



*Changing How
the World Builds*



Operating System 2.0 - Collaborating to Transform the Projects Industry



Rice Global E&C Forum
**Engineering &
Construction**

Rice Global Forum 2019

Steve Cabano
12 November 2019

Introduction: Stephen (Steve) Cabano

- **Title:** President, Pathfinder, LLC
- **Degree:** BS - Mechanical Engineering, Villanova University
- **Years of Experience/Professional Field:**
 - 30 years direct project management experience for owner & government clients in Petroleum, Petrochemical, Chemical, Environmental, Power, Pharmaceutical, Food & Beverage, Mining, Industrial and Commercial industries
 - Project Manager/team member in large project teams: responsible for costs, planning, scheduling, procurement, and similar project-related services
- **Professional affiliation memberships include:** ACEI®, PMI, AIChE, ASTD, SAVE; board member and 2019 Chair of the Construction Industry Institute (CII), and Engineering and Construction Contracting (ECC) Association Board Member, (2006-2007 ECC Association Board Chair)





Safety Moment

Topic Outline

- About CII
- Today: Current Industry Status
- Tomorrow: Desired Future State of the Industry
- Results: Expected Impact
- Status Update: Fall 2019
- Conclusions
- Questions & Comments



ABOUT CII



History of CII

- Founded in 1983 by 28 organizations; now 143
- Organized Research Unit (ORU) of the Cockrell School of Engineering (CSE) at the University of Texas at Austin (UT)
- First structured owner-contractor-academic research collaboration for the constructed project
- Global collaboration to advance the capital projects industry through research and deployment of Best Practices



CII Member Companies – Owners



PETRONAS



CII Member Companies – Contractors

AECOM



Eichleay

JACOBS

NPCC
شركة الهندسة والبناء الوطنية

SBI
OFFSHORE

WANZEK

Alfred **MILLER**
CONTRACTING

BLACK & VEATCH

EMERSON

KBR



WILHELM
CONSTRUCTION

APTIM

BURNS & MCDONNELL

Kiewit

QualEx Engineering

SKANSKA

WISON

FLUOR



RICHARD
INDUSTRIAL GROUP



wood.

ARCADIS

CDI Corporation

H+M
INDUSTRIAL EPC

MATRIX SERVICE
COMPANY

SNC • LAVALIN

AZCO



hargrove



WorleyParsons

BAKER
CONCRETE CONSTRUCTION
expect more

ODEBRECHT

HASKELL

MCCARTHY

SAIPEM

TechnipFMC

ZACHRY

Barton
Malow
Construction Services



HATCH

MCDERMOTT

SAMSUNG

thyssenkrupp

ZURICH



Day & Zimmermann
We do what we say

D&B Hoovers

MIDWEST
STEEL

SI
SAULSBURY

TURNER
INDUSTRIES

victaulic

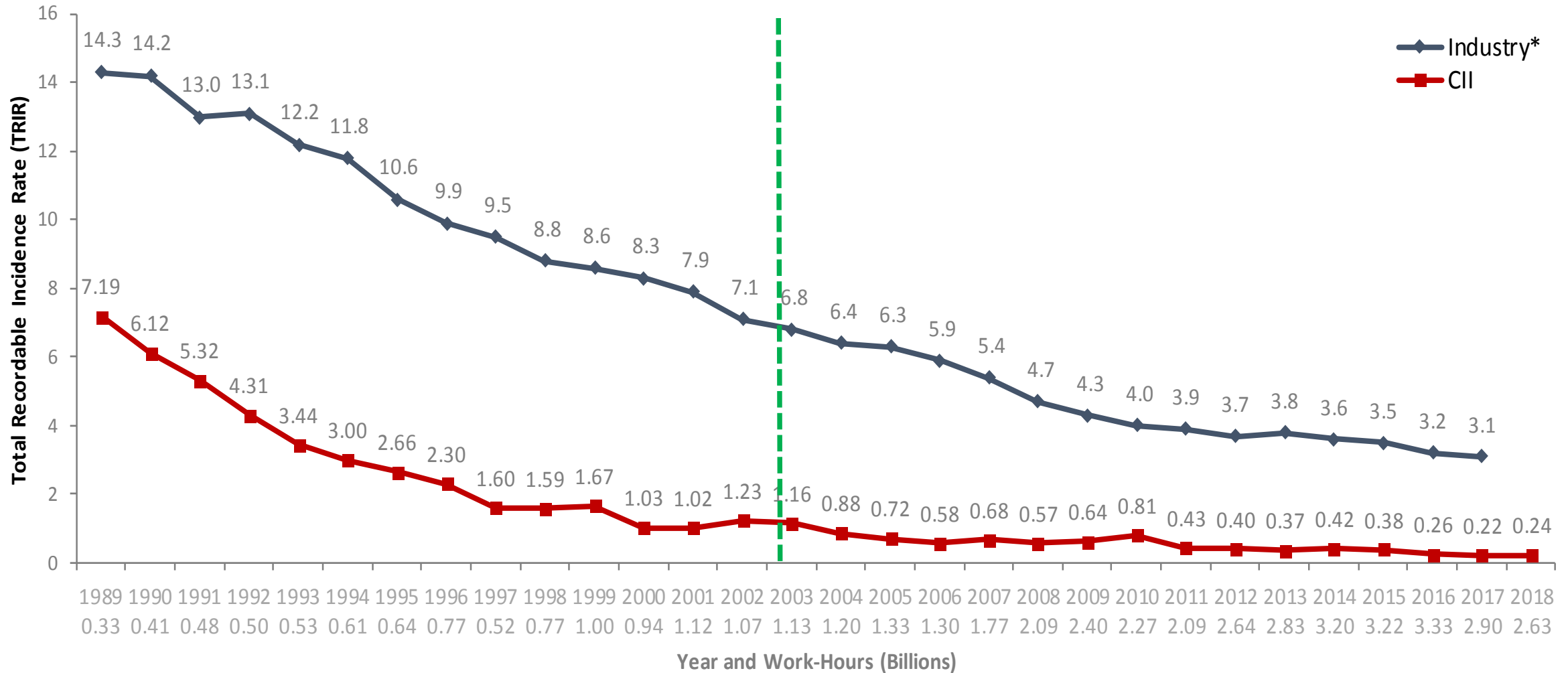
CII Member Companies – Service Providers



Design + Construction Strategies



CII Safety – Injuries/ 100 Workers /Year



*OSHA Construction Division, NAICS 236-238 (SIC 15-17)

--- Reflects OSHA reporting change

Seventeen CII Best Practices

Advanced Work Packaging

Alignment

Benchmarking & Metrics

Change Management

Constructability

Dispute Prevention & Resolution

Front-End Planning

Implementation of CII Research

Lessons Learned

Materials Management

Partnering

Planning for Modularization

Planning for Startup

Project Risk Assessment

Quality Management

Teambuilding

Zero Accidents Techniques



TODAY: Current Industry Status



Industry Advancement?

