

IPA

Independent Project Analysis

State of Industrial Capital Projects in Texas

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LincP

Independent Project Analysis

Unparalleled database of >18,000 projects

Independent perspective

Proven ability to measure almost anything

Extensive research linking Best Practices to results

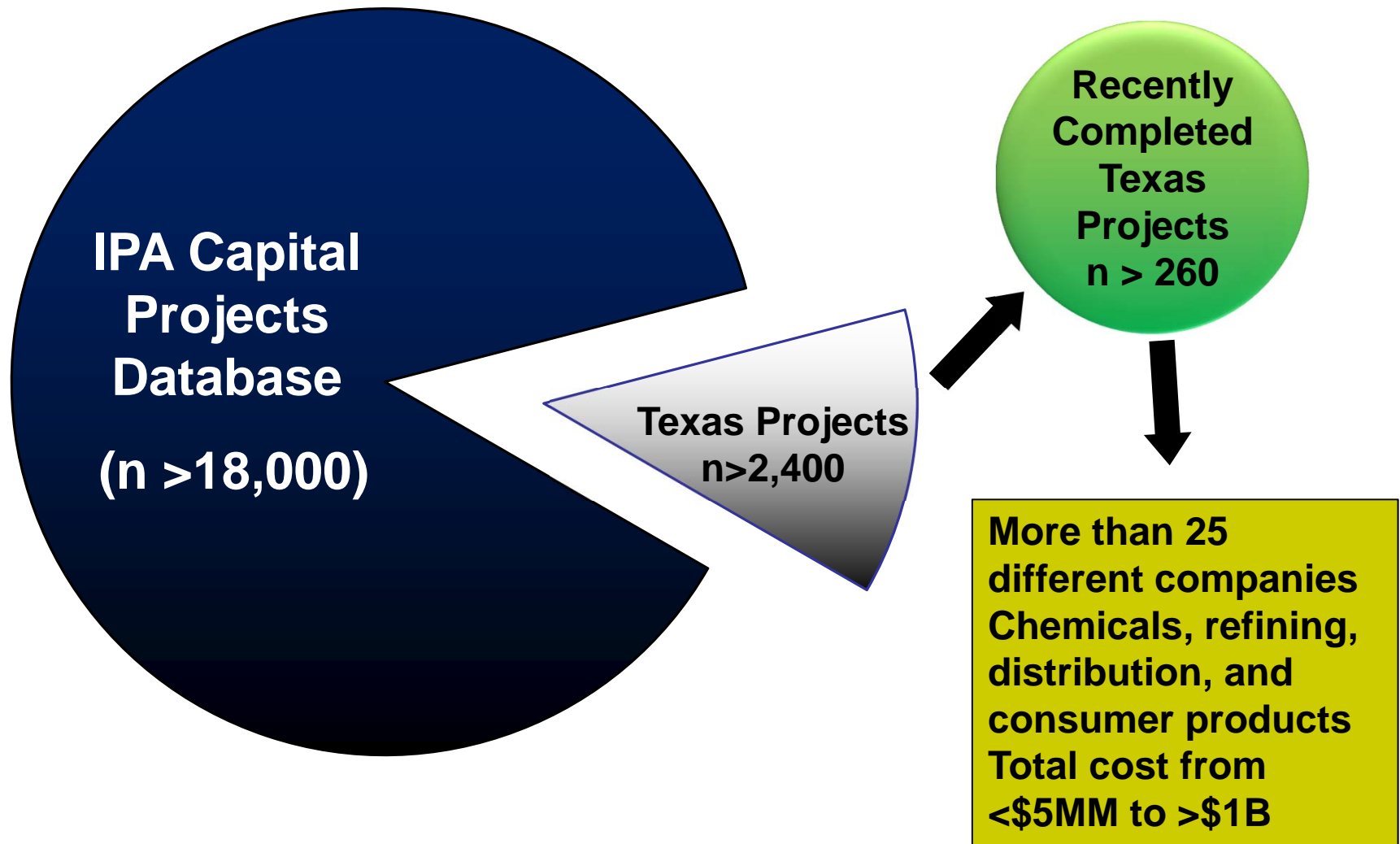
Cost and schedule benchmarking for diverse scopes

Clearinghouse of sensitive information



***IPA Is the World's Leading Advisory
Firm on Capital Projects***

IPA's Database of Texas Capital Projects



What Are We Seeing In Texas?



