

TODAY

Tomorrow & Beyond

LEVERAGING LEADERSHIP, DIVERSITY AND INNOVATION





Brownfield Project Success



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Independent Project Analysis



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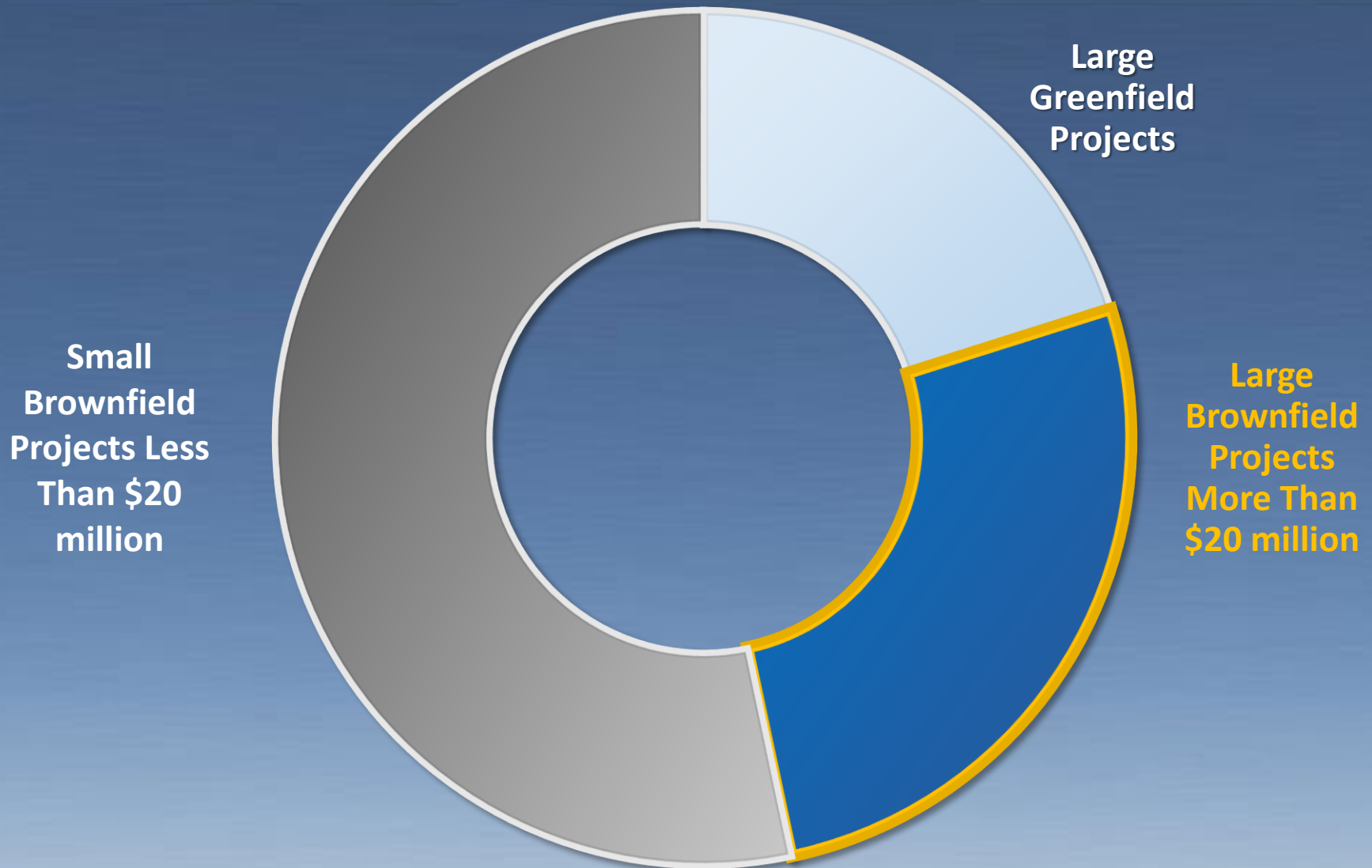
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Characteristics of IPA's Database

