



The Knowledge Leader for Project Success

Leveraging 25 Years of Industry Leadership

COAA Benchmarking and Metrics Program

COAA Best Practices Conference XX
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CII History



- CII is an Organized Research Unit (ORU) of the Cockrell School of Engineering at the University of Texas at Austin
- Founded in 1983 by 29 companies; now 115+ members
- Purpose is to MEASURABLY improve the delivery of capital facilities
- First structured owner-contractor-academic research collaboration for the constructed project.
- The industry forum for the engineer-procure-construct process.



Owner CII Members

Abbott	Ecopetrol S.A.	SABIC
Air Liquide	Eli Lilly and Company	Sasol Technology
Air Products and Chemicals	Eskom Holdings Limited	Shell Global Solutions US
Ameren Corporation	ExxonMobil Corporation	Smithsonian Institution
American Transmission Co.	GlaxoSmithKline	Southern Company
Anheuser-Busch InBev	Hovensa, LLC	Statoil ASA
Aramco Services Company	International Paper	Teck Resources Limited
Archer Daniels Midland Co.	Irving Oil Limited	Tennessee Valley Authority
Architect of the Capitol	Kaiser Permanente	TransCanada Corporation
Barrick Gold Corporation	Koch Industries	U.S. Army Corps of Engineers
BP America	LyondellBasell	U.S. Dept. of Commerce/NIST/ Bldg. and Fire Research Lab
Bristol-Myers Squibb Co.	Marathon Oil Corporation	U.S. Dept. of Energy
Cargill, Inc.	NASA	U.S. Dept. of Health & Human Services
Chevron	NOVA Chemicals Corp.	U.S. Dept. of State
CITGO Petroleum	Occidental Petroleum Corp.	U.S. General Service Administration
ConocoPhillips	Ontario Power Generation	
The Dow Chemical Company	Petrobras	
DuPont	Praxair, Inc.	
Eastman Chemical Company	The Procter & Gamble Co.	



Contractor CII Members

Aker Solutions	Emerson Process Management	Midwest Steel
Alstom Power	eProject Management, LLC	Mustang
AMEC	Faithful+Gould	Oracle USA
Apex Engineering	Flad & Associates	Parsons
AZCO INC.	Flint Energy Services	Pathfinder LLC
Baker Concrete Construction	Fluor Corporation	Quality Execution
Bateman Engineering N.V.	Foster Wheeler USA Corporation	S&B Engineers and Constructors
Bechtel Group	Grinaker-LTA/E+PC	The Shaw Group
Bentley Systems	Gross Mechanical Contractors	Siemens Energy
BIS Frucon Industrial Services	GS Engineering & Construction	SNC-Lavalin
Black & Veatch	Hargrove Engineers+Constructors	Technip
Burns & McDonnell	Hilti Corporation	URS Corporation
CB&I	Industrial Contractors	Victaulic Company
CCC Group	IDEA	Walbridge
CDI Engineering Solutions	Jacobs	Wanzek Construction
CH2M HILL	JMJ Associates	WorleyParsons
Coreworx	KBR	Zachry Holdings
CSA Group	Lauren Engineers & Constructors	Zurich
Day & Zimmermann	M. A. Mortenson Company	
Dresser-Rand Company	McDermott International, Inc.	



CII Benchmarking & Metrics (BM&M)

- 2,049 projects entered since 1995, valued at over \$133 billion
- Confidential
- Cost Effective
- Compelling, Focused Metrics
 - unique measures of CII Best Practices and productivity for engineering and construction
 - **external** performance benchmarks of safety, cost, schedule, change, and rework
- Unique Approach
- Experienced
 - Competent, Professional Staff



WHY BENCHMARKING?



Trim Capital Spending by 25%

- McKinsey & Company

“The management of capital investment has an enormous effect on profitability and competitiveness, yet few companies do it effectively. We believe that the use of **evaluation tools**, **disciplined processes**, and **best practices** can help companies trim capital spending by **up to a quarter** without reducing capacity or functionality - and improve their operating costs and revenues through **better investment decisions**.”



National Research Council (2009)

- Advancing the Competitiveness and Efficiency of the U.S. Construction Industry
 - Opportunities for Breakthrough Improvements:
 - Widespread Use of Interoperable Technology Applications (BIM)
 - Improved Jobsite Efficiency (Effective Interfacing of People, Processes, Materials, Equipment and Information)
 - Greater Use of Prefabrication, Preassembly, Modularization, and Offsite Fabrication (PPMOF) Techniques and Processes
 - Innovative, Widespread Use of Demonstration Installations
 - **Effective Performance Measurement to Drive Efficiency and Support Innovation**

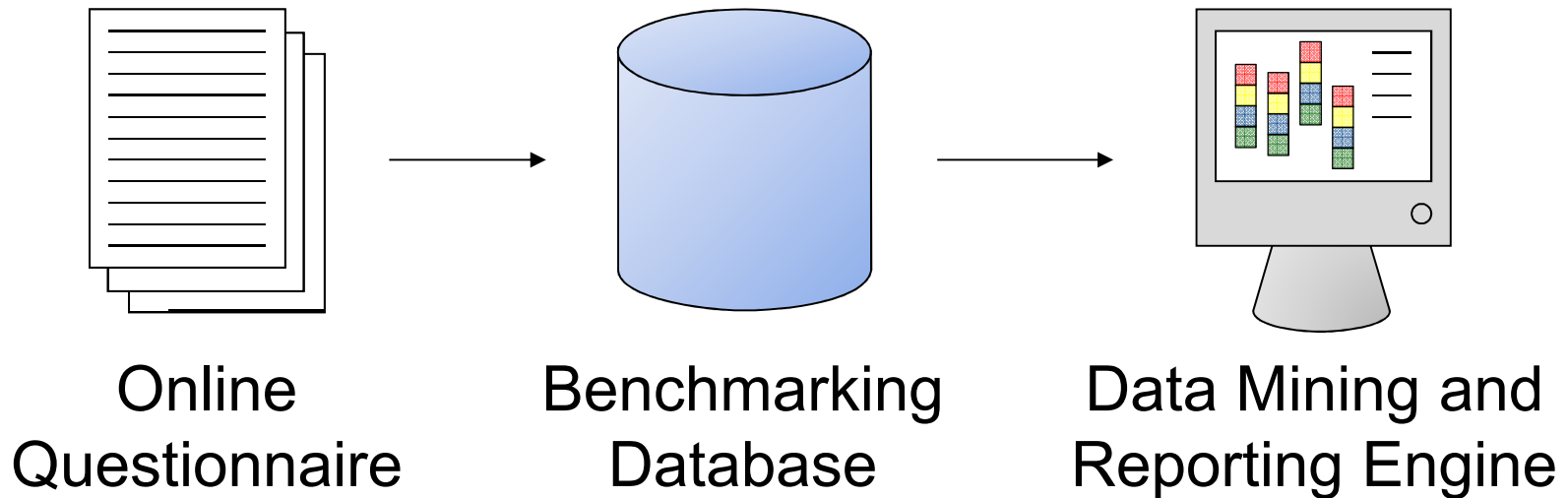


HOW DOES COAA BENCHMARK CAPITAL PROJECTS?

