



The Knowledge Leader for Project Success

Leveraging 25 Years of Industry Leadership

COAA Benchmarking Phase III

The 10-10 Program: from Lagging to Leading

COAA Best Practices Conference XXIII

May 13, 2015
Edmonton, Alberta

Stephen P. Mulva, Ph.D.
Associate Director

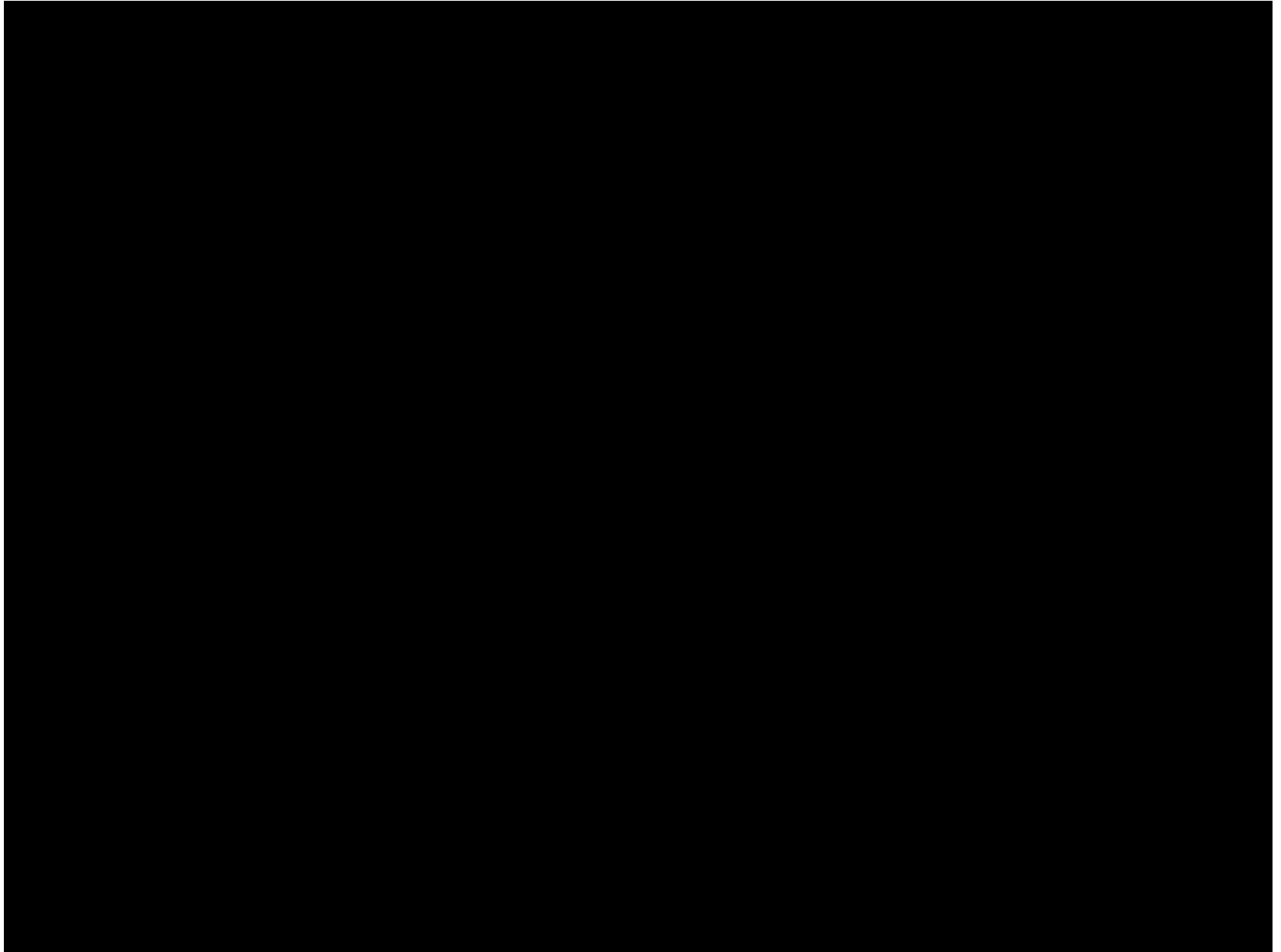
Jim Lozon, Ph.D., P.Eng.
VP, PDE Systems Inc.



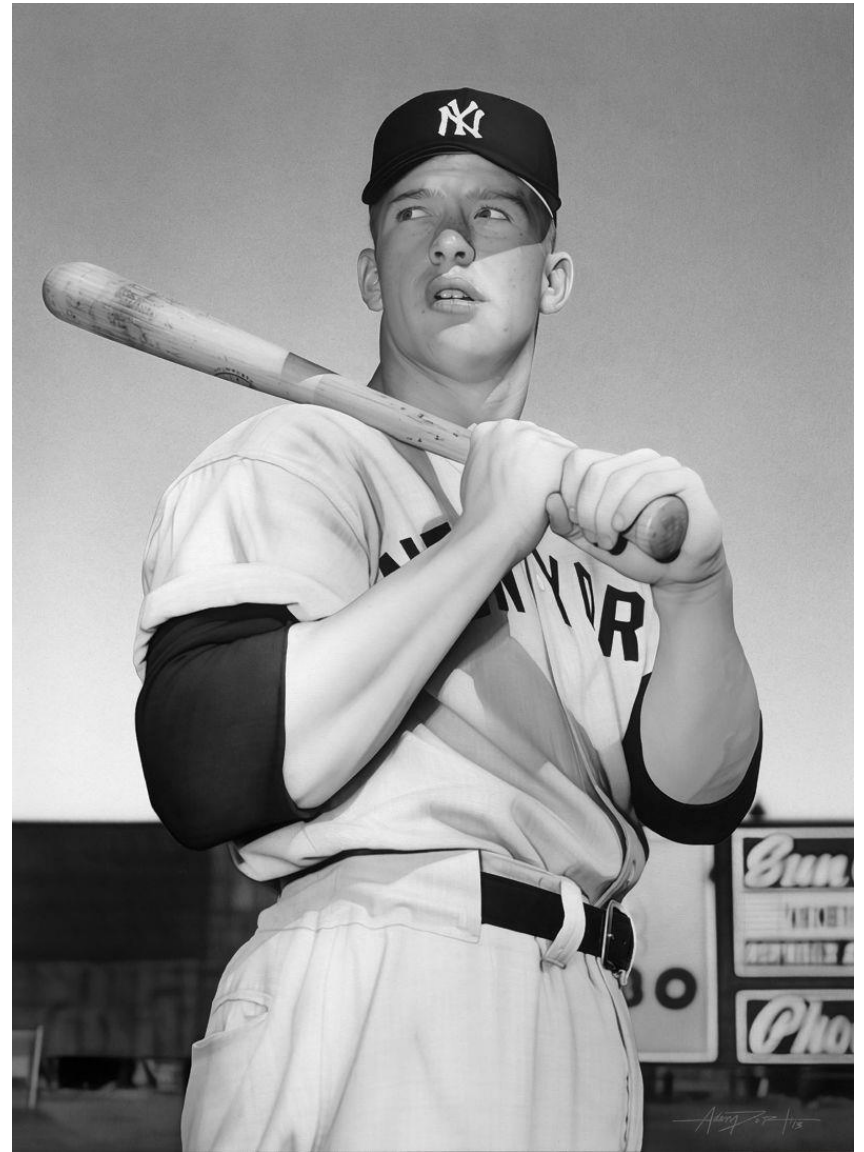
Agenda

- CII / COAA 10-10 Program Overview
- 10-10 Findings / Analyses
- 10-10 Portfolio Analyses (Corporate)
- 10-10 Program System
- New Frontiers
- COAA Benchmarking Phase III

Awareness Test



- “It’s unbelievable how much you don’t know about the game you’ve been playing all your life.”
 - Mickey Mantle



A, B, or C Team? How to Know / Measure?

- 5 Principles of Project Integration
 - Work and Work Process
 - Organizational Engineering
 - Leadership and Governance
 - Communications and Information Flow
 - Business Environment and Culture
- CII's 10-10 Program Measures
 - 10 Leading (Team) Indicators
 - 10 Performance Outcomes (Cost, Capacity, etc.)

CII's 10-10 Program

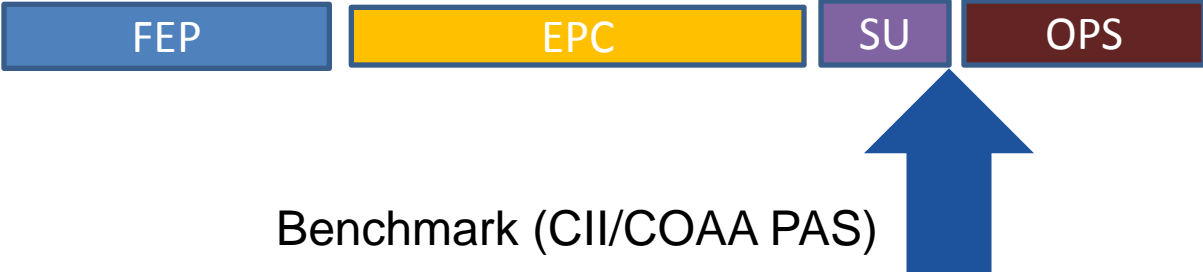
- Simple and Important Measures
 - 10 Input Measures (Leading Indicators)
 - 10 Output Measures (Cost, Duration, Capacity, FTE, Quantities)
- Research-Based
 - 75% CII / COAA Research (e.g., Project Health Indicators)
 - 15% Capital Projects Research (CII Members)
 - 10% Other Industries (Project Management Measures)
- Launched July 2013 (CII Annual Conference)
- Industrial, Building, and Infrastructure Sectors Phase-Based Surveys
- CII Requesting 10 Project-Phase Surveys from Each CII Member by May 15, 2015
- www.10-10program.org



Traditional Benchmarking vs. 10-10 Performance Assessment Program

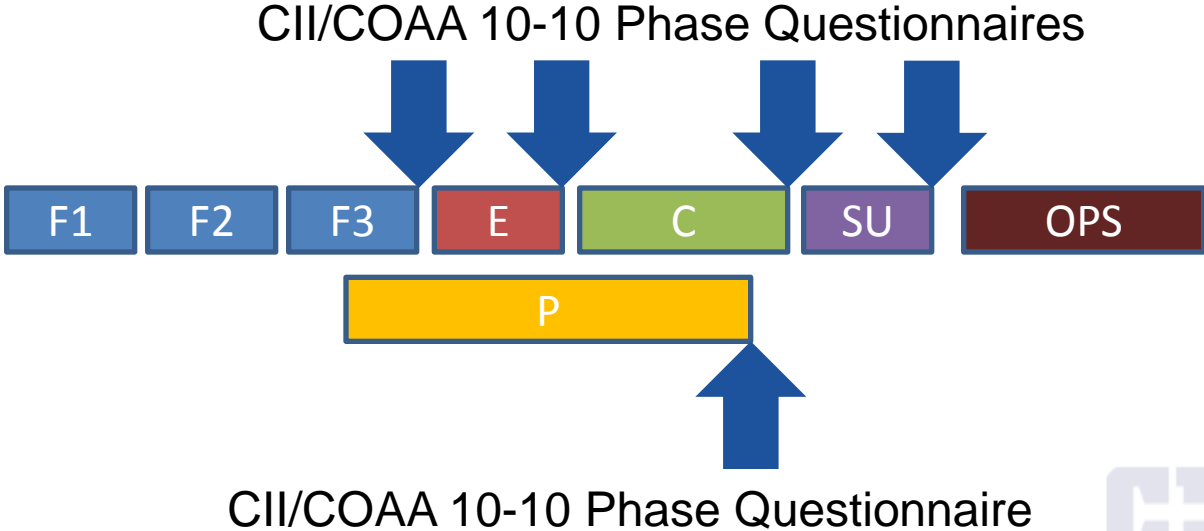
CII/COAA General Benchmarking Program

Process, Practice



CII/COAA 10-10 Program

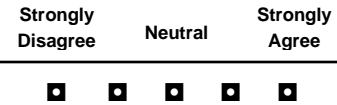
People, Practice



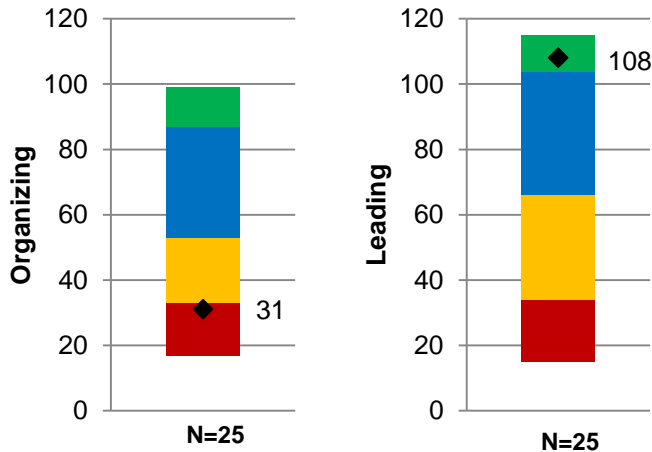
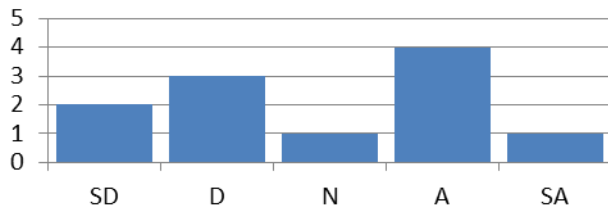
How CII's 10-10 Program Works

Sample Statement-Based Question

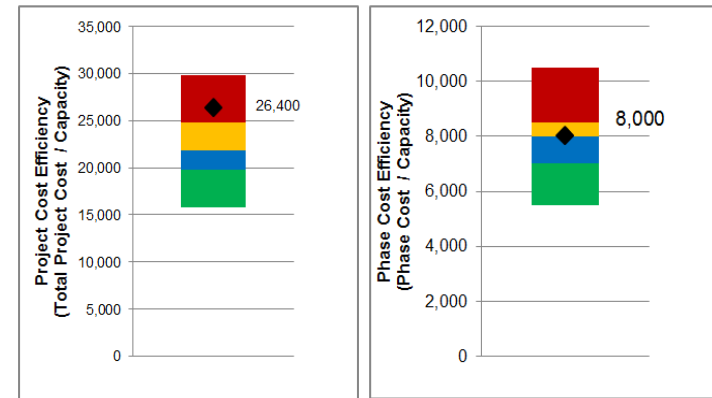
26. The interfaces between project stakeholders were well managed.



