



The Knowledge Leader for Project Success

Leveraging 25 Years of Industry Leadership

Overview of the Global Project Landscape

Advanced Work Packaging Conference 2014

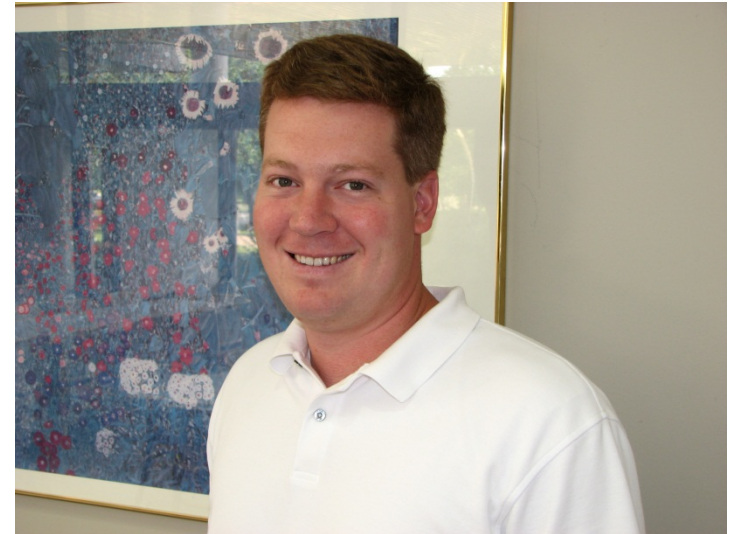
October 7, 2014
Houston, Texas

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Associate Director, CII



Dr. Stephen P. Mulva

- Associate Director of the Construction Industry Institute; University of Texas at Austin
- Lecturer, Researcher, and Consultant in the benchmarking of capital projects
- Program Management Expert
- Former employee of Fluor (Constructability Coordinator and Field Engineer), Phillips Petroleum, Bechtel, ePM, and Texas State University

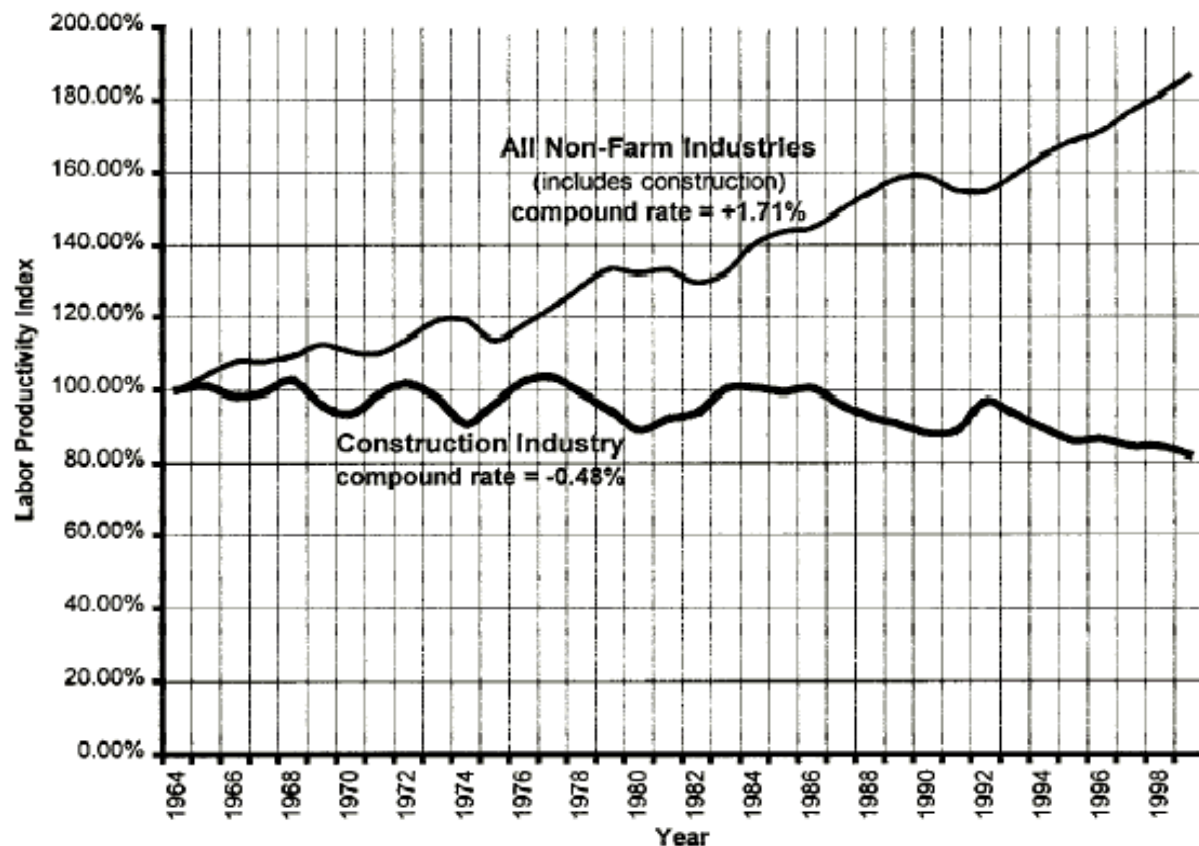


Construction Productivity Decline

Productivity Index (1964-1999)

(Constant \$ of contracts / workhours of hourly workers)

Sources: U.S. Bureau of Labor Statistics, U.S. Dept of Commerce



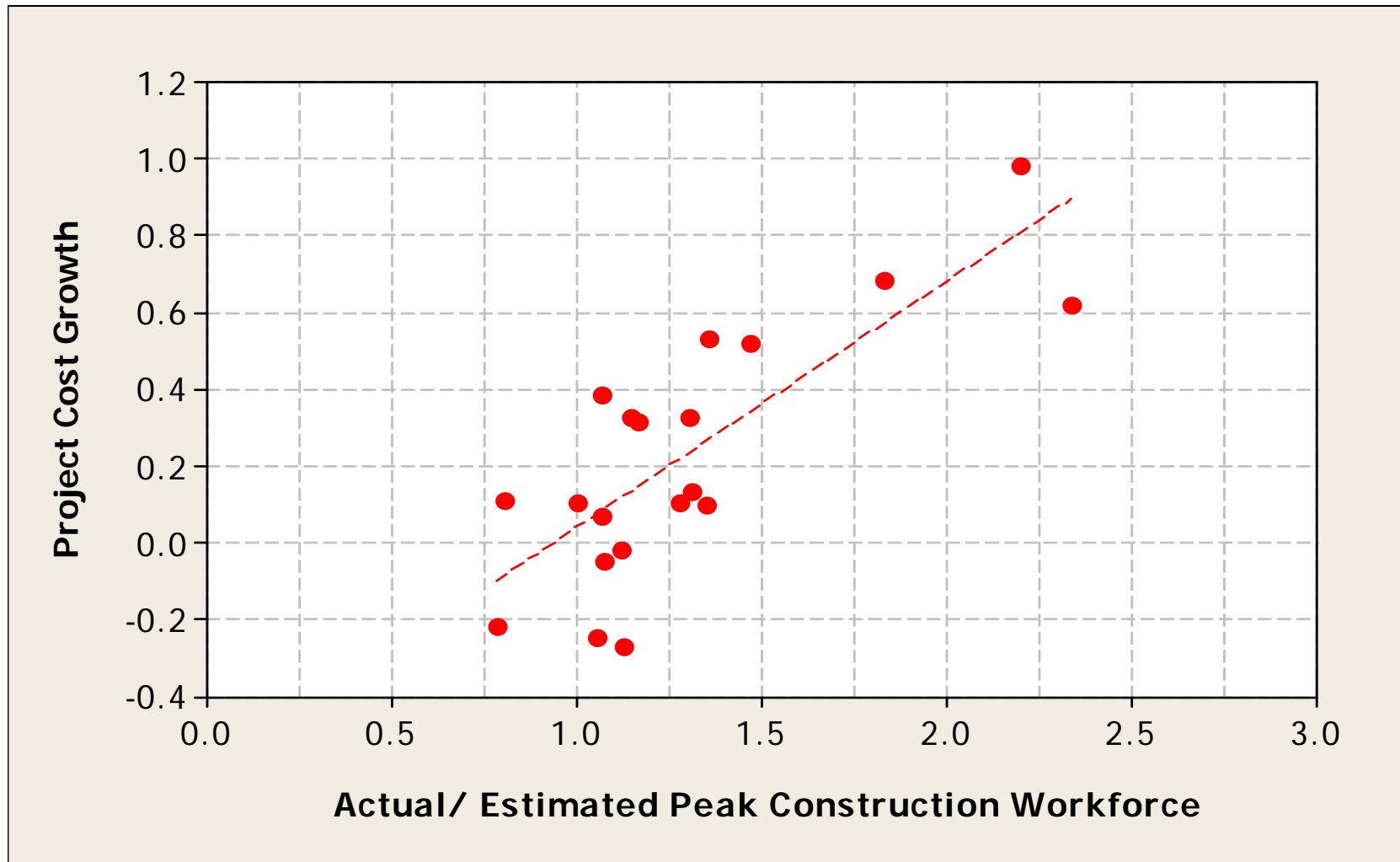
All Non-Farm Industries
+1.71%

Construction Industry
-.48%

Source: *Journal of Construction Engineering and Management*
(Sept./Oct. 2001)



