



ENGINEERING & CONSTRUCTION CONTRACTING ASSOCIATION



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Collaboration Outside the Box



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ARS Demographics

Please identify yourself as being from:

- A. Owner
- B. Contractor
- C. Supplier

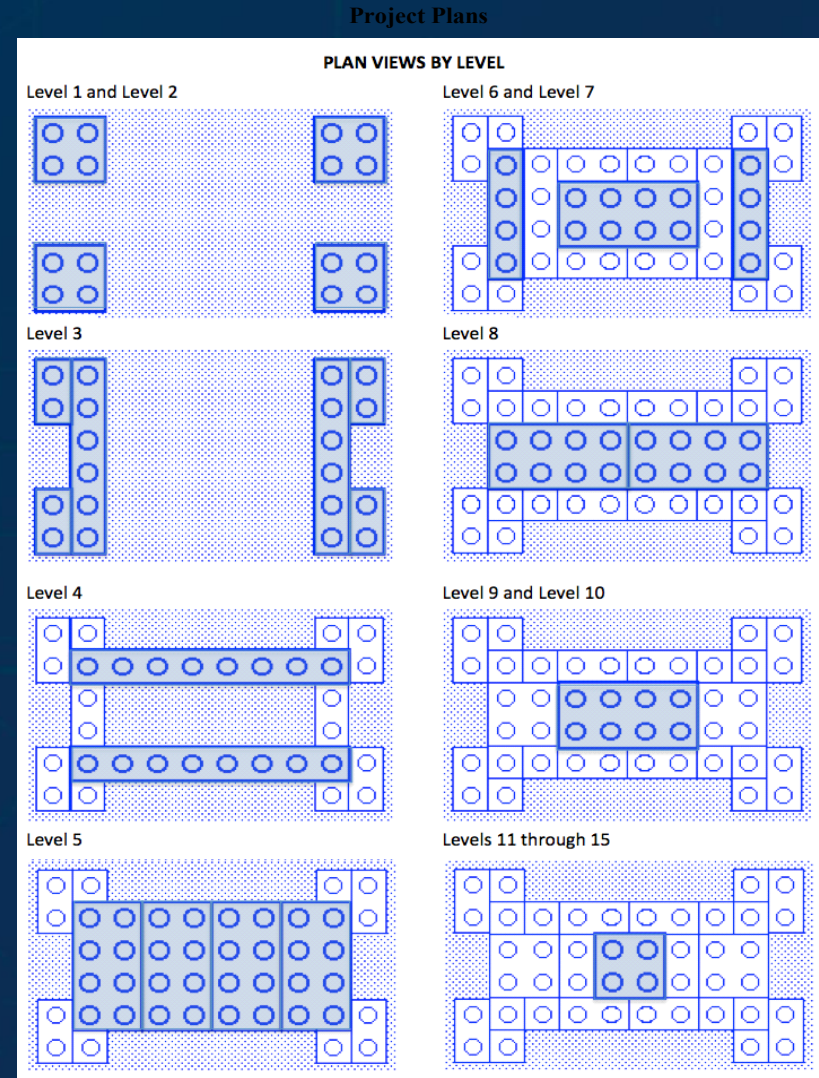
ARS Demographics

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)



Infernal Towers Debrief

Coming together is a beginning;
keeping together is progress; working
together is success

—Henry Ford

Poor Collaboration (Oh S%&#!)

A black and white photograph of a high-speed train, likely a TGV, stopped at a station platform. The train is white with a dark front section. The platform is visible on the right side of the frame. The background shows the station's structure with concrete pillars and overhead lights.

THIS YEAR, FRANCE ORDERED
\$20 BILLION WORTH OF TRAINS.