98%

of mega-projects
>\$1 Billion
experience cost
overruns of 80%

(Source: Bechtel)

95%

of all projects
FAIL to meet one or
more of their
business objectives

(Source: CII)

70%

of all projects are not
completed within
10% of budgeted
cost or schedule

(Source: CII)

>40%

of project capital is
**WASTED on
transactions**

(Source: CII/NTNU)

“I think the current model within our industry is broken.”

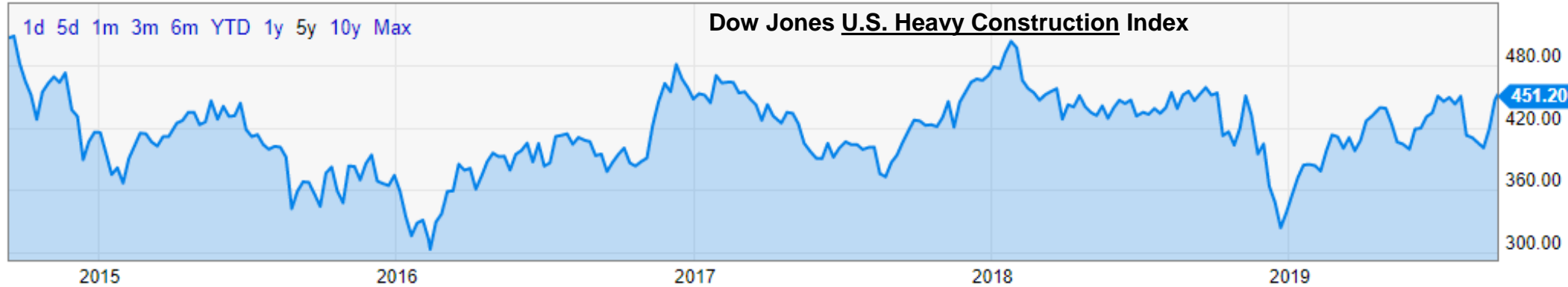
– Ian Edward, Interim CEO, SNC-Lavalin

(on August 1, 2019, after SNC-Lavalin reported a \$1.6B loss and their stock dropped to a 14-year low)

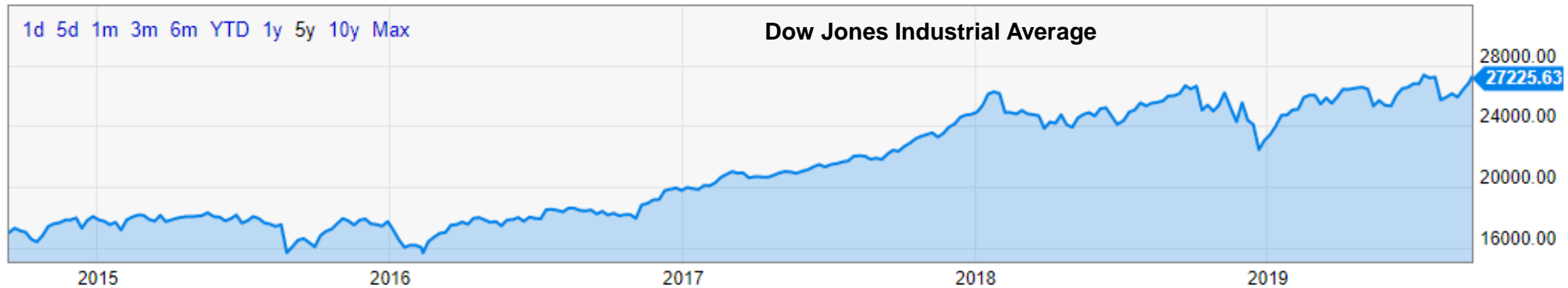


We Are Not Delivering Financially

Dow Jones U.S. Heavy Construction Index (DJUSHV) vs. DJI (Sept 13, 2014 – Sept 13, 2019):



-11%
0.5% profit
on \$93B
in 2018



+60%



Poor Productivity (Of Capital)

- Need to *improve capital efficiency*
- Not attracting enough investment
- Financially unhealthy (0.5% net profit)
- \$1.6T lost productivity each year, globally
- 5.7% increase in U.S. construction cost in 2018 (vs. 1.9% inflation)
- Breakthrough vs. continuous improvement
 - Improve 2.5% / year via Best Practices, but...
 - Industry declines 3% / year