Actual / Estimated Peak Construction Workforce

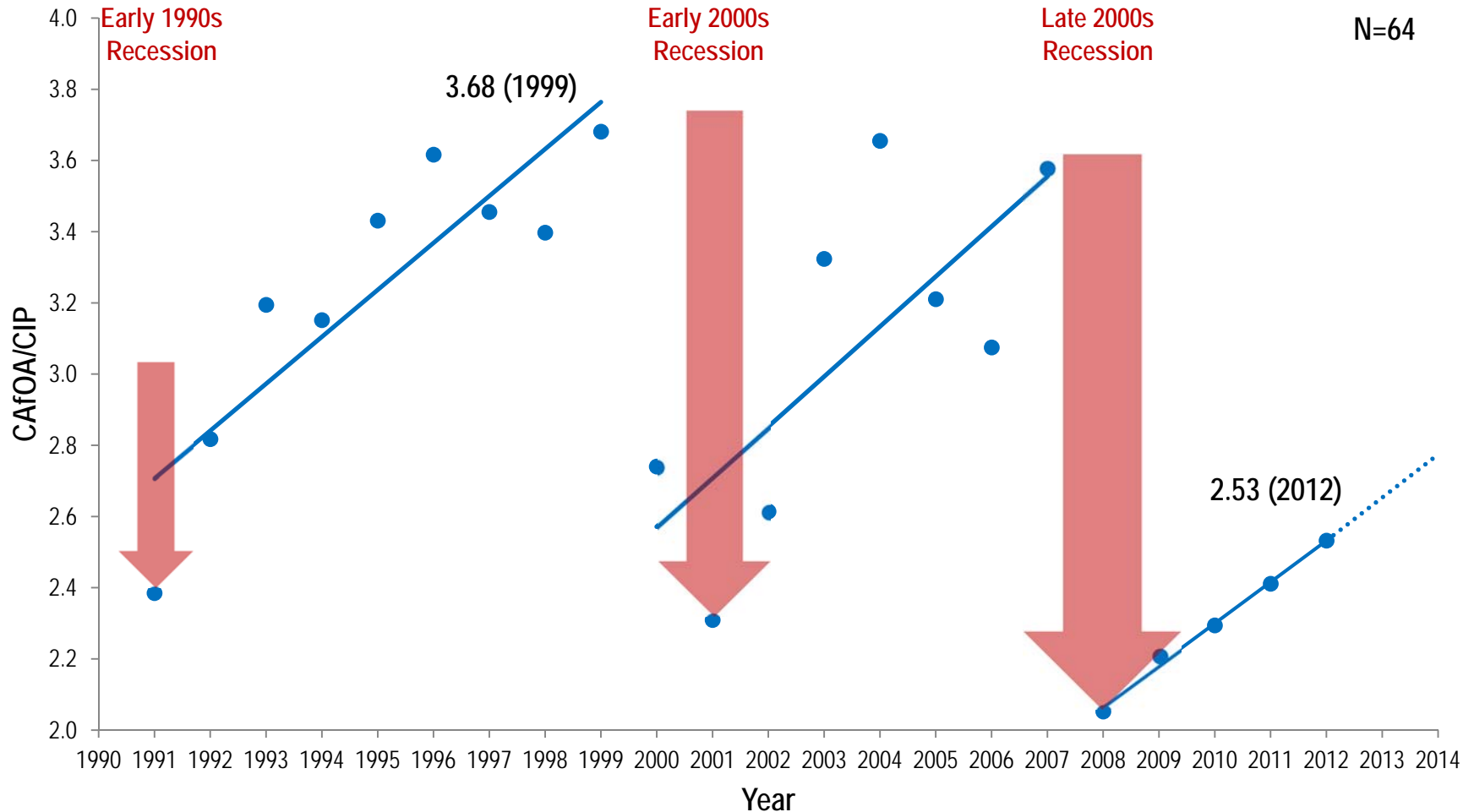


**PROJECT PERFORMANCE
PREDICTABILITY RESEARCH
(IMPACT ON FINANCIAL RETURNS)**

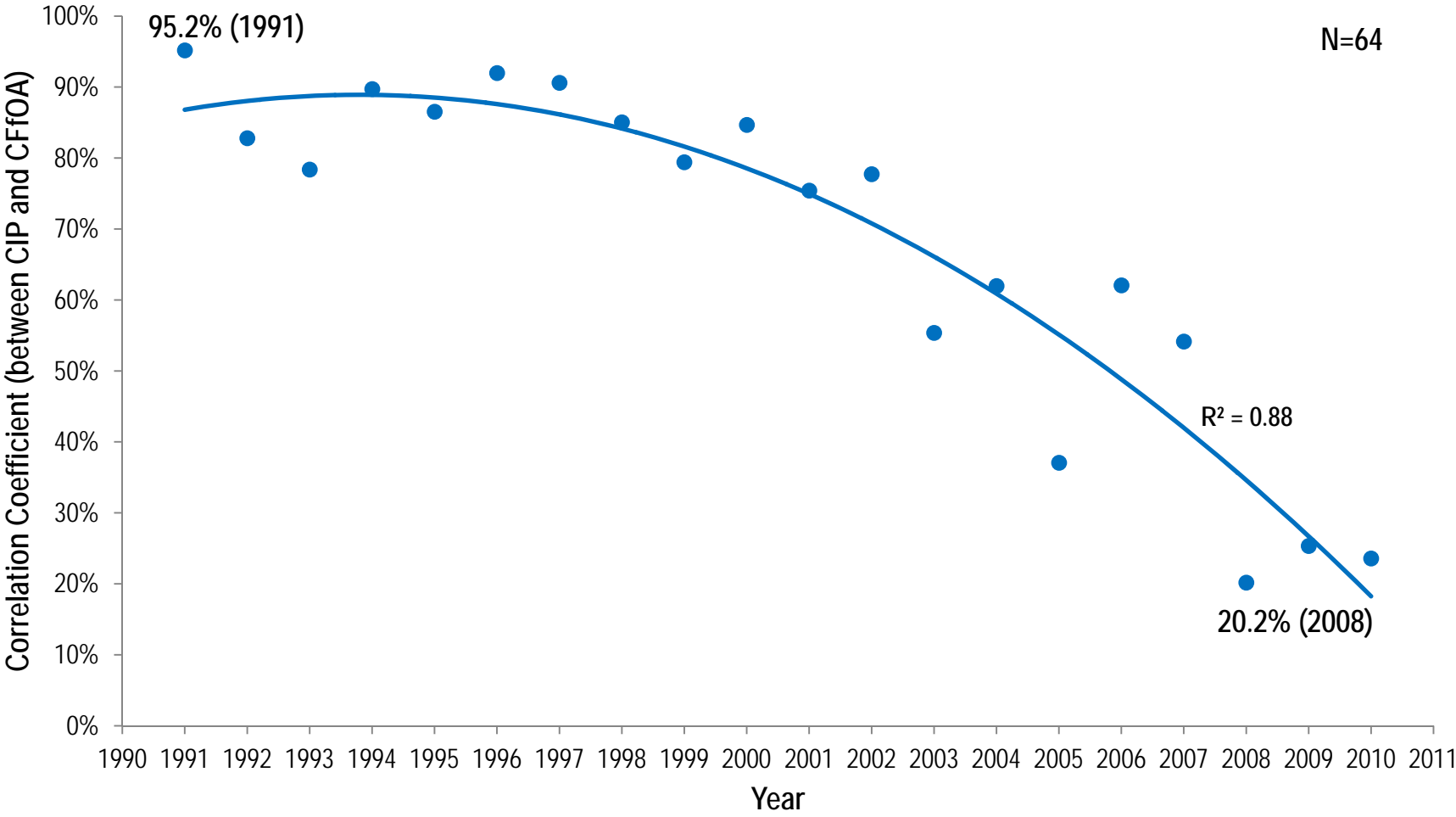


CII Owners' Capital Efficiency

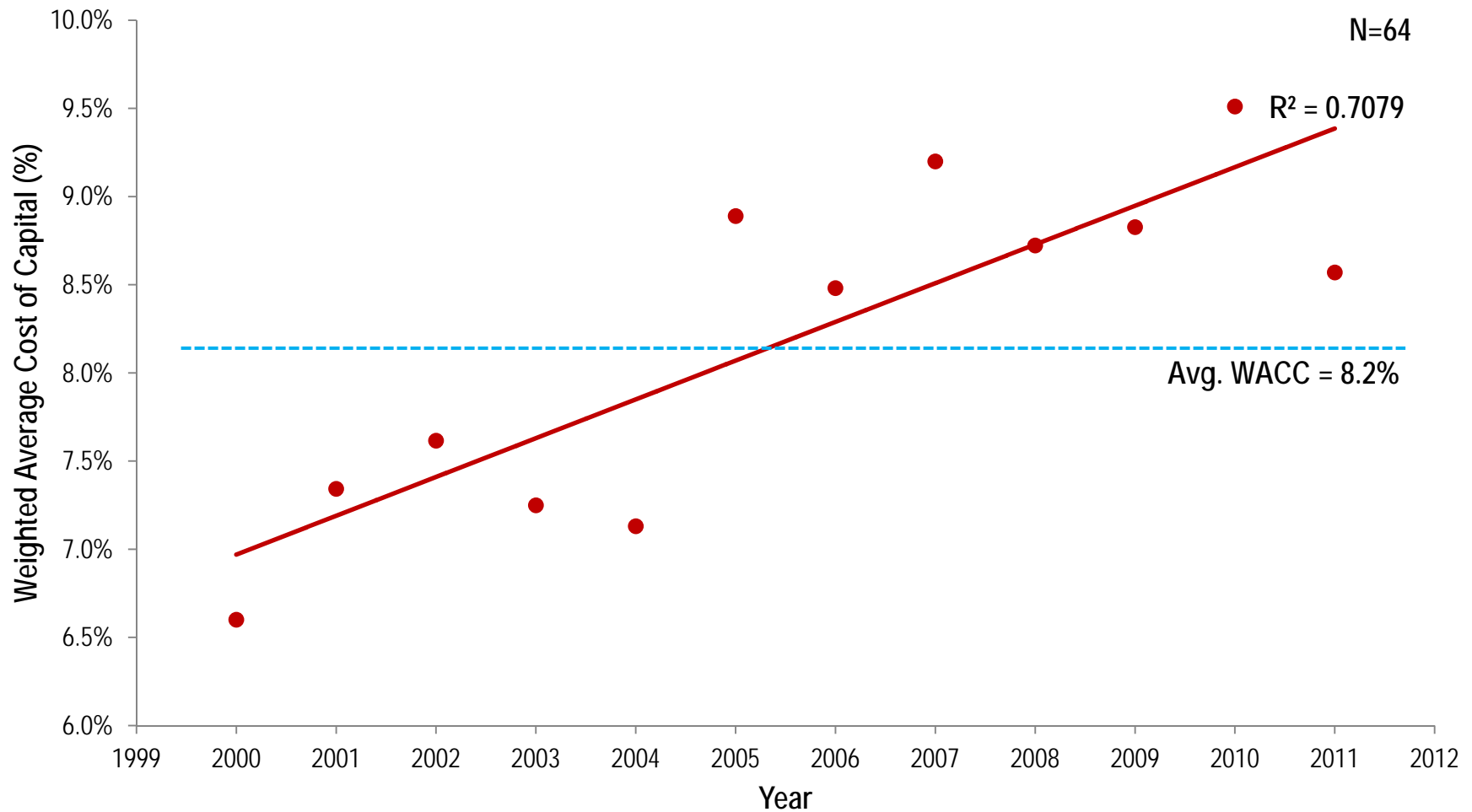
(Ratio of Cash Flow (CFfOA) to Construction In Progress (CIP))