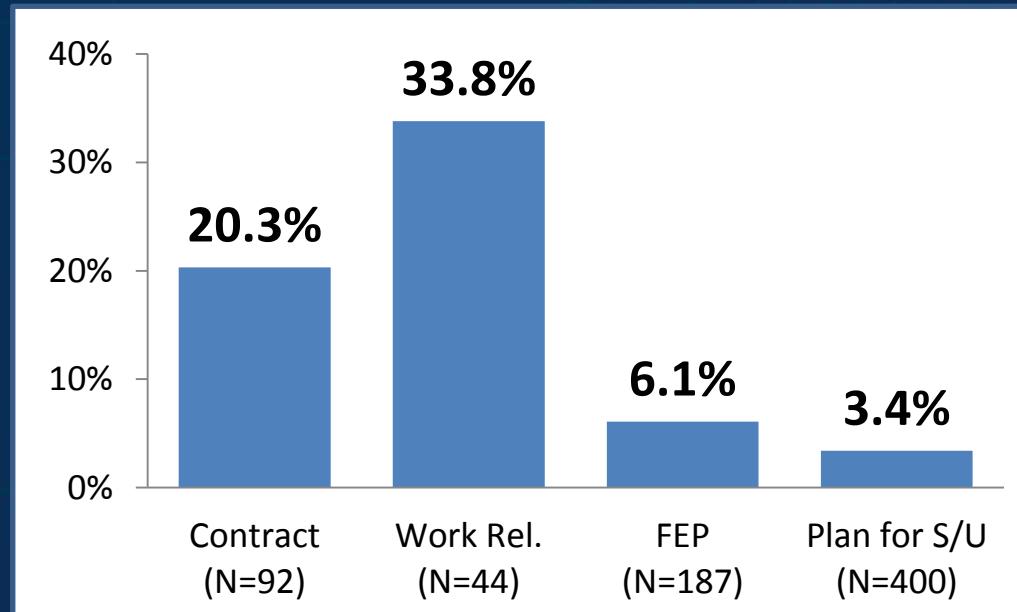
**The platform specs were incorrect.
The trains are too wide.**

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

Question 1

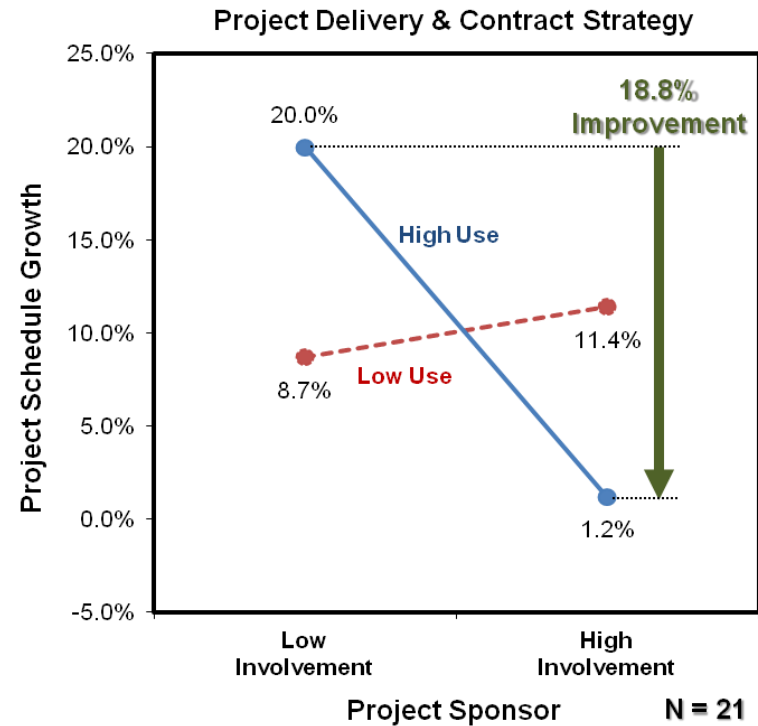
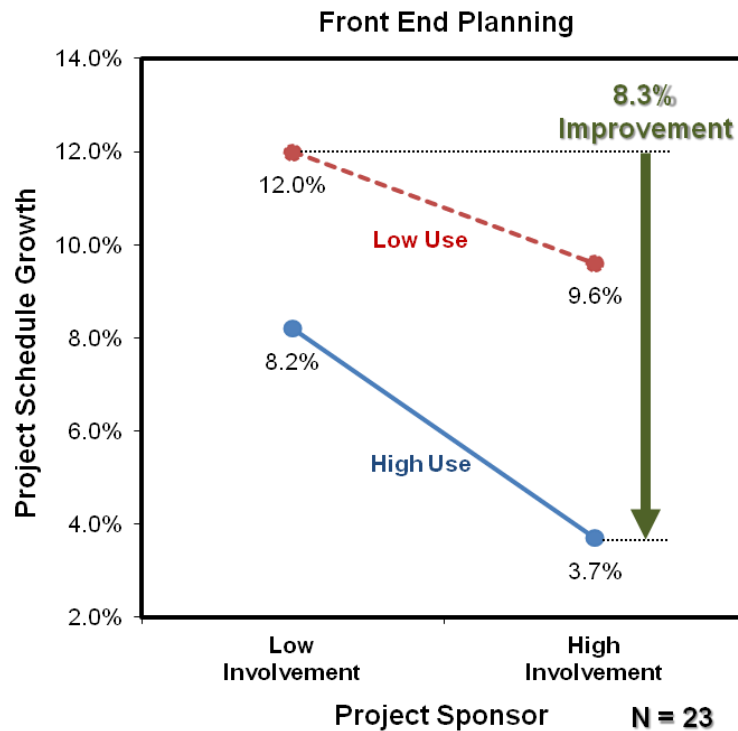
- Which factor most influences an owner's* project NPV?