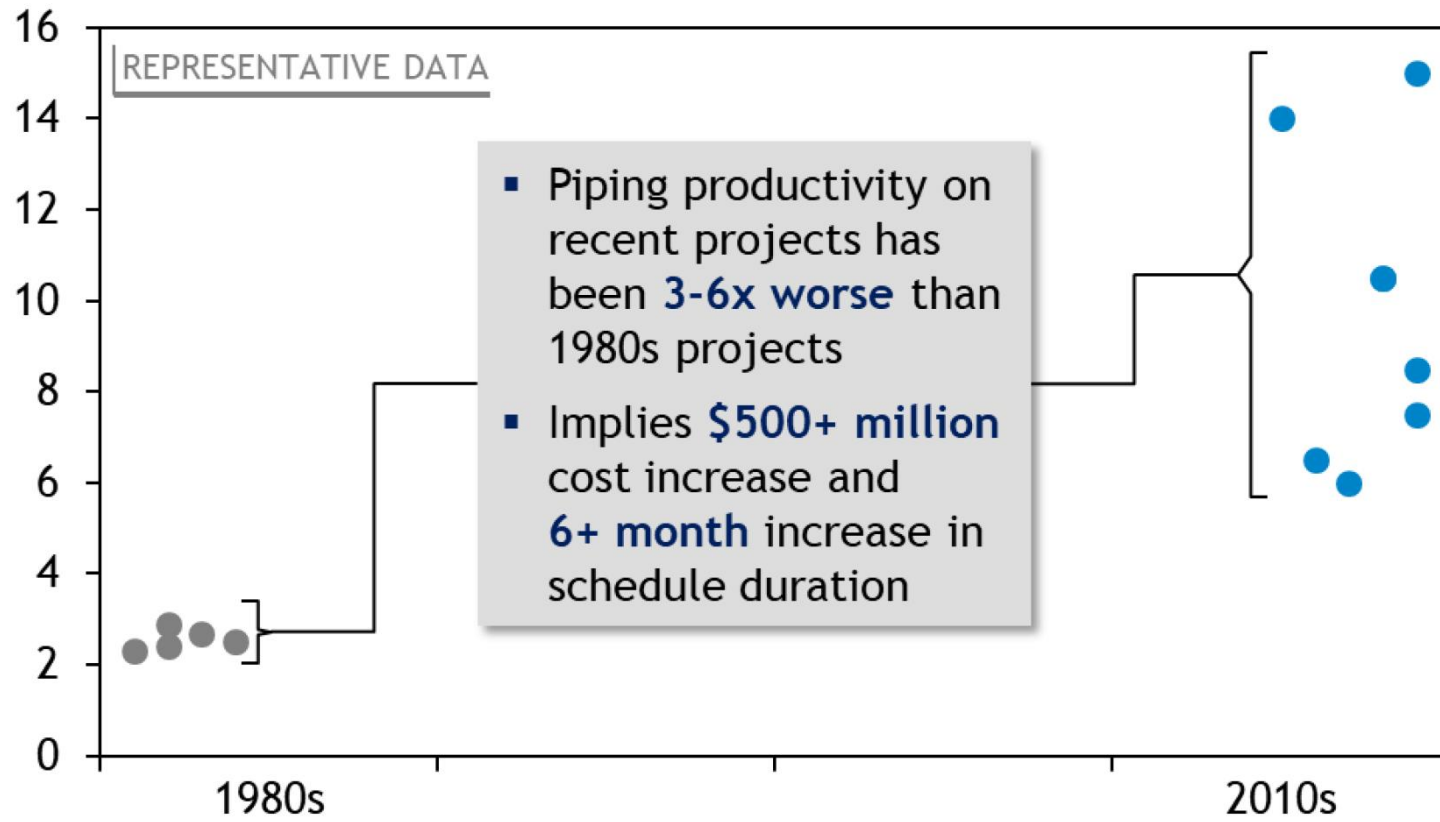


1980's Piping Productivity vs. Today

Piping productivity for major US Gulf Coast onshore investments¹

Work-hours per linear foot of pipe

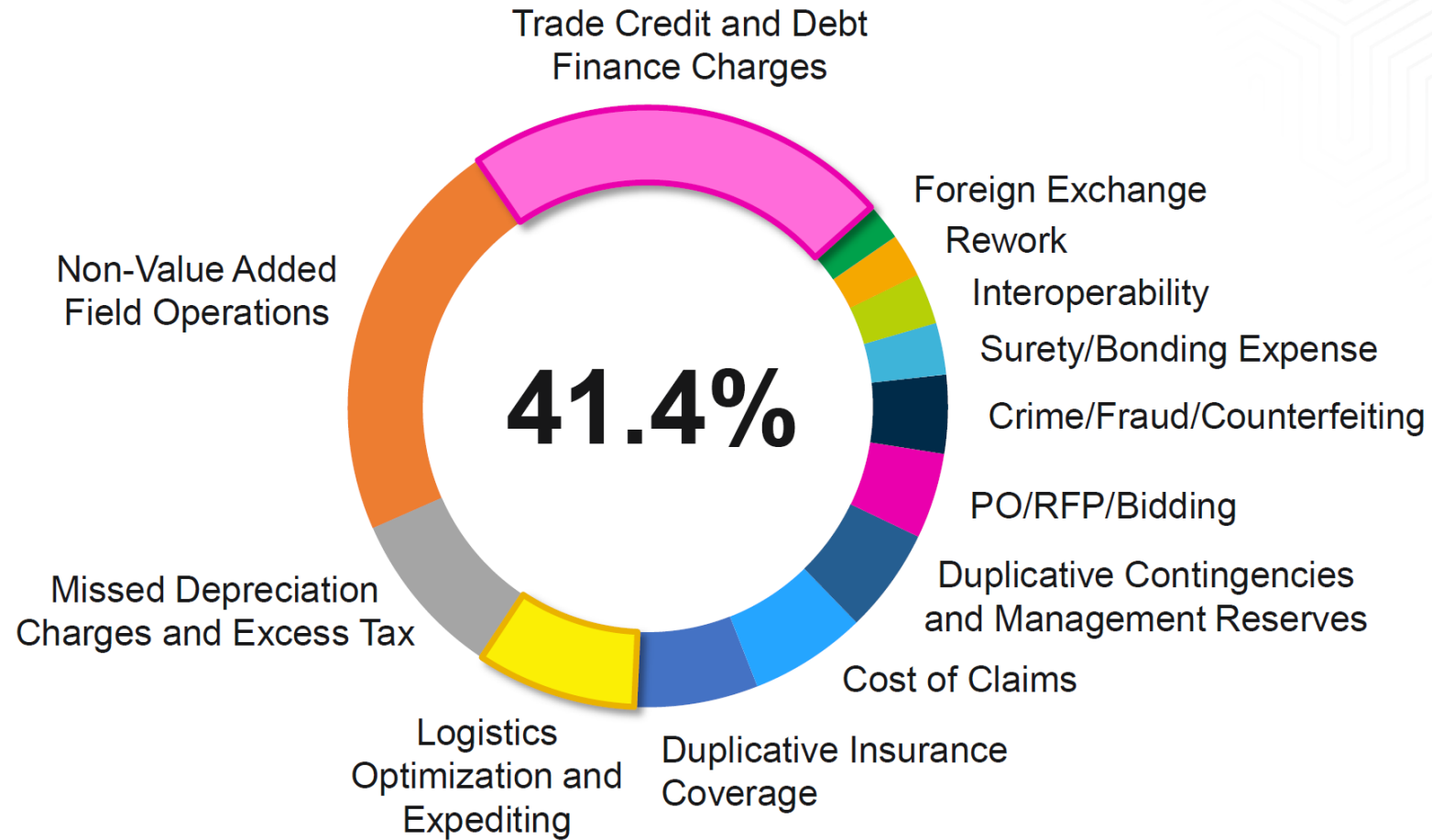
● 1980s ● Recent



¹ Larger diameter, higher pressure and temperature projects (e.g., ethane crackers, LNG facilities, and similar)