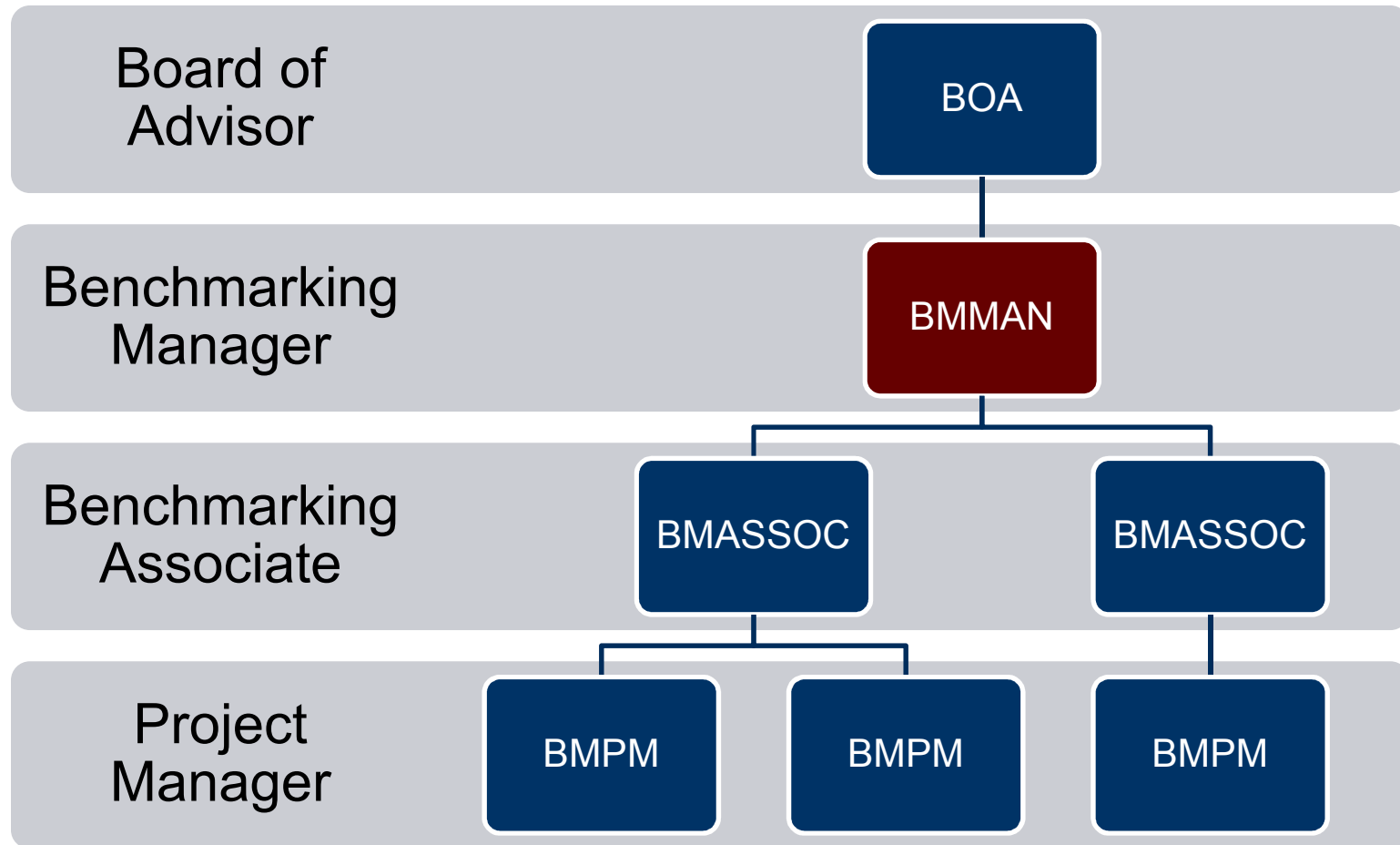


COAA Benchmarking Process

Three-step Process



COAA Benchmarking Roles



General Benchmarking Questionnaire

Currently editing - BMMAN TESTs

General Project Info	Performance	Practices	Engineering Productivity	Construction Productivity
Project Description	Budgeted & Actual Project Costs	Front End Planning	Instructions	Instructions
Project Information	Planned & Actual Project Schedule	Alignment	Engineering Team & Workhours	Concrete
Project Scope	Achieving Facility Capacity	Partnering	Concrete	Structural Steel
Project Management Team	Project Outcomes	Team Building	Structural Steel	Electrical-Part1
Union Site Construction Workforce	Work Hours & Safety Data	Project Delivery	Electrical	Electrical-Part2
Engineering Deliverables	Project Environment Impacts	Constructability	Piping	Piping
Contract Type & Alliance		Risk Assessment	Instrumentation	Instrumentation
		Change Management	Equipment - Part1	Equipment-Part1
		Zero Accident Techniques	Equipment - Part2	Equipment-Part2
		Benchmarking	Direct Hire/Contract/Off-Shore	Insulation
		Planning For Start Up		Scaffolding
		Technology Use		

Project Process Legend: Not Started In Progress



PAS – Data Collection / Internal Benchmarking

Hierarchy Control Panel

Company Business Unit Product Line

Country / State / City

- United States
 - Texas
 - Austin**
 - Dallas
 - Houston
 - Florida
 - Tampa
 - Saint Petersburg
 - Miami
 - California
 - LA
 - Brazil
 - United Kingdom
- Canada
 - Quebec
 - Montreal
 - Ontario
 - Toronto

Hierarchy Editor

Project Assignments

User Assignments

Project Permissions

Users:



ID	First Name	Last Name	Role	Approver
54	Test	PM	BMPM	matto2
50	Greg	Test2	BMASSOC	lab_master
4074	Matt	O	BMPM	matto
4086	Yatzo	Brobgozy	BMPM	matto