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



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
 $p > 0.1$

Collaboration = Communication

- Communicate Too Much or Not Enough?
- Lines of Communication = $(n(n-1))/2$

# Project Team Members	# Lines of Communication
7	21
15	105
50	1225
100	4950
500	124750

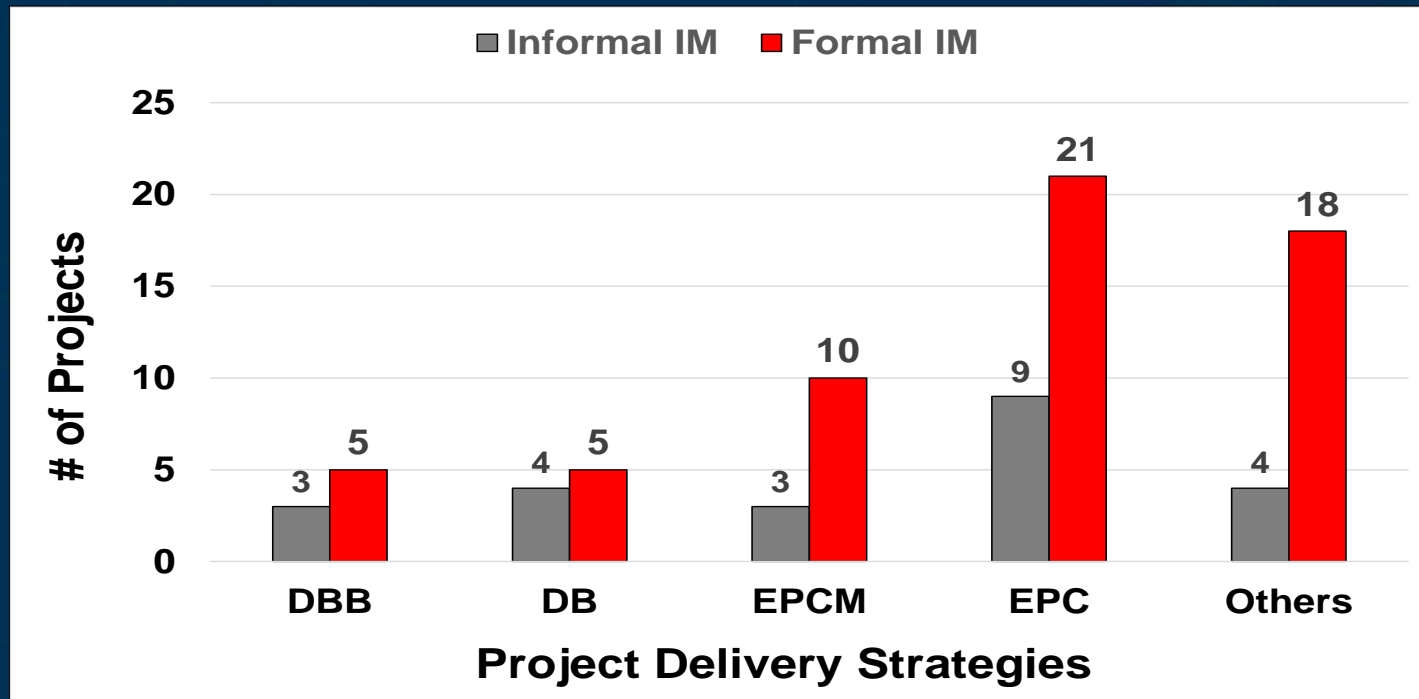
Interface Management

“Interface Management is the management of communications, relationships, and deliverables among two or more interface stakeholders”

CM Research Team 302, 2014

Formal Interface Management?