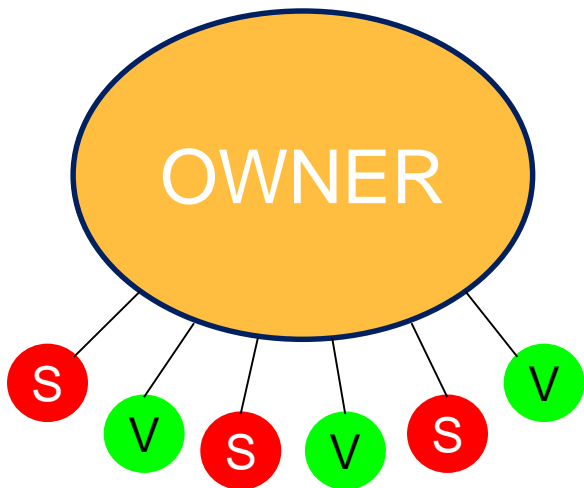


Primary Sources of Transactional Waste



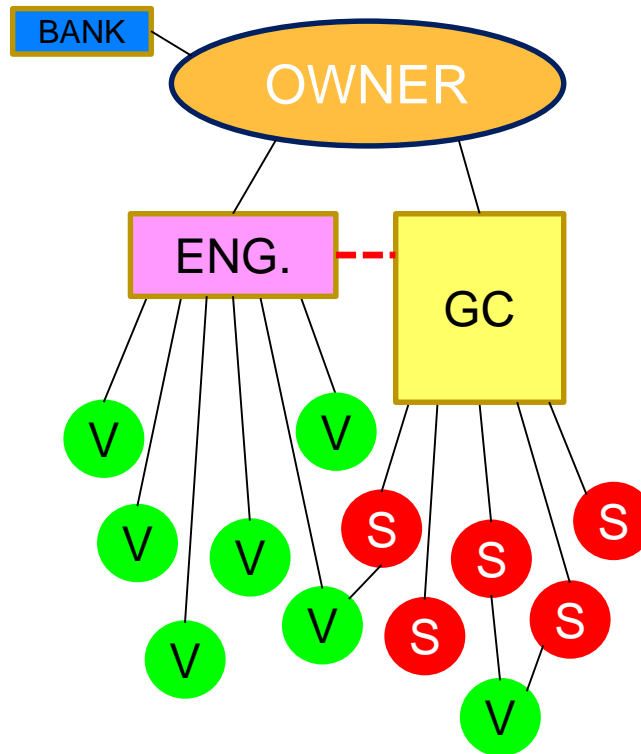
Trends: Increasing Fragmentation and Complexity

1960s
(\$10s M)



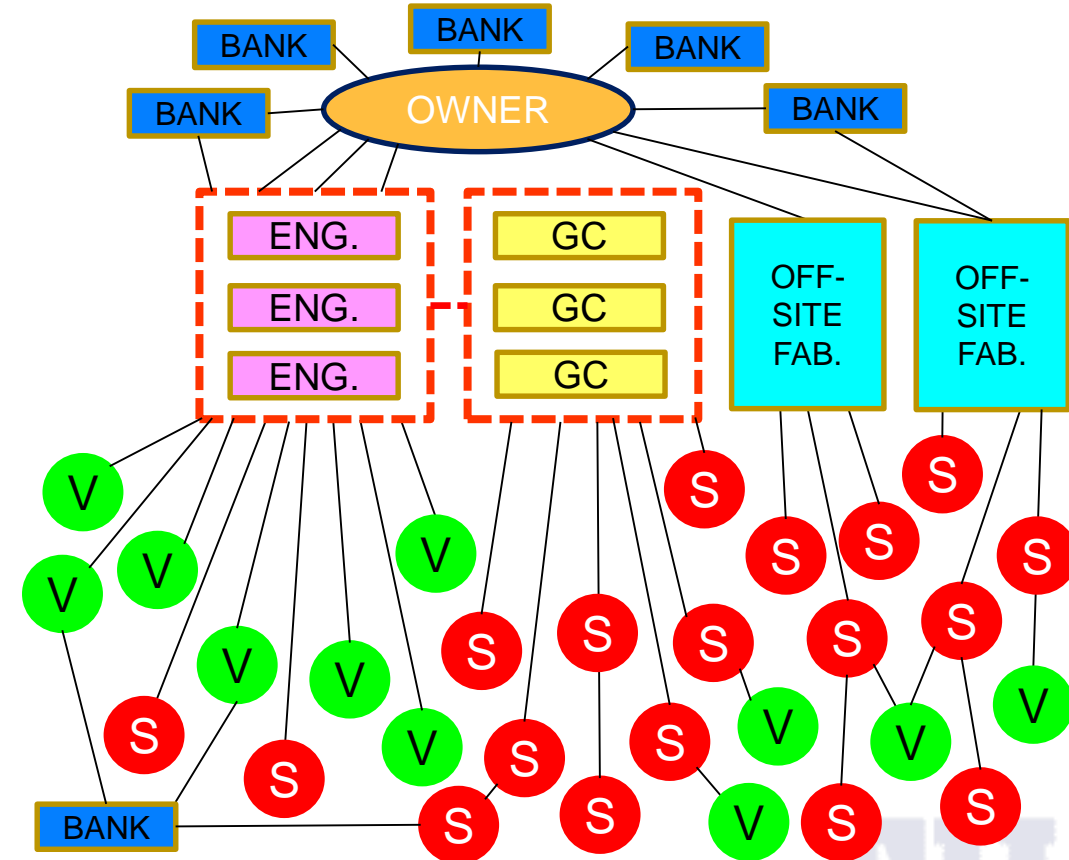
S Subcontractor

1990s
(\$100s M)



V Vendor / Supplier

TODAY
(\$1000s M)