Over 17,000 Projects in Total



IPA's Large Brownfield Projects Database

Number of Projects	3,532
Median Project Cost (2016 USGC\$*) <i>Range of Total Project Cost</i>	\$58 million \$20 million to \$992 million
Median Authorization Year <i>Range of Authorization Year</i>	2005 1986 to 2017
Companies Represented	295
Construction in a Turnaround	73 percent of projects
Median Execution Duration (Authorization to Startup) <i>Range of Execution Duration</i>	20 months 7 months to 58 months
Average Cost Growth <i>Range of Cost Growth</i>	3 percent -36 percent to 88 percent

* USGC = US Gulf Coast

Source: 

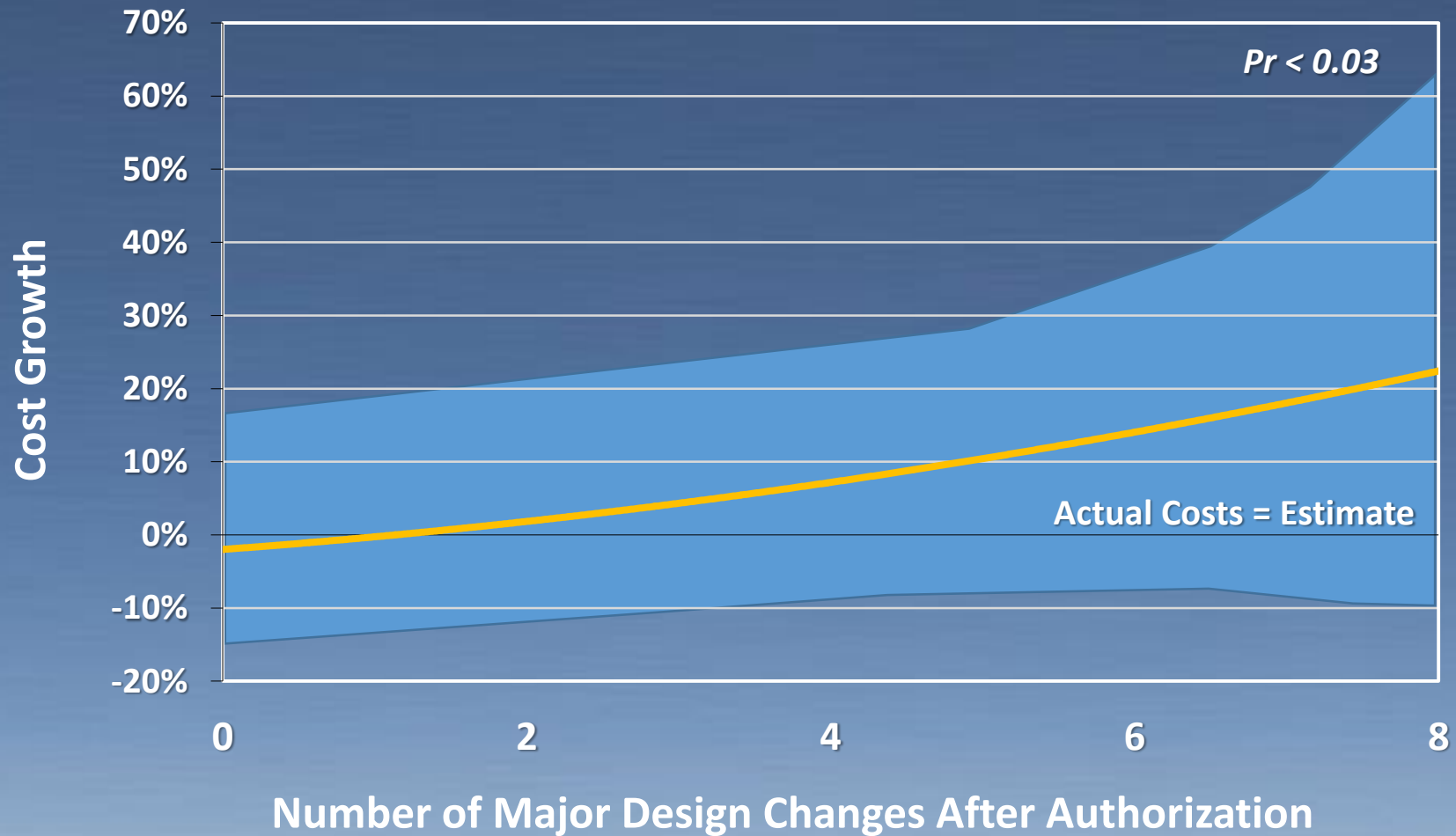
Keys to Successful Brownfield Projects

- Scope
- Site Constraints and Limits
- Relationships and Teamwork

Scope

- Existing site requires modifications to accept the Brownfield project
 - What modifications are necessary and what is urban renewal?
 - Get scope agreement early, strict change order policy, place change authority at a high level
- Inspect and test existing equipment

Changes After Authorization Are Costly



Scope Definition

- As the owner, what are the most critical elements to scope definition?

Scope Definition Key Takeaways

- Think both Technically and Organizationally when defining scope.
- Technically:
 - Don't assume. Assess the plant.
 - INTEGRITY, CAPACITY and PERFORMANCE
- Organizationally:
 - Understand the Owner's organization.
 - Understand the objective. Setup governance.
 - Talk value or total cost of ownership; not just cost and schedule.

