:
- Red: Owner
- Blue: Contractor