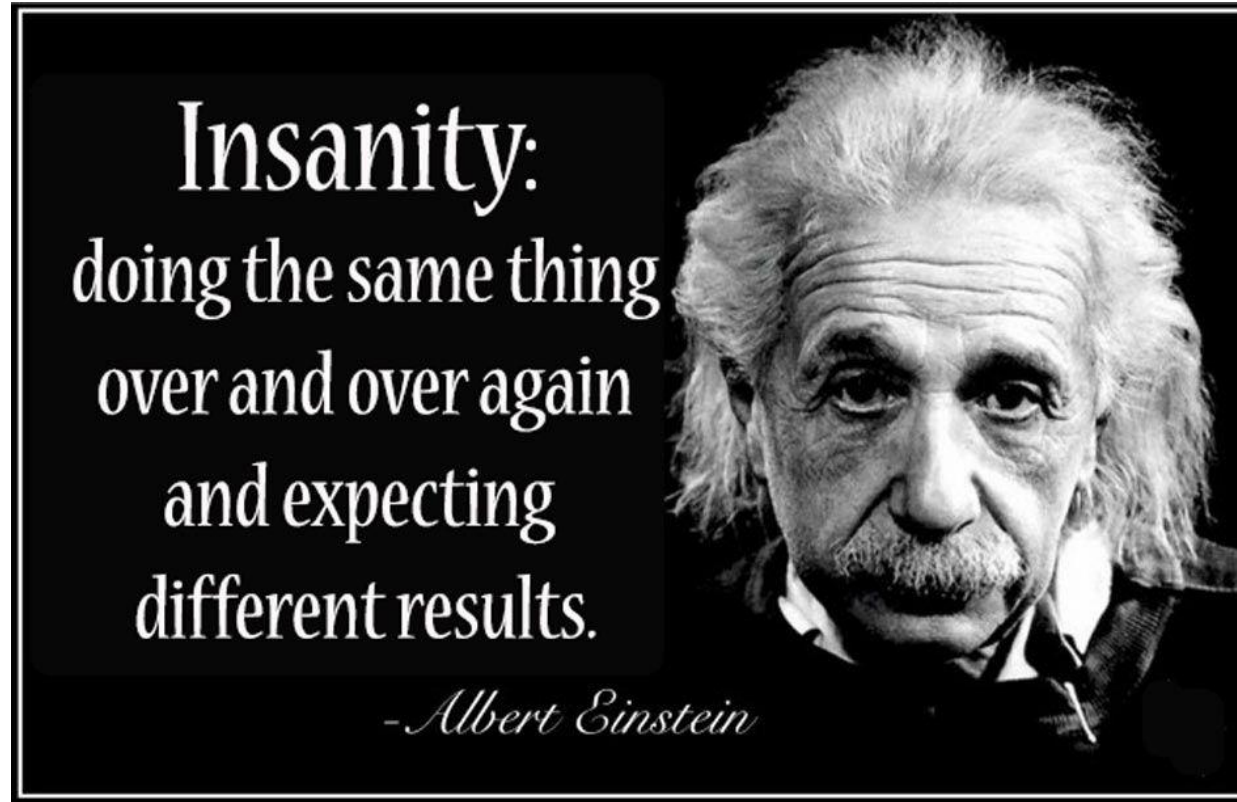
Band-aid Solutions?

- Today's BEST PRACTICES and technology POINT SOLUTIONS are good, but they aren't delivering step-change improvement
- Why? Because they are being applied to an inherently broken business model
- We need a NEW BUSINESS MODEL that allows our best efforts to thrive:
 - Advanced Work Packaging (AWP)
 - Early (agile) planning
 - Alignment and team building
 - Modularization and off-site fabrication
 - Zero accident techniques
 - ...and more...

Best Practices are the best of what we know today, but they won't necessarily make you successful tomorrow. The world is moving fast. By definition, Best Practices are yesterday's news.



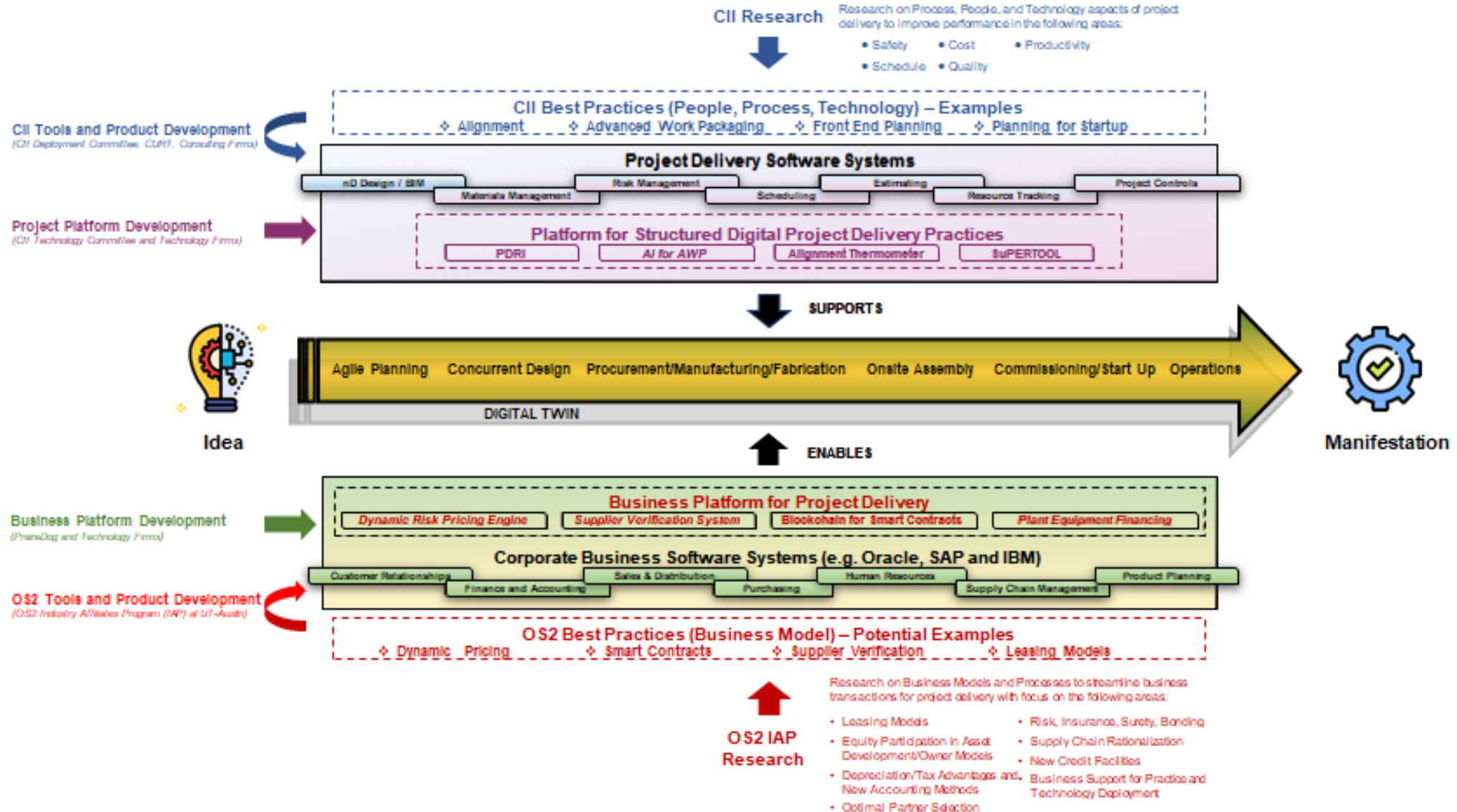
Overused, Yet Nonetheless TRUE





TOMORROW: Desired Future State of the Industry

Harmonizing Project Delivery and Business Support



Operating System 2.0 (OS2) Overview

- OS2 is a new business and commercial model for the capital projects industry
 - How can we use the capital project to enhance business outcomes?
 - How do we accelerate our organic growth by using our capital better?
- OS2 will enhance the health and stability of the industry
 - Intelligent finance, accounting, tax, legal platform for a globally-distributed industry
 - Participating companies can leverage their own capital
 - Provide enabling environment for point solutions to thrive
- Key words: Distributed, Speed, Agility
 - Reverse the trends toward costly vertical integration (distributed risk, finance)
 - Dramatic reduction in time for planning, selecting, engaging, integrating, executing



Key Questions

“How can the project better enhance business value?”