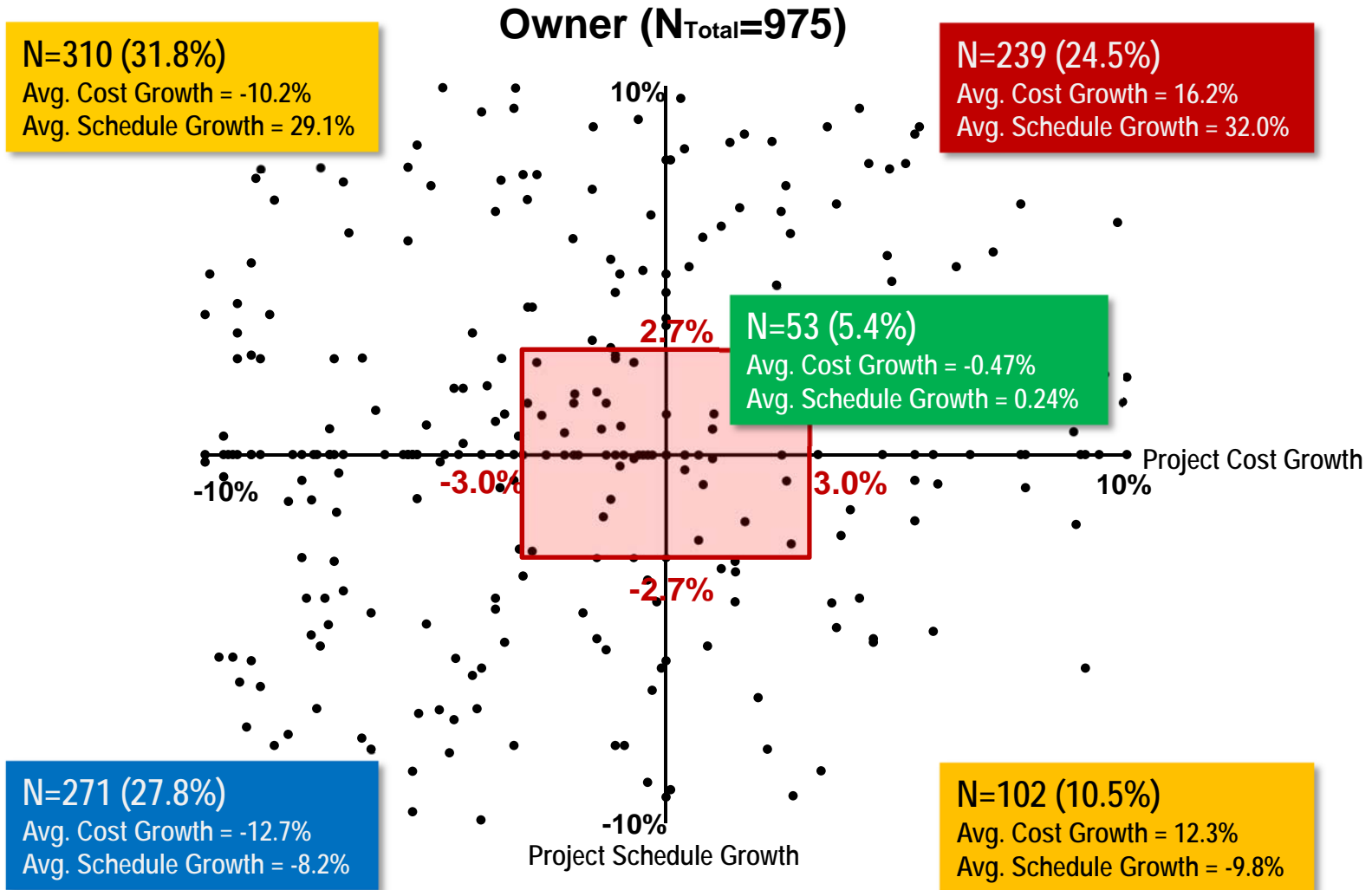
Correlation between Construction In Progress (CIP) and Cash Flow (CFfOA) for CII Owners



CII Owners' Weighted Average Cost of Capital (WACC)



Capital Project Performance - CII Owners

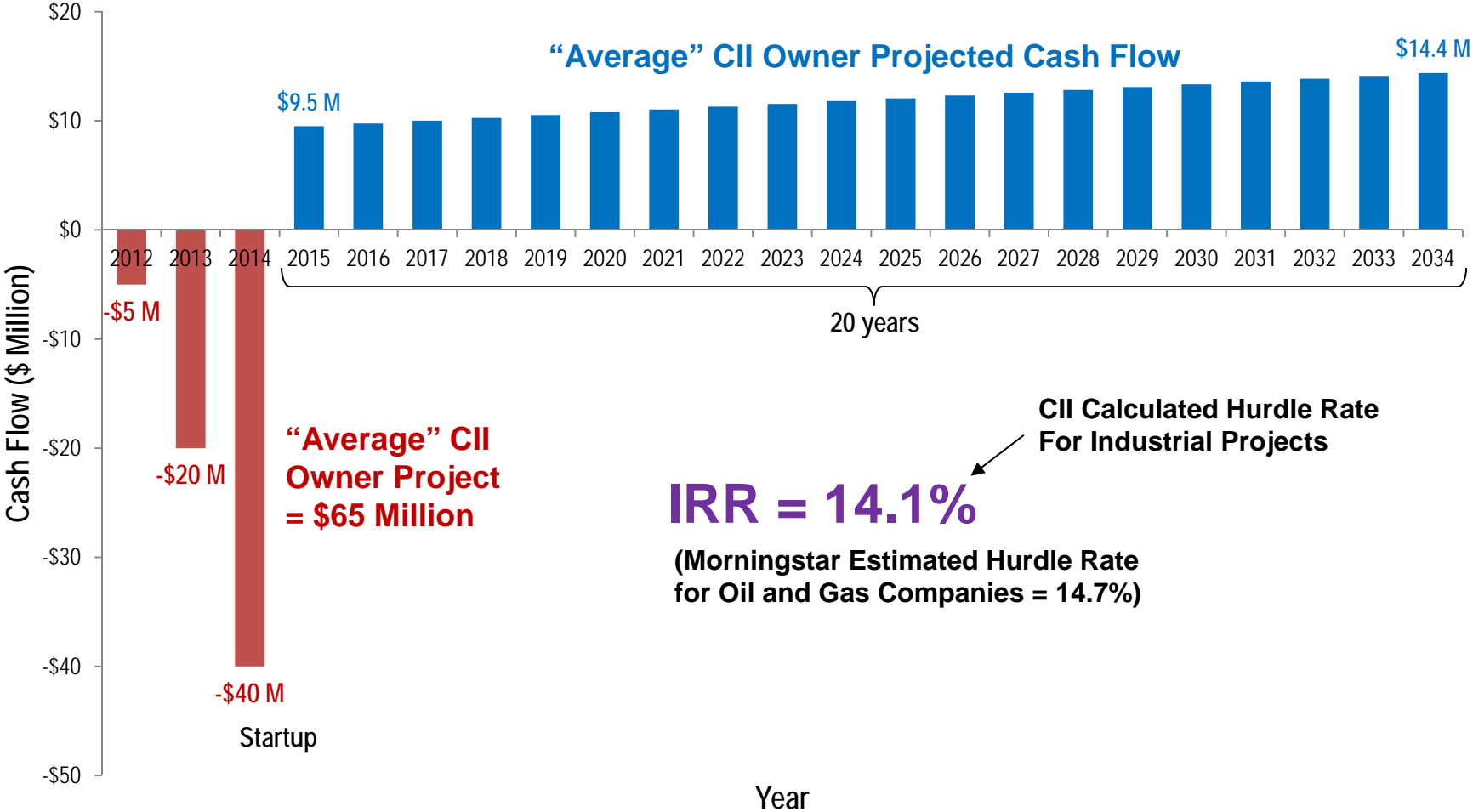


69.7% Projects Not Shown



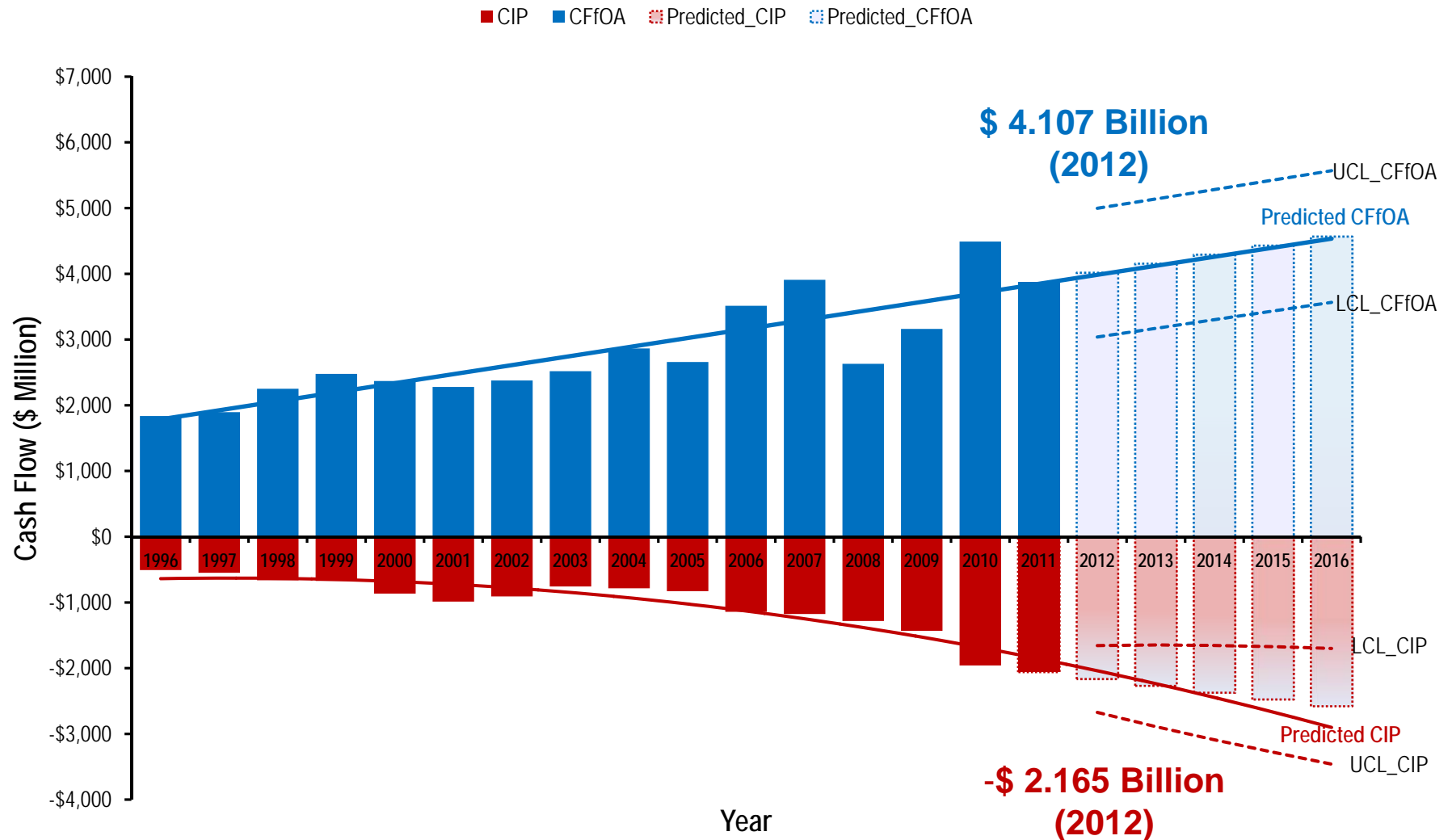
Cash Flow for an “Average” CII Owner Project