Projects:

Project ID	Project Name	None	Read	Full
L01C102	Once again test	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
L01C103	test-as-a-bmpm	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
L01C109	Sample Thing	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
L01C111	North Equator Pipelines	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
L01C110	Sample Test	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
L01C111	More proj	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
L01C112	Yams	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
L01C113	Samss	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
L01C114	Simple Tools	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
L01C115	More simple things	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
L01C120	CurrencyTest	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



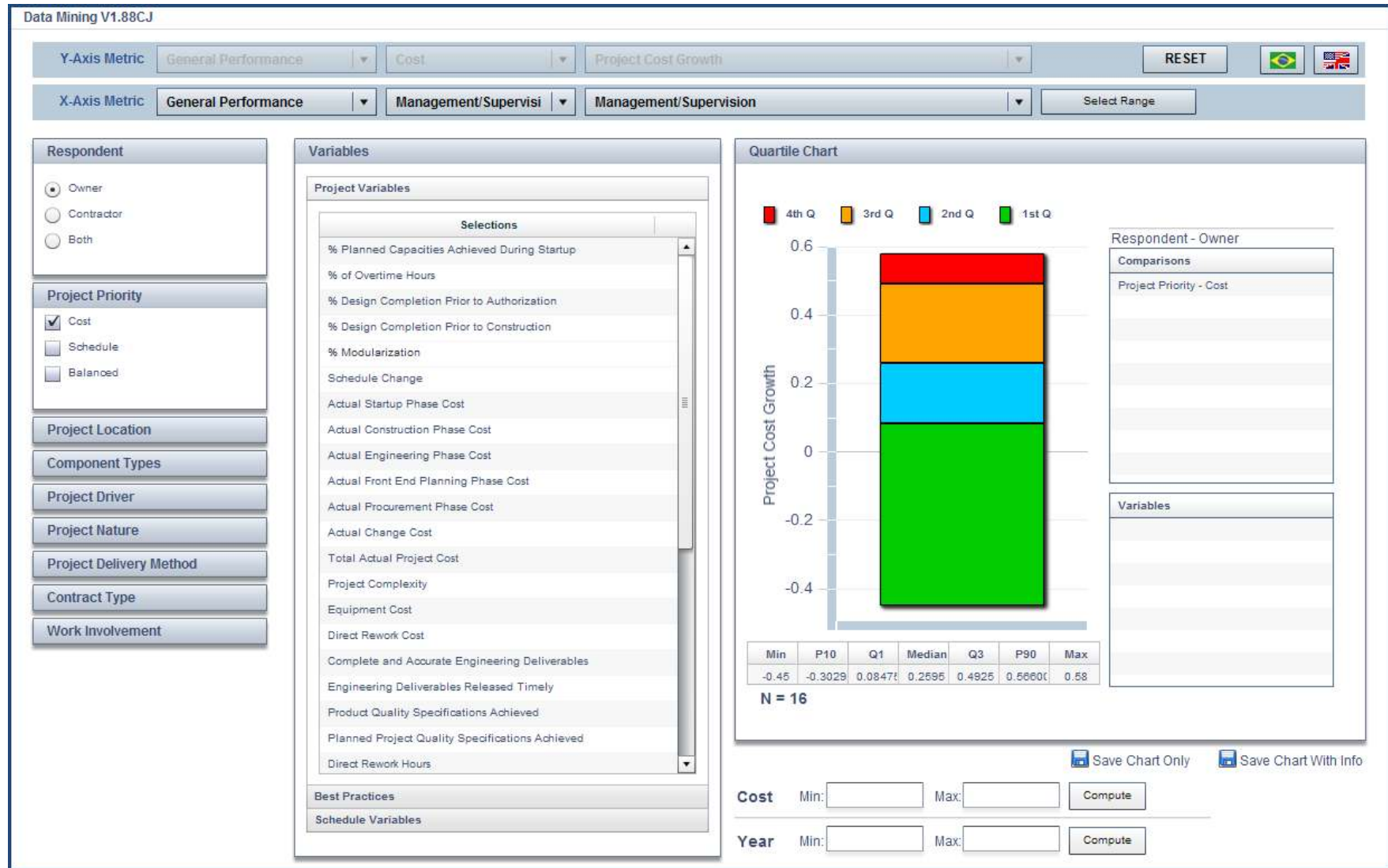
Project Key Reports

 Construction Industry Institute®	Test General Large - Contractor		
	General Performance Key Report Report Date: 10/05/2011		
Project General Information			
Company Name	Testco	Respondent Type (RT)	Contractor
Project ID	CIIC09219	Questionnaire Type (QT)	General Benchmarking (Large)
Project Location	United States	Location Category (LC)	Domestic
Project Cost	USD\$ 91,849,000.00	Company Involvement (CI)	Design and Construct
Site Work Hours	4,000,000	Industry Group (IG)	heavy industrial
Overall Project Duration	988 Days	Project Type (PT)	Oil Sands SAGD
Design thru Startup Duration	988 Days	Project Nature (PN)	grass roots
Midpoint of Construction	04/15/2007	Cost Category (CC)	\$50MM - \$100MM
Key Report Legend			
<ul style="list-style-type: none"> • Q1, Q2, Q3 and Q4 stands for the 1st, 2nd, 3rd and 4th quartile respectively. If the quartile cell is colored, Q1 represents best performance and Q4 represents worst performance. • If the quartile cell is not colored, Q1 represents the group with the highest metric value, while Q4 represents the group with the lowest metric value. (for these metrics, lower or higher scores are not necessary better.) • UO indicates an Upper Outlier with a extremely high metric value. LO indicates a Lower Outlier with an extremely low metric value. • C indicates that the benchmarking result is suppressed because the comparison dataset doesn't meet minimum requirements to ensure confidentiality (i.e. 10 or more projects from 3 or more companies). •  in the comparison criteria indicates that the comparison dataset has the same specific characteristic as your project. • Asterisk (*) on the n value denotes a small sample of projects (between 10 & 20) 			
Hide Legend			