- **IPA forecasts an average annual capital spend of \$48B for next several years in USGC**
 - **Substantial activity in petrochemical sector – several multi-billion dollar projects underway, and more announced**
 - **Oil & gas sector starting to rebound from low prices**
- **Current environment brings challenges**
 - **Political/regulatory uncertainty**
 - **Challenge to obtain adequate resources**
 - **Construction management and project controls in short supply**
 - **Engineering and construction also a concern at times**
 - **Megaprojects bring need for supporting infrastructure**
 - **Schedule pressure**

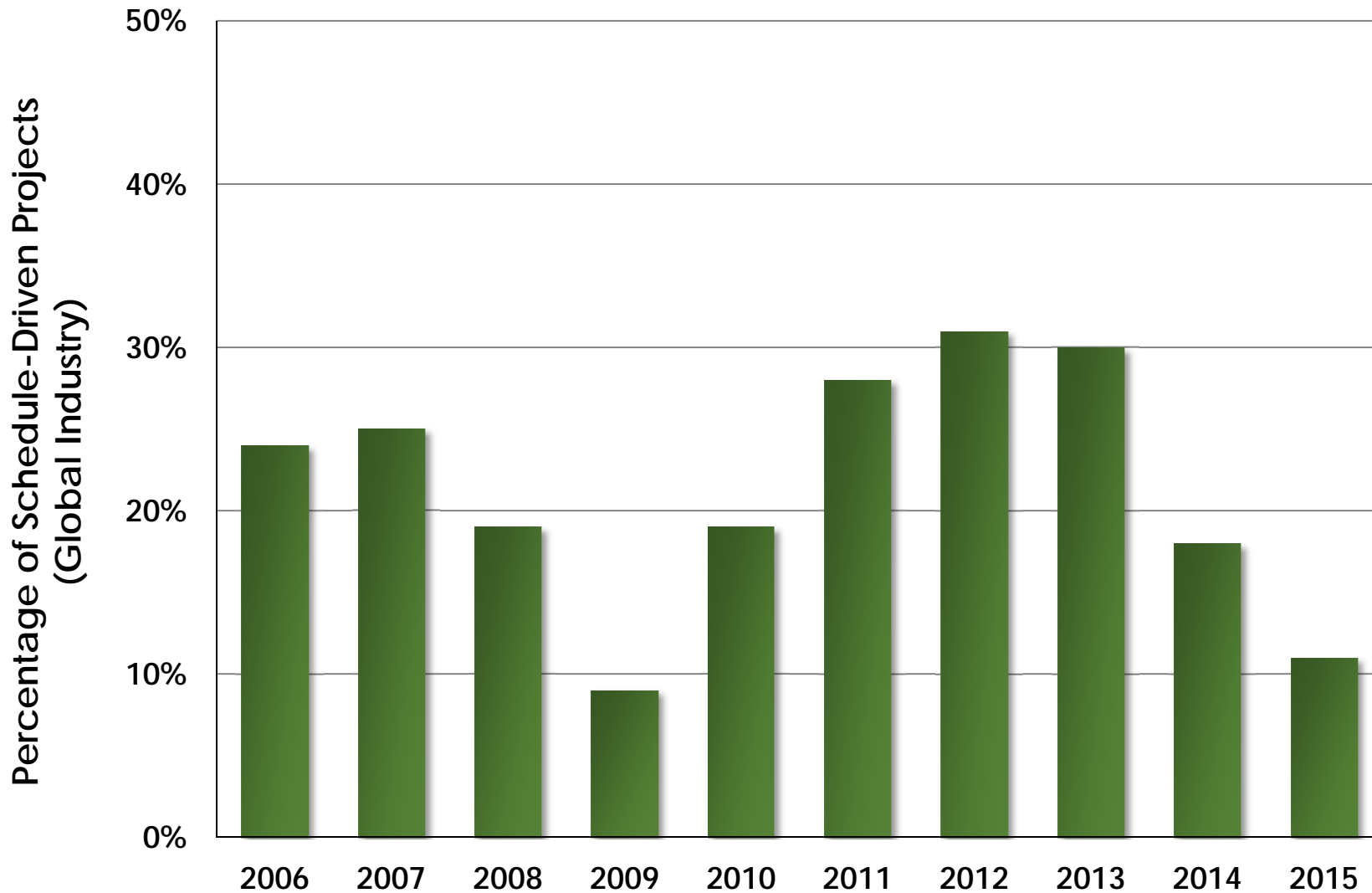
Pressure to Deliver Projects Quickly



- **About 40% of recently completed, large projects from Texas considered schedule driven**
- **Schedule driven projects intentionally place achieving the project schedule targets ahead of other project priorities, namely cost**
- **Schedule driven projects tend to exhibit the following behaviors**
 - **Overlapping and/or accelerating project phases; projects spend too much money prior to official project sanction**
 - **Construction labor works more overtime than regional norms**
 - **Equipment and materials often includes expediting costs**
- **Problem is – schedule-driven projects tend to spend more money - by about 7%!**

