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# COMPLEXITY, AMBIGUITY AND VOLATILITY | LEADING IN THE NEW NORMAL



ENGINEERING & CONSTRUCTION CONTRACTING ASSOCIATION



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## Capital Efficiency – Keys to Success



**Dan Morlang**

Vice President Capital Projects – AP-Networks

# Agenda

- 1 Capital Efficiency Background
- 2 Current State of Projects
- 3 Addressing Three Industry Themes
- 4 Wrap-Up



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## Voting Device – The Connector

Using the keypad to text



**Practice Question: Have you used a voting device before?**

1. Yes
2. No



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## How Your Responses Will Be Used

- Shape the presentation based on information you provide
- Capture your thoughts on projects at various points during session
- Provide you captured data after the session



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## Survey Says! Help Shape This Presentation

What type of company do you represent?

1. Owner
2. Contractor
3. Supplier
4. Academic
5. Other

Are most of your projects

1. Small/Medium (< US \$25 million)
2. Large (> US \$25 million)
3. Mega (> US \$1 billion)

Which best describes your role?

1. Executive Team
2. Project Management
3. Engineering
4. Operations
5. Health Safety Environmental
6. Project Services
7. Other

True or False: The industry has seen improvement in capital efficiency in the past two decades.

1. True
2. False

Slide not presented.  
Questions for ARS system



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## Capital Efficiency – Current State

- Energy industry invests hundreds of billions annually in new capital projects and technology.
- Meeting project schedules and budgets is imperative to achieving capital efficiency.
- Clearly defining and managing risks is essential.
- Despite comprehensive governance and assurance, data shows capital efficiency has not improved over last two decades.
- Governance and assurance process are not keeping pace with project complexities of today.



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# Key Areas Impacting Projects







## Challenges to Your Project Performance



Slide not presented.  
Questions for ARS system

Which area is the most challenging on your projects?

1. Project Definition
2. Target Setting
3. People, Leadership, Organization
4. Contracting Strategy / Management
5. Partner, Commercial, Government
6. Risk Management Processes



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## Data: Major Projects (>US \$25 Million)

- Industry has struggled to meet objectives
- Approximately 72%\* of projects fail to satisfy all performance goals defined as
  - +10% of budget
  - +/- 10% of planned schedule
  - no major operability issues post startup
- Approximately 1 in 4 major projects grossly exceed 1 or more success criteria and can be labeled as a “Train Wreck”



\* Based on AP-Network's database of >800 major projects executed since 2002



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## Data: Megaprojects (>US \$1 Billion) \*

- Only 24% of megaprojects meet business objectives
- Publically available data shows disappointing results for 8 recent US refining megaprojects
  - Half experienced a regulatory related delay or issue
  - 6 were delayed by more than a year
  - 6 exceeded initially announced costs by 30%
  - None achieved mechanical completion cost within 10% of initial announced costs
  - 3 of these projects had fatalities

\* Source - Booz Allen



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## Why Don't Projects Meet Performance Goals?

*All 8 megaprojects used some type of assurance process and many used industry project benchmarking; however, overall performance was disappointing due to complexities inherent in megaprojects*

**Consider your projects not meeting performance goals...**



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## Common Quotes

### Which quote do you hear most on failed projects?

1. “We followed our process, so everything should have been fine.”
2. “The project’s Front-End Loading (FEL) was best-in-class, but we did not follow our plan.”
3. “It was the contractor’s responsibility, but they did not ensure the quality of their deliverables.”
4. “We have a lump-sum EPC, so costs should not have increased.”
5. “The estimate was wrong.”
6. “ We would have stopped the project, but it was too late to say no.”

*Slide not presented.  
Questions for ARS system*



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# The Industry Problem Today

Projects are often misreporting the true state of project definition (FEL) creating a false sense of confidence in decision makers.

<b>Checklist-Driven Approach</b>	Quality and content of project development deliverables not accurately assessed by qualified assessors.
<b>Heavy Front-End Focus</b>	Focus placed on front-end analysis and relatively minimal emphasis post-full-funds authorization activities (Execute).
<b>Estimate Basis</b>	Accuracy of estimate is overstated. Estimate is driven by approval dates rather than engineering progress.
<b>Risk Management</b>	Risk register is in place, but effective follow-through and mitigation plans are lacking.
<b>Capability and Experience</b>	Project Organization lacks relevant experience and/or resources, which leads to over-optimism regarding the state of planning and preparation. People don't know what they don't know.
<b>Misalignment</b>	Lack of input / alignment from all key stakeholders leads to late changes.