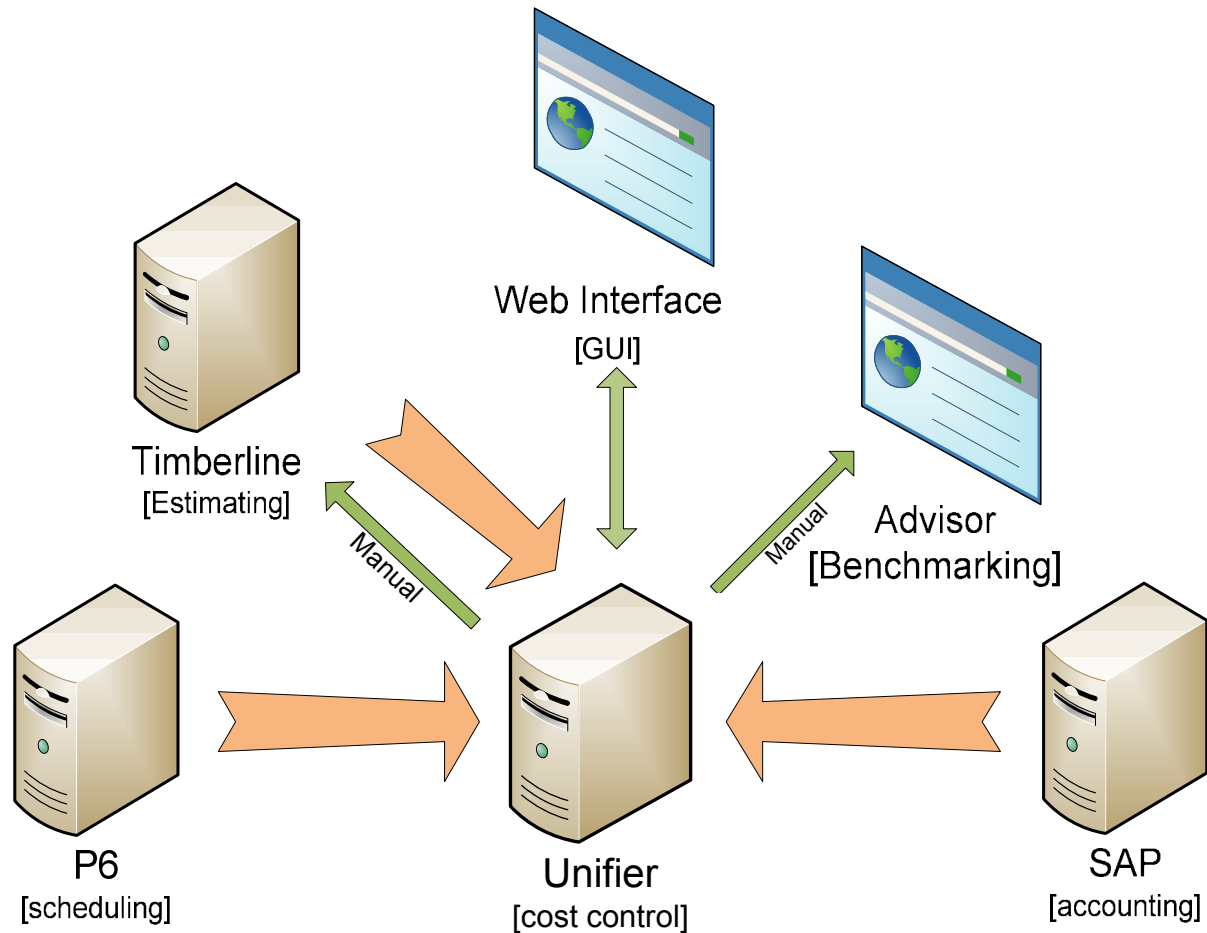
General Performance - Cost											
Metric	Project Score	CII Database Mean	Quartile	Comparison Criteria							n
				QT	LC	CI	IG	PT	PN	CC	
Project Cost Growth	0.031	0.010	Q3	✓	✓	✓	✓	all	✓	✓	19*
Delta Cost Growth	0.031	0.092	Q1	✓	✓	✓	✓	all	✓	✓	19*
Project Budget Factor	0.970	0.950	Q3	✓	✓	✓	✓	all	✓	✓	18*
Delta Budget Factor	0.030	0.083	Q2	✓	✓	✓	✓	all	✓	✓	19*
Detail Engineering Cost Growth	0.026	0.068	Q2	✓	✓	✓	✓	all	✓	✓	15*
Procurement Cost Growth	0.036	-0.040	Q3	✓	✓	✓	✓	all	✓	✓	17*
Construction Cost Growth	0.048	0.011	Q3	✓	✓	✓	✓	all	✓	✓	15*
Startup Cost Growth		C	C	C	C	C	C	C	C	C	C