Schedule Driven Projects Increased 2011-2013

Now on the Rise Again

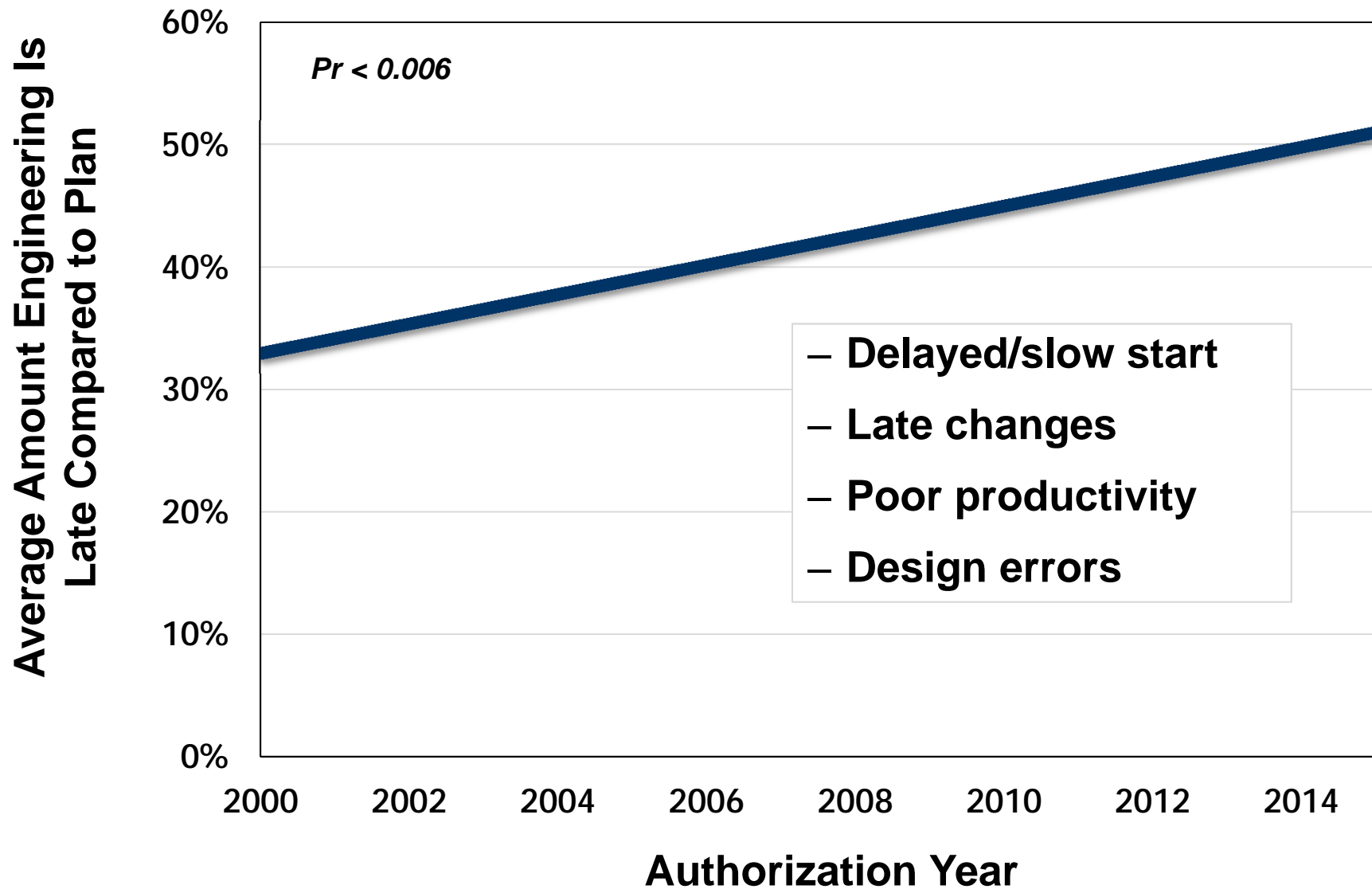


Engineering is Routinely Taking Longer than Expected



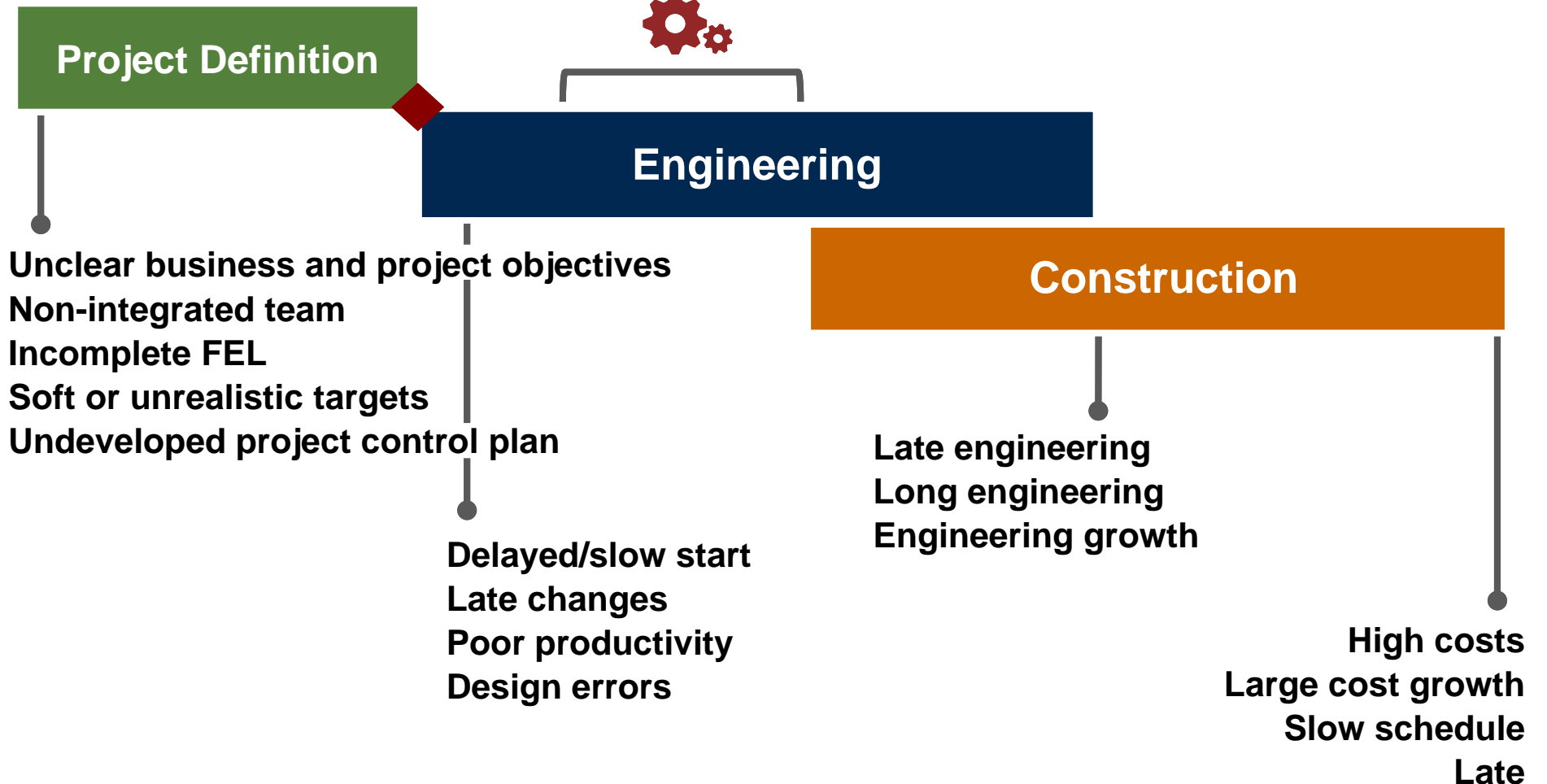
- **Projects in Texas had a recurring problem of engineering going longer than planned**
- **This problem is not unique to Texas; engineering slip is a global phenomenon**
- **Engineering slip can cause a cascading series of problems for projects**
- **The real question is, why does engineering slip?**