Slope of Revenue = 2.7% per year
(Incremental Rate of Corporate CFfOA)



Cash Flow Diagram for an “Average” CII Owner

(Includes Forecast 2012 - 2016)

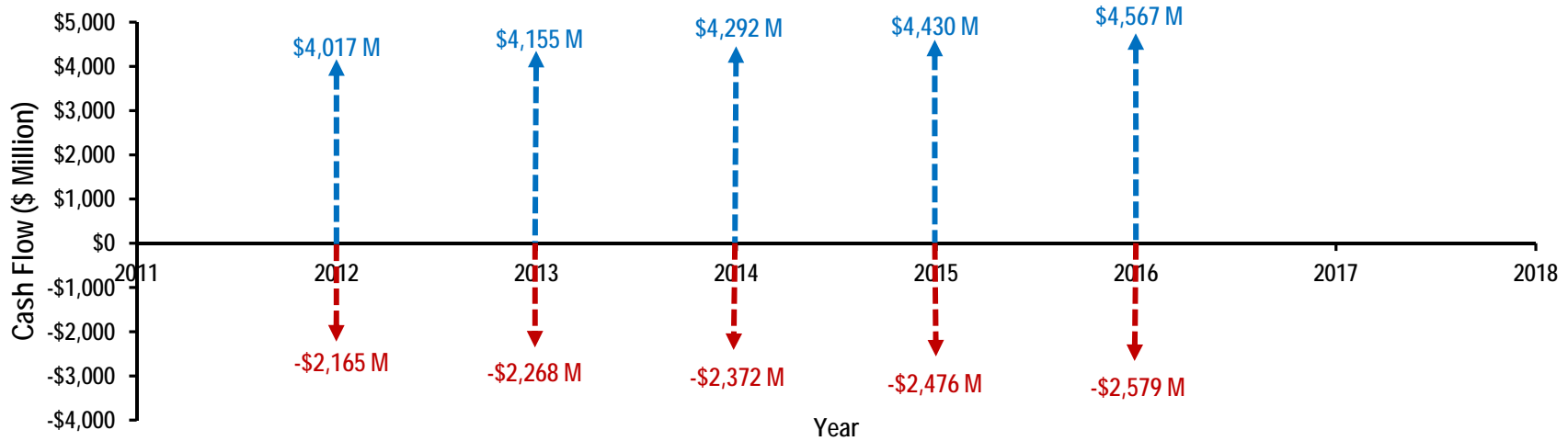


Source: Capital IQ Courtesy of McCombs School of Business, UT Austin

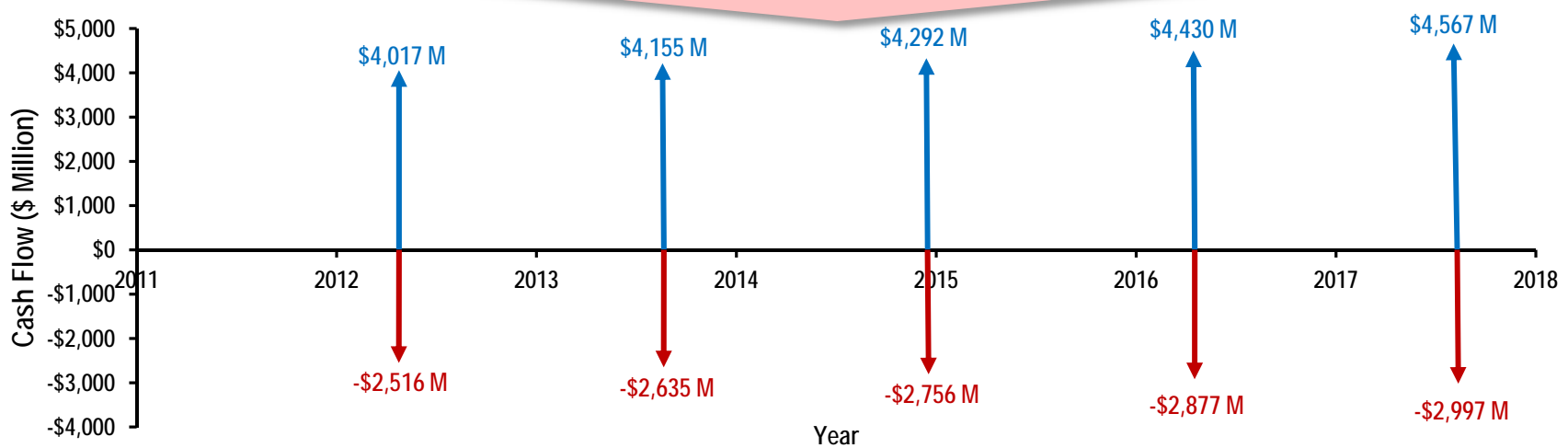


Scenario 1: High Cost and Schedule Growth

As-Is Cash Flow



To-Be Cash Flow



NPV_{Target} = \$7.6 Billion

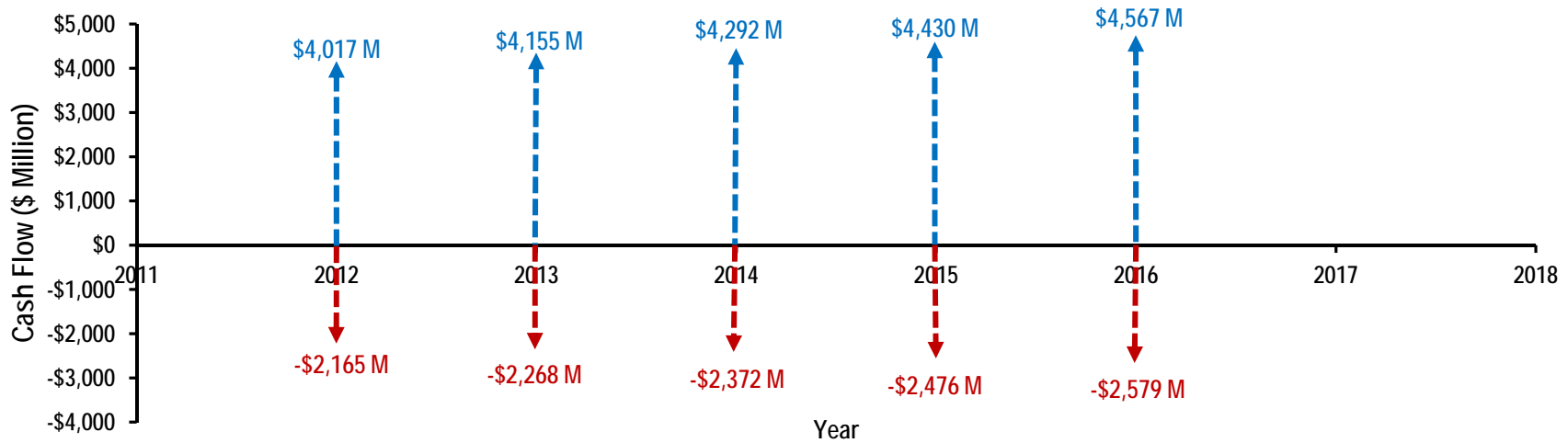
25.3% Loss of NPV

NPV_{Scenario 1} = \$5.7 Billion

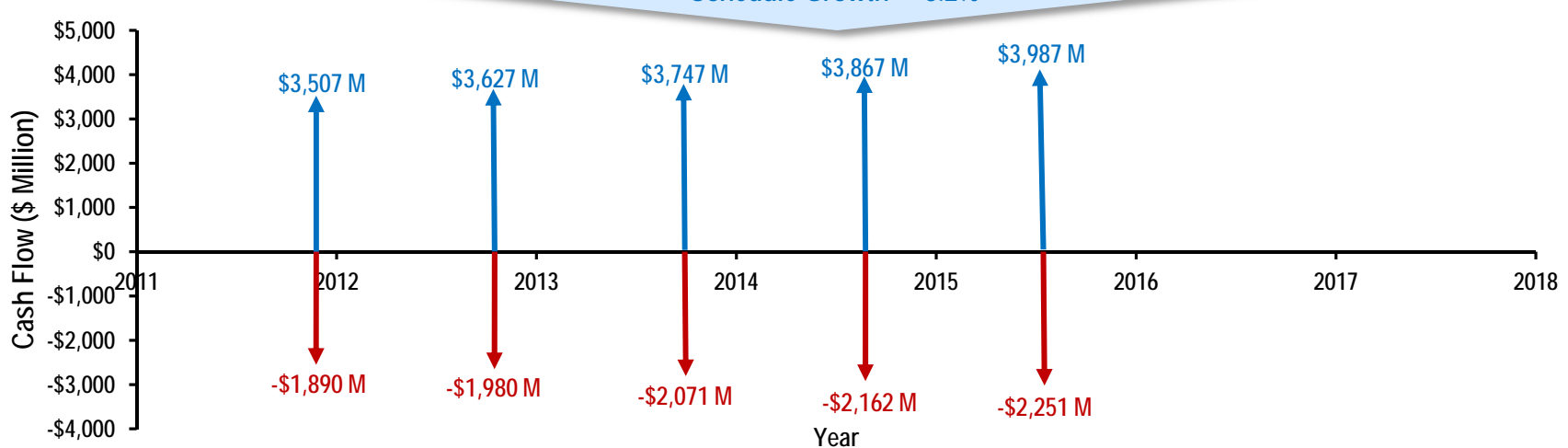


Scenario 2: Low Cost and Schedule Growth

As-Is Cash Flow



To-Be Cash Flow



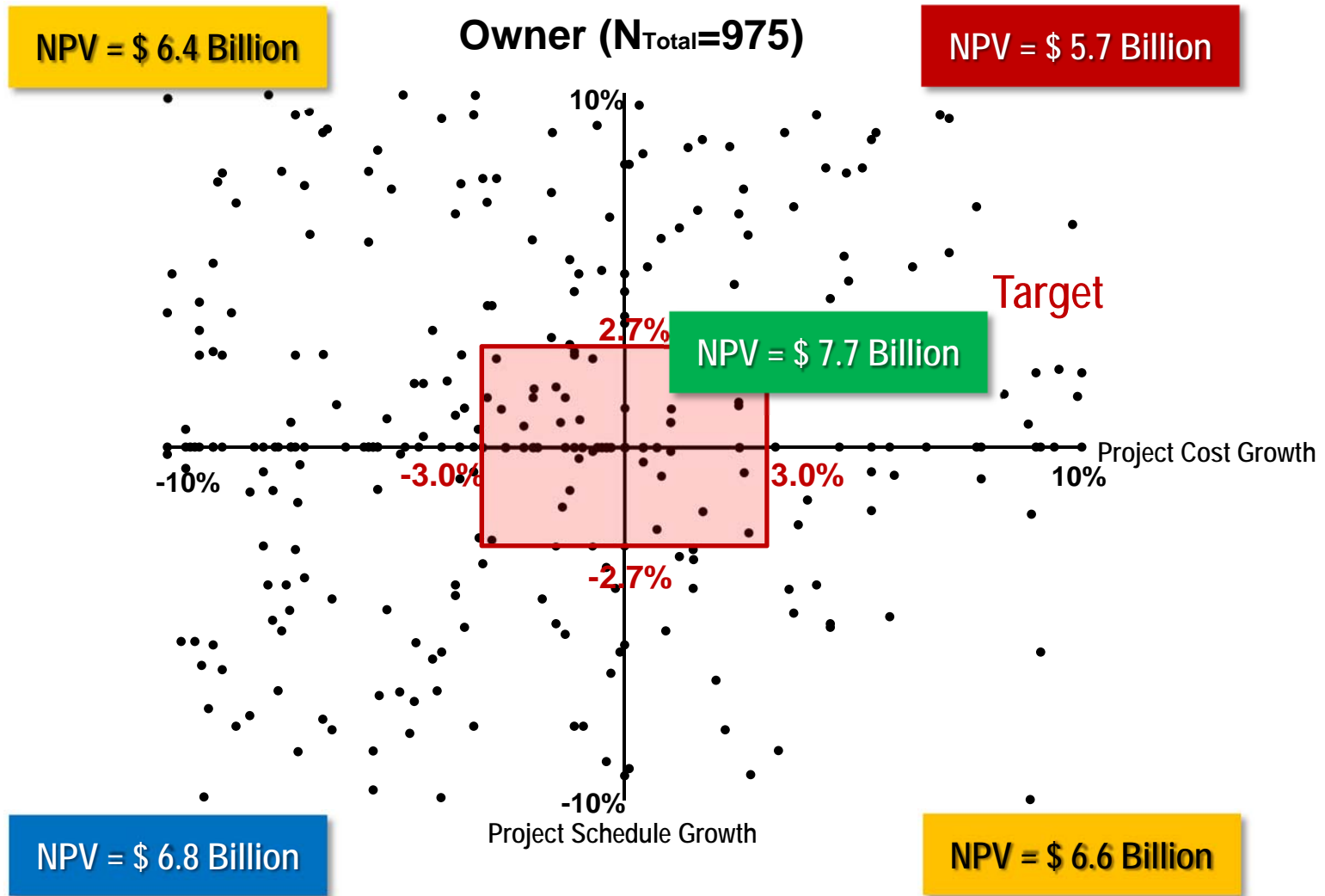
NPV_{Target} = \$7.6 Billion

11.1% Loss of NPV

NPV_{Scenario 2} = \$6.8 Billion



Net Present Value (Forecast for 2012-2016)



Expected NPV = \$ 6.5 Billion



NPV Impact of Suggested P.M. Practices

	Practices	Expected NPV	Gain/Loss	Improvement
CII Owners' Average		\$ 6.45 Billion	N/A	N/A
