TURNAROUND/PROJECT SUCCESS:

TAMING THE COMPETING INITIATIVES FOR SAKE OF THE COMMON INTEREST

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Presentation Overview

- Reflect on industry turnaround performance
- Top 10 reasons for turnaround failure
- What's the data say about capital projects and turnarounds?
- The fatal flaw fault trees
- Practices to drive success

Current state of the Turnaround Industry

- Increasing regulatory compliance requirements
- Challenging performance targets & step change expectations
- High profile initiatives competing for $ and people
- Dramatic increase in capital project “interference”
- Industry-wide decline of Turnaround experience and capability
- Analysis of AP-Networks dataset of ~1000 turnarounds, shows that since 2007
  - ~ 1 in 4 turnarounds meet all performance objectives
  - ~ 1 in 3 grossly exceed one or more success criteria metric and are considered a “Train Wreck”

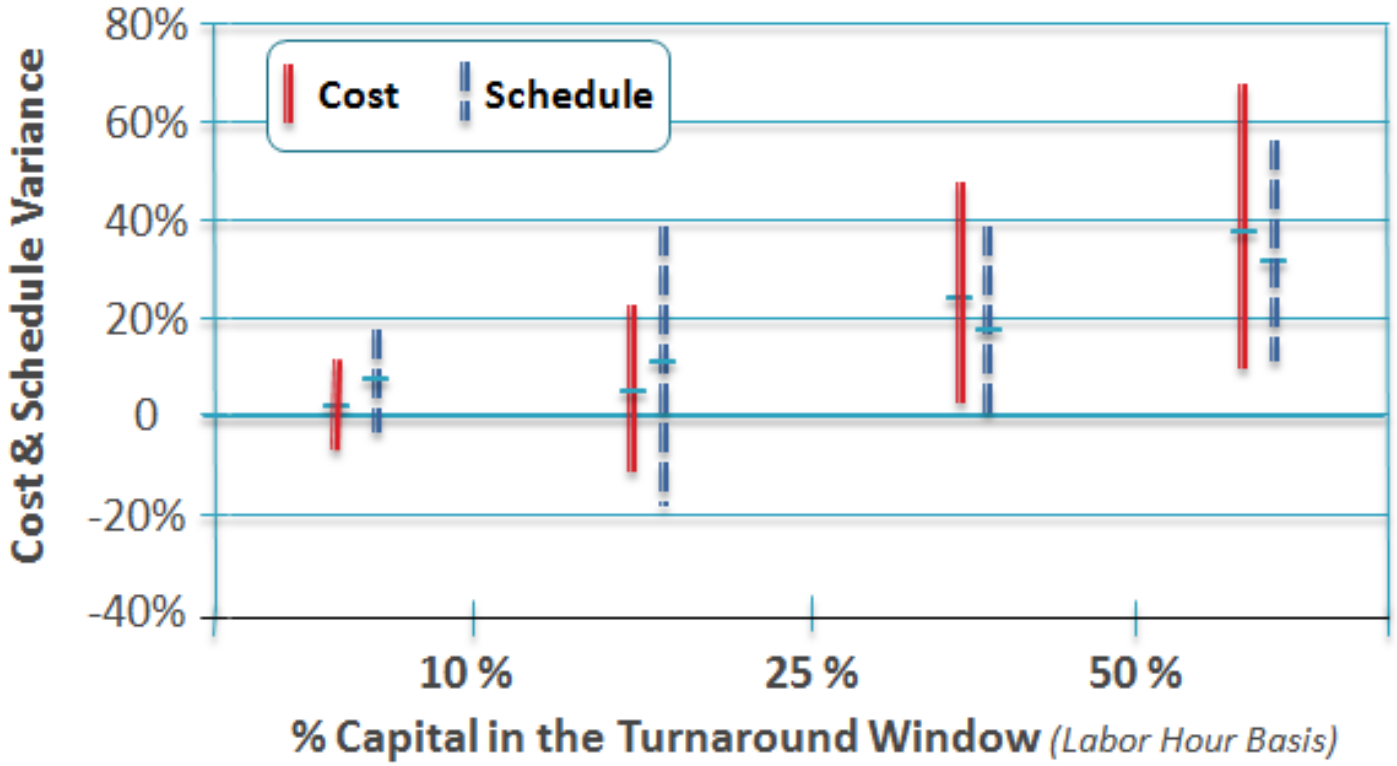
Top Reasons For Turnaround Failure

10. Quality issues at start-up
9. Improper management of contractor resources
8. Significant scope growth
7. Delayed decontamination and unit handover
6. Lack of resources for optimum preparation
5. Incomplete adherence to turnaround work process
4. Inadequate/Incapable execution organization
3. Ineffective turnaround Strategy and/or Steering Teams
2. **Inability to integrate with capital projects**
1. Unrealistic targets for turnaround success