Q26



Sample Input Metrics



Sample Output Metrics

- Project Diagnostics (KBSC)
- Implement CII Research and Tools

10-10 Surveys ALL CII Practices

- Constructability (Engr.) – RT3, 29, 34, 283
 - “Comprehensive constructability suggestions (e.g., preassembly, prefabrication, modularization, and offsite fabrication) were evaluated and incorporated into the Engineering of this project” (SA, A, N, D, SD)
- Quality Management (Proc.) – RT10, 31, 36, 130, 172, 254, 257, 264, 307, 308
 - “This project implemented a supplier quality surveillance program” (SA, A, N, D, SD)
- Change Management (Const.) – RT27, 43, 158, 244, 258, 290,
 - “Plan and progress including changes were communicated clearly and frequently amongst project stakeholders” (SA, A, N, D, SD)
- 41 Practices and Best Practices
- Surveys New Research

10 Leading Indicators (Team Indicators)



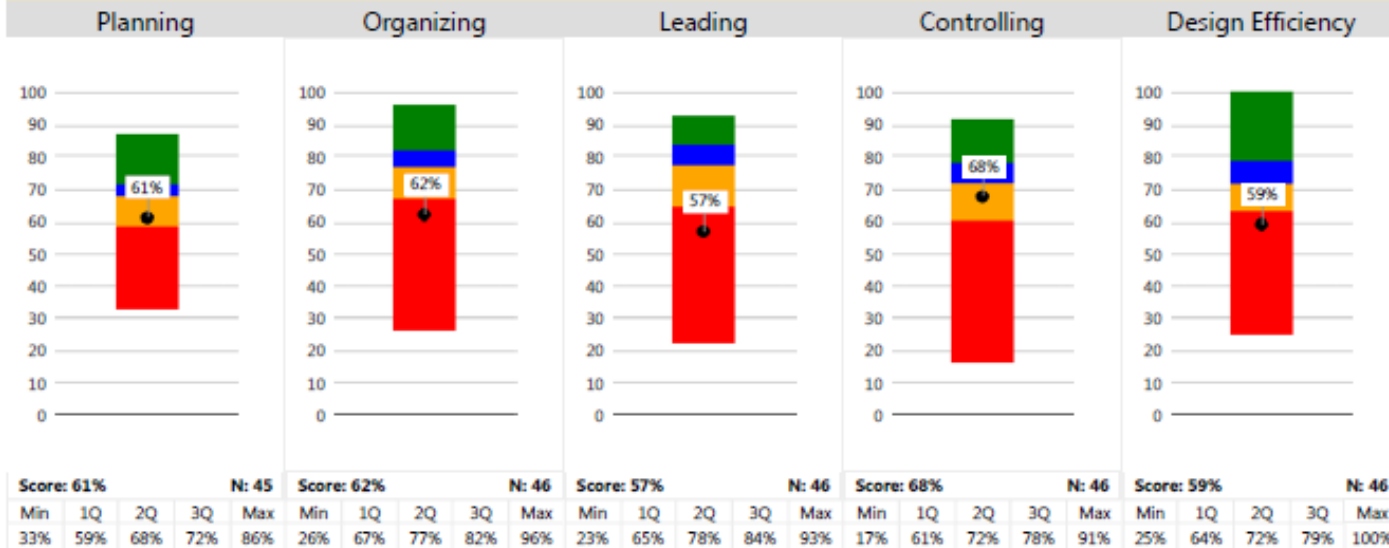
CII 10-10 Performance Assessment Report
 Industrial Projects - Engineering Phase
 TENC12345 ~ Zydeco Chemicals Expansion

Date: Sep 10, 2014

Project General Information

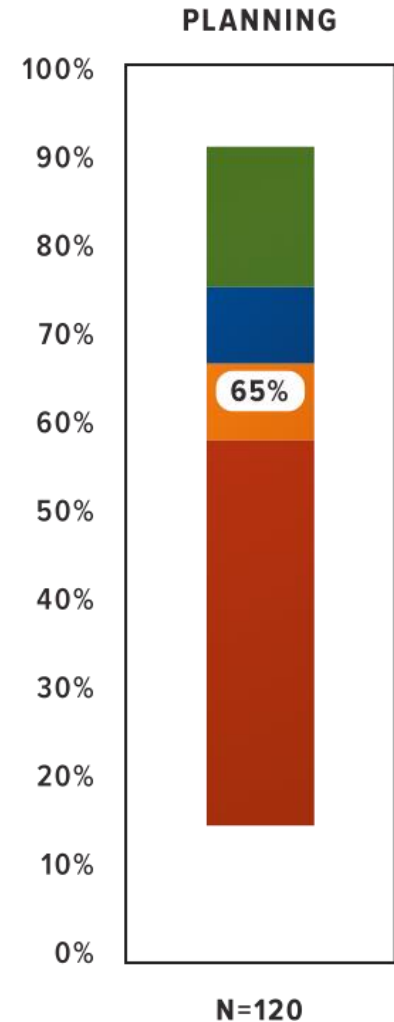
Company:	CII Engineering & Construction. Co.	Total Project Cost	
Project:	Zydeco Chemicals Expansion	Local (2011):	USD 275,000,000
ID:	TENC12345	Chicago (2013):	USD 289,382,845
Location:	New Orleans, Louisiana, United States	Midpoint of Phase:	Dec 17, 2011
Project Type:	Chemical Manufacturing	Forecasted Phase Duration:	65.00 wks
Capacity:	100,000.00 short tons per day	Actual Phase Duration:	91.29 wks

Input Measures



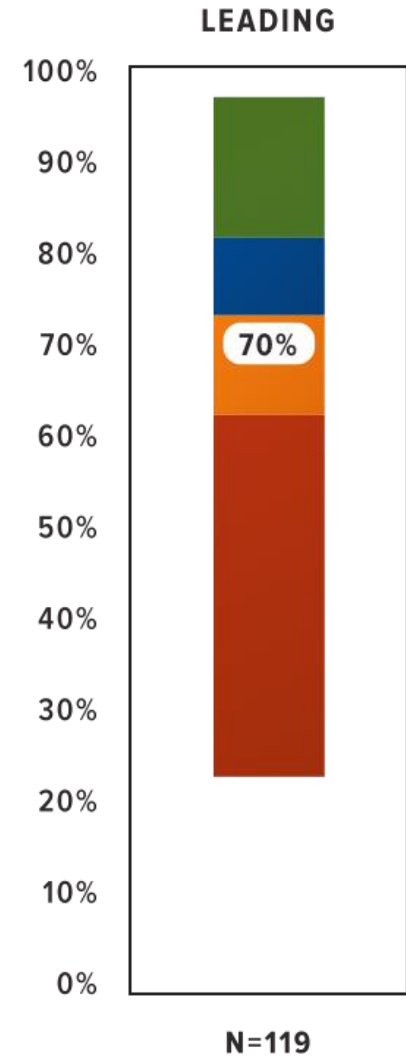
10 Leading Indicators

- 1. Planning:** The work a manager performs to predetermine a course of action. The function of planning includes the following activities: Forecasting, Objective Setting, Program Development, Scheduling, Budgeting, and Policies and Procedures Development.
- 2. Organizing:** The work a manager performs to arrange and relate the work to be done so people can perform it most effectively. The function of organizing includes the following activities: Development of Organization Structure, Delegation of Responsibility and Authority, and Establishment of Relationships.



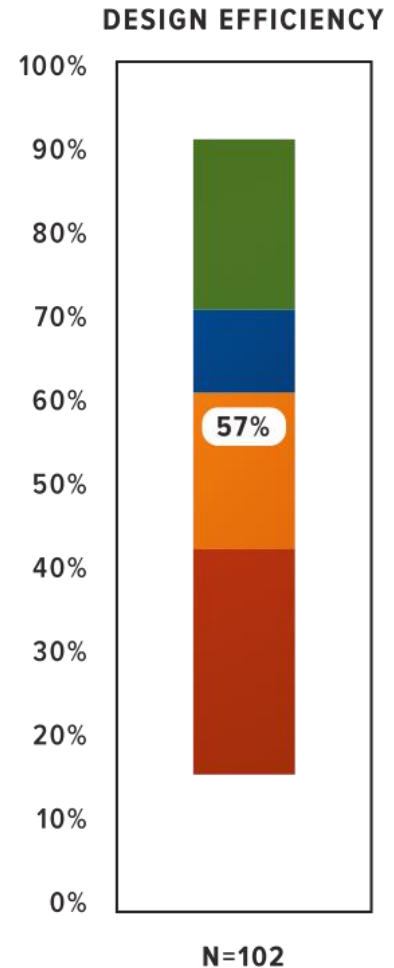
10 Leading Indicators

- 3. Leading:** The work a manager performs to cause people to take effective action. The activities involved in the function of leading include: Decision-Making, Communications, Motivation, Selection of People, and Development of People.
- 4. Controlling:** The work a manager performs to assess and regulate work in progress and completed. Management controls are achieved through the following activities: Establishment of Performance Standards, Measurement of Performance, Evaluation of Performance, and Correction of Performance.



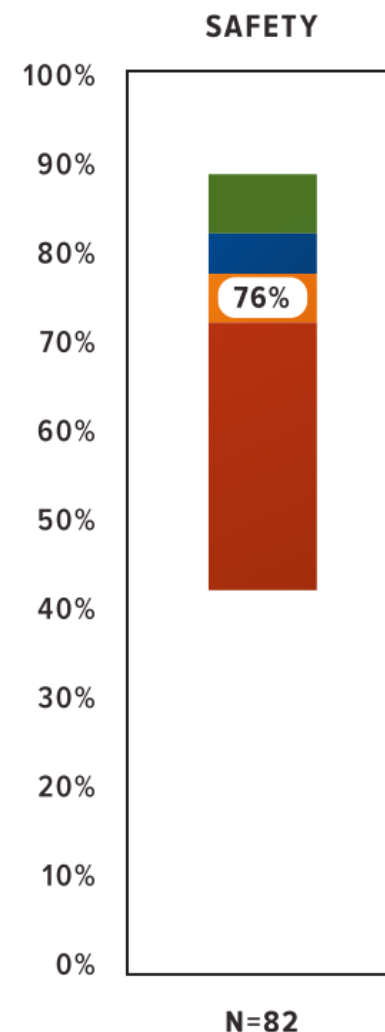
10 Leading Indicators

- 5. Design Efficiency:** Measures if the project team is exhausting all techniques to optimize the design in its use of material quantities to provide maximum capacity at minimum cost.
- 6. Human Resources:** Examines if the project is staffed correctly, with a minimum amount of staff turnover and appropriate training. Measures if people are capable of achieving project goals.
- 7. Quality:** Measures if the project team is strictly conforming to project requirements. Analyzes if programs are pursued to assure the delivery of material goods as intended.



10 Leading Indicators

8. **Sustainability:** Evaluates steps taken by the project team to reduce the environmental impact of the project during construction and operation.
9. **Supply Chain Management:** Examines the strategies used by the project team to promote enhanced working relationships amongst all project stakeholders including those in the project supply chain.
10. **Safety:** Measures the steps followed by the project team to eliminate any possibility of personal injury or property damage on the project.



10 Outputs (Capacity and FTE-Based Metrics)

Table 5: List Output Metrics by Phase

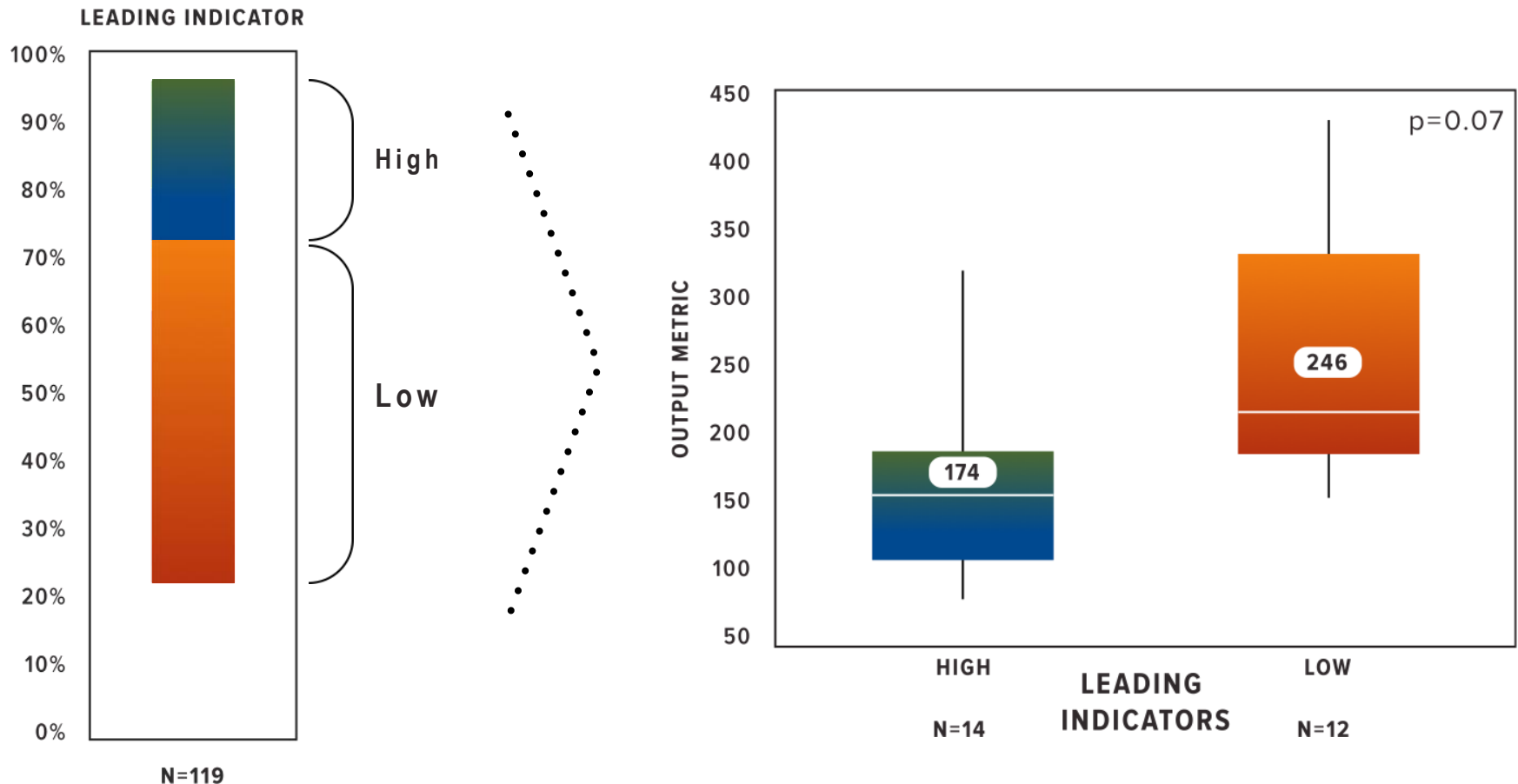
Metrics Type	FEP/PROG	ENG/DES	PRO	CON	STA/COM
Capacity-based Metrics	1. (Building) Forecasted Project Cost Efficiency	1. (Building) Forecasted Project Cost Efficiency	1. (Building) Forecasted Project Cost Efficiency	1. (Building) Forecasted Project Cost Efficiency	1. (Building) Actual Project Cost Efficiency
	2. (Building) FEP (Programming) Cost Efficiency	2. (Building) Engineering (Design) Cost Efficiency	2. (Building) Total Equipment Cost/Capacity	2. (Building) Construction Cost Efficiency	2. (Building) Startup (Commissioning) Cost Efficiency
	3. (Building) Forecasted Project Schedule Efficiency	3. (Building) Forecasted Project Schedule Efficiency	3. (Building) Forecasted Project Schedule Efficiency	3. (Building) Forecasted Project Schedule Efficiency	3. (Building) Actual Project Schedule Efficiency
	4. (Building) FEP (Programming) Schedule Efficiency	4. (Building) Engineering (Design) Schedule Efficiency 5. (Building) Capacity Efficiency	4. (Building) Procurement Schedule Efficiency	4. (Building) Construction Schedule Efficiency 5. (Building) Capacity Efficiency	4. (Building) Startup (Commissioning) Schedule Efficiency
Relative Metrics	5. FEP (Programming) Cost Growth	6. Engineering (Design) Cost Growth	5. Procurement Schedule Growth	6. Construction Cost Growth 7. Construction Schedule Growth	5. Startup (Commissioning) Cost Growth 6. Startup (Commissioning) Schedule Growth
	6. FEP (Programming) Schedule Growth	7. Engineering (Design) Schedule Growth	6. Total Cost of Equipment/Total Project Cost		
Phase Burn Metric	7. FEP (Programming) Burn Rate	8. Engineering (Design) Phase Burn Rate	7. Procurement Phase Burn Rate	8. Construction Phase Burn Rate	7. Startup (Commissioning) Phase Burn Rate
Procurement Metrics			8. Total Cost of Equipment/Total Number of Major Equipment		
			9. Total Project Cost/Number of Vendors		
			10. Total Project Cost/Number of Purchase Orders		
FTE-Based Metrics	8. Project Management Team Size/Total Project Cost (Adjusted for Complexity)	9. Project Management Team Size/Total Project Cost (Adjusted for Complexity)	11. Project Management Team Size/Total Project Cost (Adjusted for Complexity)	9. Project Management Team Size/Total Project Cost (Adjusted for Complexity)	8. Startup (Commissioning) Management Team Size/Total Project Cost (Adjusted for Complexity)
		10. Engineering Team Size/Total Project Cost (Adjusted for Complexity)	12. Procurement Team Size/Total Project Cost (Adjusted for Complexity)	10. Craft Work Force/Construction Phase Cost	9. Startup (Commissioning) Phase Management Team Size/Startup Phase Cost
		11. Engineering Team Size/Engineering Phase Cost	13. Procurement Team Size/Total Cost of Major Equipment		
Safety Metrics				11. TRIR 12. DART	