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## Three Themes of the Industry Problem

Cost and  
Schedule

Risk  
Management

Governance  
and  
Assurance

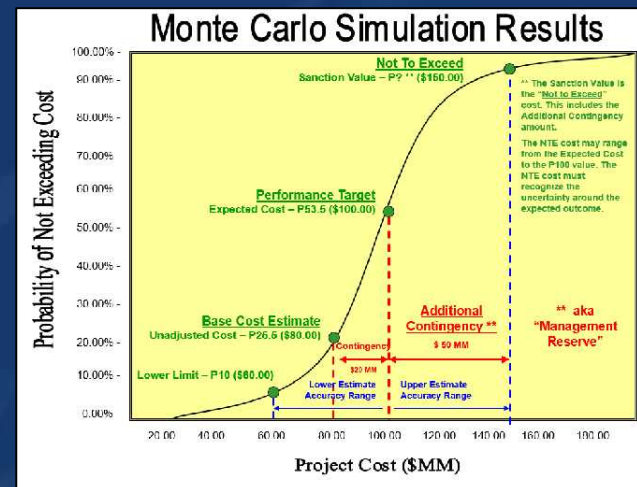


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# Delivering Cost and Schedule Objectives

- Analysis builds understanding and ownership
- Transparency is created around project funding decisions
- Important to
  - Agree performance targets with stakeholders
  - Talk in terms of ranges (lower limit and not to exceed)
  - Clearly understand what makes up the estimate

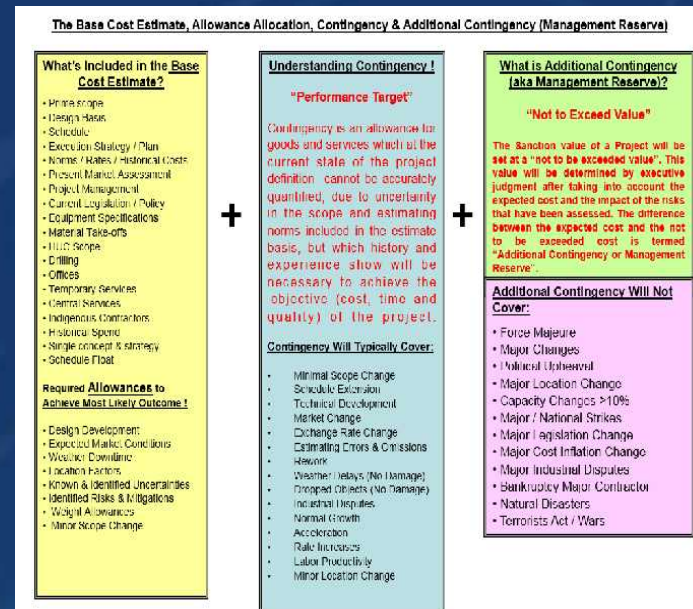


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# What Makes Up the Estimate

- Estimate Components
  - Base Cost Estimate
  - Allowances
  - Contingency
  - Management Reserve
- Cost estimate tied to schedule
- Must be clear on what's in and what's out of the estimate