PAS – Data Miner



PAS – Integration with Corporate Systems is Important

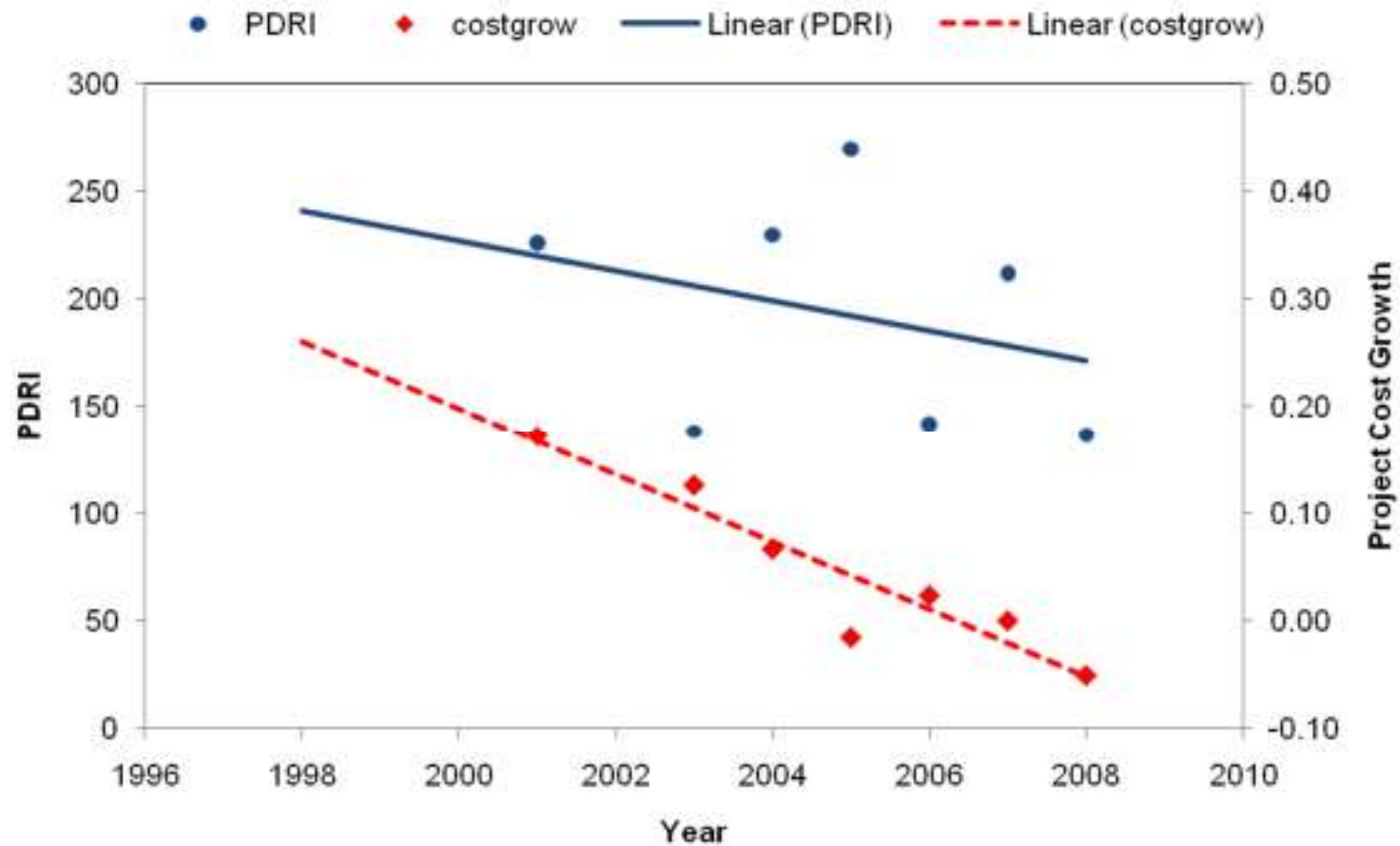


WHAT ARE THE RESULTS?



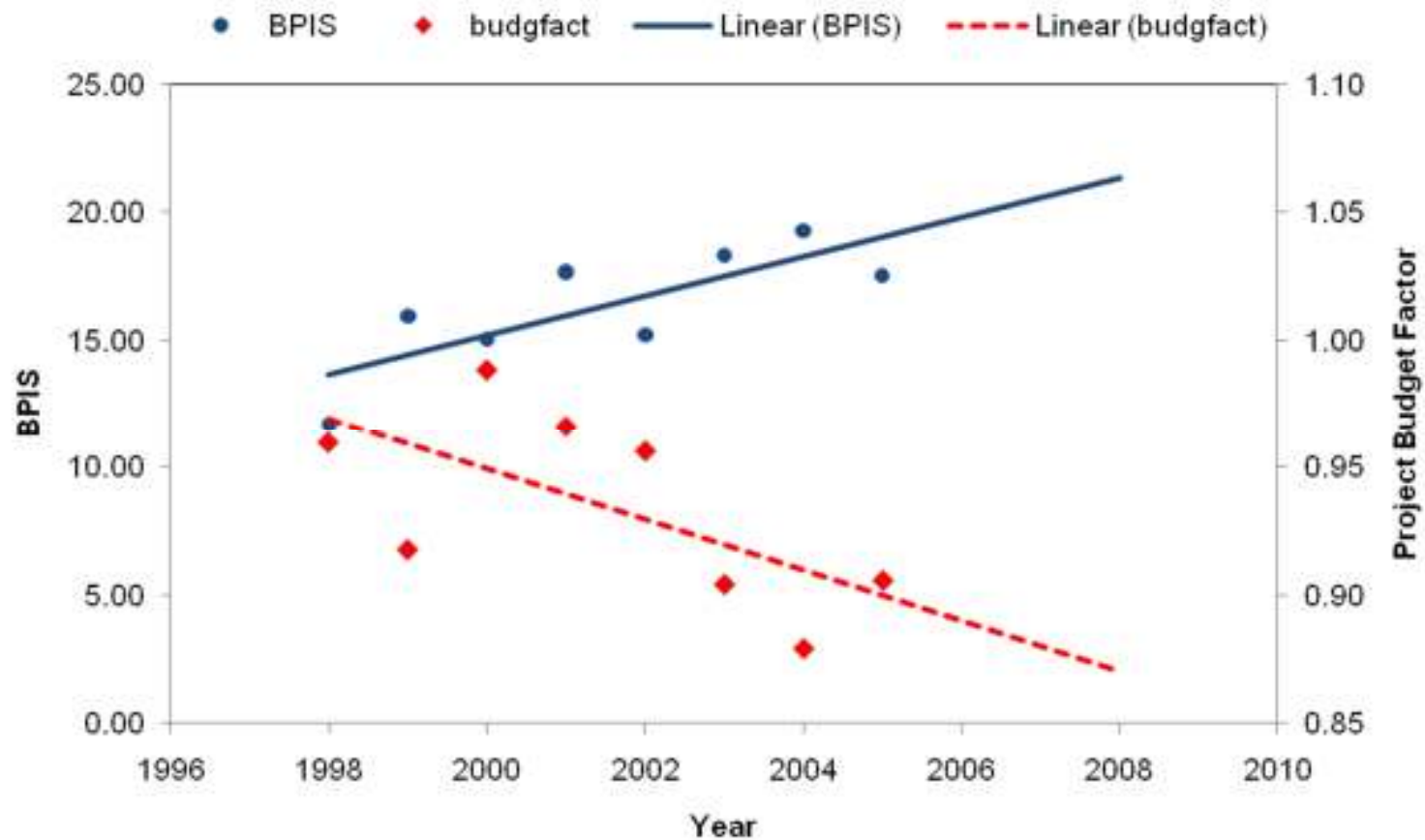
Owner “1”