“Can we make projects a preferred investment choice for the C-suite?”

“Can we eliminate significant transactional waste through better contracting and collaboration?”

“Can we procure materials and services based on ROI/ROCE instead of just initial cost?”

“Can we leverage advanced computing power to improve project outcomes?”

“Can we better take advantage of global trade and tax regulations?”

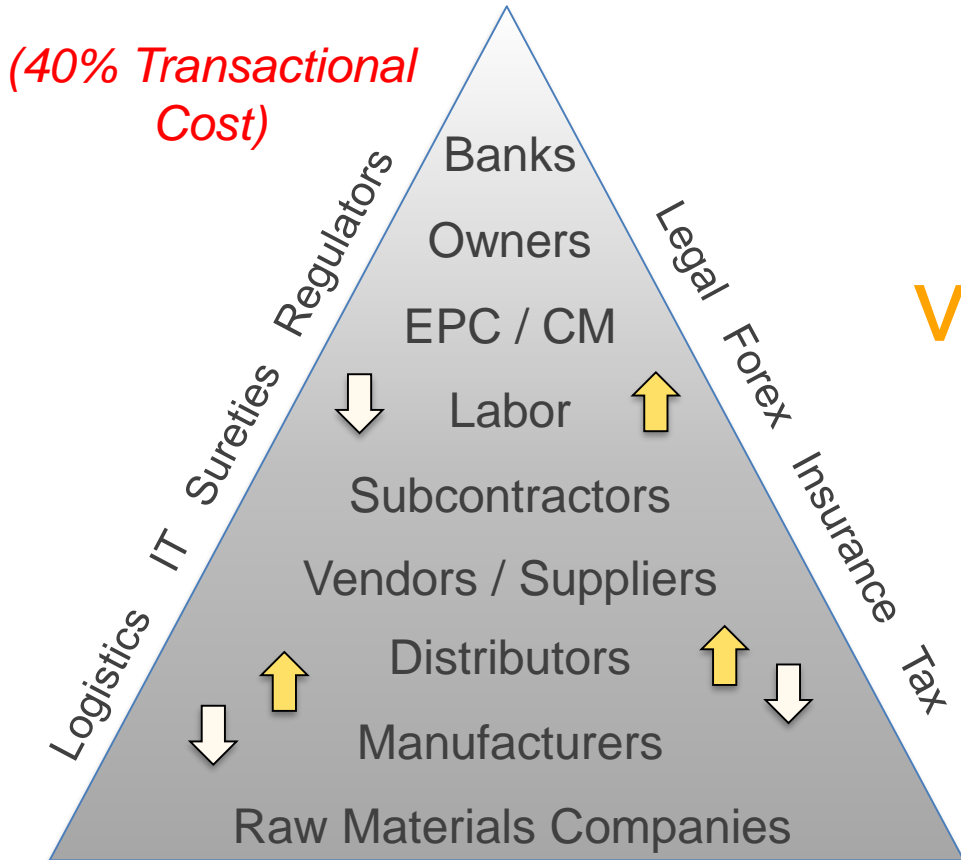
“Can leasing provide a better option for funding capital projects?”

“Can we improve the overall financial health of the industry?”



OS2 Business Model Comparison

TODAY'S "OS1" BUSINESS MODEL



VS.

OS2

Capital Markets
 (Owners, Private Equity, Bonds, MLP's, Syndicates)

(Open Source, Cloud-Enabled Thin Platform)



Commercial Finance	Integrator (IT)	Tax
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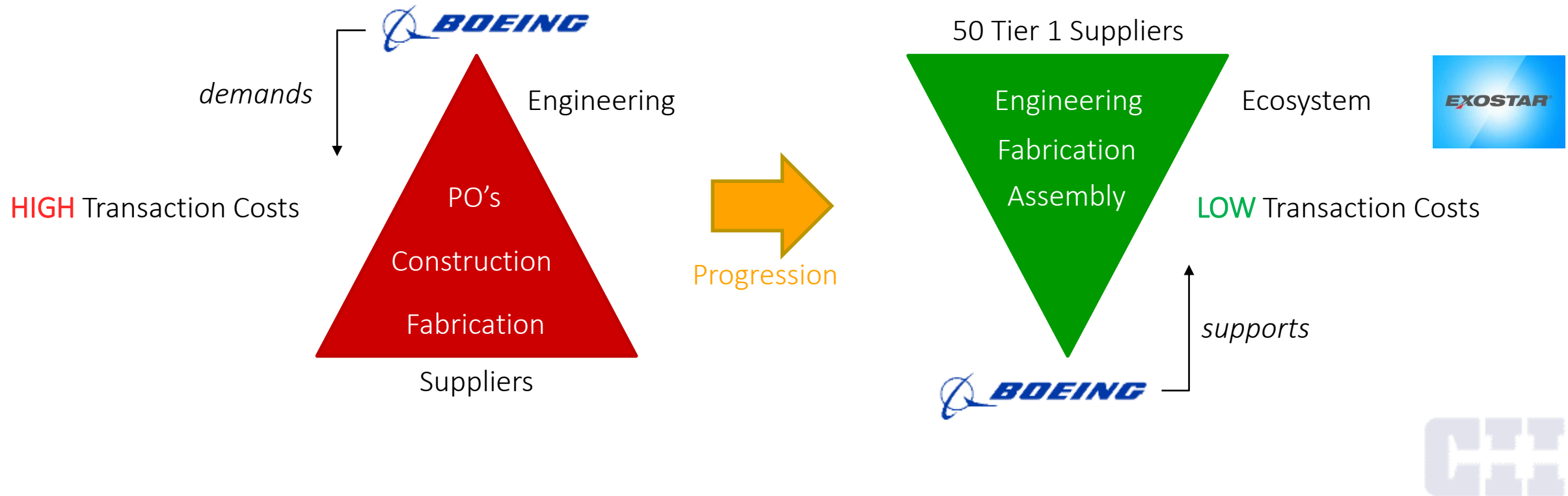
- CM
- Labor
- Licensors
- Engineering
- Regulators
- Manufacturers
- Raw Materials Cos.
- Contractors
- Large Risk Mgmt.
- Logistics
- MRO