10-10 FINDINGS / ANALYSES



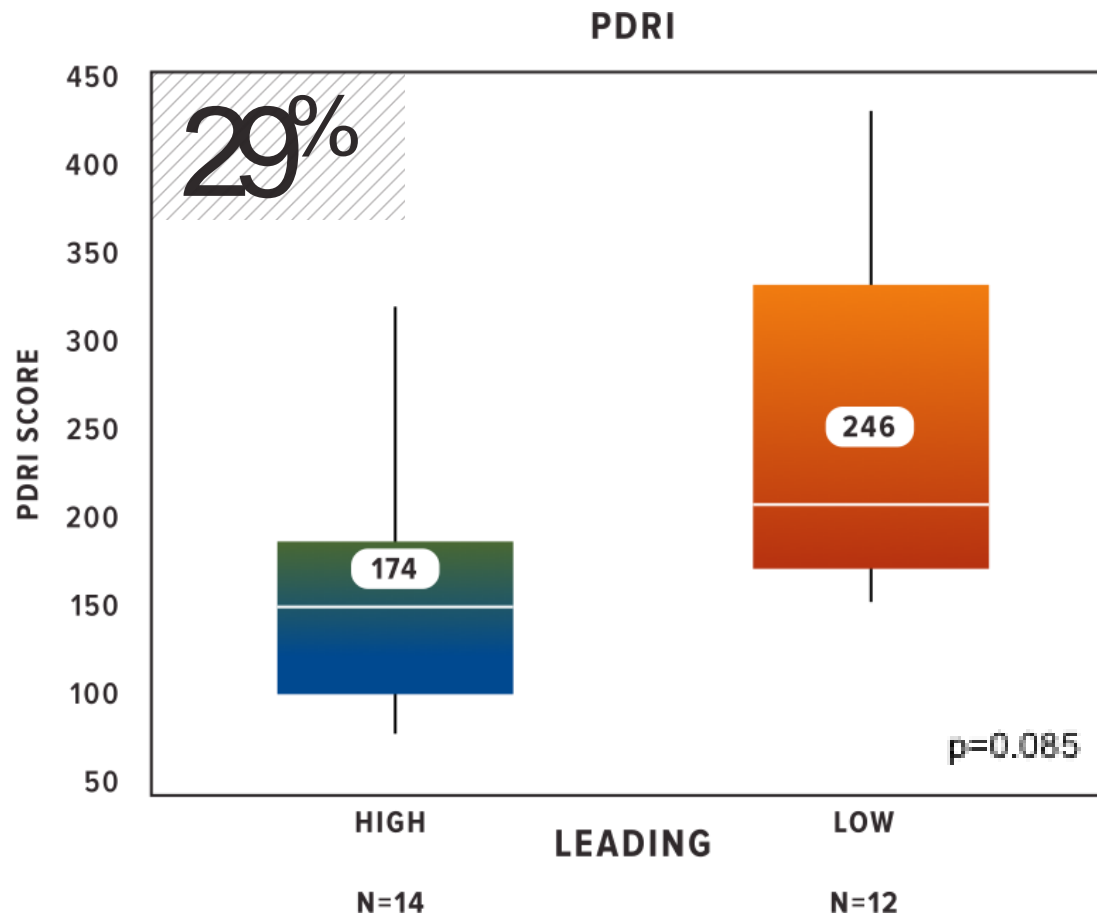
Round 1 Results (600+ Global Projects)

- Typical Analysis of a Leading Indicator



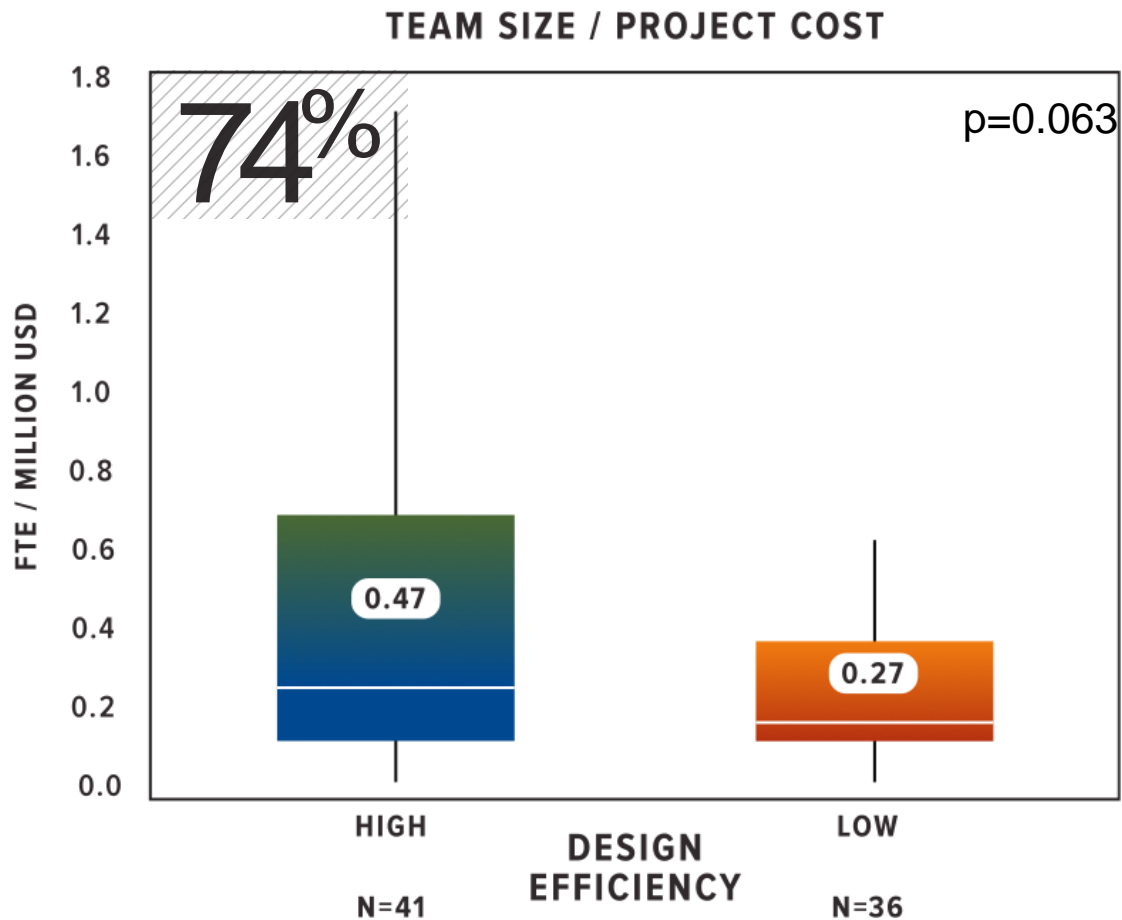
Front End Planning (FEP)

- Effect of Leadership



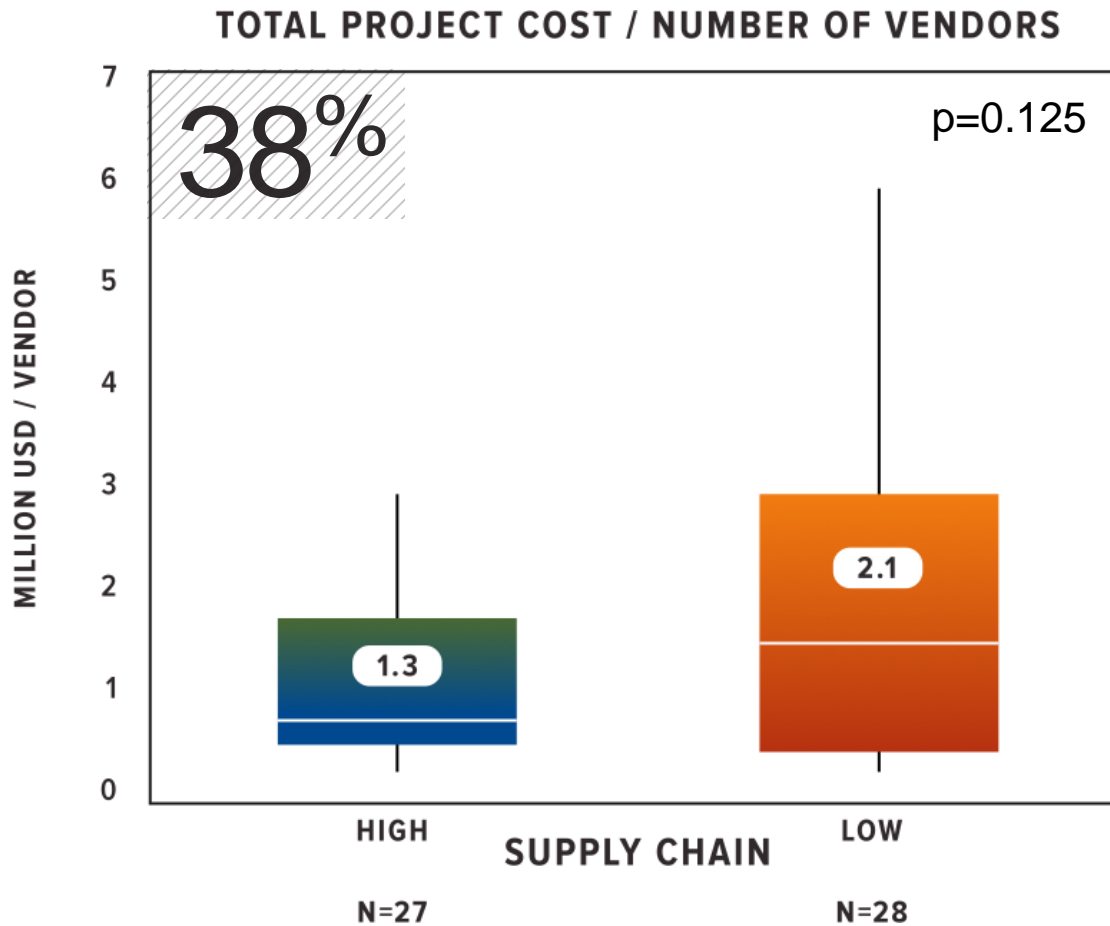
Engineering (Design)