Contract Method	Lump Sum	\$ 6.81 Billion	\$ 360 Million	5.5%
	Cost Reimbursable	\$ 5.50 Billion	- \$ 950 Million	-14.8%
Working Relationship	Work w/ CII Contractor	\$ 6.80 Billion	\$ 350 Million	5.3%
	Work w/ Non-CII Contractor	\$ 4.61 Billion	- \$ 1,840 Million	-28.5%
PDRI	<=200	\$ 6.48 Billion	\$30 Million	0.5%
	>200	\$ 6.10 Billion	- \$360 Million	-5.6%
Planning for Startup	High Use	\$ 6.45 Billion	\$ 0 Million	0.0%
	Low Use	\$ 6.23 Billion	- \$220 Million	-3.4%

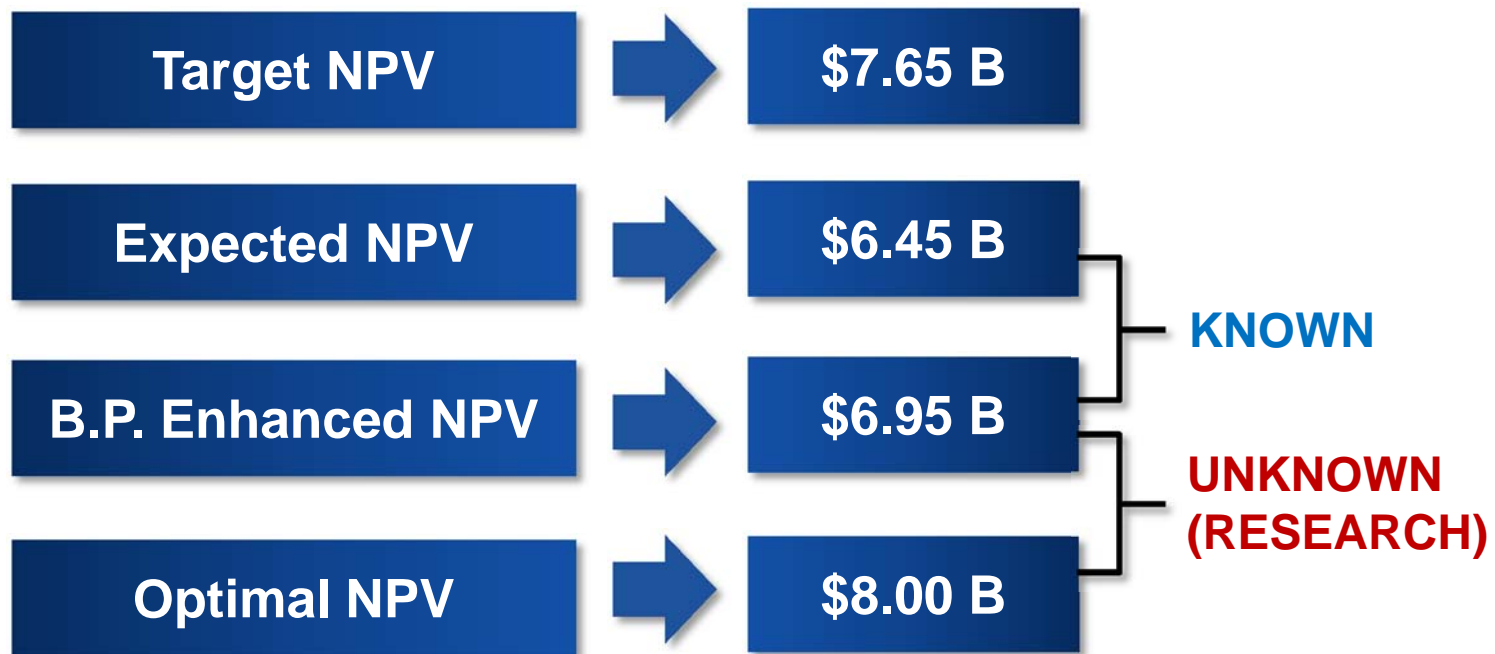
- Best Strategy to Maximize Expected NPV
 - Lump Sum Contract, Working with CII Contractor, PDRI<=200, and High Use of Planning for Startup

$$\sqrt{(\$360)^2 + (\$350)^2 + (\$30)^2 + (\$0)^2} = \$496 \text{ Million}$$

- Expected NPV can increase \$496 Million
- Expected NPV can decrease \$2,113 Million



Opportunity Exists To Improve



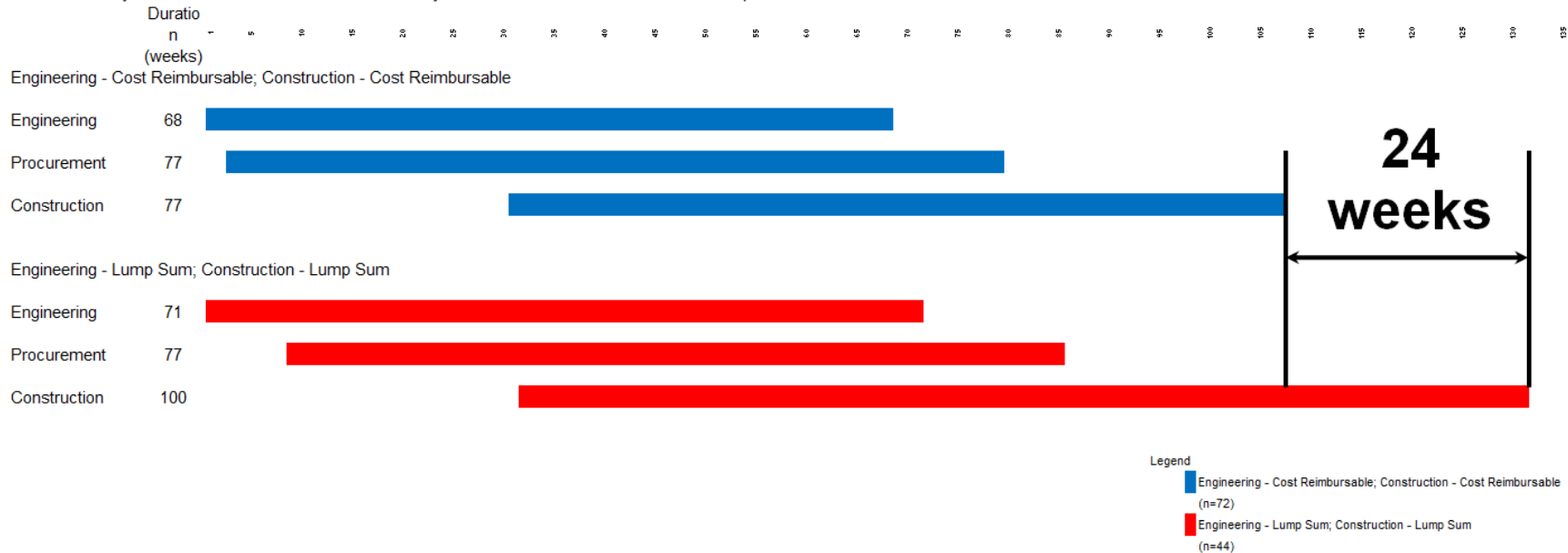
PROJECT PHASE PERFORMANCE RESEARCH (IMPACT ON SCHEDULE)