(1/10th Transactional Cost)



Case Study: Aerospace Industry

- B787 Development Cost: From \$10B to \$6B (-40%)
- B787 Development Time: From 6 Years to 4 Years (-33%)



Business Support (OS2 IAP Sponsors)

ExxonMobil

BHP

SUNCOR

COAA
Construction Owners
Association of Alberta

Confirmed w/ signed IAP contracts (currently \$1.57 million for 9/19-8/20)

سابك
sabic



Budgeted, expected confirmation by November 1, 2019



Business Support (CII OS2 Research)

- Operating System 2.0 (OS2) Industrial Affiliates Program (IAP)
- Faculty / Researchers from the University of Texas at Austin
- Four initial research areas:
 - Supplier Verification
 - Dynamic Risk Pricing Engine
 - Blockchain-Enabled Smart Contracts
 - Permanent Plant Equipment Leasing



STATUS UPDATE: FALL 2019



Status Update: Fall 2019

- OS 2.0 Sponsor Meeting held in early October 2019
- Purpose: to obtain Sponsor feedback on proposed direction of OS 2.0 research program
- A mix of sponsors attended (BHP, Suncor, CoAA and ExxonMobil)



Status Update: Fall 2019

- CII proposed following focus of the initial research effort:



Status Update: Fall 2019

- This proposed focus, while interesting, was not thought to be well aligned with current Industry needs/priorities
 - E.g. - Equipment leasing area was deemed to be of limited value while supplier verification was seen as being too narrowly focused on just material & equipment suppliers and not sufficiently expansive to include contracted service providers like EPC providers
- Attendees broke out into two groups to discuss changes needed



Status Update: Fall 2019

- After interactive, collaborative discussion – agreement reached to align initial focus of OS2 program with highest priority needs of the Industry:



Status Update: Fall 2019

Revised focus differs from original proposal in several significant ways:

- Biggest addition is explicit addressing of risk –
 - Primary enabler of issues faced in our business today
- Broadened out supplier focus to include contracted services (EPCs)
- Recommended engagement of experts from Organizational behavior and data science areas
 - Many roots have ties back to interpersonal / team interactions and data analytics



Status Update: Fall 2019

Revised focus differs from original proposal in several significant ways:

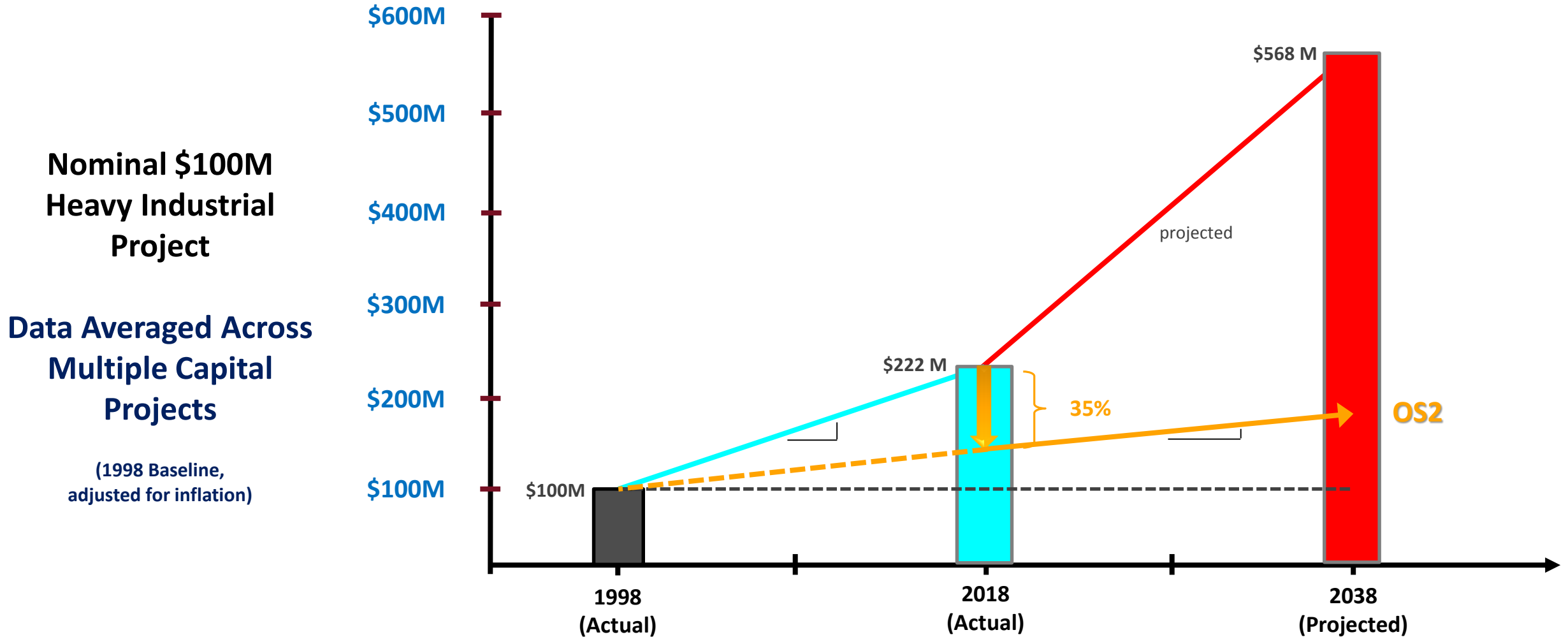
- Risk model to be based on factors available from both private & public sources ...
 - Would help increase characterization of risks in transparent fashion
 - Tailorable to each company's needs/unique attributes
 - Other deliverables will flow from this model
 - Will include engagement of multi disciplinary experts from other non-engineering departments