What's the data say about the impact of Capital Projects on Turnarounds

- ***Predictability***
- ***Integration***

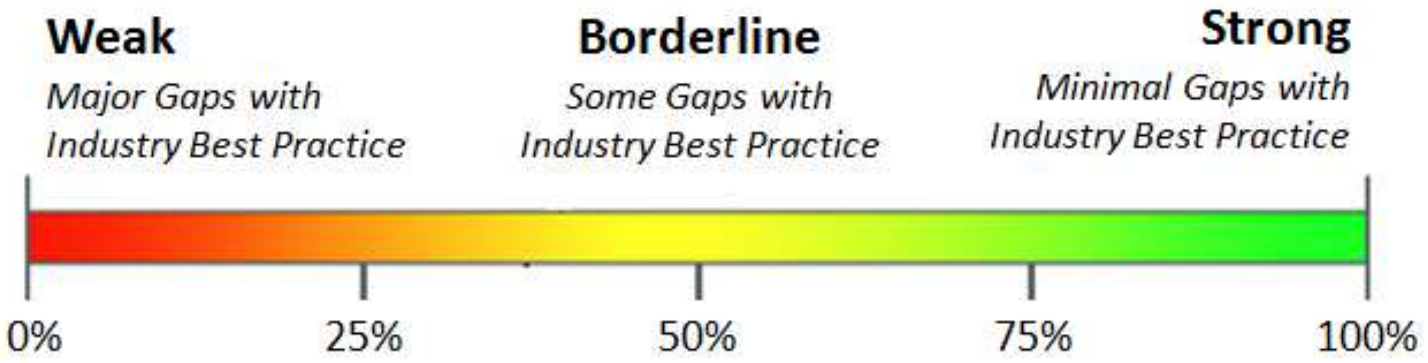
Turnaround Predictability



Capital Project hrs, TA Predictability

6

Integration Index



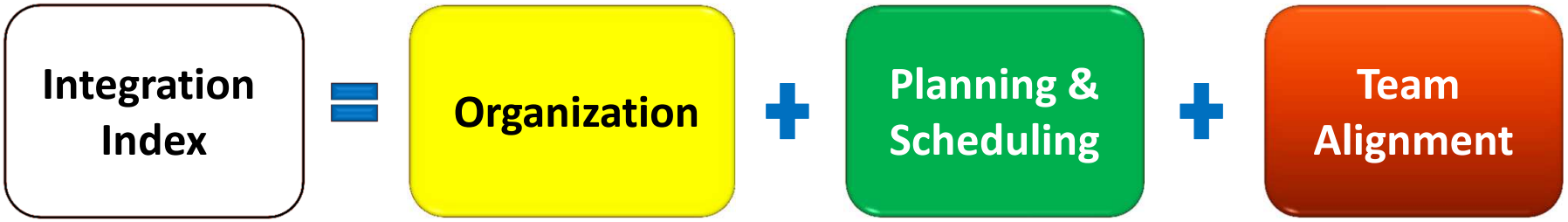
- AP-Networks' (Turnaround/Capital Project) Integration Index measures the quality of organizational and planning integration between the capital project and turnaround organizations.
- Measured on a scale of 0% to 100%.
- Effectively pinpoints gaps between project and TA teams.
- Indicator of Turnaround Performance outcomes.

Integration Index

- Generated from statistically the most significant drivers of TA performance from our Project Readiness Pyramid.

Integration Index

- These drivers are then grouped into a three part algorithm for calculating the Integration Index.



- Event Team
- Leadership
- Steering Team

- Pre-TA Const
- Cap Project Work packages
- Material Mgmt
- Permitting
- Cost control & Allocations

- Common Goals & Milestones
- Project and TA Team Communication

Integration Index

- Empirically-based on a recent database (2005 and later) of medium and high complexity TAs with significant capital scope.