**How do you know your estimate is a good estimate?**

## Three Themes of the Industry Problem

Cost and  
Schedule

Risk  
Management

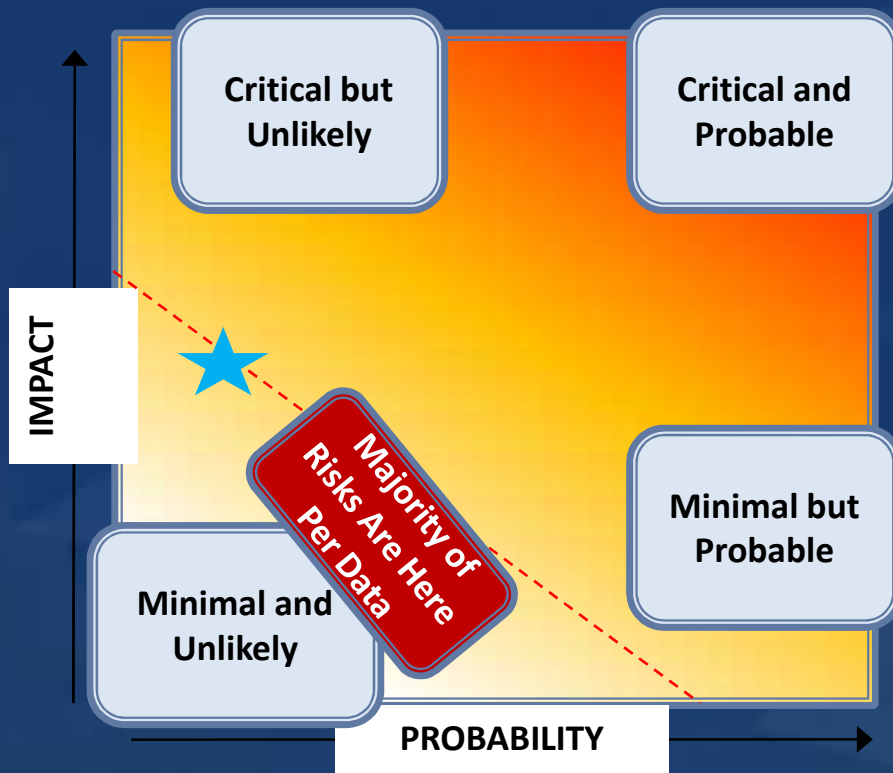
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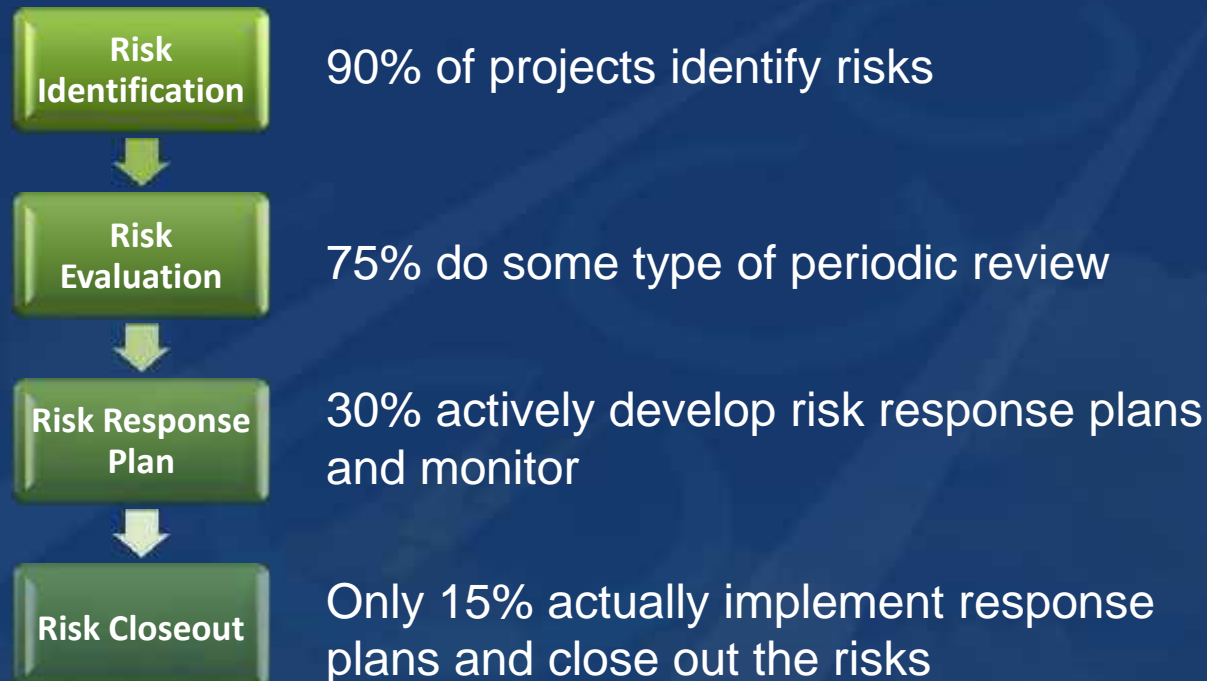
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## Teams Like to Play Below the Line (Executive Reporting Threshold ★)