**RESULTS:
Expected Impact**

OS2 Will Mitigate Escalating Costs

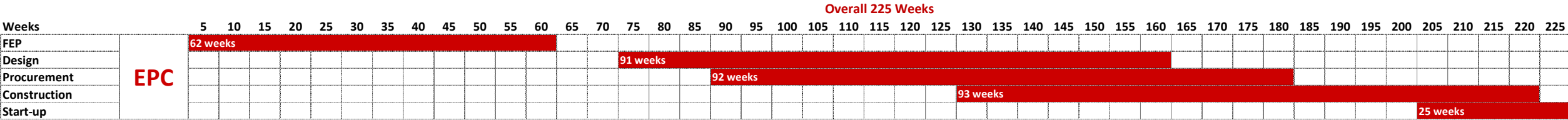


Schedule Comparison: EPC vs. PEpC vs. OS2

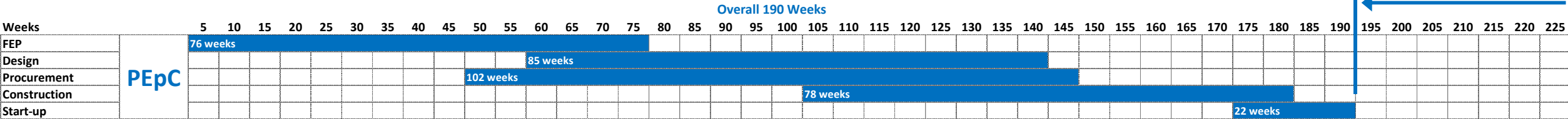


Analysis performed by CII Performance Improvement Group (March 2013)
 * Each project was normalized to \$250M

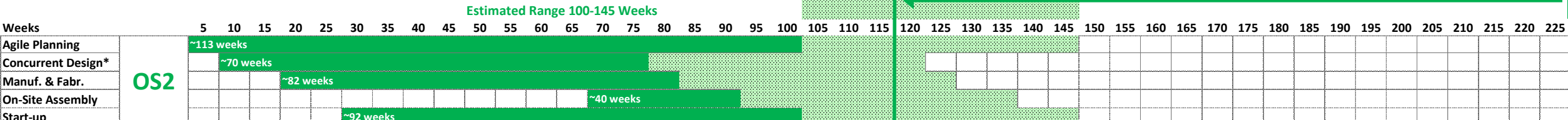
100% FEP complete PRIOR to PROCUREMENT start (n = 97)



LESS THAN 100% FEP complete PRIOR to PROCUREMENT start (n = 53)



PrairieDog Platform via OS2 Delivery Model (projected)



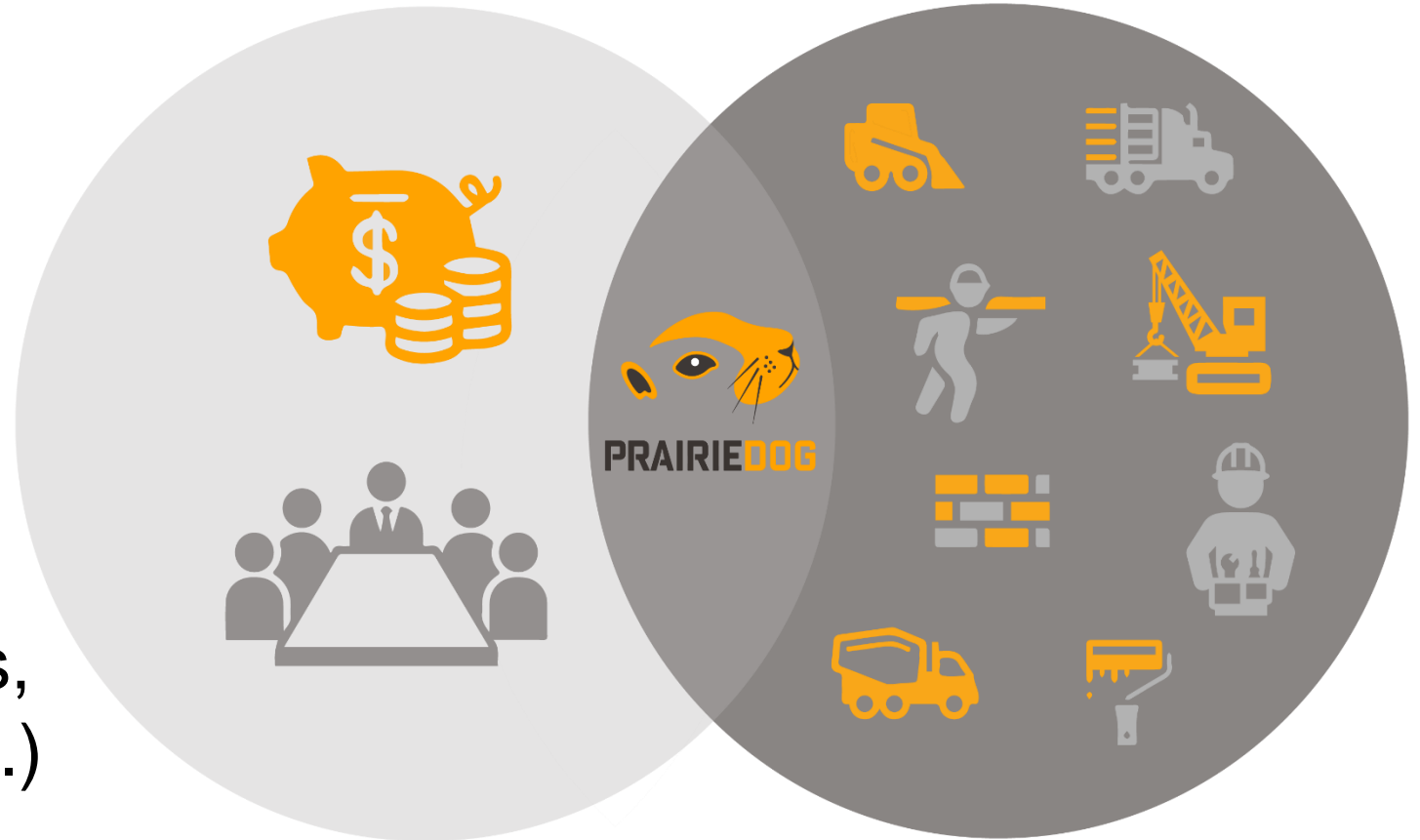
* Concurrent, Supplier-Led Design (Reuse ~70%; Custom ~30%)

Total Cost of Ownership

- 35% cost reduction
- 50% cycle time reduction
- 60% better ROCE*
- 250% more projects

Plus...

- 300% more profit for participants (e.g. engineers, suppliers, constructors, etc.)



* Return on Capital Employed



Conclusions

- Transformation is needed, if we don't do it, someone will do it for us!
- We (the Owners) need to address the business value of capital spending - we are not in the business of building projects
- We (the Contractors) need to focus on providing value, not spending man-hours
- Need to engage our legal, accounting, supply chain, etc. counterparts in the solution
- We cannot be afraid of change: Uber, VRBO, & Tesla have revolutionized their industries. We need to as well!



QUESTIONS / COMMENTS?



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