- Impact of Design Efficiency



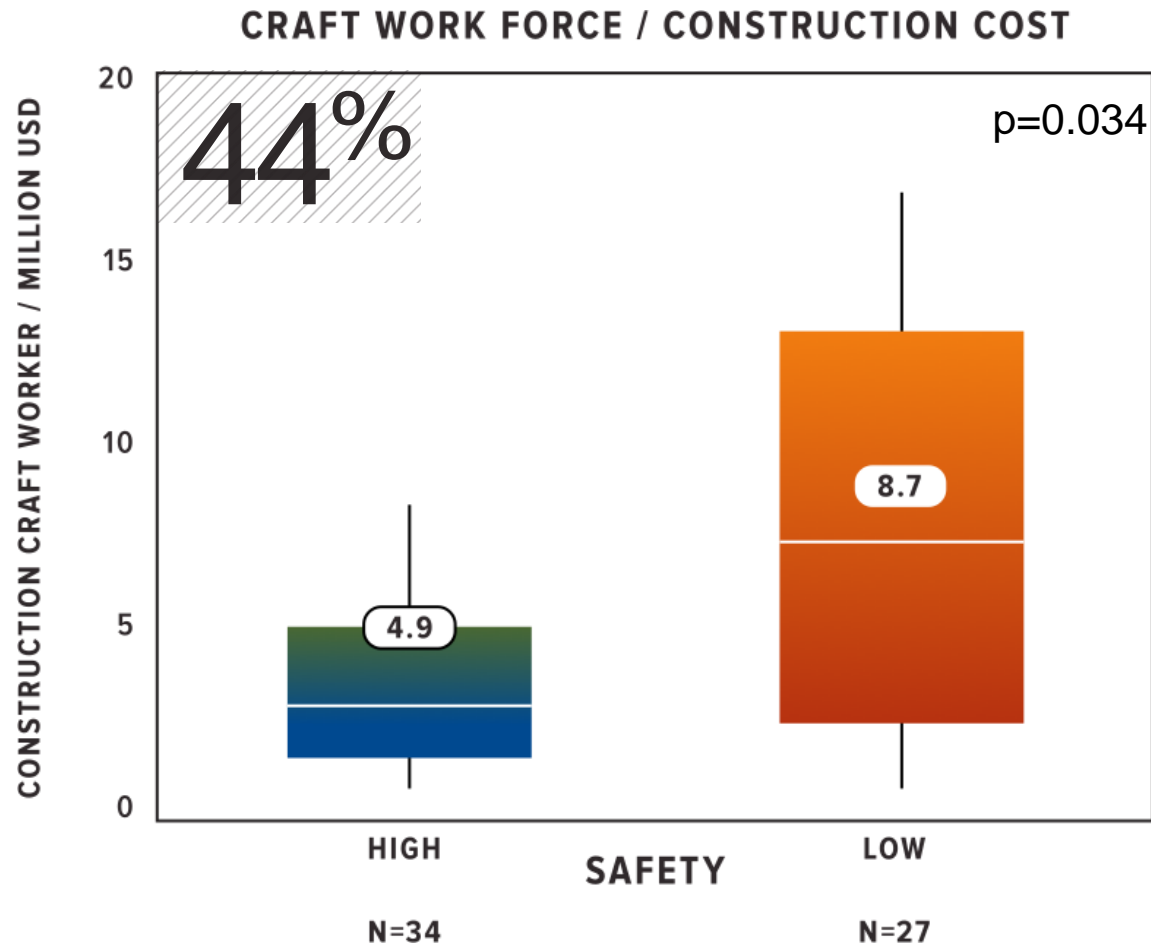
Procurement

- Effect of Supply Chain



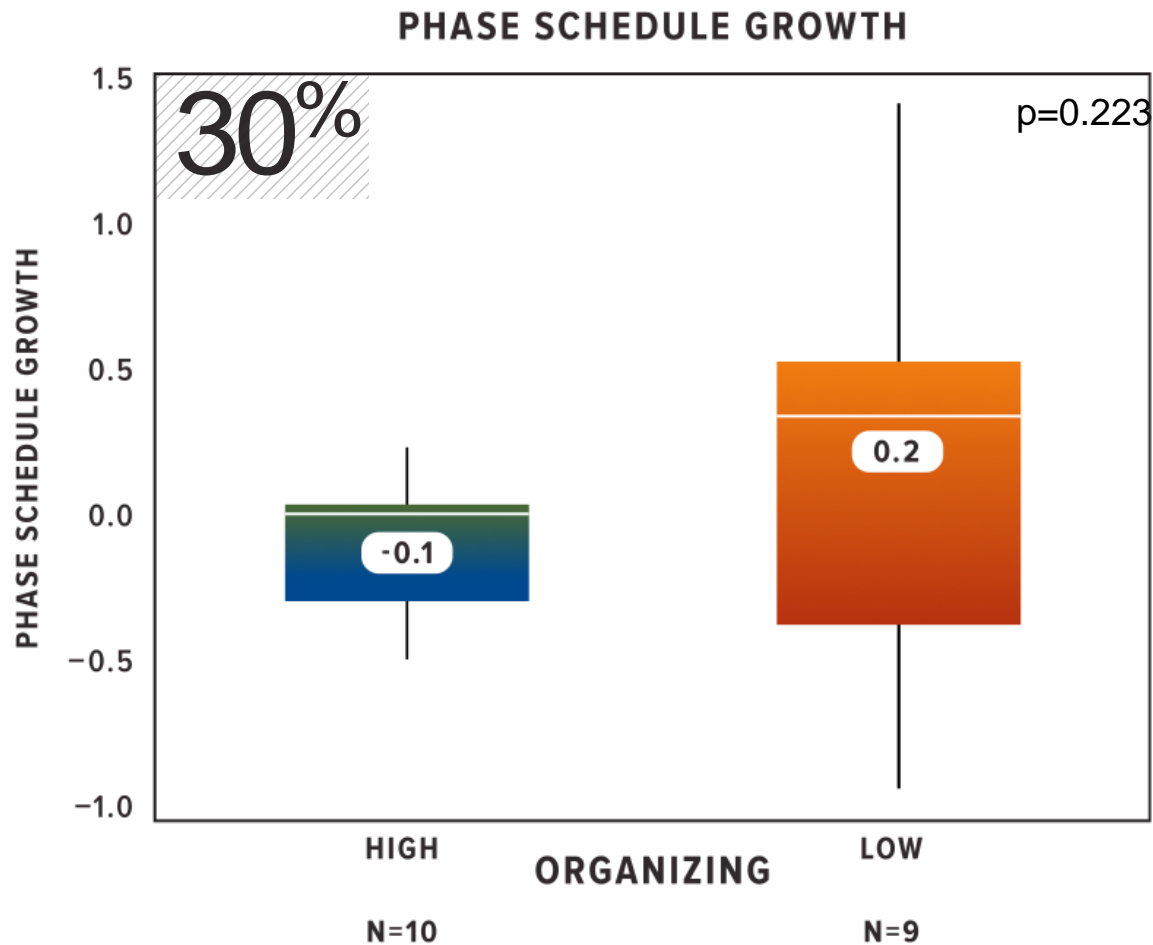
Construction

- Impact of Safety

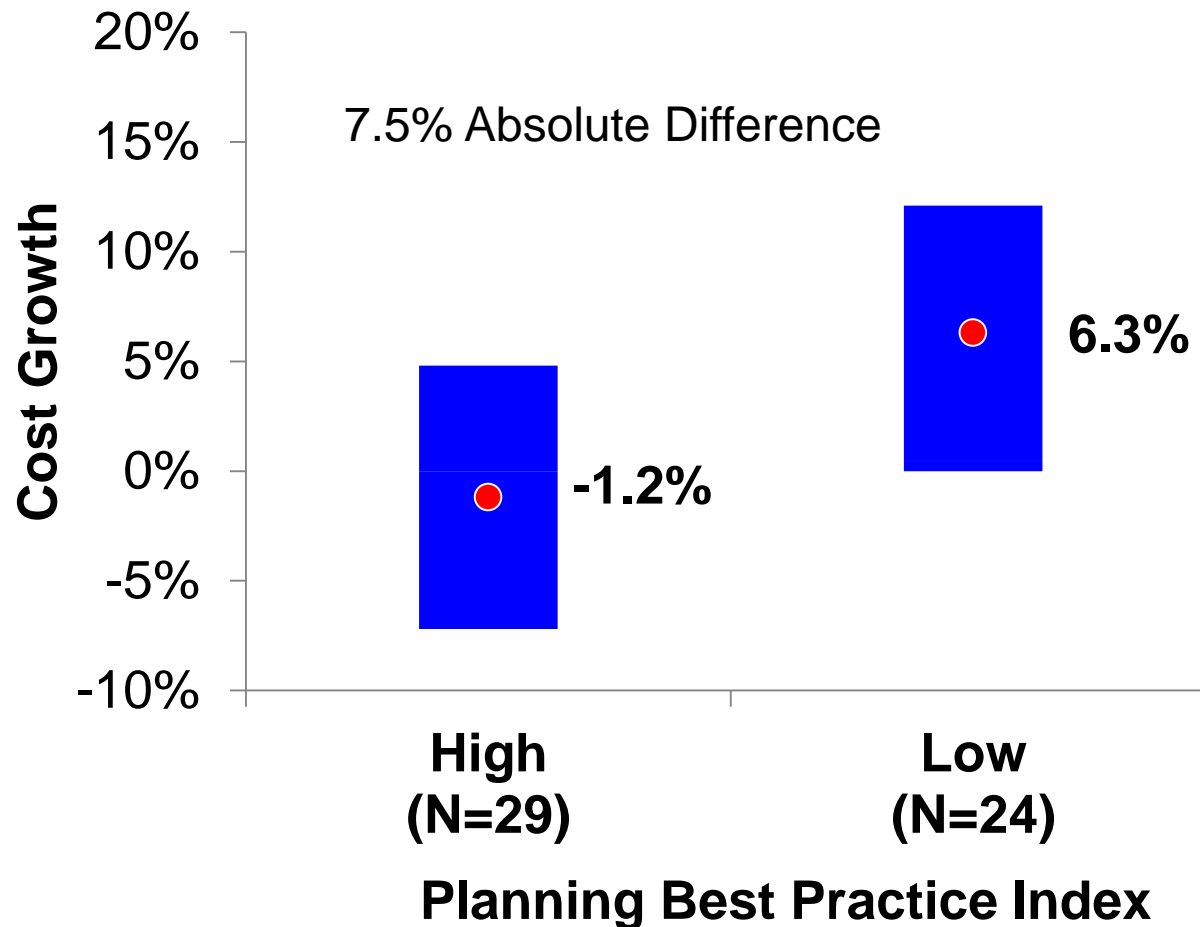


Start Up / Commissioning

- Effect of Organizing



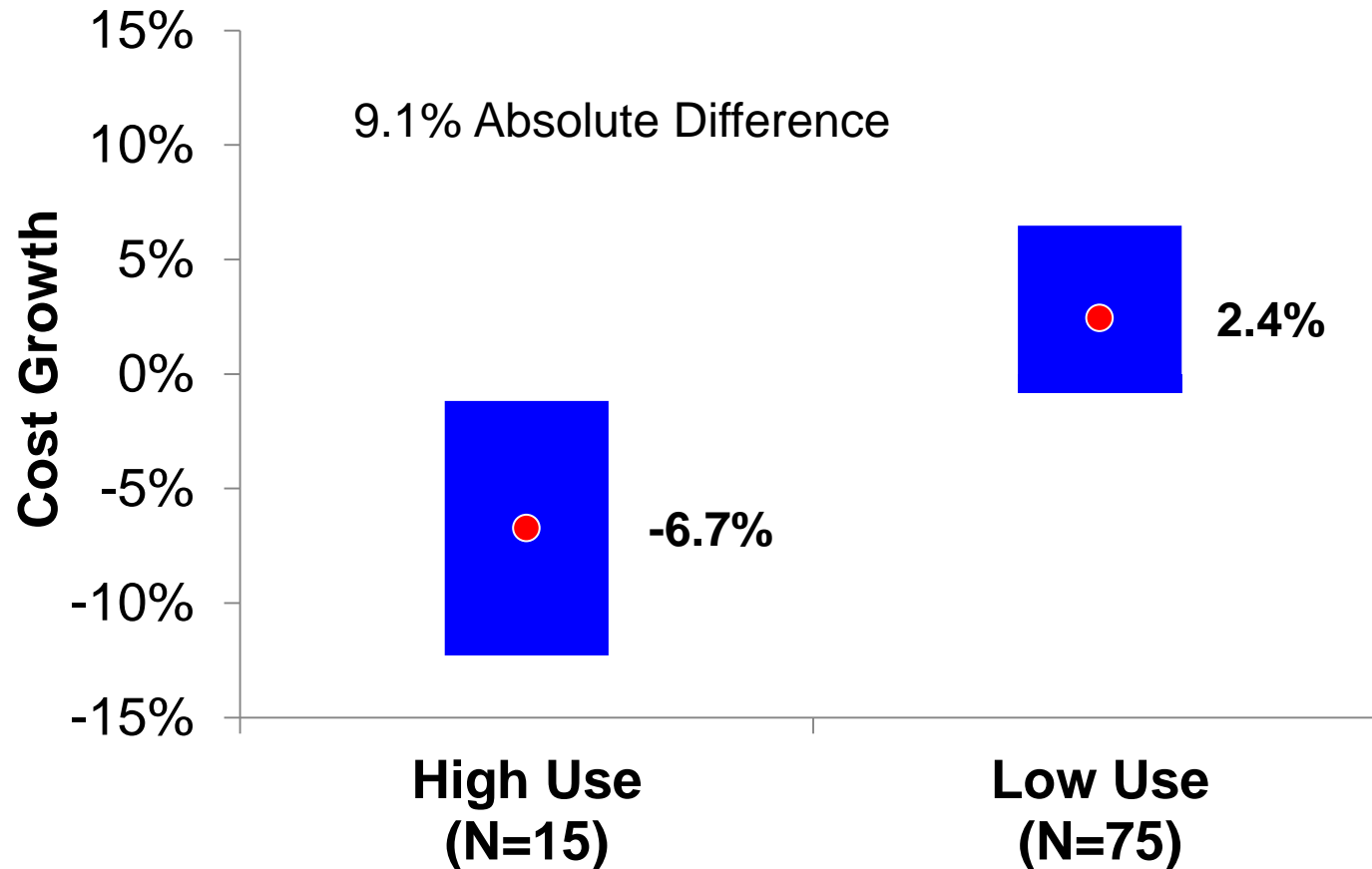
CII VBP: Owner Planning (6.1% NPV Gain)



- *Front End Planning*
- *Alignment for FEP*
- *Planning for Start-up*

■ =standard error of mean (90% confidence interval)

CII VBP: Owner Partnering (33.8% NPV Gain)



■ =standard error of mean (90% confidence interval)

CII Working Relationship

- The goal of the analysis is to assess whether projects that have CII members as owners and contractors have better performance (10-10 input measures)
- Each box and whisker plot shows:

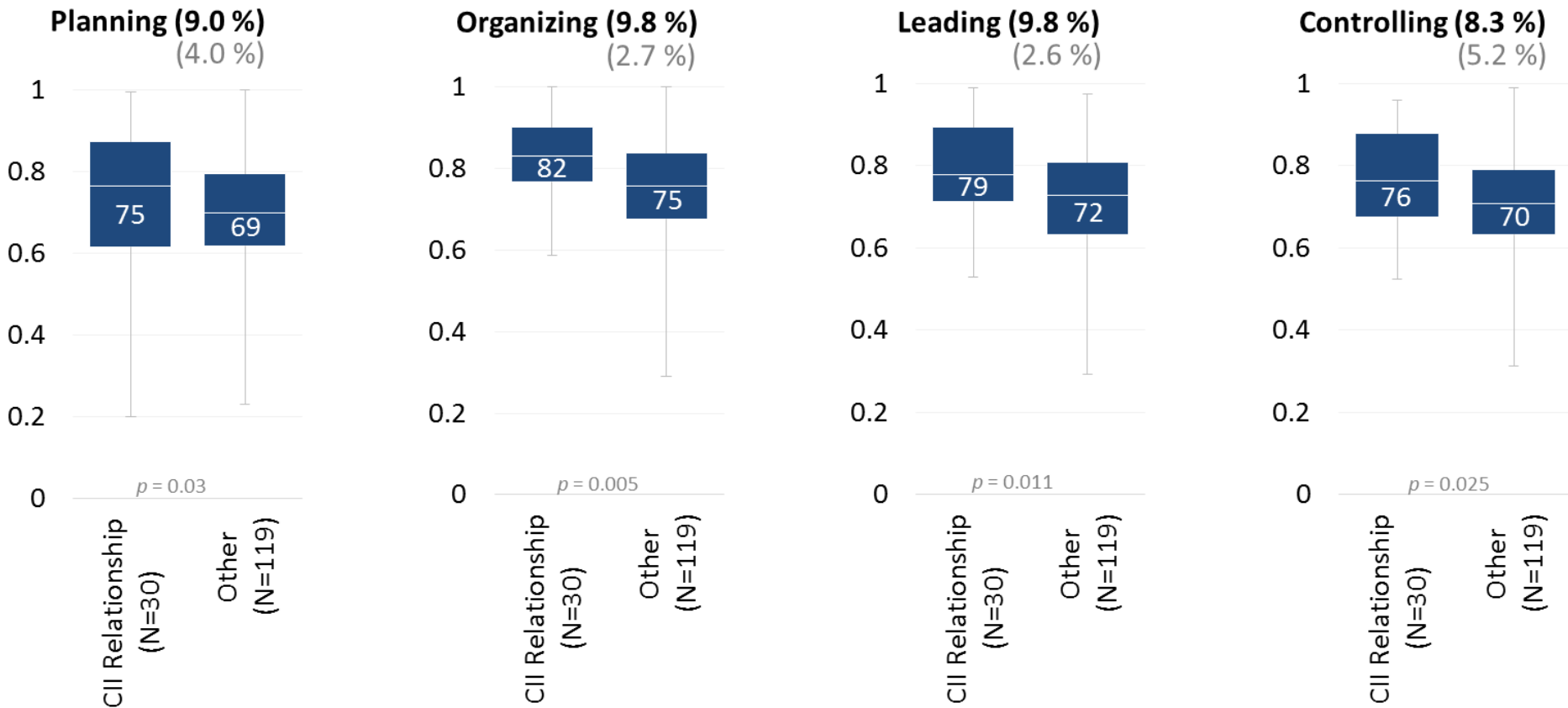
**Group of projects that
had CII members as
both owners and
contractors**

versus

**Group of projects in
which either the
owner or contractor
were not a CII
member**

The number in white within the boxes indicate the group average

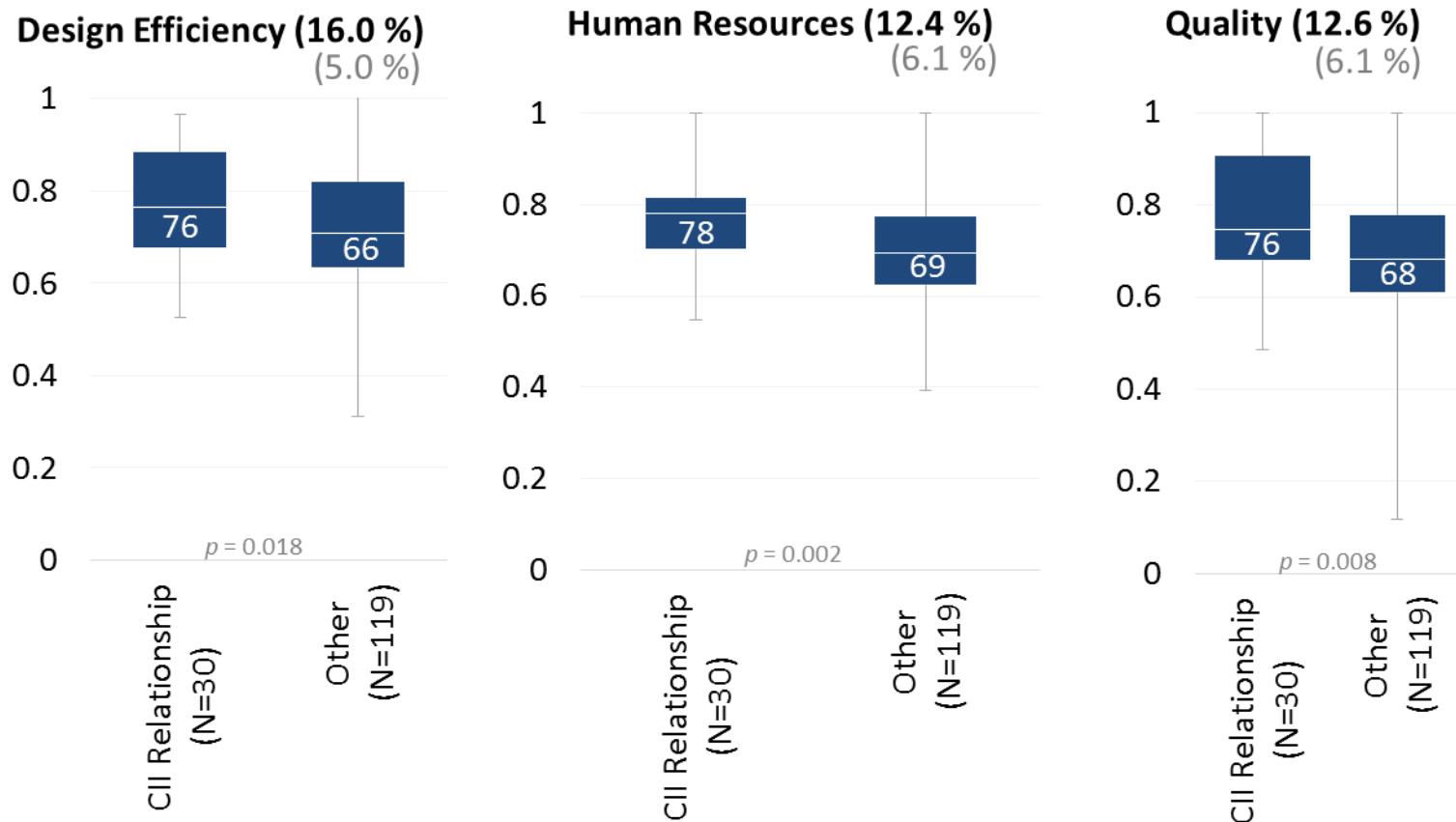
Input Measures by Working Relationship



The number in white within the boxes indicate the group average for projects with more than two respondents. The percentage in black indicates the difference between the two averages. The percentage in light gray indicates the difference for projects with only one response.



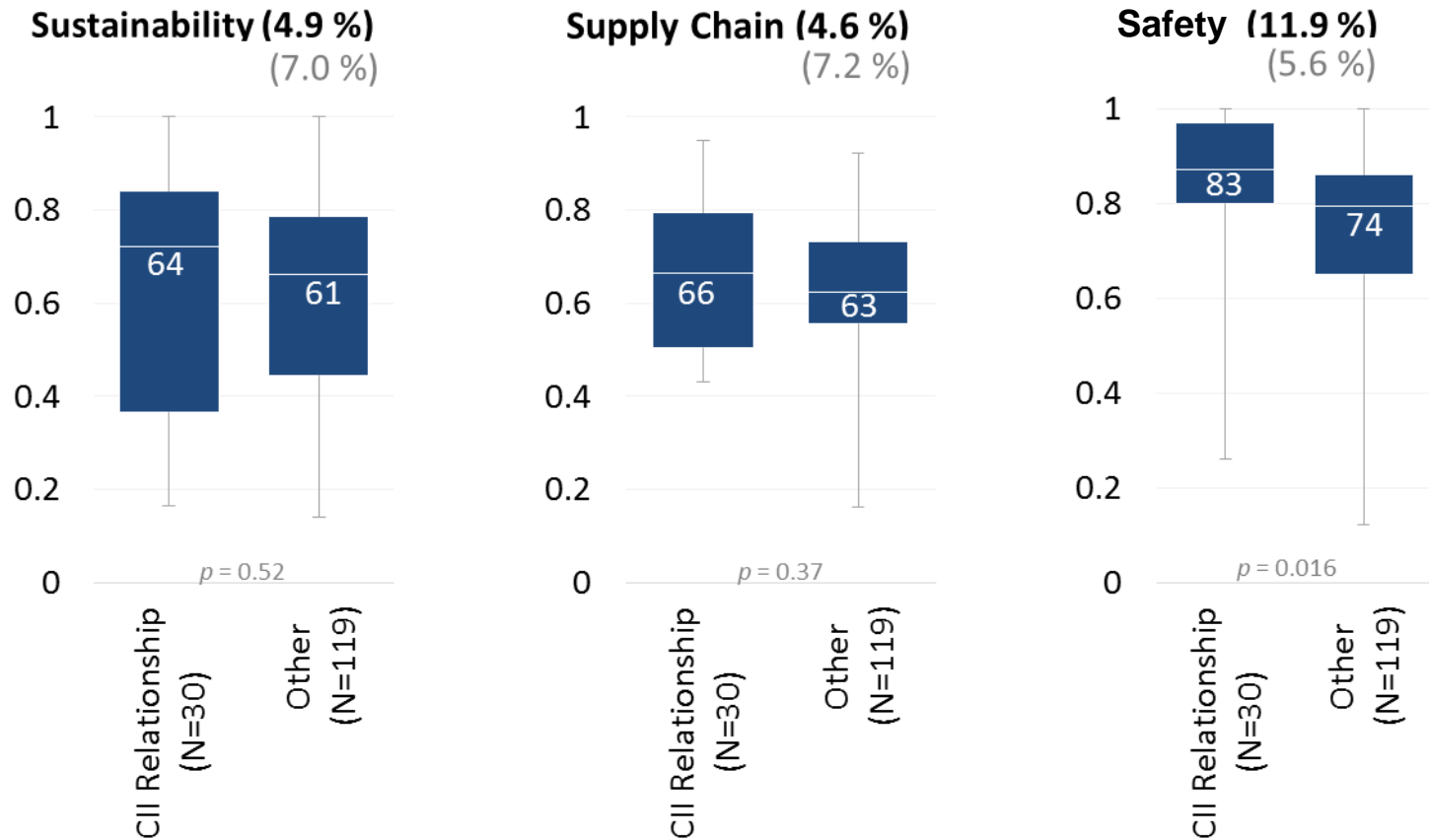
Input Measures by Working Relationship



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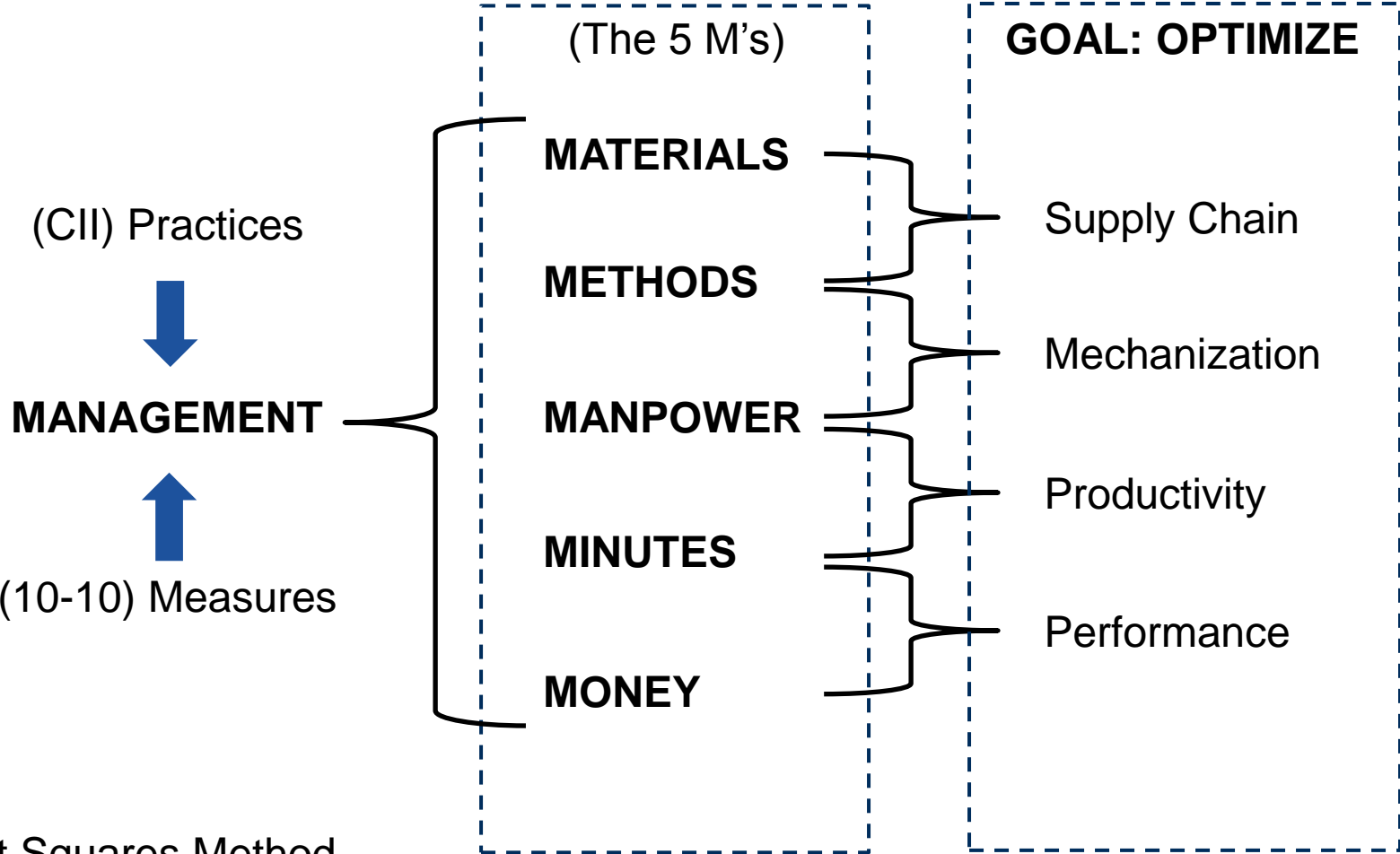


Input Measures by Working Relationship



The number in white within the boxes indicate the group average for projects with more than two respondents. The percentage in black indicates the difference between the two averages. The percentage in light gray indicates the difference for projects with only one response.