- Looking across 1200+ Risk Registers
- Average Number of Risks per Register: 55
- Median Number of Risks per Register: 28

## Teams Fail to Complete the Risk Process



**Where are you typically in the risk process?**

## Three Themes of the Industry Problem

Cost and  
Schedule

Risk  
Management

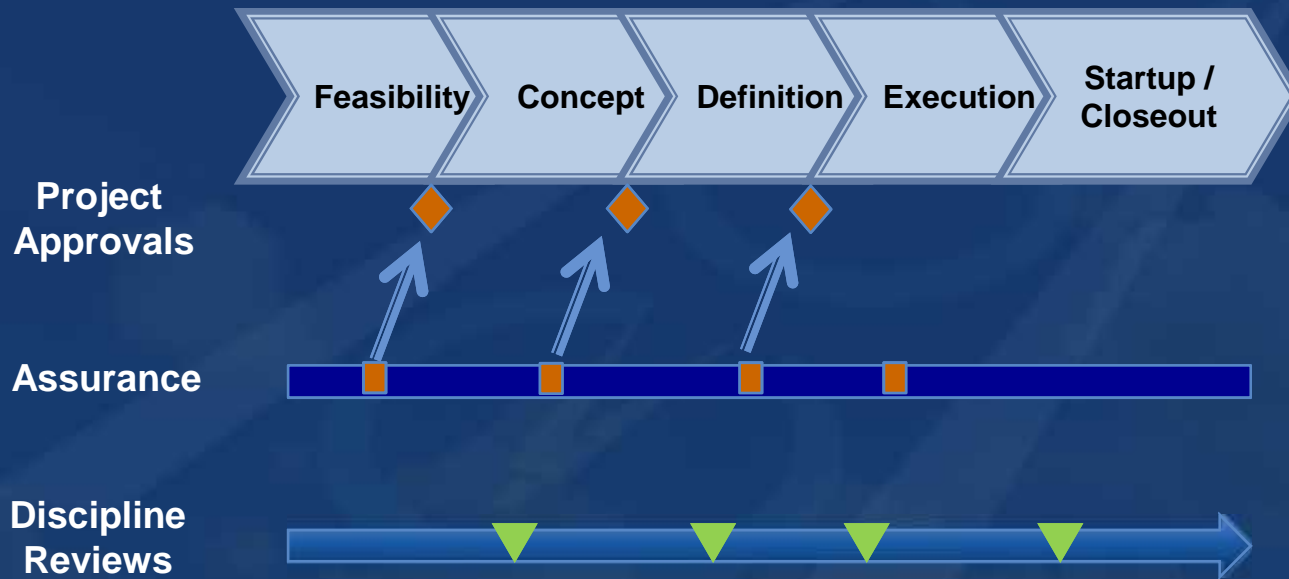
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# Project Governance and Assurance



When have you said “no” to progressing a project?



## Current Project Governance and Assurance

- Most governance framework today is targeted at funding, with little concern for execution
- Many front-end loading activities are
  - “Cut and paste” from similar projects
  - Rewarded for format and volume vs content
- Need ability to judge content in an industry very short on people to review content, especially in execute
- Data and information-based decision making is key



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## Take Aways

- Drive optimal Front-End Loading (FEL) based on engineering and produce a high-quality cost and schedule estimate.
- Ensure that risks are identified, scored, communicated, and mitigated.
- Ensure project objectives are in alignment with business needs.
- Provide a common framework for all project data so that the company can work consistently across its portfolio of opportunity.



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# BACKUP SLIDES

# Recent US Megaproject Disappointments

- Data from recent U.S. Refining Megaprojects (publicly available information)

## Project

- BP Whiting Upgrade
- Chevron Pascagoula Base Oil Project
- Marathon Garyville Major Expansion
- Marathon Detroit Heavy Oil Upgrade
- Motiva Port Arthur Refinery Expansion
- Wood River Refinery Expansion
- Valero Port Arthur Hydrocracker
- Valero St. Charles Hydrocracker

## Statistics

- 6 of 8 authorized after 2006 suffered significant cash flow constraints; the six were delayed by more than a year
- At least 4 experienced a regulatory related delay or issue
- Lack of megaproject experience was a consistent theme
- Many used modularization to address labor concerns
- There were fatalities on at least 3 of these projects
- Average overruns on 6 projects with publically available cost information exceeded 30 percent from initial announcements; none achieved a mechanical completion cost within 10% of the initially announced cost