- PDRI vs. Project Cost Growth



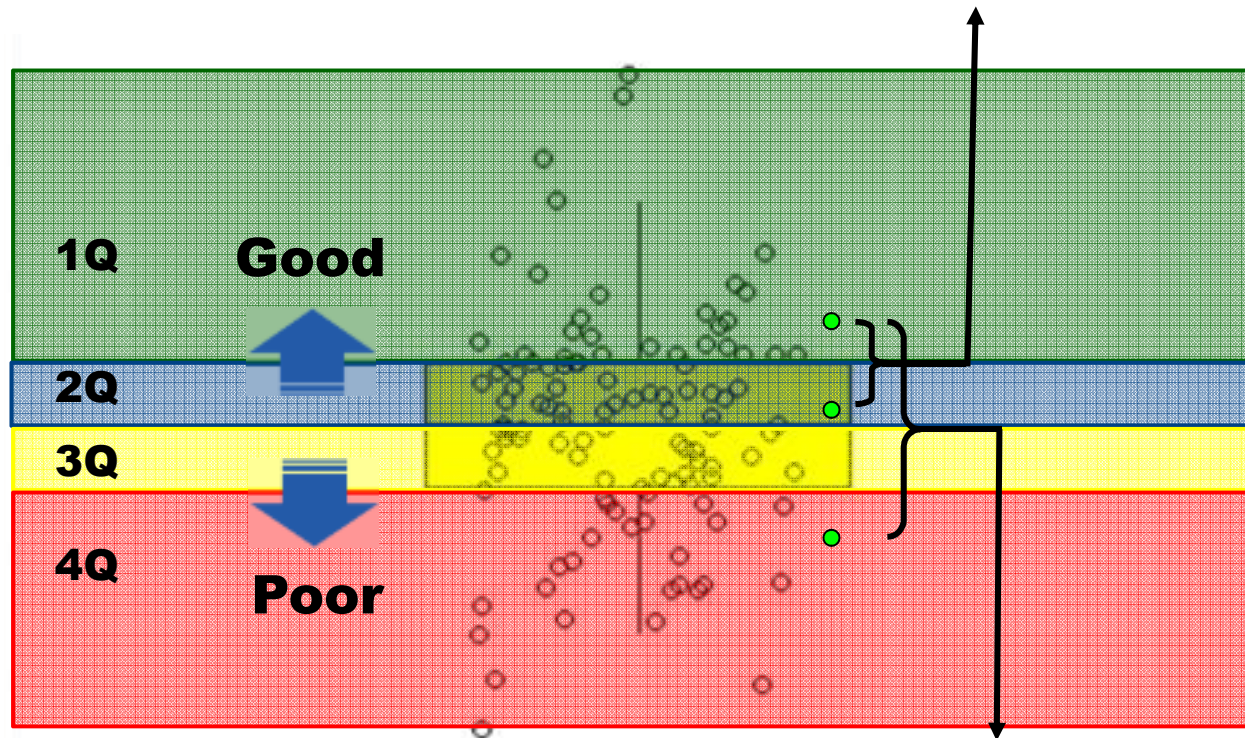
Contractor "1"