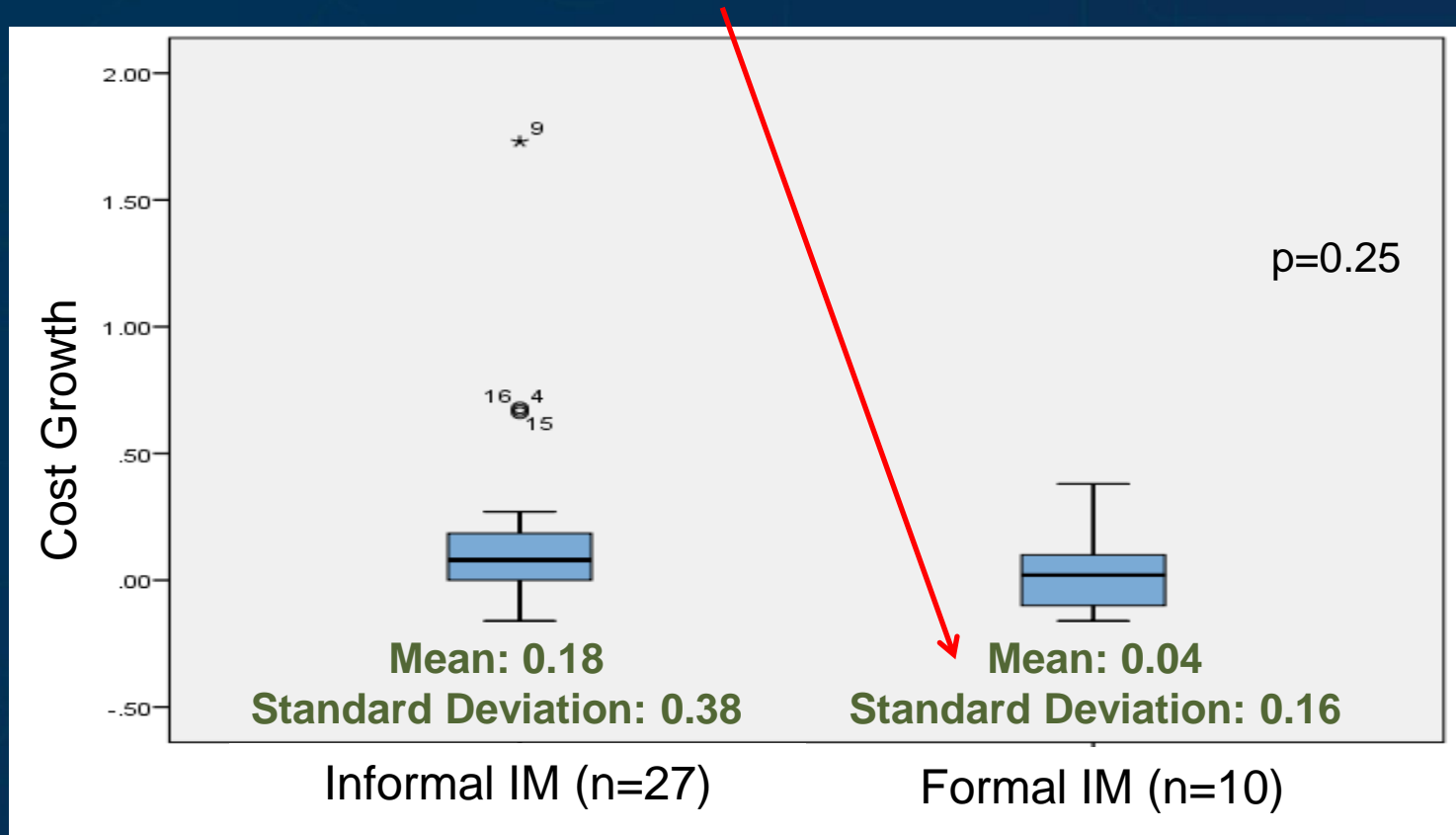
- EPC & EPCM have more Formal IM



- 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



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!
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