46th Annual ECC Conference
Aligning THE STARS
Connecting People, Projects & Performance
Engineering & Construction Contracting Association
Collaboration Outside the Box

Stephen Mulva, Ph.D.
Associate Director, CII
ARS Demographics

Please identify yourself as being from:

A. Owner
B. Contractor
C. Supplier
ARS Demographics

Please identify your primary job function:
A. Business development
B. Project management
C. Engineering design
D. Procurement
E. Other
Infernal Towers

• Instructions
  – SILENT during entire exercise!
  – OBJECTIVE is to build a Lego tower per the plans and quality guidelines
  – SIX (6) participants per table (others are observers)
Coming together is a beginning; keeping together is progress; working together is success

—Henry Ford
This year, France ordered $20 billion worth of trains. The platform specs were incorrect. The trains are too wide.

*The cost is in the hundreds of millions and counting!*
Question 1

- Which factor most influences an owner’s project NPV?

A. Contract Type
B. Working Relationships
C. Front End Planning
D. Planning for Startup

![Bar chart showing percentages for each category with labels and data points]

- Contract (N=92) - 20.3%
- Work Rel. (N=44) - 33.8%
- FEP (N=187) - 6.1%
- Plan for S/U (N=400) - 3.4%
Collaboration: Business Unit & Project Personnel

• Involvement AND Interaction
Question 2

• Which role has the biggest impact on project schedule performance?

A. CEO 22.9%*
B. Project Sponsor 21.7%*
C. Finance Manager 35.4%
D. Controls / Legal Mgr. 11.8%*
E. Project Controls Mgr. 33.5%
F. Engineering Team Leads 33.1%
G. QA/QC Manager 29.5%

Percent Variation Explained
N = 39
* Not Significant at ρ > 0.1
Collaboration = Communication

- Communicate Too Much or Not Enough?
- Lines of Communication = \( \frac{n(n-1)}{2} \)

<table>
<thead>
<tr>
<th># Project Team Members</th>
<th># Lines of Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>21</td>
</tr>
<tr>
<td>15</td>
<td>105</td>
</tr>
<tr>
<td>50</td>
<td>1225</td>
</tr>
<tr>
<td>100</td>
<td>4950</td>
</tr>
<tr>
<td>500</td>
<td>124750</td>
</tr>
</tbody>
</table>
“Interface Management is the management of communications, relationships, and deliverables among two or more interface stakeholders”

CII Research Team 302, 2014
Formal Interface Management?

- EPC & EPCM have more Formal IM

- Formal IM more prevalent in bigger ($) projects
- IM more prevalent on projects with more stakeholders
IM Implementation vs. Project Cost Growth

- Formal IM projects had lower mean of cost growth and less standard deviation

![Chart showing cost growth comparison between Formal IM (n=10) and Informal IM (n=27).]

- Mean: Informal IM = 0.18, Standard Deviation = 0.38
- Mean: Formal IM = 0.04, Standard Deviation = 0.16

$p=0.25$
Question 3

During Front-End Planning (FEP/FEL), effective collaboration is most problematic (critical?) between:

A. Owner’s Business Unit and Owner’s Project Personnel / Corporate Engineering Group
B. Owner and Contractor conducting Preliminary / Phase 1 Engineering Studies
C. Owner and Licensor
D. Licensor and FEED / Phase 1 Engineering Contractor
E. Owner and Vendors supplying long-lead items
F. Other
Question 4

In Detailed Engineering / Design, what are the most challenging aspects regarding collaboration?

A. Incomplete design basis (from Phase 1 engineering, licensor package, or planning studies)
B. Incomplete and/or late vendor data
C. Interfaces amongst different engineering disciplines (e.g., process, piping, structural, etc.)
D. Continually changing equipment sizes, weights, and other technical requirements
E. Technology (e.g., BIM / PDS) causing collaboration difficulties electronically
F. Use of High Value Engineering Centers offshore / abroad
G. Other
Question 5

Where are the biggest problems with effective collaboration on Procurement functions?

A. Owner provided materials
B. Owner or EPC preferences for equipment/instrumentation
C. Communication of vendor design data to Owner/Engineering
D. Intellectual property
E. Logistics
F. Counterfeit materials
G. Other
Question 6

Where are the gaps in collaboration on Construction?

A. Engagement of the constructor early in the design process
B. Inexperience of owner/contractors workforce
C. Vendor/supplier inclusion in the collaboration
D. Manpower/ bulk material forecasting
E. Forecasting /Reporting/Scheduling
F. Coordination with Operations for scheduling
G. Other
Closing Comments

• Thank You!

• Contact Information:

Stephen P. Mulva, Ph.D.
smulva@cii.utexas.edu
(512) 232-3013

Stephen “Steve” Buras
stephen.buras@albemarle.com
(225) 388-7238