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

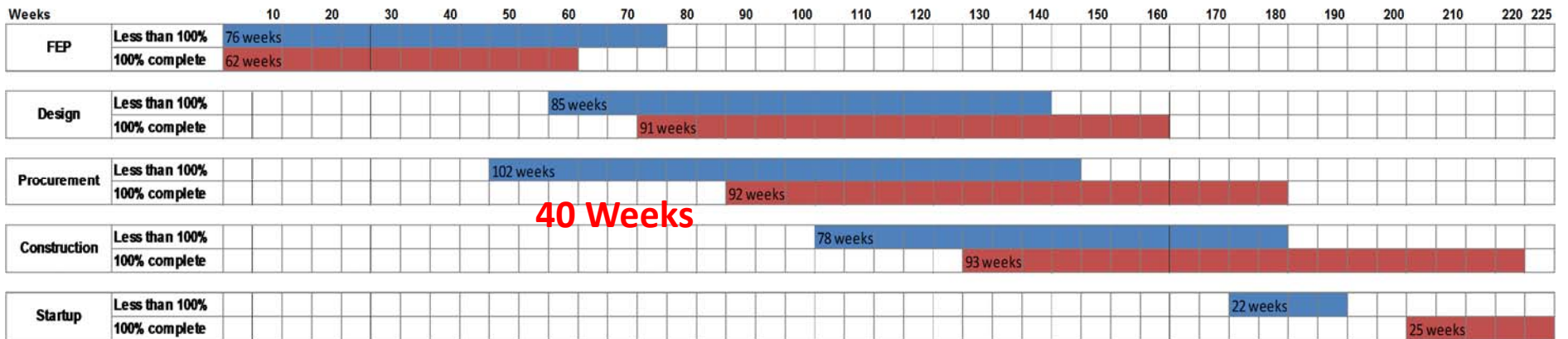
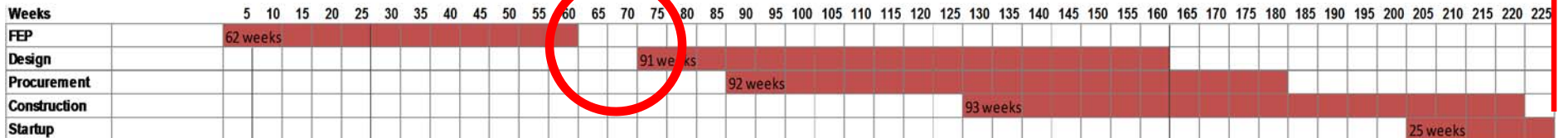


Analyzed by: BMM Team
 *Each project's cost was normalized to \$ 250 MM

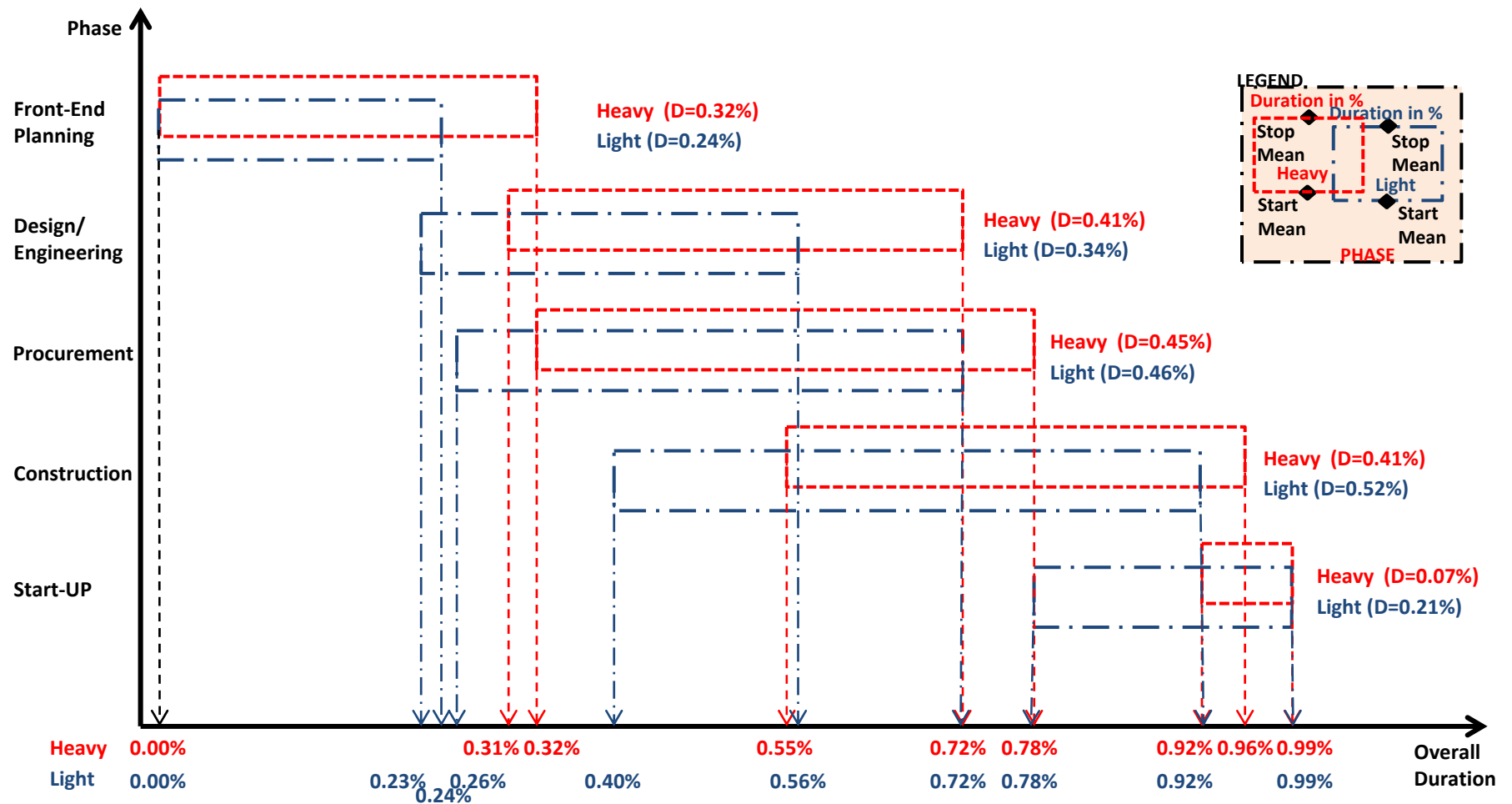
Less than 100% FEP complete prior to Procurement start (n=53 projects)
 Overall 190 weeks



100% FEP complete prior to Procurement start (n=97 projects)
 Overall 225 weeks

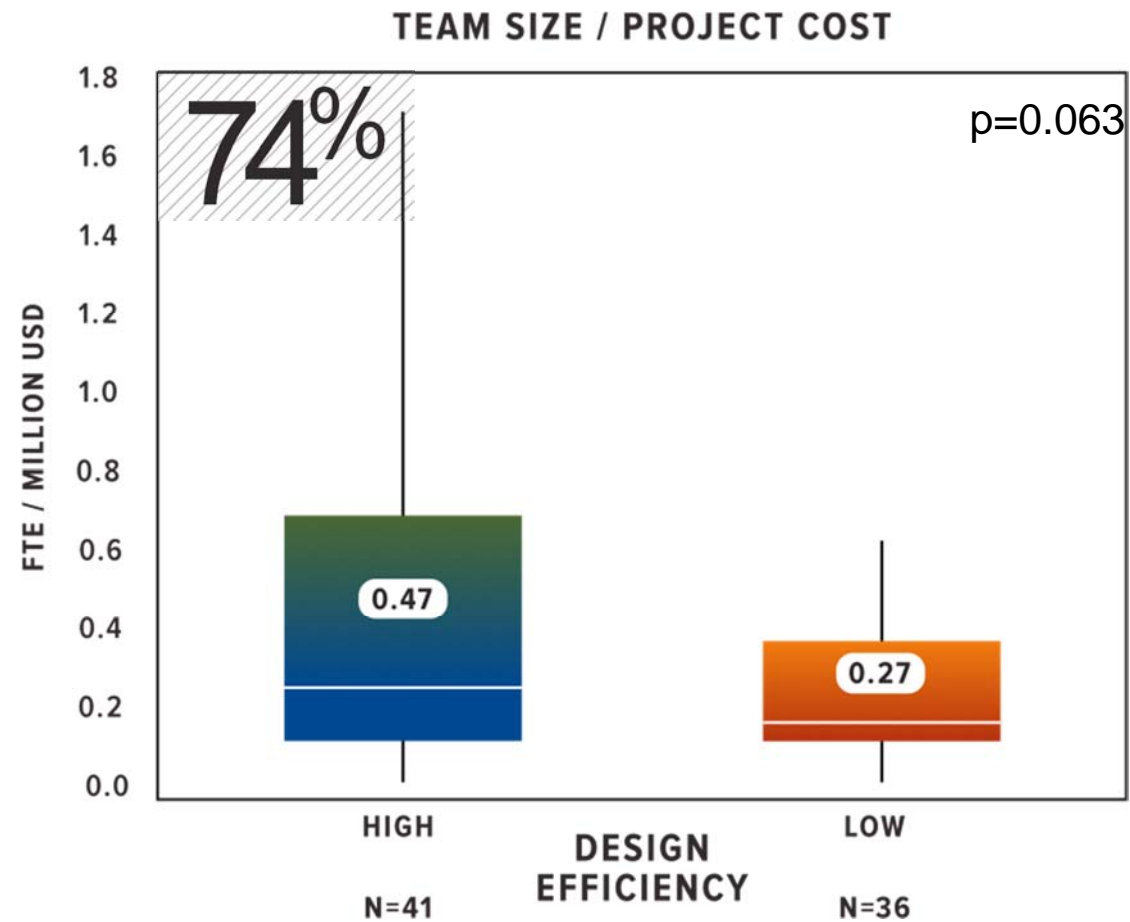


Arrangement of Phases



Engineering Phase

- Impact of Design Efficiency



5 Principles of Project Integration

- Work and Work Process
- Organizational Engineering
- Leadership and Governance
- Communications and Information Flow
- Business Environment and Culture