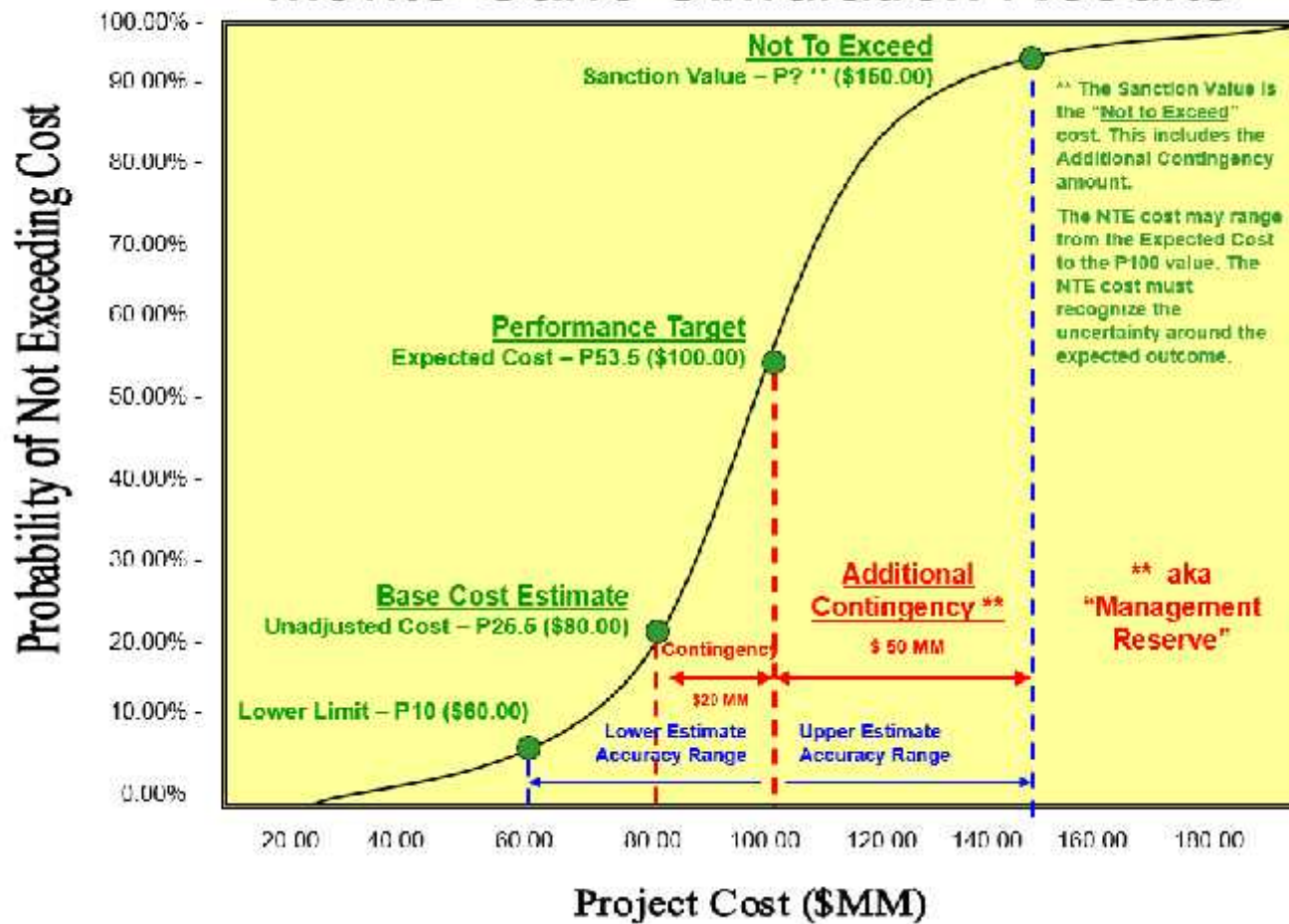
- All 8 projects used some type of **assurance process** and many used **industry project benchmarking**; however, overall performance was disappointing due to the complexities inherent in **megaprojects**.



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# Monte Carlo Simulation Results



**The Base Cost Estimate, Allowance Allocation, Contingency & Additional Contingency (Management Reserve)**