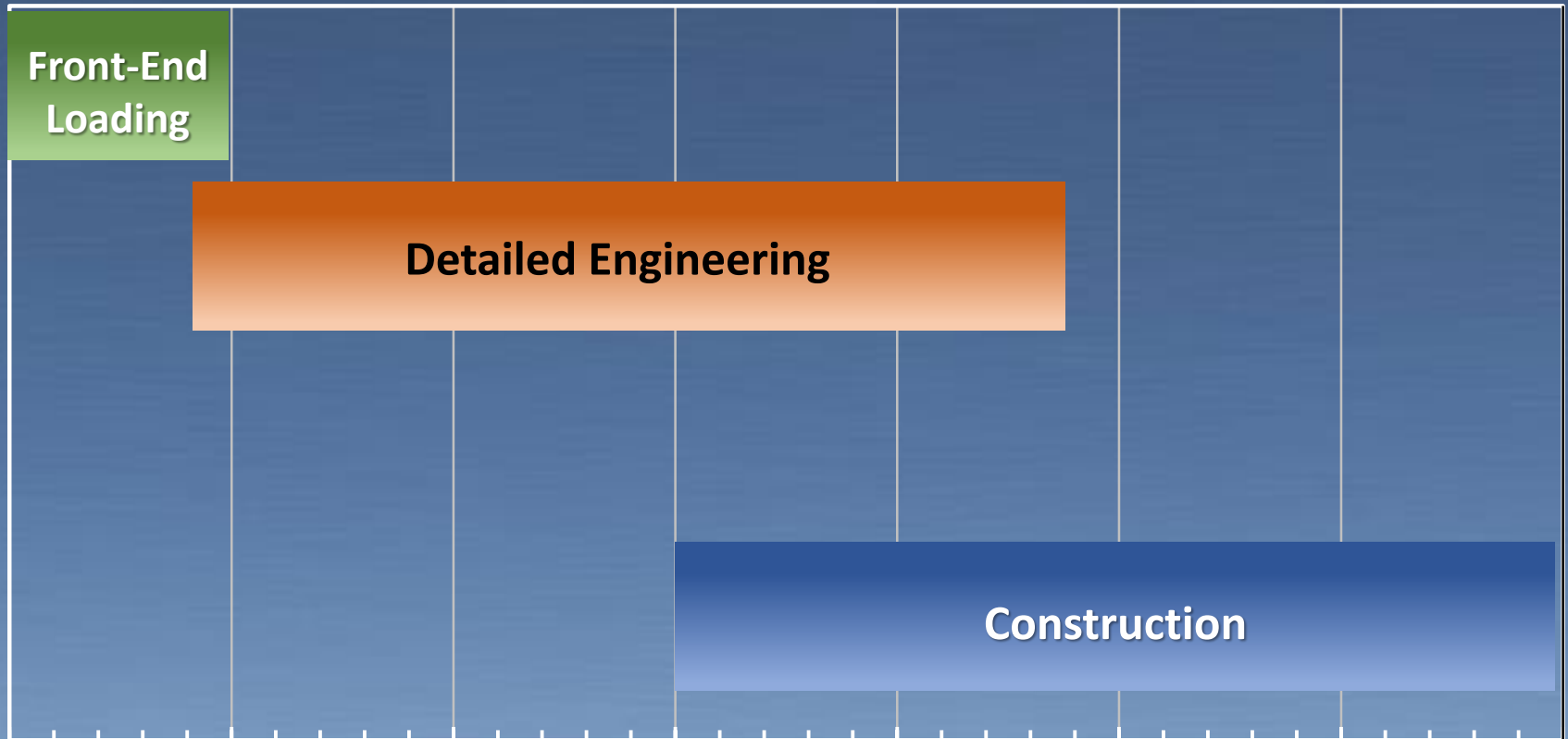
Keys to Successful Brownfield Projects

- Scope
- **Site Constraints and Limits**
- Relationships and Teamwork

Site Constraints and Limits

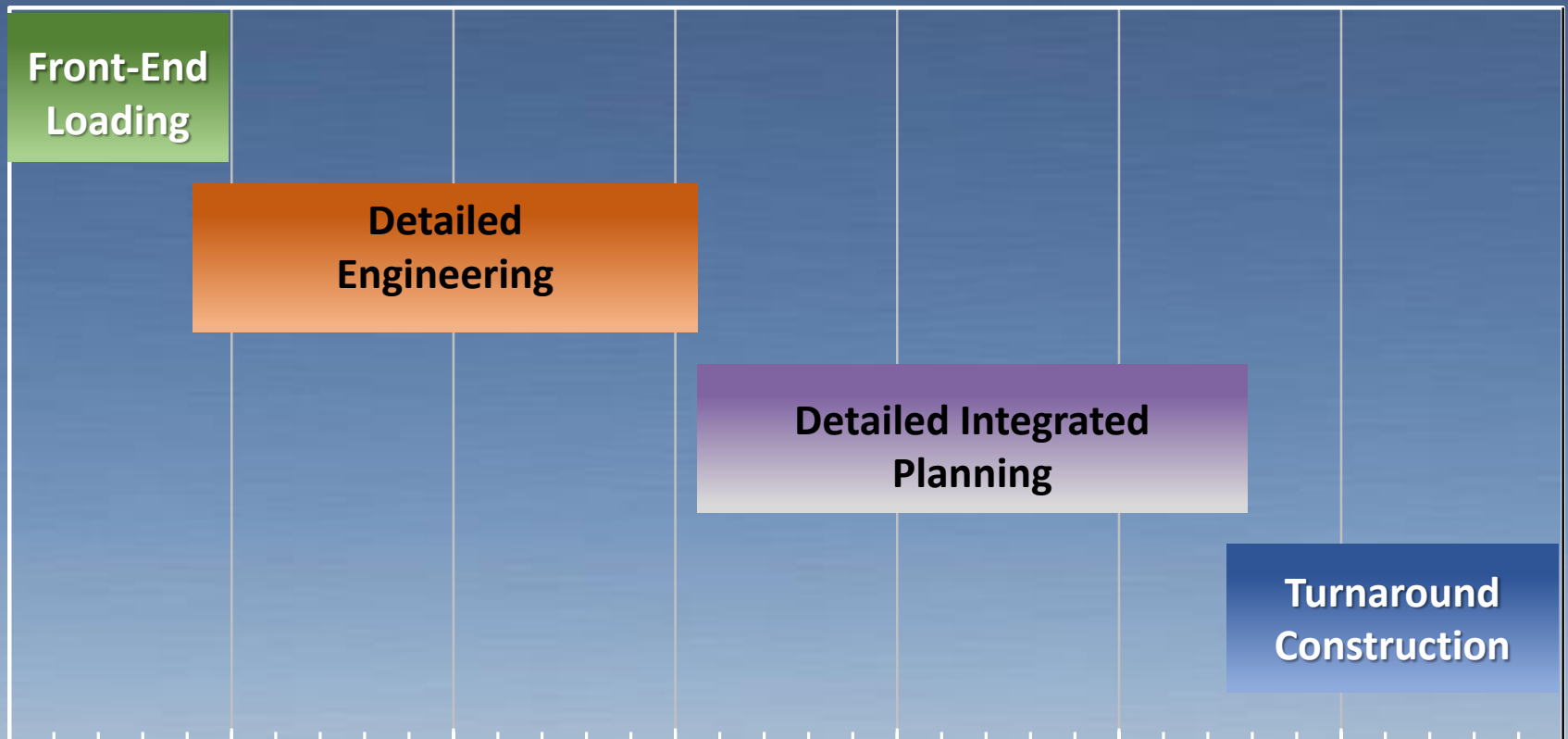
- Material management
 - Purchasing, receiving, laydown areas, moving to work site
- Permitting near operating units
- Existing contractual alliances with local contractors
- Turnaround issues
 - Recognize the detailed planning phase requires sufficient time—early delivery of engineering packages