Communication and Information Flow

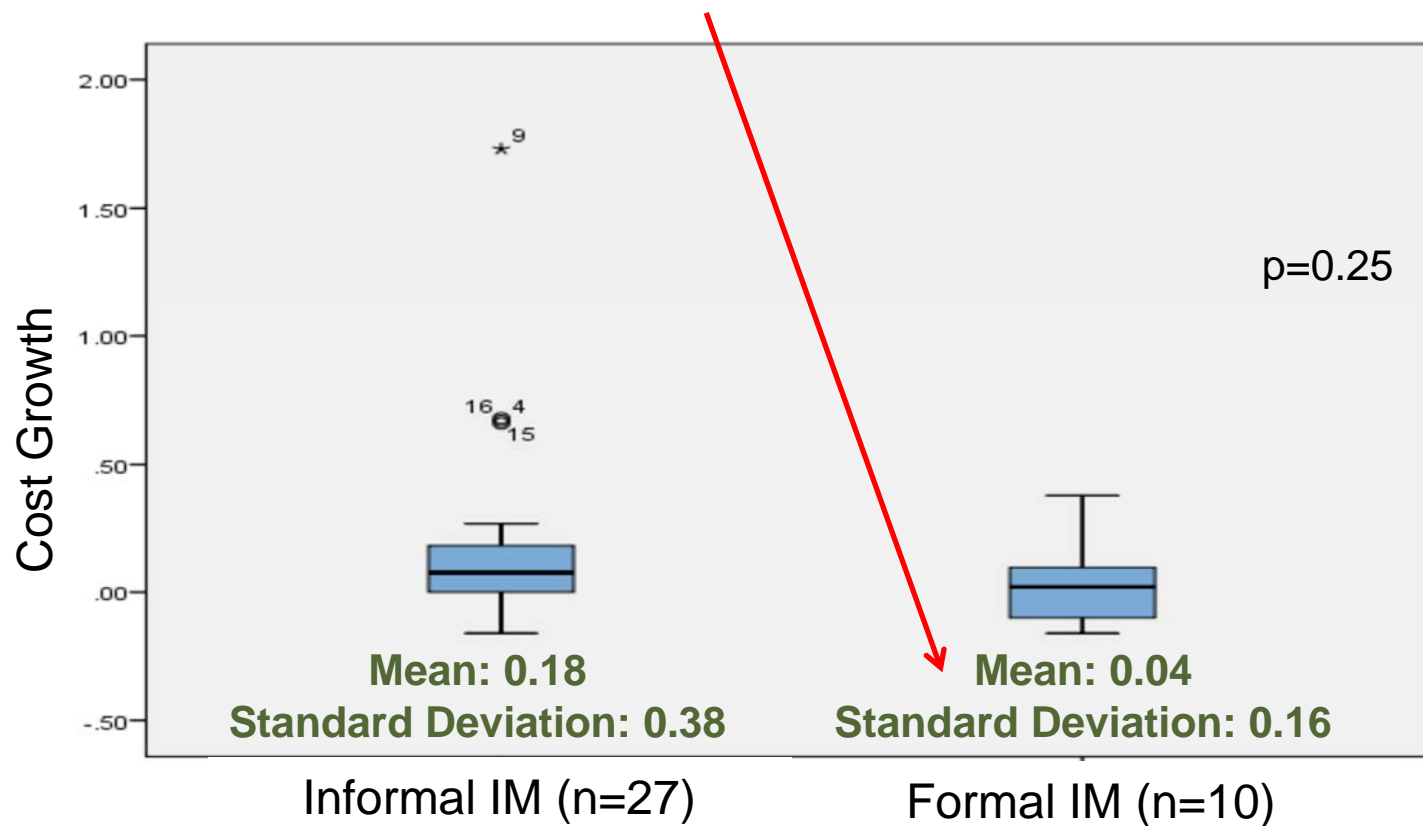
- Communicate Too Much or Not Enough?
- Lines of Communication = $(n(n-1))/2$

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



Interface Mgmt. vs. Project Cost Growth

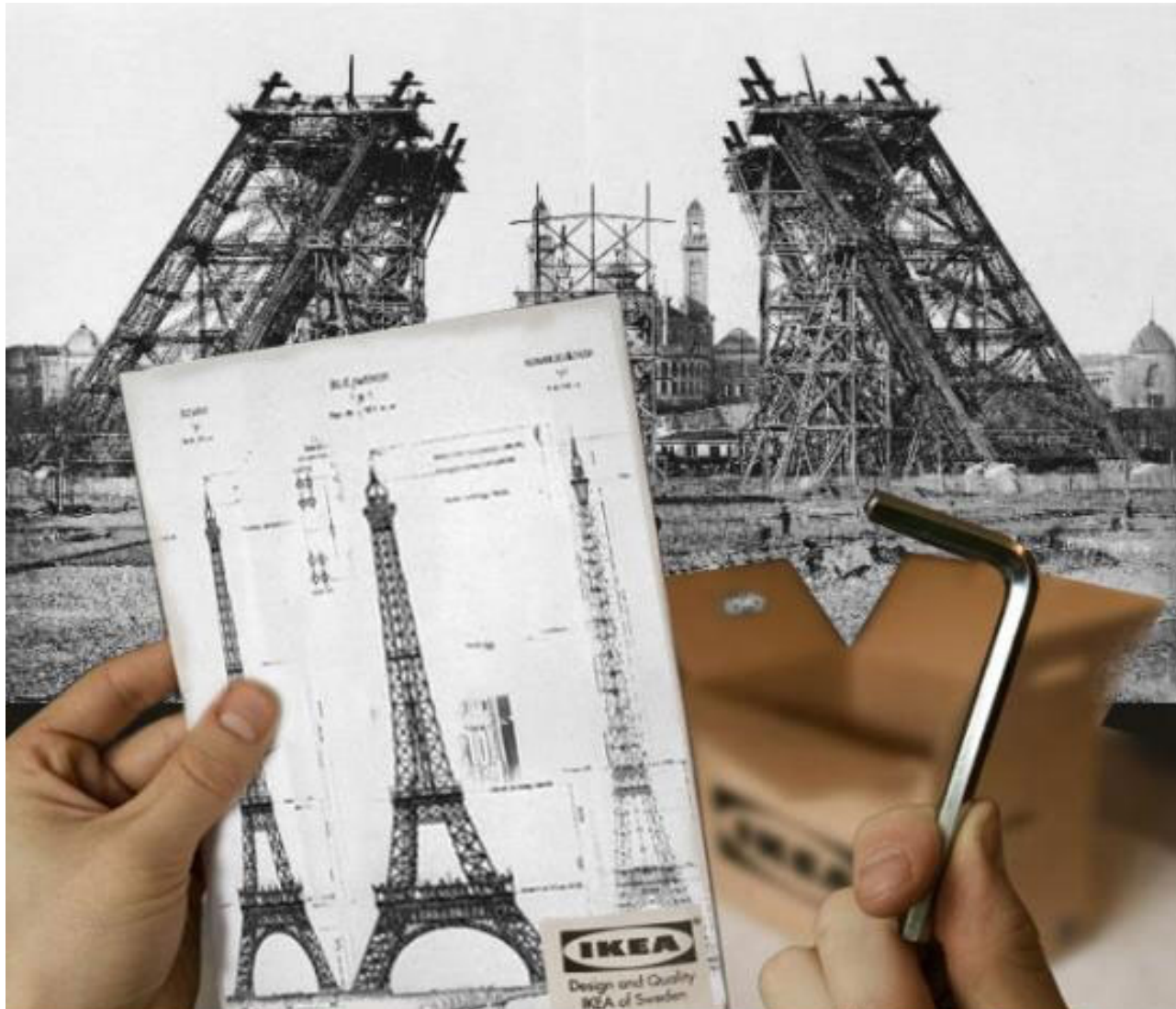
- Formal IM projects had lower mean of cost growth and less standard deviation



Advanced Work Packaging?