Dataset
- Number of High Complexity "Capital" Driven Turnarounds: *ca.* 75
- Timing: 2005 – 2008
- Locations: US, Canada, and Europe,

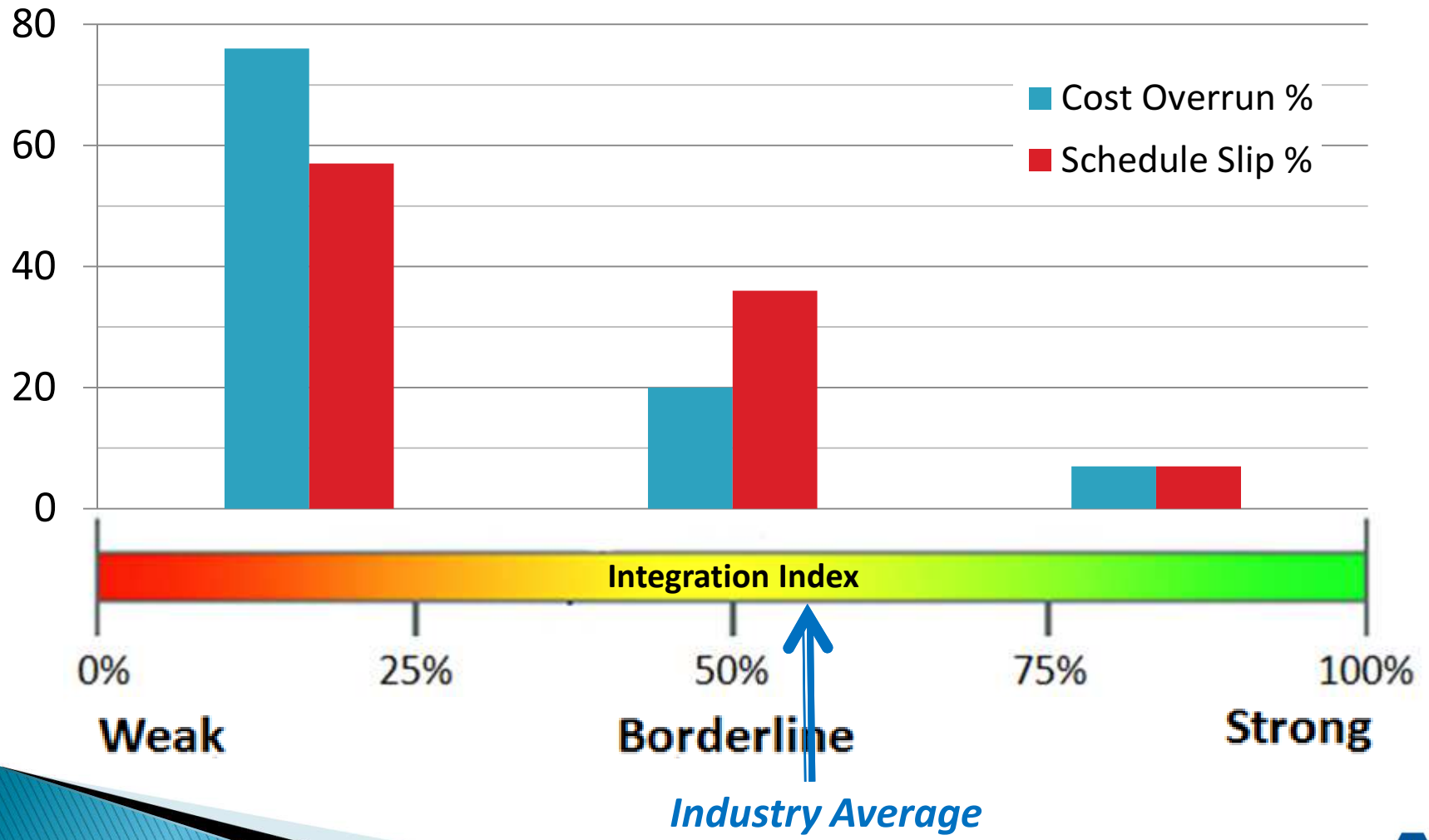
Schedule
- Average Planned Duration: 43 days (range = 23-69 days)
- Average Actual Duration : 53 (range = 23-77 days)