Typical Schedule for Greenfield Project with Minimal Turnaround Scope



Typical Schedule for Brownfield Project with Major Turnaround Scope

*Require Early Delivery of Engineering Packages to
Support Detailed Integrated Planning*



Site Constraints and Limits

- As the constructor, what are the most critical elements to site constraints and limits?

Site Constraints and Limits Key Takeaways

- Well-defined Change Management process
- Dedicated field design engineer(s) assigned to the site
- Specific plans to transition from Pre-Outage construction into Outages/Commissioning
- Early involvement of Contractor (FEL3) – Execution Planning
- “You are in someone else’s home”

Keys to Successful Brownfield Projects

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Brownfield Projects Require Key Input From Site-Based Resources



Operations



Maintenance



(Plant) Engineering



Materials Management



Safety

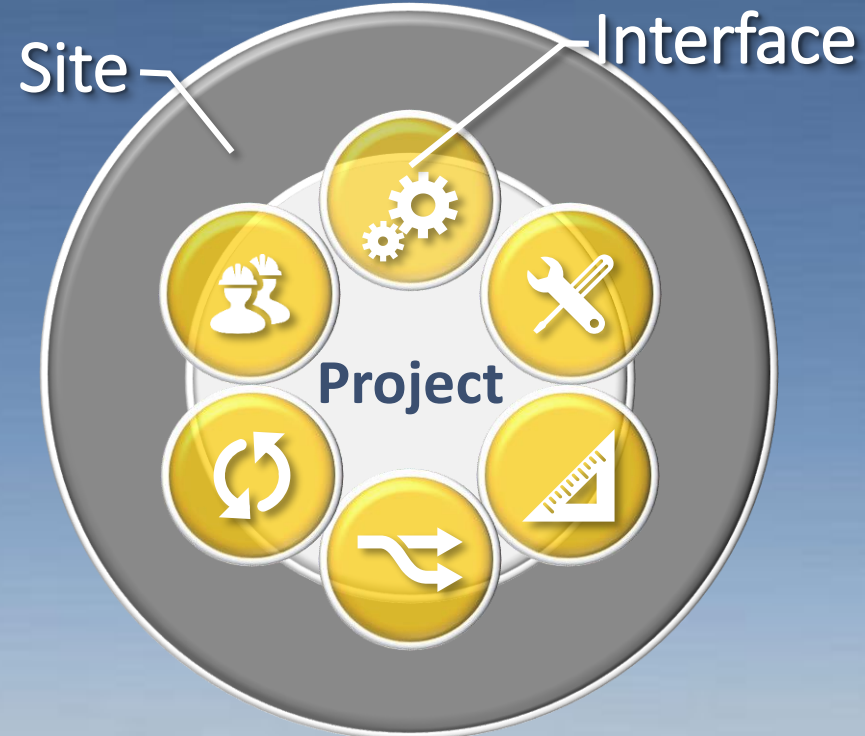


Turnaround

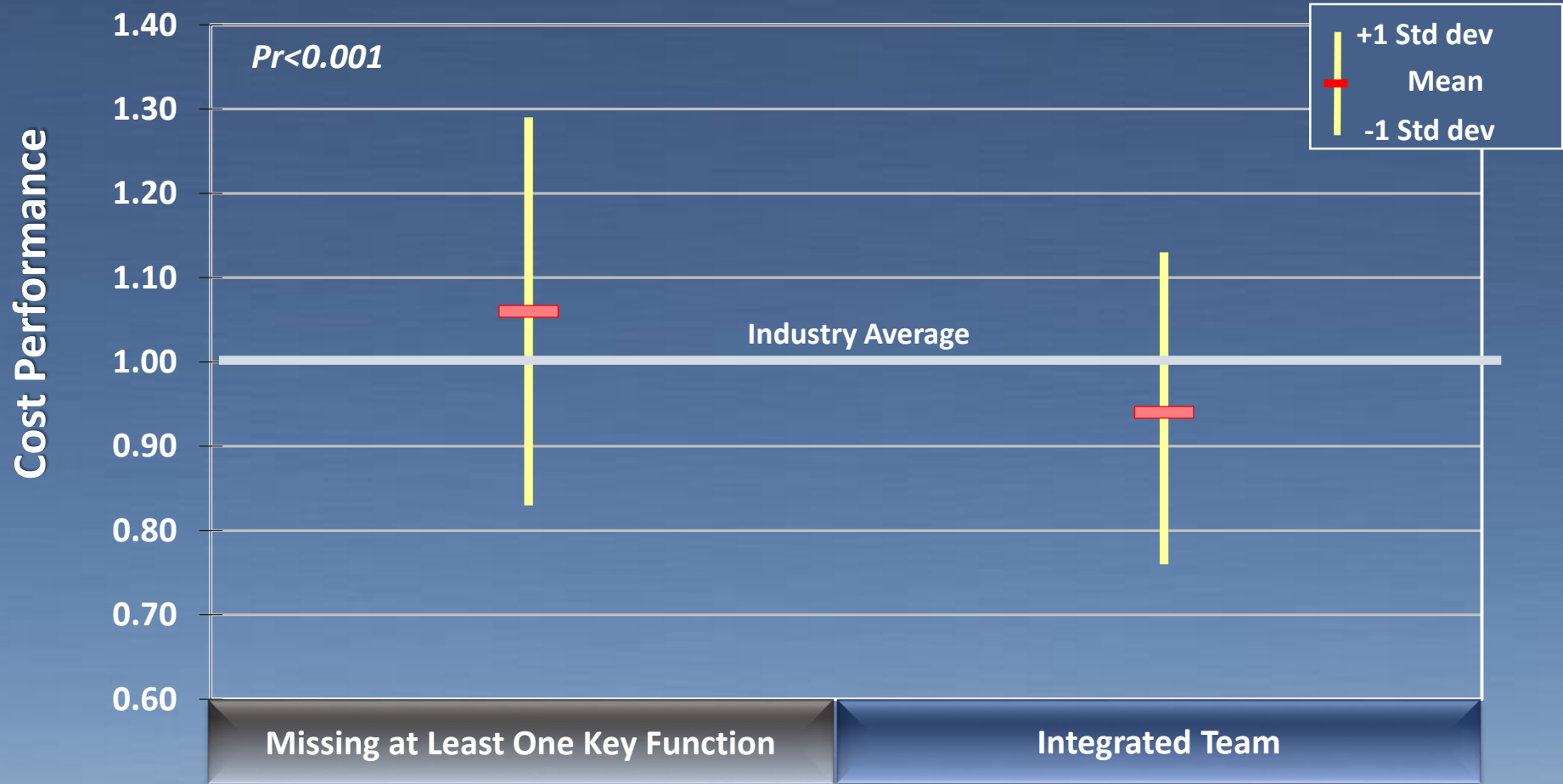
Greenfield



Brownfield



Team Integration is Essential During Definition *Operations and Maintenance Functions Most Common Gap*



Relationships and Teamwork

- As the engineer, what are the most critical elements to relationships and teamwork?



Relationships and Teamwork Key Takeaways

- Conduct a team chartering session – make it happen regardless of project size.
- Openly discuss the difficult subjects early to align expectations – create an environment of candor.
- Understand who the project owner is – plan communications accordingly.

Summary

Keys to Successful Brownfield Projects:

- Scope
- Site Constraints and Limits
- People: Relationships and Teamwork