The Logic of 10-10 (33.1% Better Management*)



*Least Squares Method



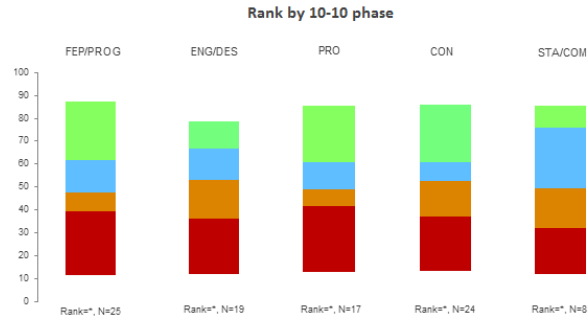
10-10 PORTFOLIO ANALYSIS (BY COMPANY)



CII Company Portfolio 10-10 Analysis

10-10 Contractors's Rank by Project Performance

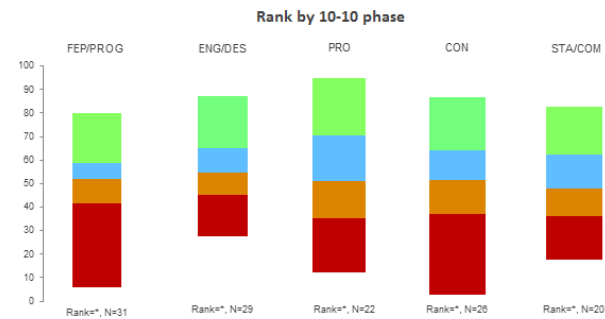
10-10 Contractor



The white circle indicates your company average score in each phase.
 The score is the average of the score of all 10 measures for all the projects submitted by your company in each phase.
 * Rank and average score are reported only when more than three projects have been submitted in a given phase.

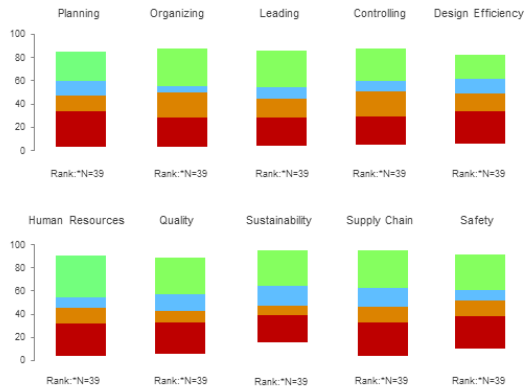
10-10 Owner's Rank by Project Performance

10-10 Owner



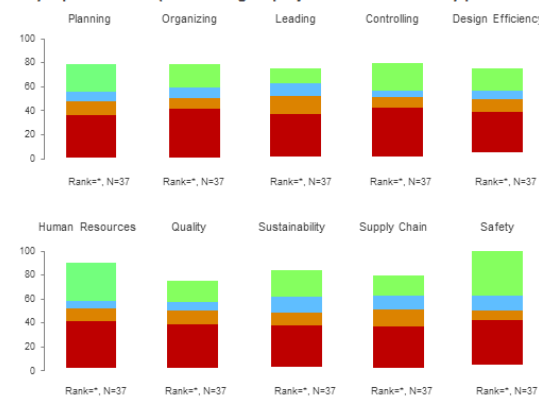
The white circle indicates your company average score in the phase.
 The score is the average of the score of all 10 measures for all the projects submitted by your company in each phase.
 * Average score and rank are reported only when more than three projects have been submitted in each phase.

Rank by input measure (considering all projects submitted to any phases and sectors)



The white circle indicates your company average score.
 * Rank and average score are reported only when more than five projects have been submitted.

Rank by input measure (considering all projects submitted to any phases and sectors)



The white circle indicates your company average score.
 * Rank and average score are reported only when more than five projects have been submitted.

Last update: 3/21/2015

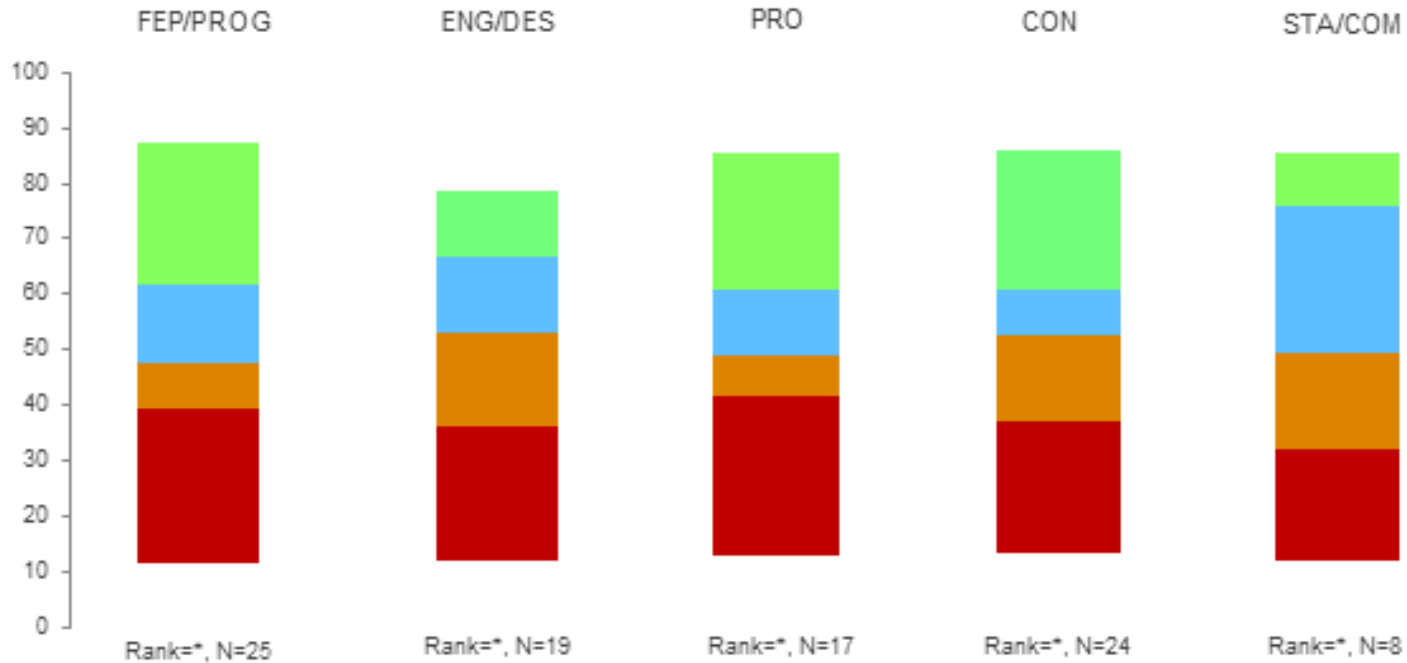


Last update: 3/21/2015



CII Company Portfolio 10-10 Analysis

Rank by 10-10 phase



The white circle indicates your company average score in each phase.

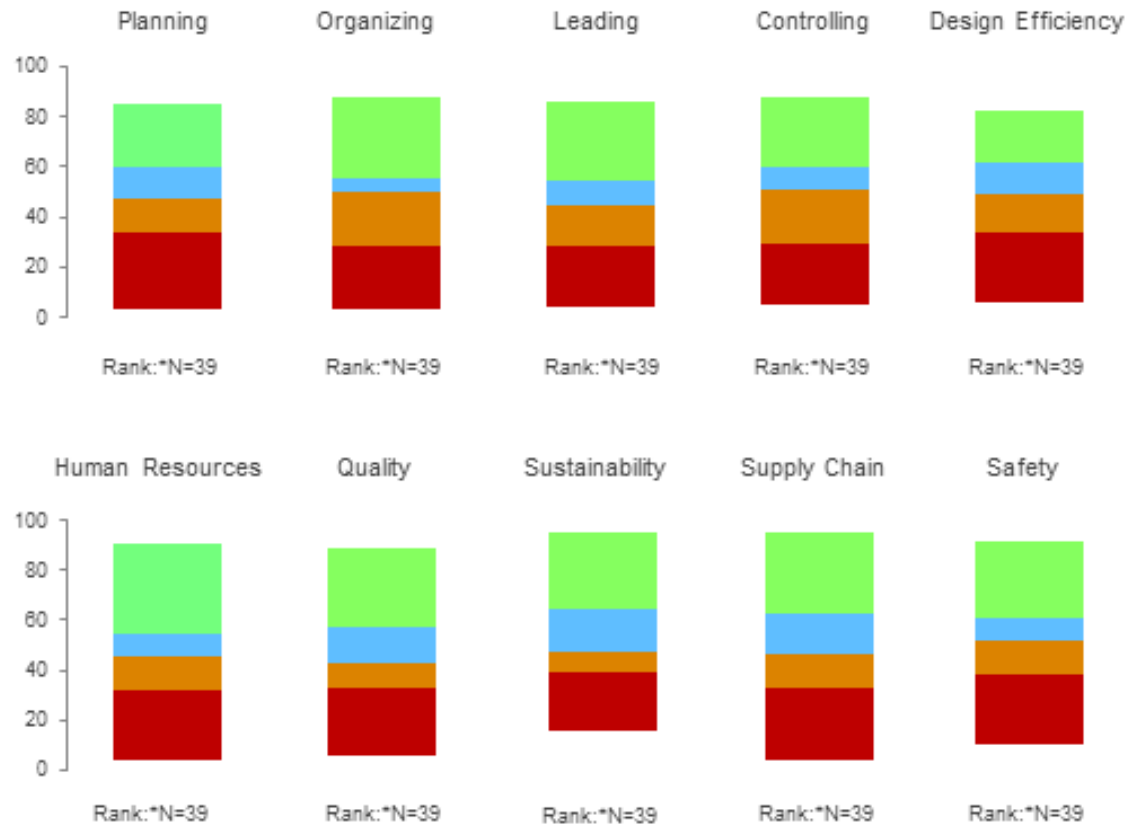
The score is the average of the score of all 10 measures for all the projects submitted by your company in each phase.

* Rank and average score are reported only when more than three projects have been submitted in a given phase.



CII Company Portfolio 10-10 Analysis

Rank by input measure (considering all projects submitted to any phases and sectors)



The white circle indicates your company average score.

* Rank are average score are reported only when more then five projects have been submitted.



10-10 PROGRAM SYSTEM



NEW User-Friendly 10-10 System

SEARCH

Search Projects

GEN General Section
 IN Input Section
 OUT Output Section

Not Created
 Not Started
 In Progress
 Completed
 Submitted to CII
 Validated

Submit Survey to CII
 View Report
 Start Survey Round
 Send Email Reminder
 Delete Item
 Edit Item
 Save Item

MY PROJECTS

Click the Project ID or Name to view team members and reports. [\(click to add a new project\)](#)

Company - Project	Front-End Planning / Programming			Engineering / Design			Procurement			Construction			Commissioning / Start-up		
	GEN	IN	OUT	GEN	IN	OUT	GEN	IN	OUT	GEN	IN	OUT	GEN	IN	OUT
TENO00258 ~ Test Project - Northweste...															
TENO00259 ~ Houston PW															
TENO00262 ~ TEST PARSONS															
TENO00264 ~ TEST Atlanta Fall 2014															

MANAGE SURVEYS - TENO00258 ~ TEST PROJECT - NORTHWESTERN ENERGY

Name	Email	Status
Engineering		Completed
Pharma Tester	hong.zhao@cii.utexas.edu	Not Started
Stephen Mulva	smulva@cii.utexas.edu	Not Started
Add new person	email@example.org	
Construction		Validated
Pharma Tester	hong.zhao@cii.utexas.edu	Completed
Daniel Oliveira	daniel.oliveira@cii.utexas.edu	In Progress

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THE UNIVERSITY OF TEXAS AT AUSTIN
Cockrell School of Engineering



10-10 User Guide



Welcome, Pharma Tester

[User Guide](#) *

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[LOG OUT](#)



The Knowledge Leader for Project Success
Owners • Contractors • Academics

SEARCH

Search Projects

GEN General Section
IN Input Section
OUT Output Section

- Not Created
- Not Started
- In Progress
- Completed
- Submitted to CII
- Validated

MY PROJECTS



Click the Project ID or Name to view team members and reports.

[\(click to add a new project\)](#) +


Company - Project	Front-End Planning / Programming			Engineering / Design			Procurement			Construction			Commissioning / Start-up		
	GEN	IN	OUT	GEN	IN	OUT	GEN	IN	OUT	GEN	IN	OUT	GEN	IN	OUT
Pharma Testco Owner															
TENO00258 ~ Test Project - Northweste...															
TENO00259 ~ Houston PIW															




Glossary, Metrics and Definitions



The Knowledge Leader for Project Success
Owners • Contractors • Academics

[Glossary](#) 

[Save & Exit](#) 

[← Previous](#) **Pharma Testco Owner - TENO00258 ~ Test Project - Northwestern Energy** [Next →](#)
SURVEY PROGRESS — 1 of 5

0 %

1. Owner Company Name:
2. Project Construction Location: City:
3. Project Construction Location:(State or Province):
4. Project Construction Location: Country:
5. Lead Construction Contractor:

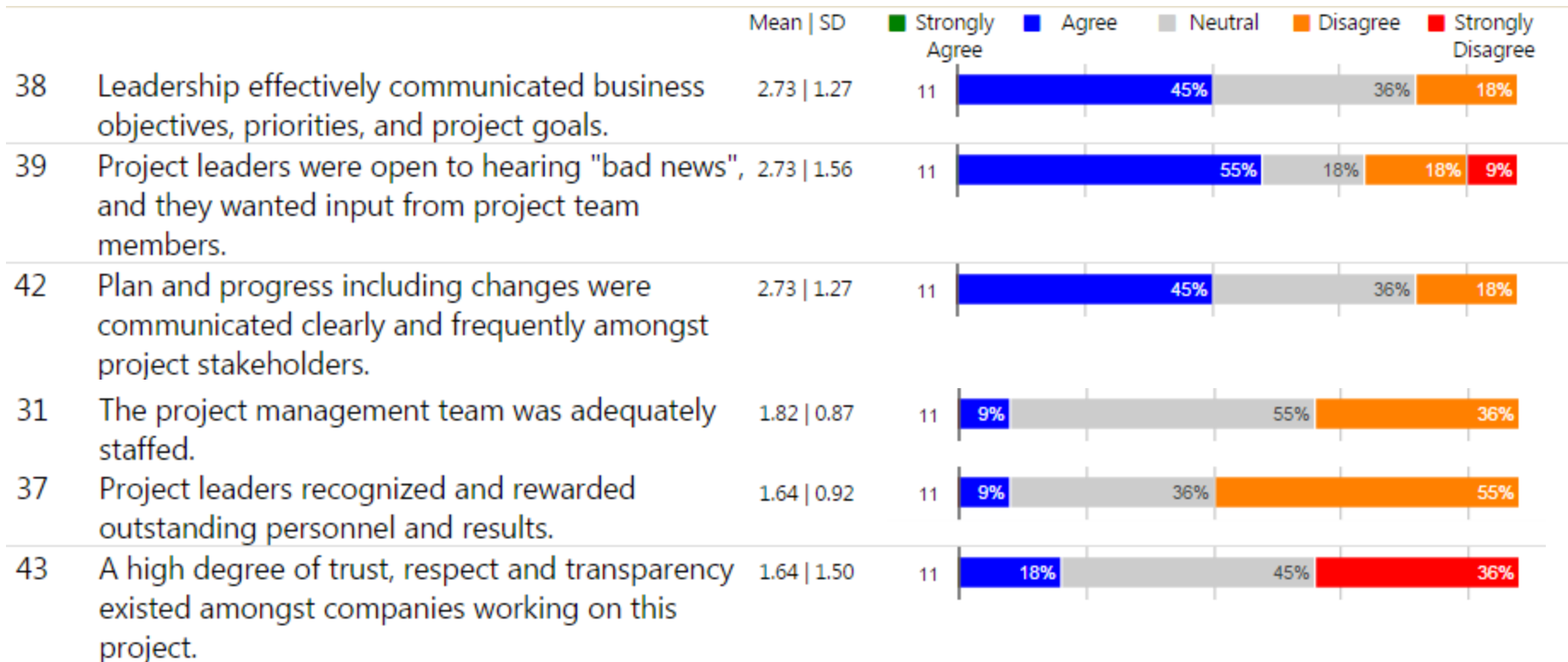
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Cockrell School of Engineering