Manpower and Projects
- Man-hours: 890,000 avg. (range=280,000 - 2,100,000)
- Percentage Capital Projects (in TA window); 35% avg. (range = 20%-80%)

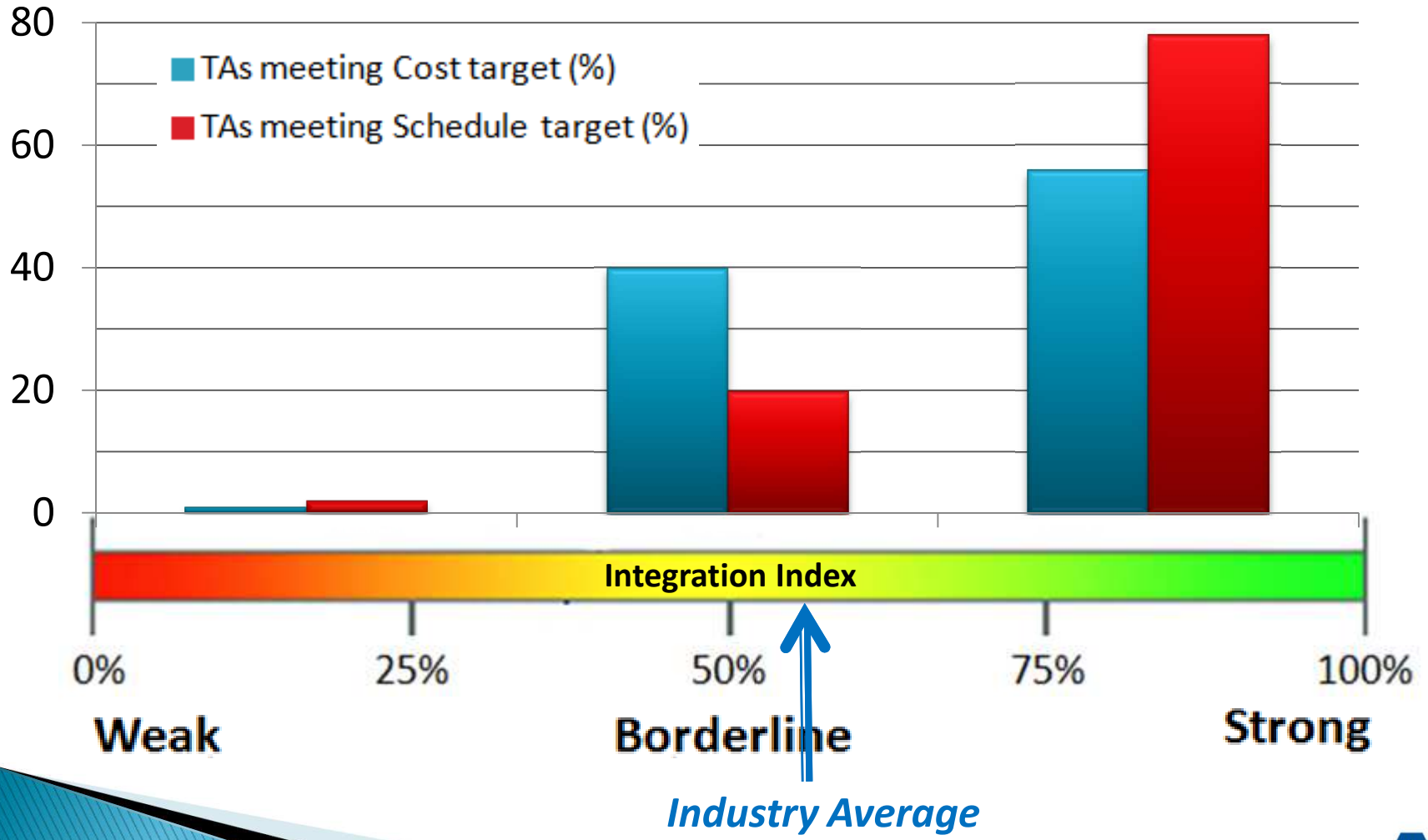
Other Characteristics
- Contracting strategy
- Organization
- Work processes and Best Practices

Integration Index

… is a leading indicator of Turnaround performance



Integration Index *- Probability of success is low without a strong Integration Index*