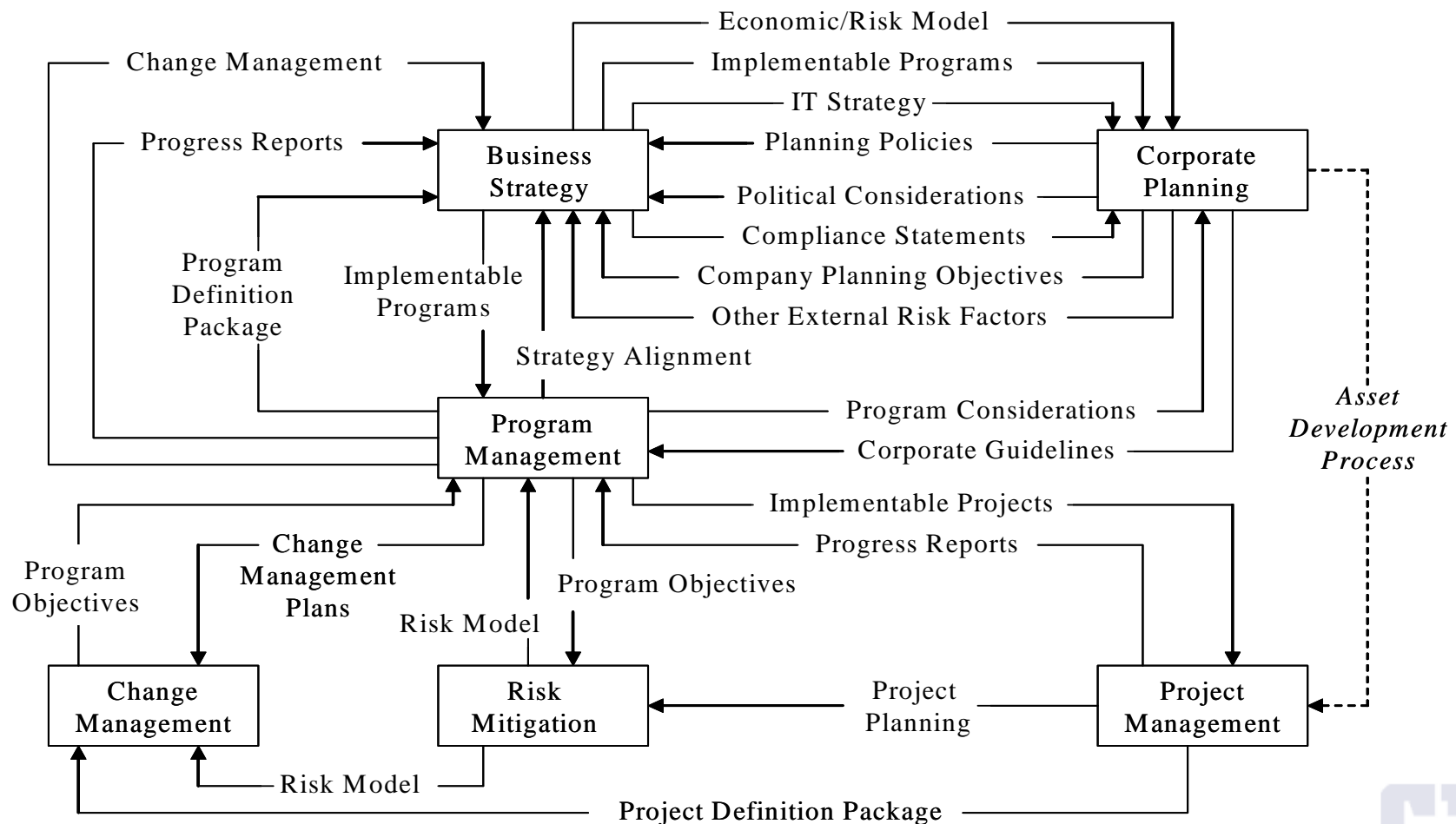


Advanced Work Packaging?



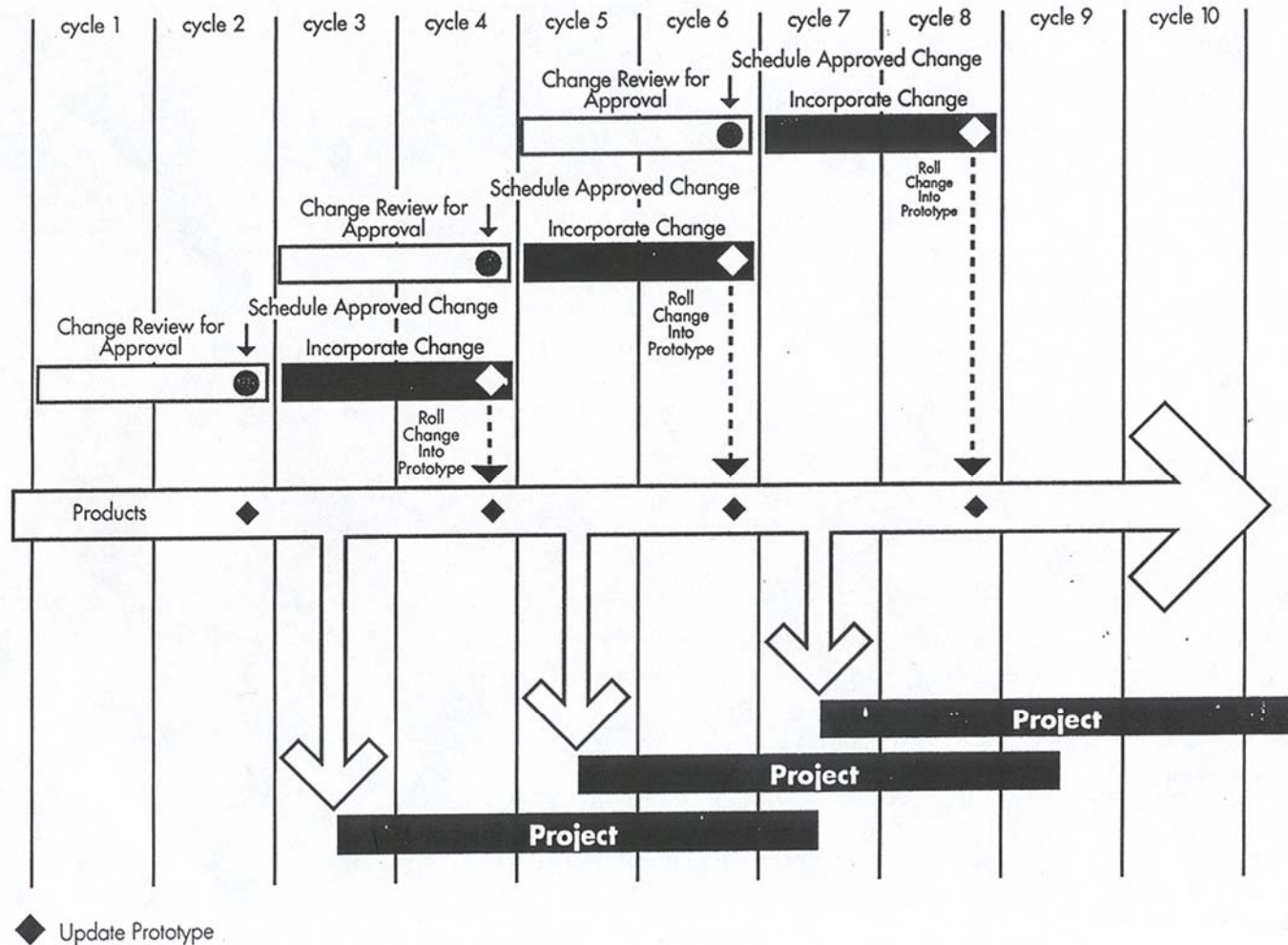
Program(me) Management

- The coordinated management of a portfolio of projects to achieve a set of business objectives (CCTA 1995)

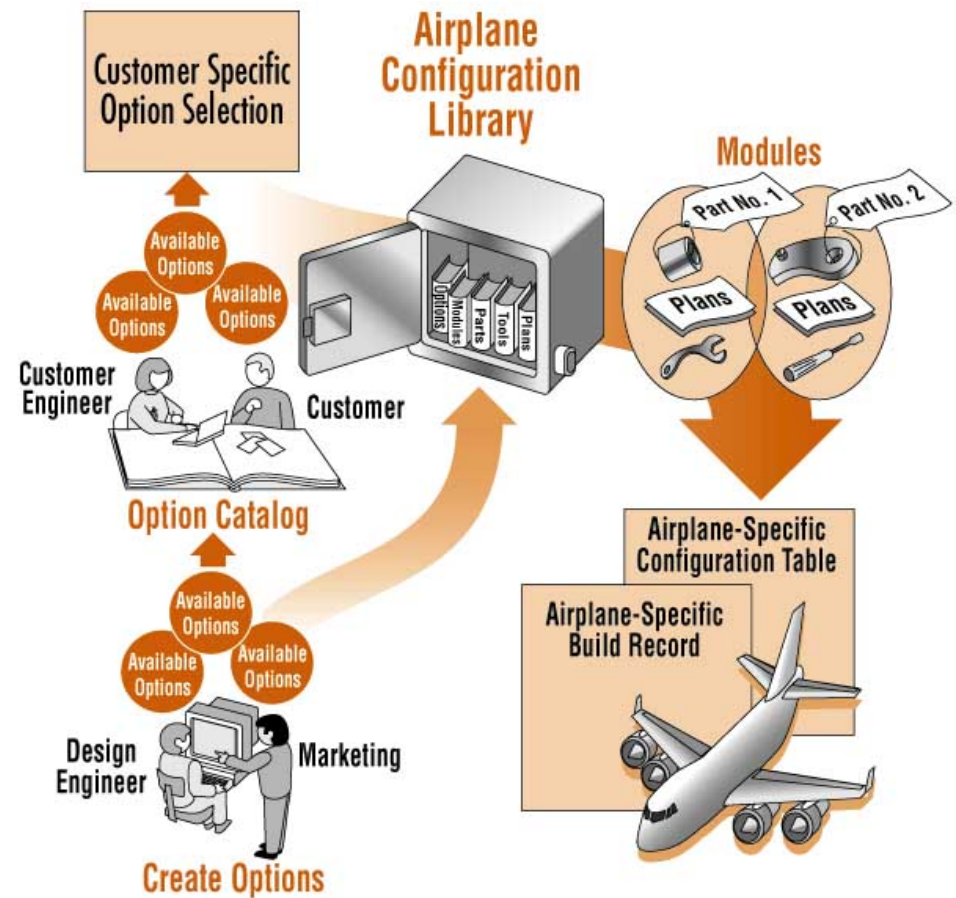
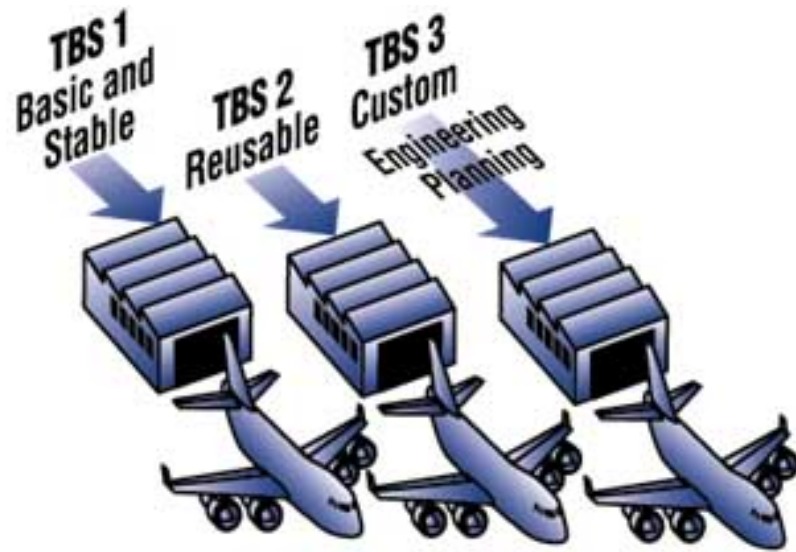


Programmatic Change Management

- Change Management System
 - Wal-Mart makes 170 changes per month to Supercenter prototype



Advanced Work Packaging!



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Questions?

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