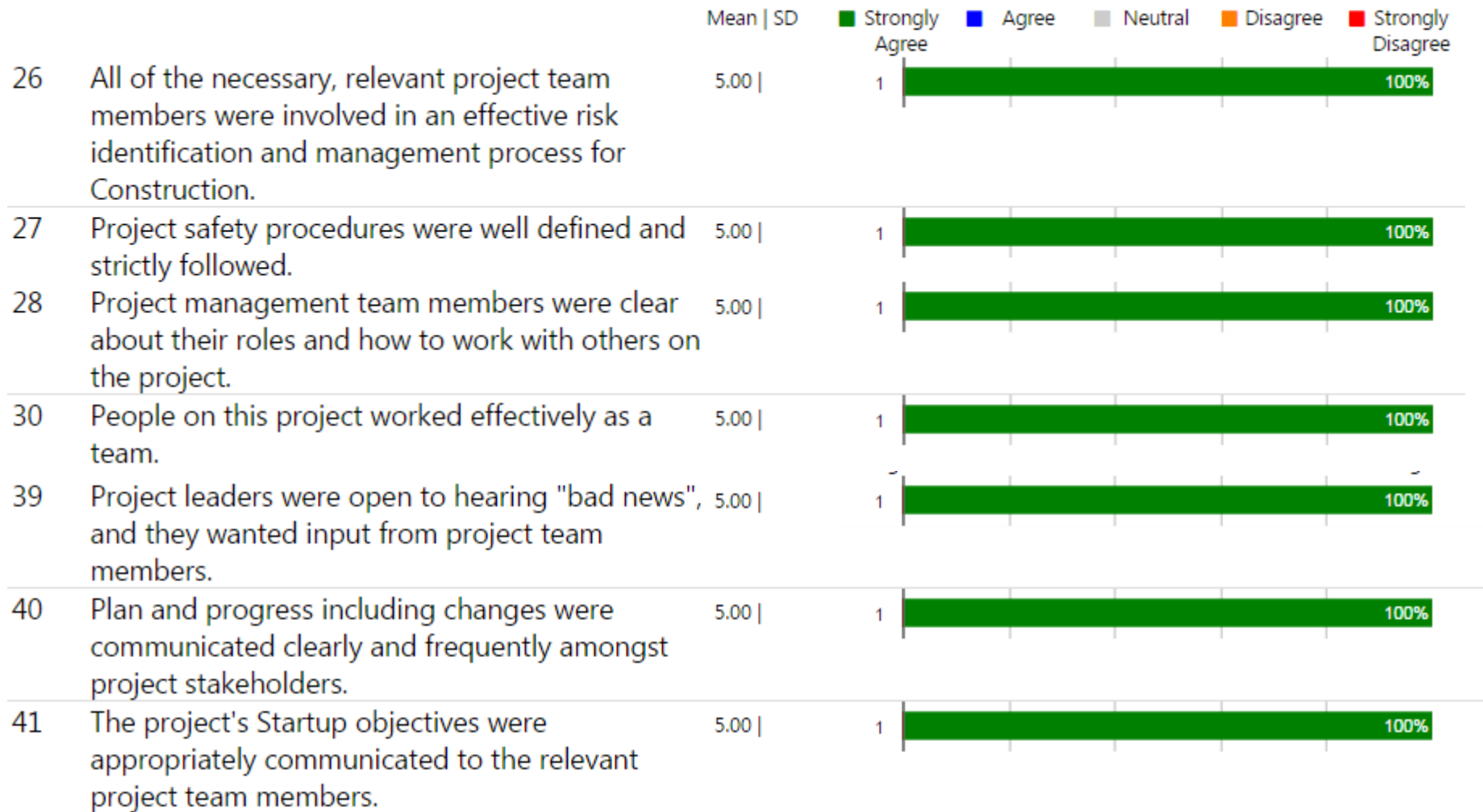


10-10 Questions/Results

Sample Report



10-10 Questions/Results



10-10 Program Implementation

- Question Mapping

Question – Input Metric map

Industrial Projects – Construction Phase		Planning	Organizing	Leading	Controlling	Design Efficiency	Human Resources	Quality	Sustainability	Supply Chain	Safety
G	What was the typical foreman to craft ratio?		■		■		■				
G	Overall how many workers per safety professional were typically (i.e., in terms of the average workforce) on site?				■		■				■
4	Did the project objectives change during Construction?	■				■					
5	This project experienced a high number of:	■									
6	Was a turnaround involved in the scope of this project?	■			■		■				
7	Please characterize how project meetings were conducted.			■	■						
8	Which of the following statements characterized the decisions made by the manager(s) of this project?			■							
9	This project used the following methods.	■	■	■	■	■		■			■
10	Formal (classroom) safety training was attended:			■							■
11	Did the original primary contractor(s) complete the project?		■								
13	Was safety performance a criterion for contractor and subcontractor selection?		■								■
14	Were safety toolbox meetings held daily?										■
15	Were accidents including near misses formally investigated?										■
16	The availability and competency of craft labor was adequate.	■					■	■			■
17	The owner level of involvement was appropriate.	■	■	■							
18	The owner and primary contractor(s) maintain a long-standing partnering arrangement.	■	■	■						■	



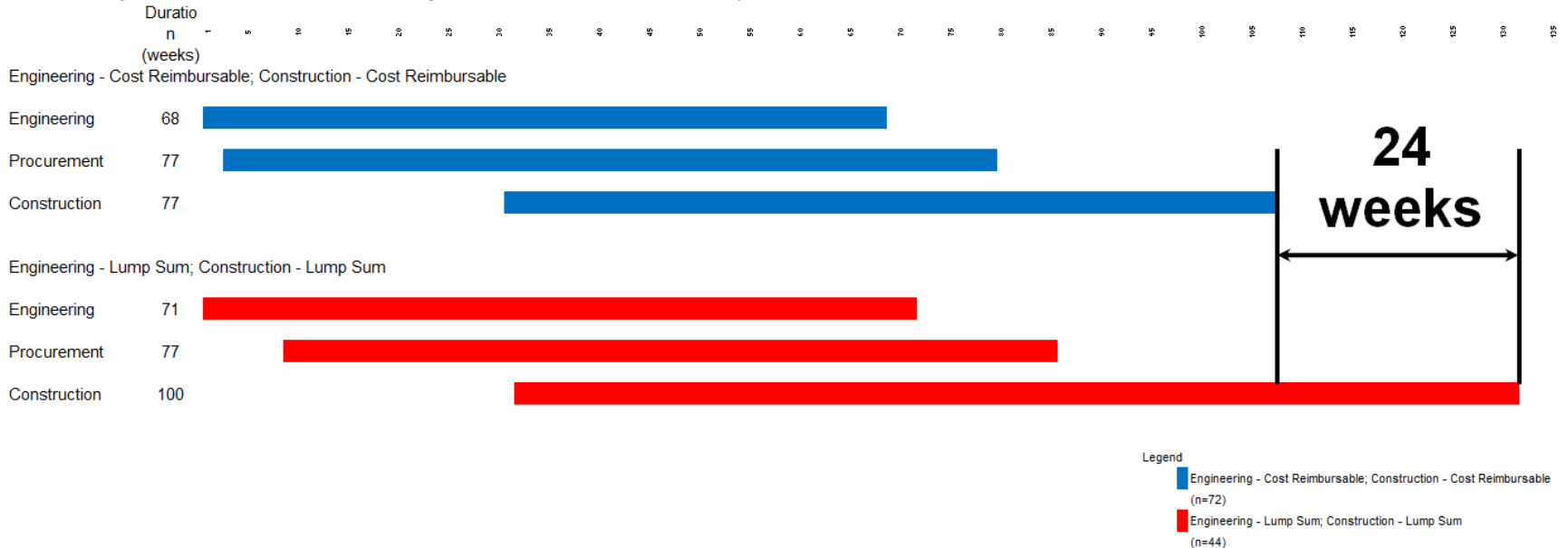
NEW FRONTIERS



CII Phase Duration Research (2011-Present)

- Normalized \$250 MM Projects
- C/R (Blue) vs. L/S (Red) Contracting

Normalized Project Execution Duration for \$ 250Million Project Between Cost Reimbursable and Lump Sum



Notes: the project cost ranges from \$25Million to \$500Million (in 2009 dollars)

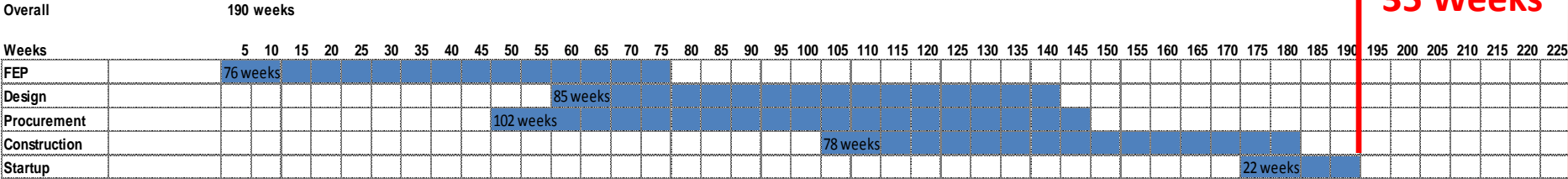
Procurement Involvement in FEP



Analyzed by: BMM Team

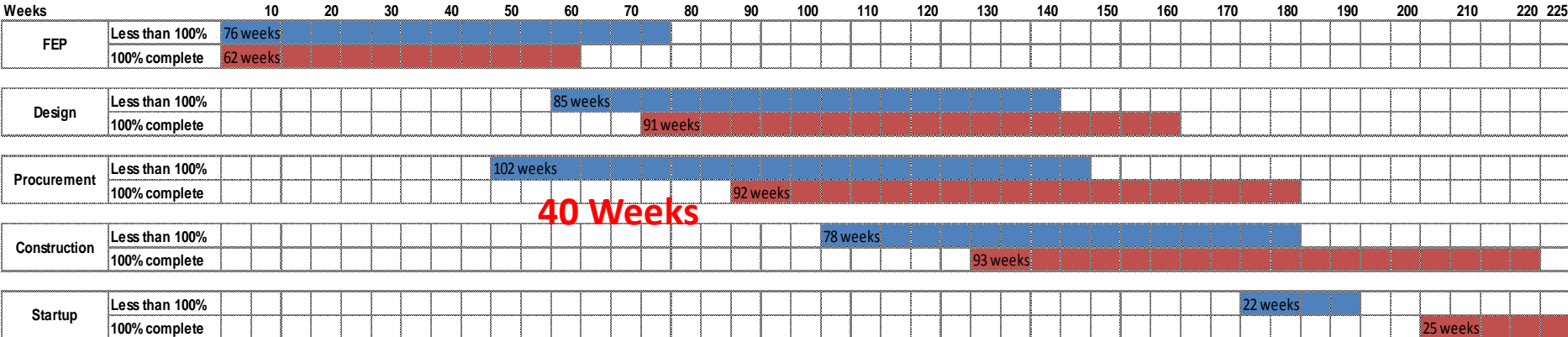
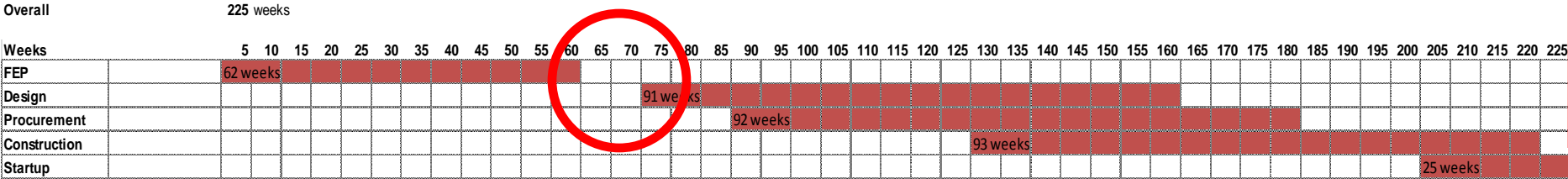
*Each project's cost was normalized to \$ 250 MM

Less than 100% FEP complete prior to Procurement start (n=53 projects)