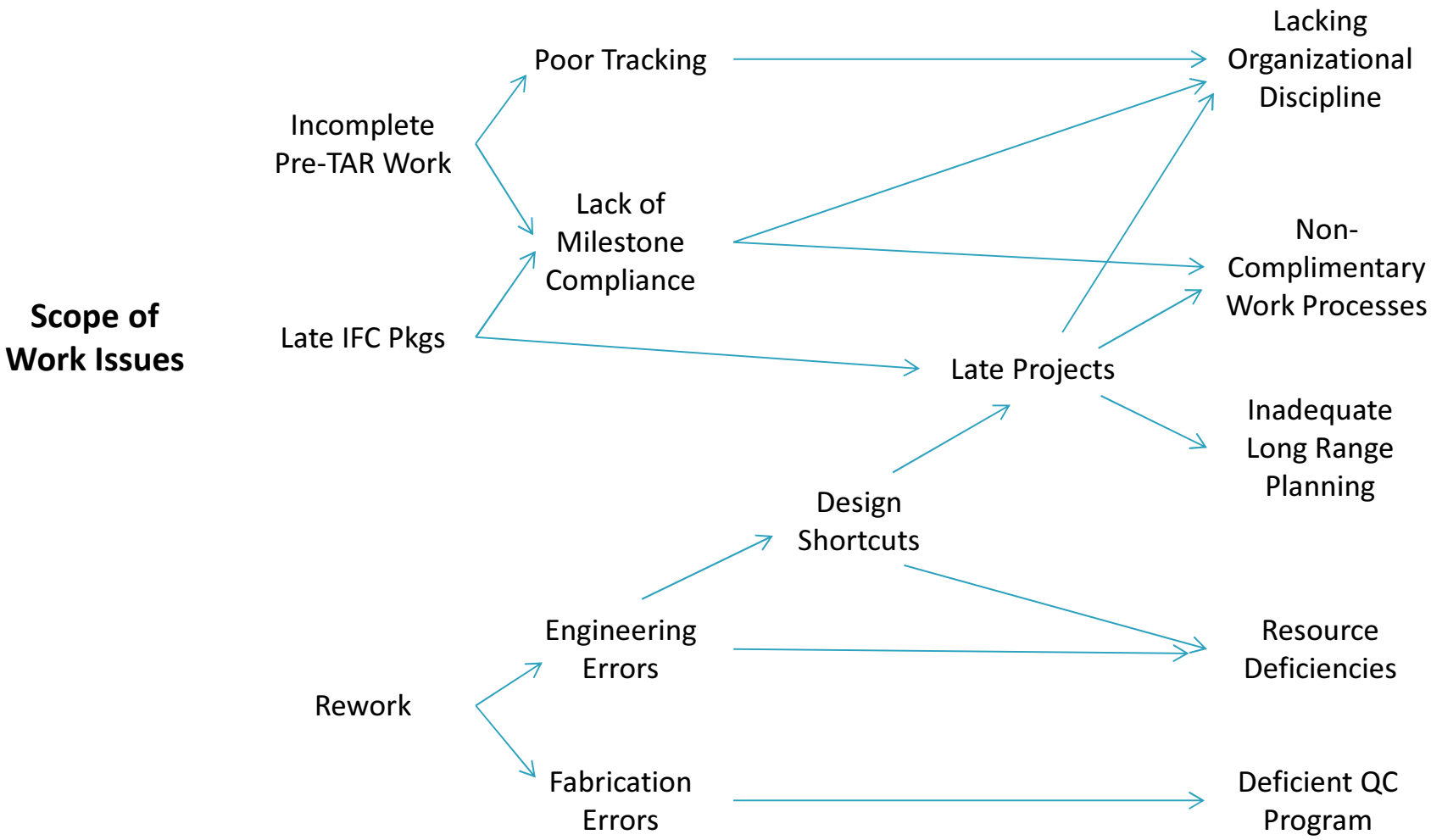


The Fatal Flaw Fault Trees

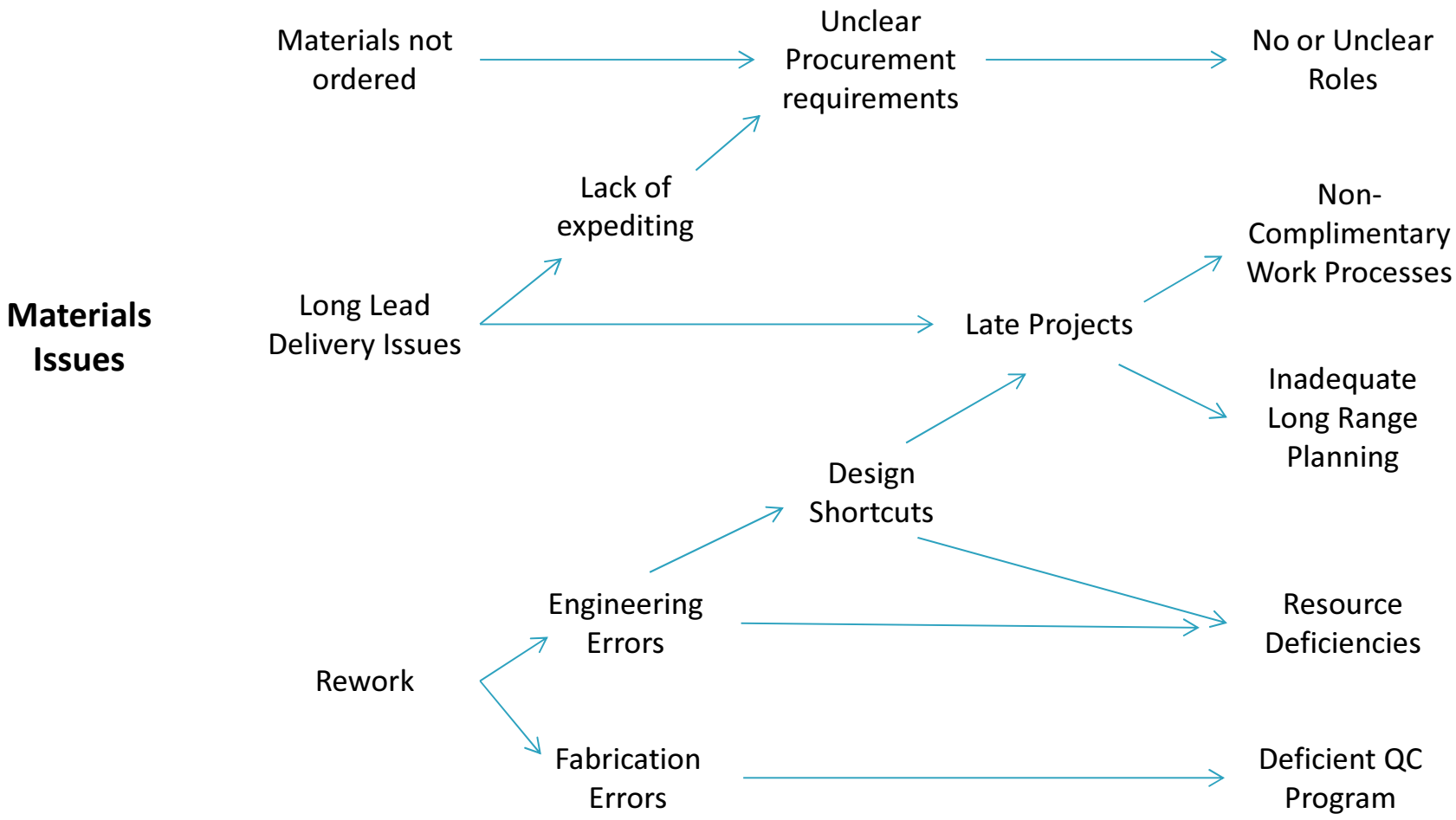
Why is it so complicated to execute Project dominated turnaround event?

- Deficiencies associated with Turnaround and Capital Project events, that drive poor performance is (very broadly) bucketed into three categories:
  1. Scope
  2. Materials
  3. Field Coordination

The Scope Fault Tree



The Materials Fault Tree



Field Coordination

Field Coordination fault tree is very complex, but most all such deficiencies have a root cause or result in one of the following areas:

- Poor field craft productivity
- Inadequate integration

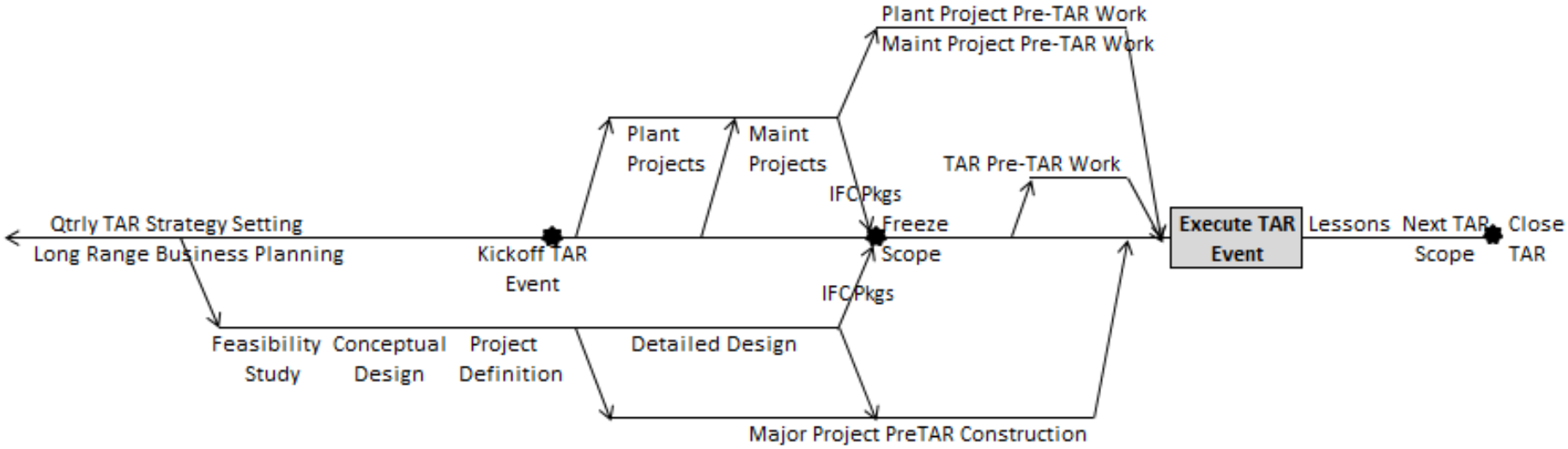
Practices that increase probability for desirable outcomes on Capital Project dominated Turnaround Events

Organizational Discipline

- Adherence to milestone plans
- Site initiative management & priority setting
- Resource availability with clear role, responsibility, expectations
- Project framing, study and appropriation
- Well designed metrics to measure the process including key leading indicators
- Tough & timely decisions.

"Collaborative" Work Processes

- Mapped out major interfaces (or Milestones) between the Capital Project and the Turnaround work processes in a way that assures they are "collaborative"



Effective Long Range Planning

- Long term planning for turnarounds (at least two interval cycles)
- Major Capital Project planning aligned with turnaround intervals
- Benchmarking and interaction with strategic business objectives
- Timely plant project deployment
- Premise setting.

Capable/Available Resources

- Detailed turnaround resource plan
- Integrated site resource plan
- Internal loanees/transfers
- Adequate technical experts
- Diligent deployment/balance between daily support and longer term preparations
- Strategic contracting of critical resources
- Effective contracting strategy with appropriate (balanced) objectives to encourage shared responsibility.

Effective Quality Management Program

- Mature (site/corporate) quality control and assurance programs
- Accurate plant documentation
- Adequate availability to build quality and safety into plan/design
  - Planning package reviews, piping verification/supercheck
- Offsite shop inspection
- Effective pre-TA to TA handoff and expectations
- Efficient and well defined field quality management protocols
- Mature weld quality program.

Sound Field Coordination Principles & Discipline

- Early definition/communication of functional execution structure and leadership positions
- Clear roles, responsibilities, accountabilities
- Well understood issue escalation process and hierarchy for ALL Event decisions
- Owner vs. contractor clarity
- Role of the execution schedule vs. people driven priorities
- Daily (and by-shift) coordination protocols
- Outstanding communications and communication tactics.

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Full Integration

- Organization
  - Steering team, preparation team(s), execution team
- Strategic Outline
  - Work process, goals & premises, contracting strategy & plans
- Preparation Practices:
  - Planning, schedule development, logistics planning, SH&E, shutdown, Clearing, Commissioning/Start up foundation, cost allocation, assumptions
- Execution Systems
  - Execution schedule, field coordination & priority setting, materials issue and control, project controls, mobile equipment coordination, logistics and people movement, systemization, work acceptance & turnover

In summary, a documented and endorsed Event Integration Plan

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Questions????

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