- BPIS vs. Project Budget Factor



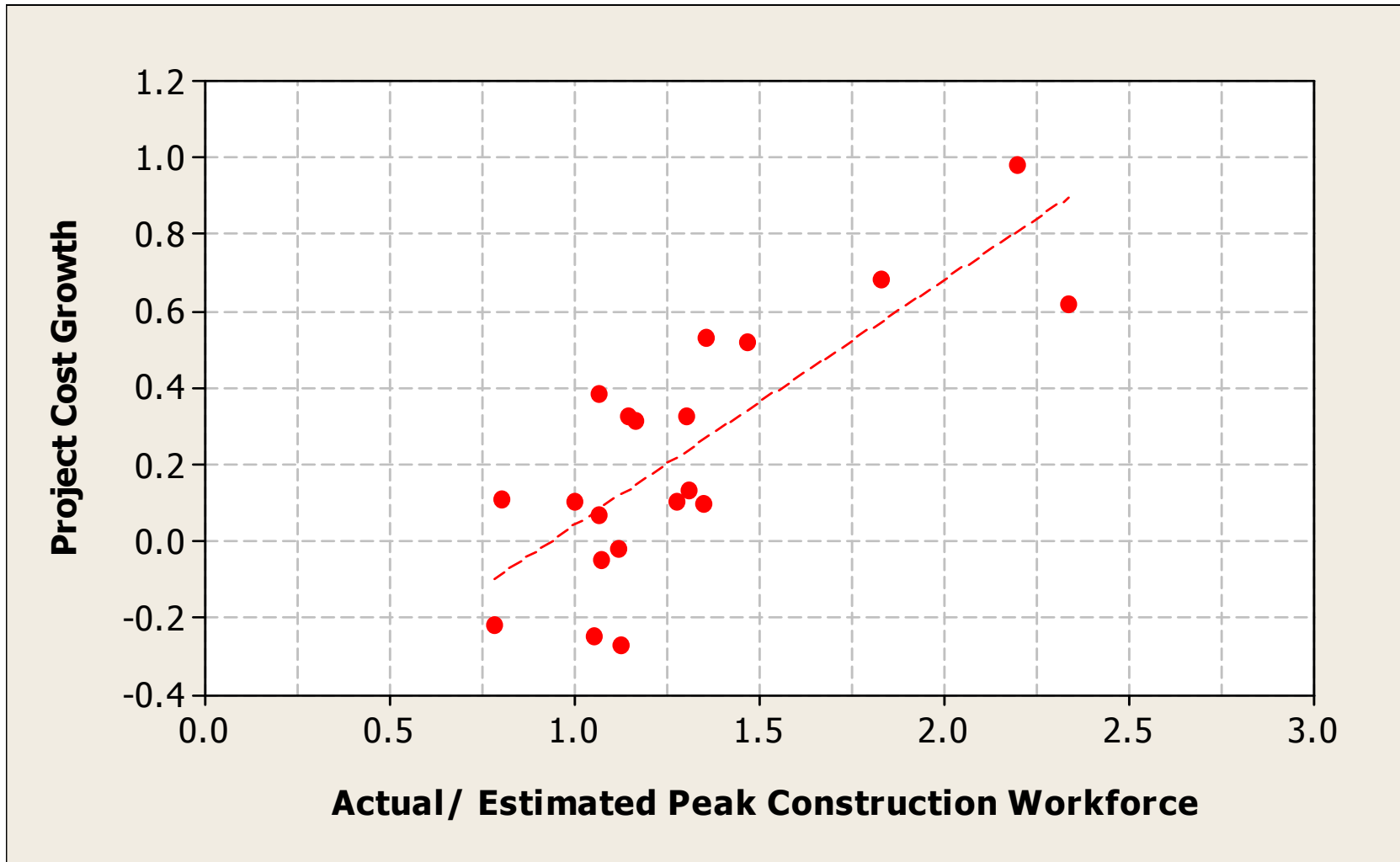
Project-Level Engineering Productivity

- **11% Improvement (2nd to 1st Quartile)**

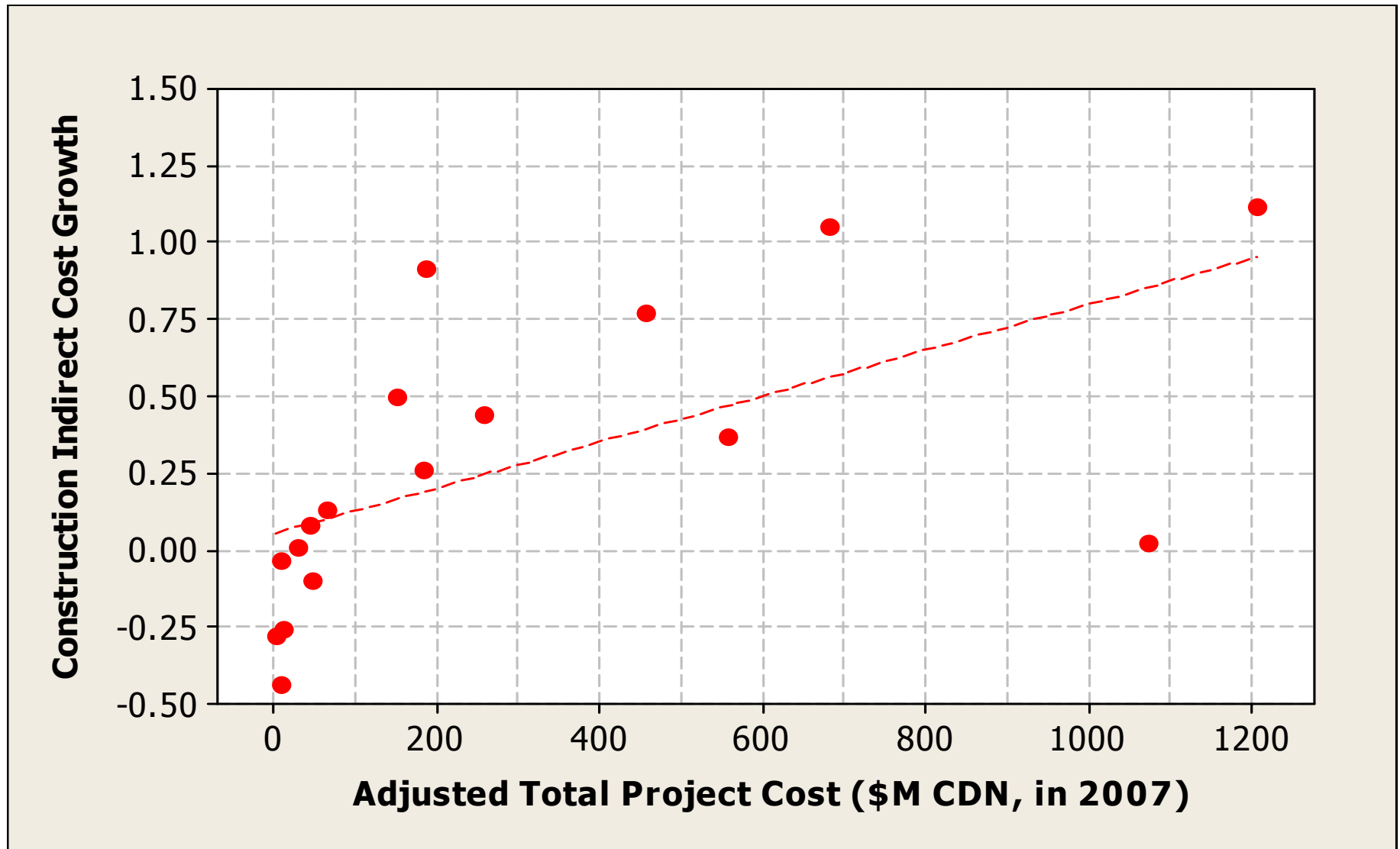


- **26% Improvement (4th to 1st Quartile)**

Actual / Estimated Peak Construction Workforce

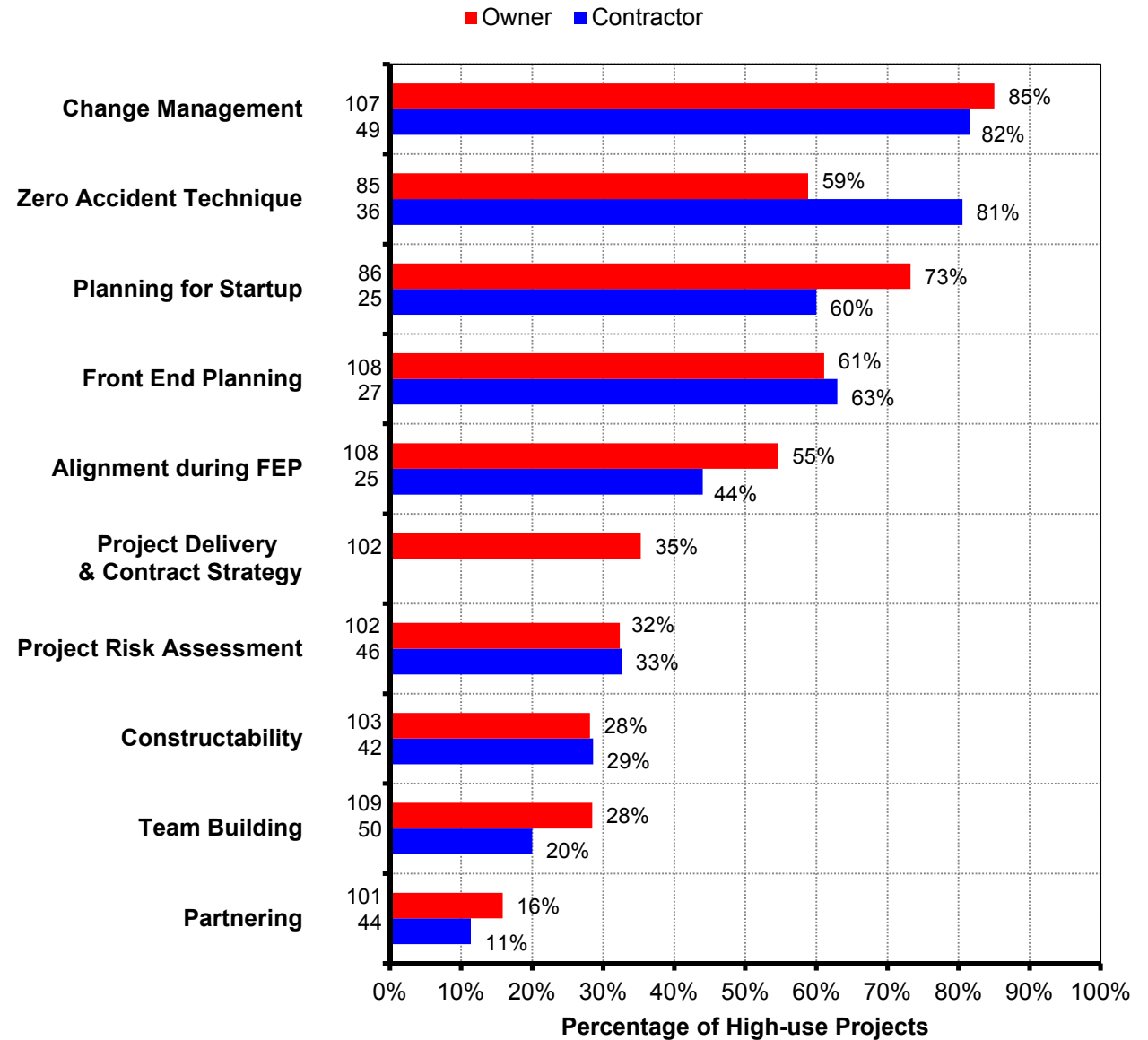


Construction Indirect Cost Growth

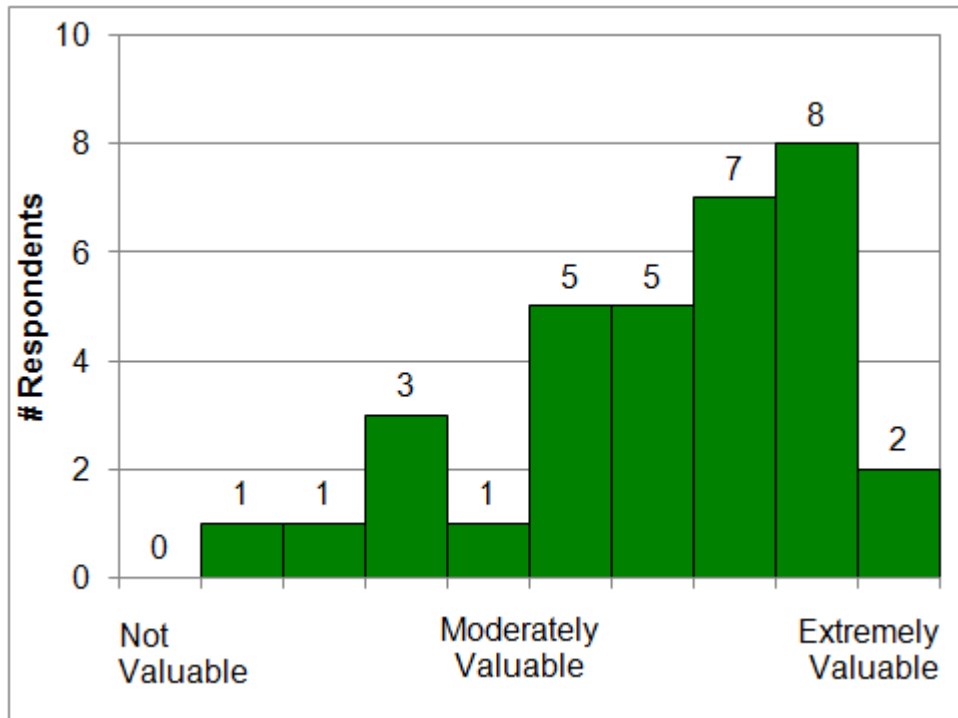


Best Practices

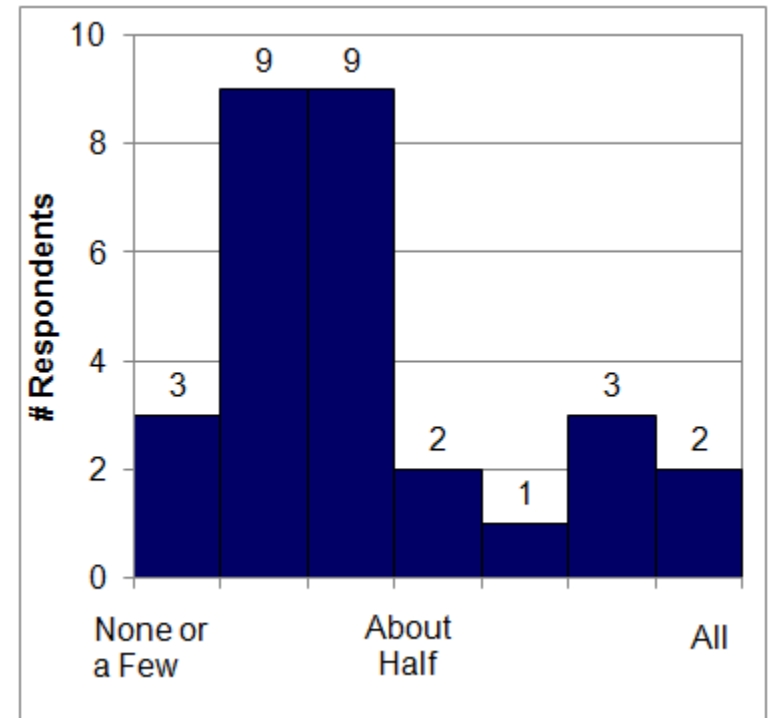
Percent of Projects with High Best Practice Use



The Benchmarking Dilemma



Value of External Benchmarking



Projects' Use of External Benchmarking

Benchmarking Lessons Learned

- Senior management buy-in is vital to success, and hard to achieve
- A company champion is essential, but often not enough
- No one wants to be at the bottom
- “My project is special”



WHAT ARE THE POTENTIAL PITFALLS?



Potential Pitfalls

- Benchmarking is NOT Estimating
 - Good PM Practice: Develop Ground-Up Estimate
 - Measure Project (Process), NOT Product
- Ignoring Tools / Proven Best Practices
 - PDRI, PHI, PFS
 - FEP, Partnering, Constructability, etc.
- Not Benchmarking
 - No Objective Measures of Performance
 - No Understanding of Where to Improve



DEMO:
COAA PERFORMANCE ASSESSMENT
SYSTEM (PAS)