Engineering Is Finishing Later Than Planned



Engineering Problem Root Cause Analysis

*How do we identify problems **before** it is too late?
Are we ready to build?*

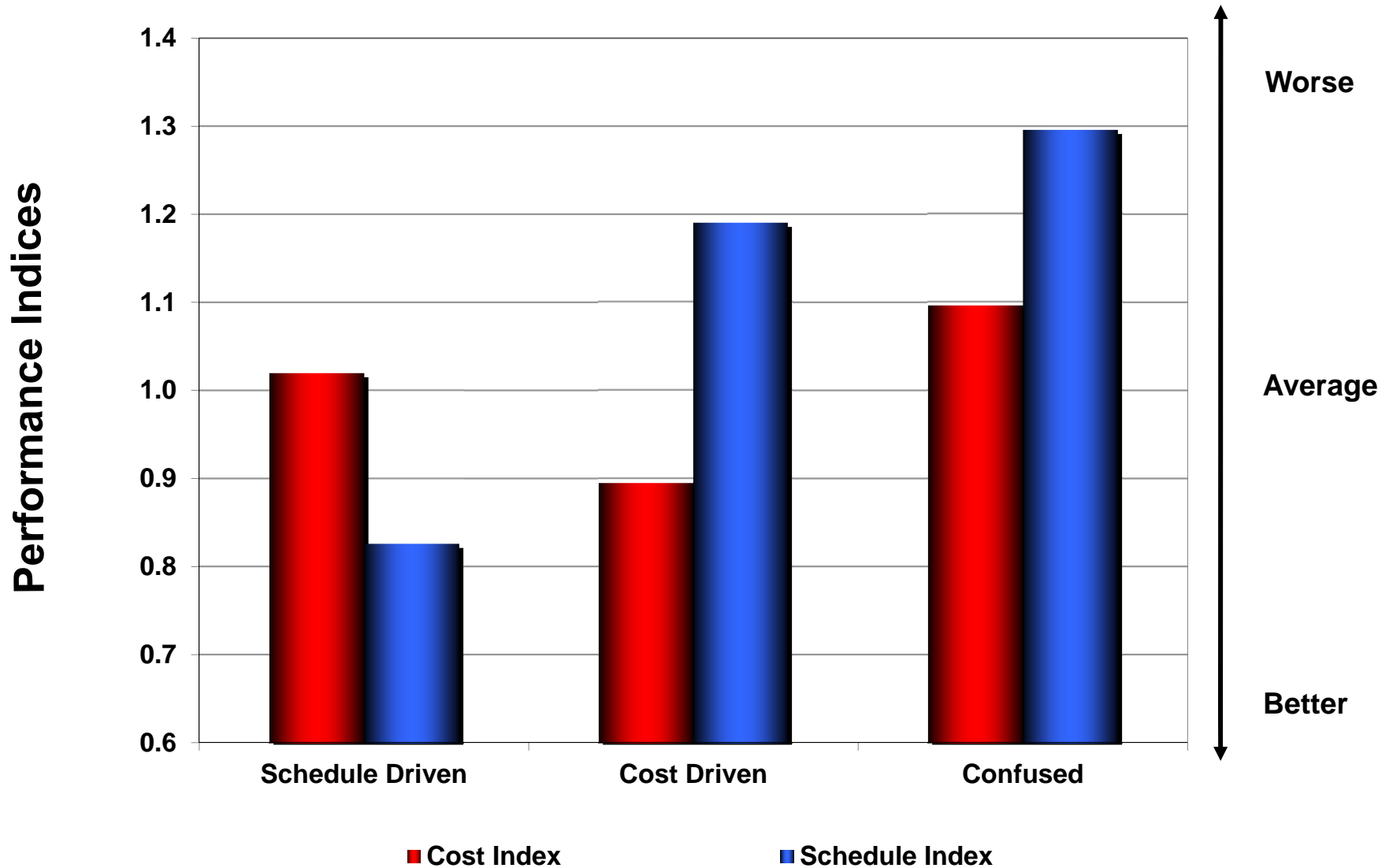


Some Keys to Project Success

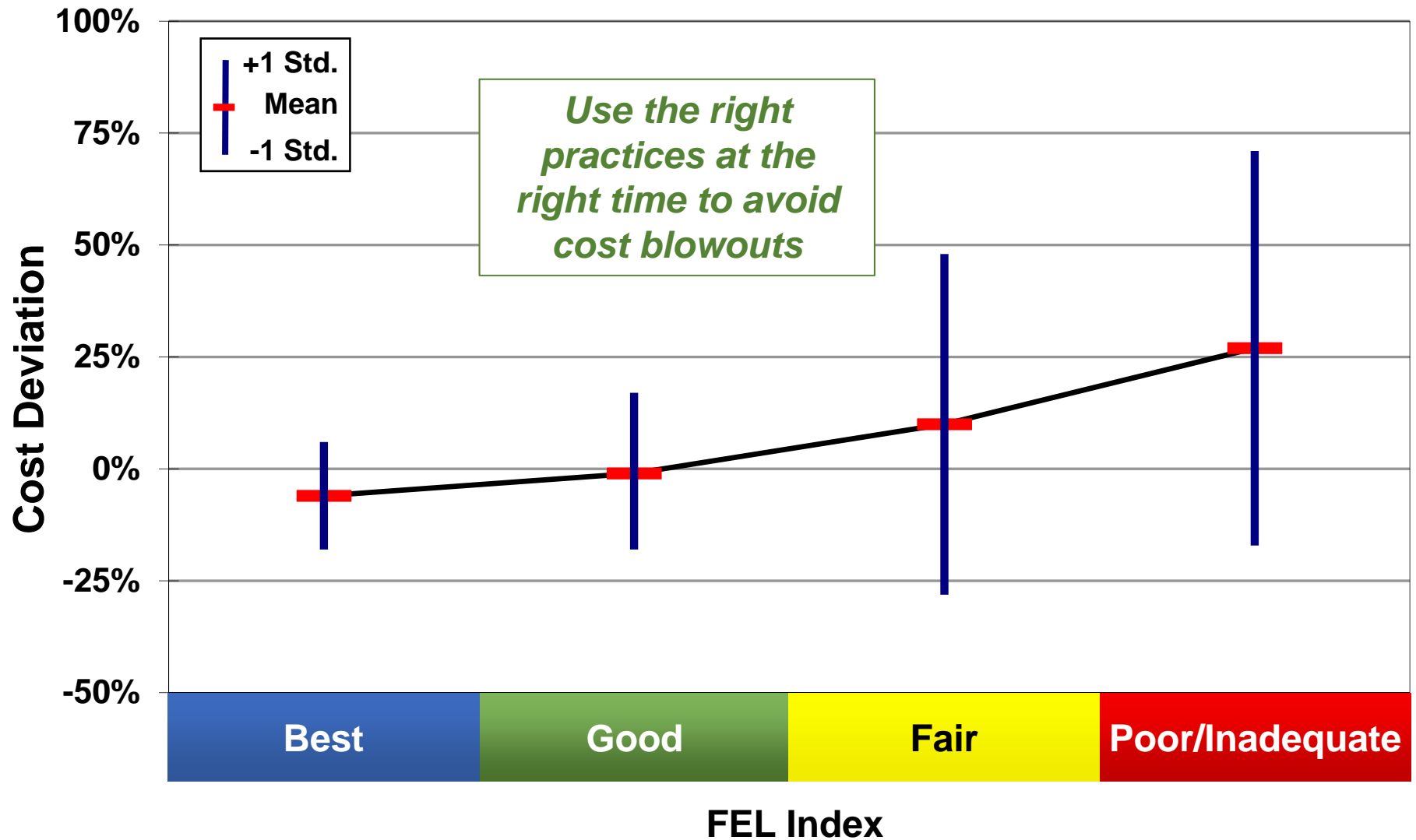


- **Establish clear project priorities, quantitative trade-offs**
- **Fully complete FEL engineering deliverables and execution plans**
- **Establish a risk mitigation strategy for potential construction start delays**
 - **Delaying the start of construction is the only way to be sure that engineering catches up**
- **Put together a robust, detailed schedule**

Clear Objectives Matter



Front End Loading is Best Way to Minimize Cost Growth and Schedule Slip



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***Thank You for Your Time!
Questions?***