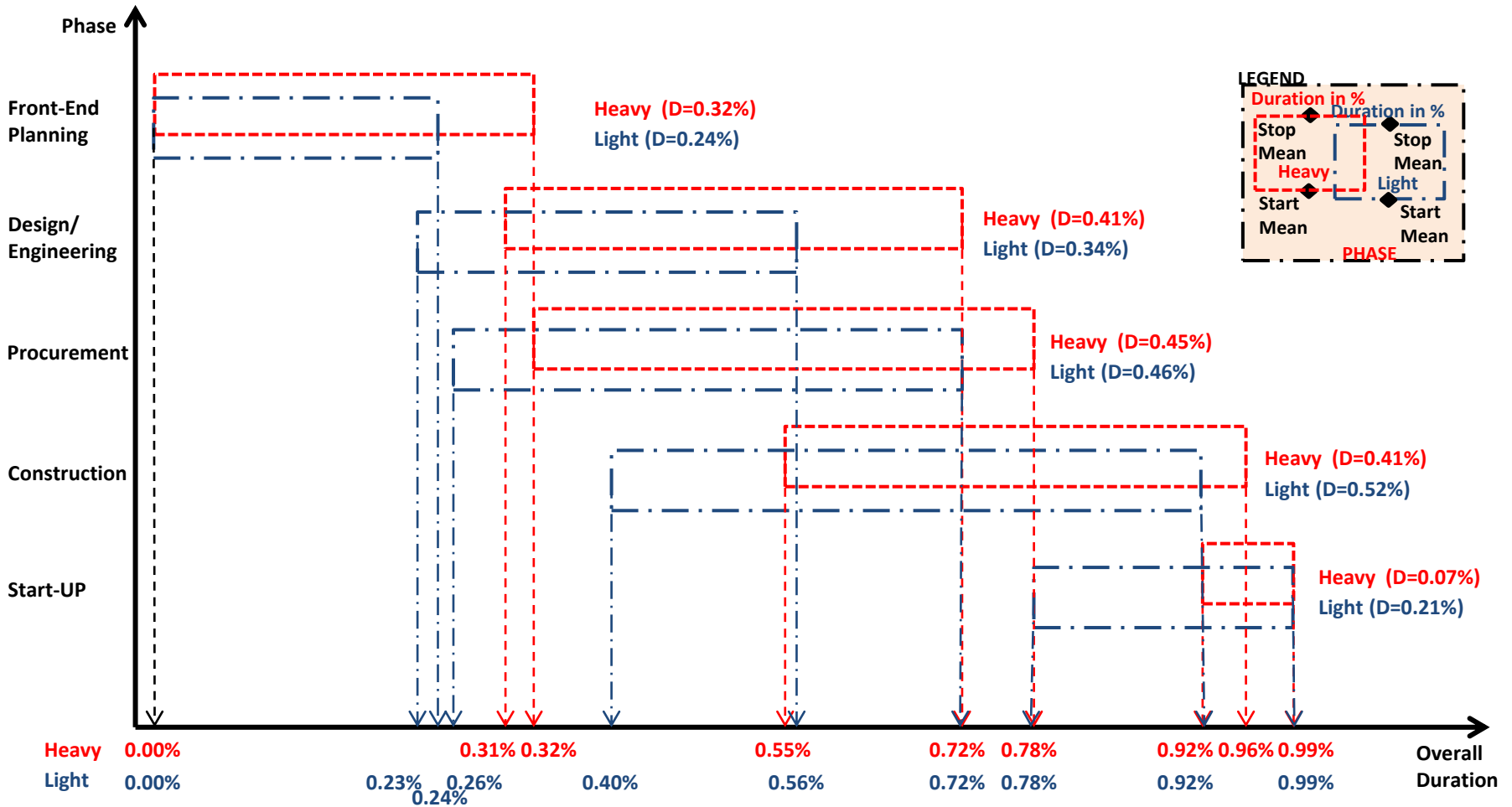
35 Weeks

100% FEP complete prior to Procurement start (n=97 projects)

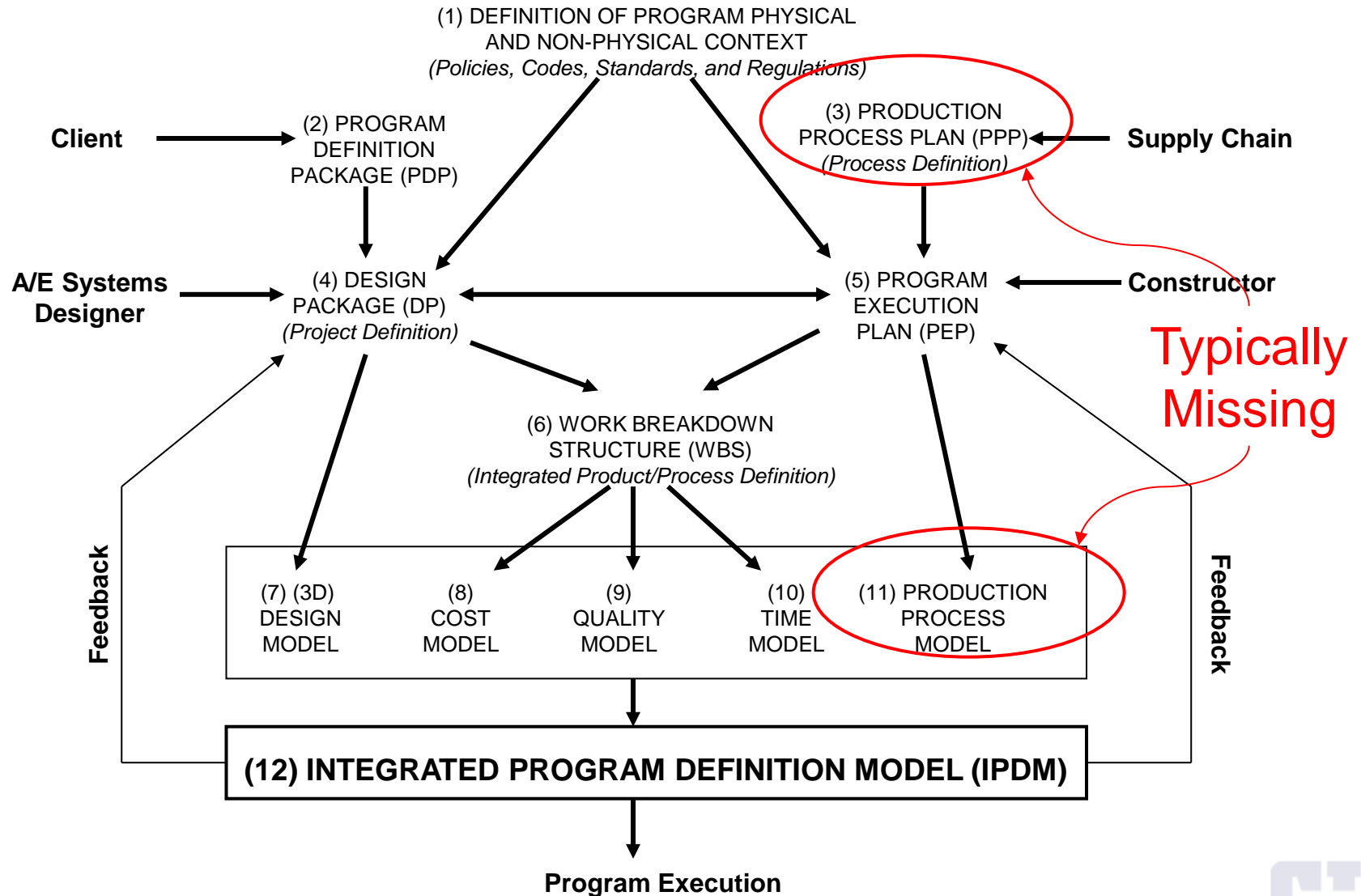


40 Weeks

Arrangement of Phases



Interface Management



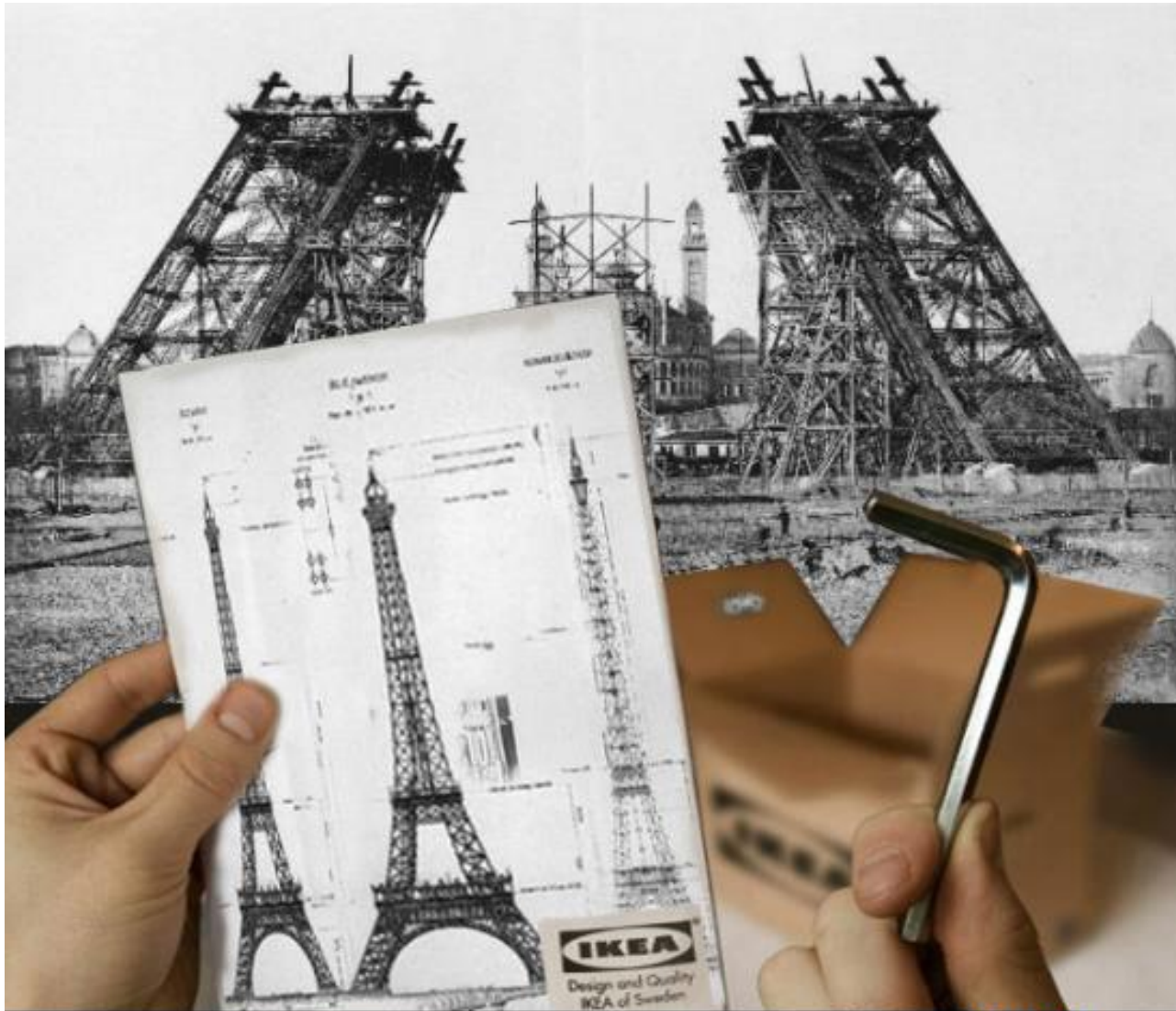
Collaboration?

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

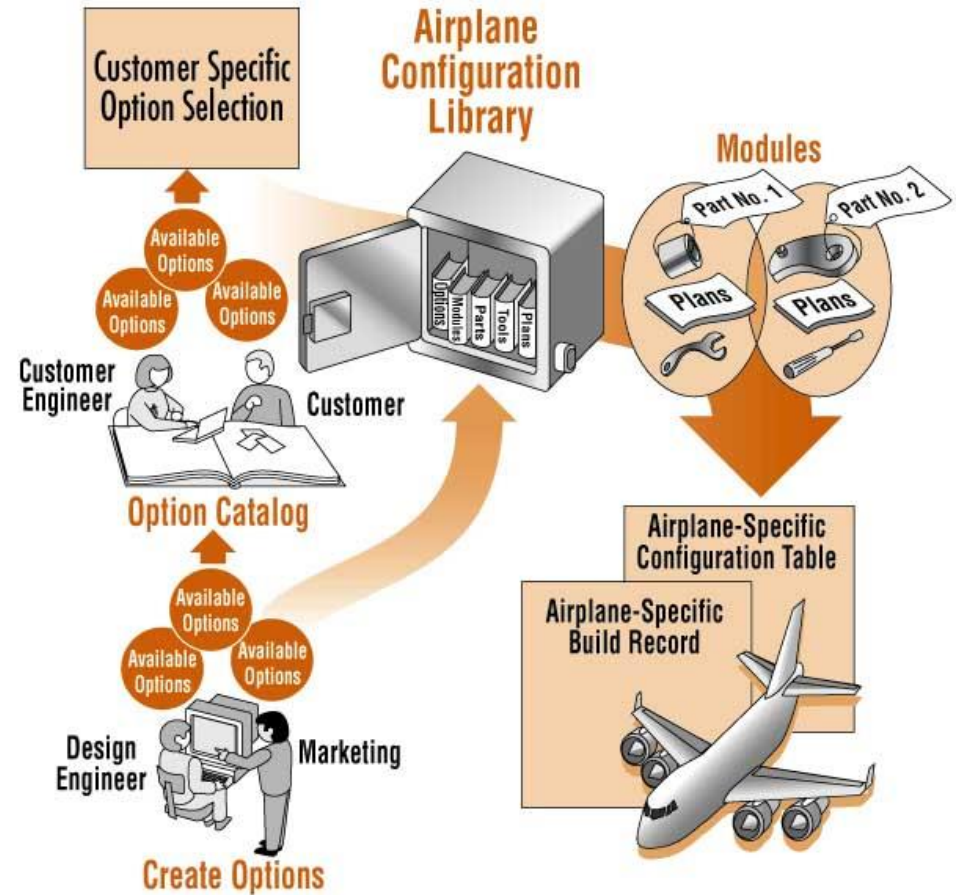
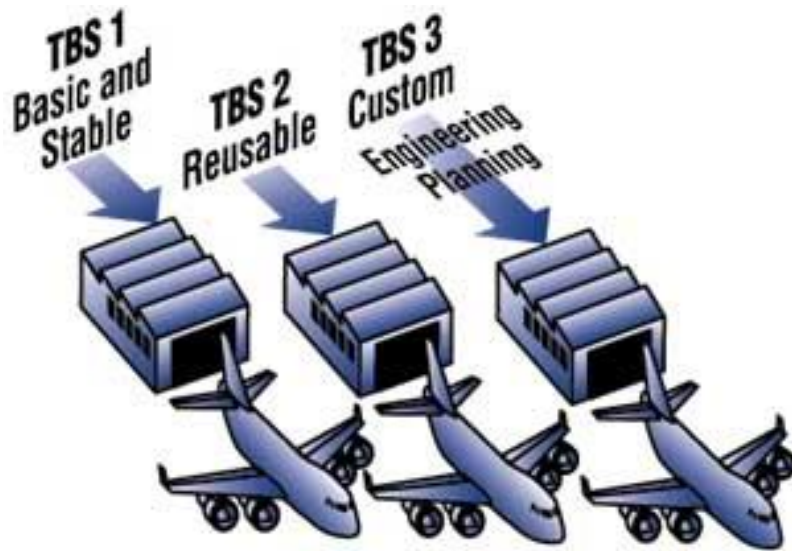
# Project Team Members	# Lines of Communication
7	21
15	105
50	1225
100	4950
500	124750



Advanced Work Packaging?



Advanced Work Packaging!



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COAA PHASE III

JIM LOZON



- Coming together is a beginning; keeping together is progress; working together is success
 - Henry Ford



Questions?

www.10-10program.org

Stephen Mulva, Ph.D.

Associate Director, CII

smulva@cii.utexas.edu

(512) 232-3013

Jim Lozon, Ph.D., P.Eng.

Vice President

jlozon@shaw.ca

(403) 466-1449

