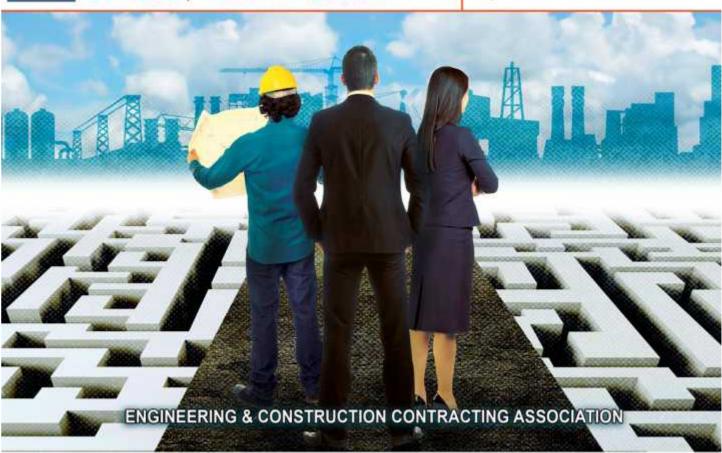
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Capital Efficiency – Keys to Success



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

Voting Device – The Connector



Practice Question: Have you used a voting device before?

- 1. Yes
- 2. No





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



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 proje

- 1. Small/Medium (5.525 mi)
 2. Large (5.525 mi)
 5.525 mi)
- Large (515) 25 min 3. Mica (505) 25 min 51000 (505) 1000)

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



Capital Efficiency – Current State

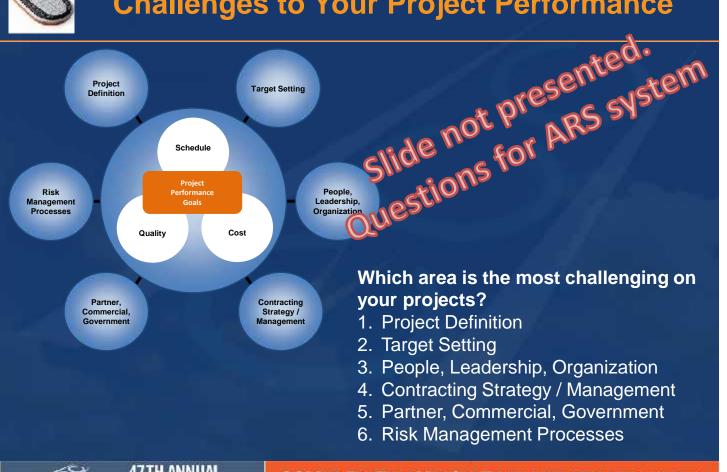
- Energy industry invests hundreds of billions annually in new capital projects and technology.
- Meeting project schedules and budgets is imperative to achieving capital efficiency.
- Clearly defining and managing risks is essential.
- Despite comprehensive governance and assurance, data shows capital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

Key Areas Impacting Projects





Challenges to Your Project Performance





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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



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



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...





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 <u>false sense of confidence</u> in decision makers.

Checklist-Driven Approach	Quality and content of project development deliverables not accurately assessed by qualified assessors.
Heavy Front-End Focus	Focus placed on front-end analysis and relatively minimal emphasis post-full-funds authorization activities (Execute).
Estimate Basis	Accuracy of estimate is overstated. Estimate is driven by approval dates rather than engineering progress.
Risk Management	Risk register is in place, but effective follow-through and mitigation plans are lacking.
Capability and Experience	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.
Misalignment	Lack of input / alignment from all key stakeholders leads to late changes.

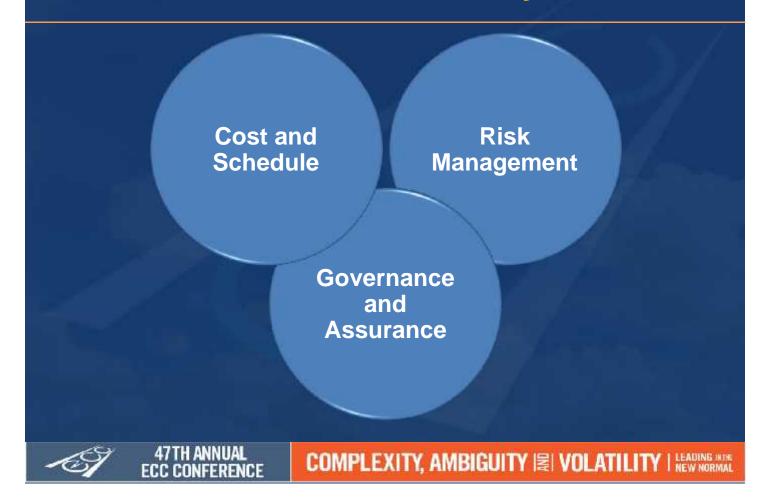


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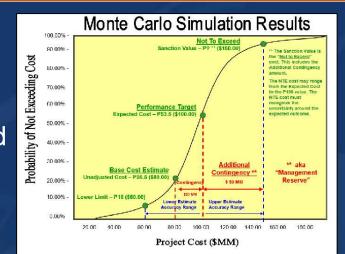
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Three Themes of the Industry Problem



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

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

The Base Cost Estimate, Allowance Allocation, Contingency & Additional Contingency (Management Reserve) What's Included in the Base **Understanding Contingency!** What is Additional Contingency Cost Estimate? (aka Management Reserve)? "Performance Target" Prime scope "Not to Exceed Value" Design Hasis Schedule Execution Strategy / Plan goods and services which at the Norms / Rates / Historical Costs set at a "not to be exceeded value". This value will be determined by executive current state of the project Present Market Assessment definition cannot be accurately Project Management quantified, due to uncertainty between the expected cost and the impact of the mass between the expected cost and the not to be exceeded cost is termed "Additional Contingency or Management in the scope and estimating - Equipment Specifications Material Take-offs norms included in the estimate basis, but which history and - Drilling experience show will be necessary to achieve the Temporary Services Additional Contingency Will Not objective (cost, time and Central Services Indigenous Contractors quality) of the project • Force Majeure Historica Spend Contingency Will Typically Cover: Major Changes Schedule Float Political Upheaval Minimal Scope Change Major Location Change Required Allowances to - Capacity Changes >10% Achieve Most Likely Outcome! Technical Development · Major / National Strikes Market Change Design Development Exchange Rate Change Major Legislation Change Estimating Errors & Omissions Major Cost Inflation Change Weather Downlime: Major Industrial Disputes Known & Identified Uncertainties Bankruptcy Major Contractor Dropped Objects (No Damage) Natural Disasters Weight Allowances Normal Growth Terrorists Act / Wars Acceleration Labor Productivity Minor Location Change

How do you know your estimate is a good estimate?

Three Themes of the Industry Problem





Teams Fail to Complete the Risk Process



90% of projects identify risks

75% do some type of periodic review

30% actively develop risk response plans and monitor

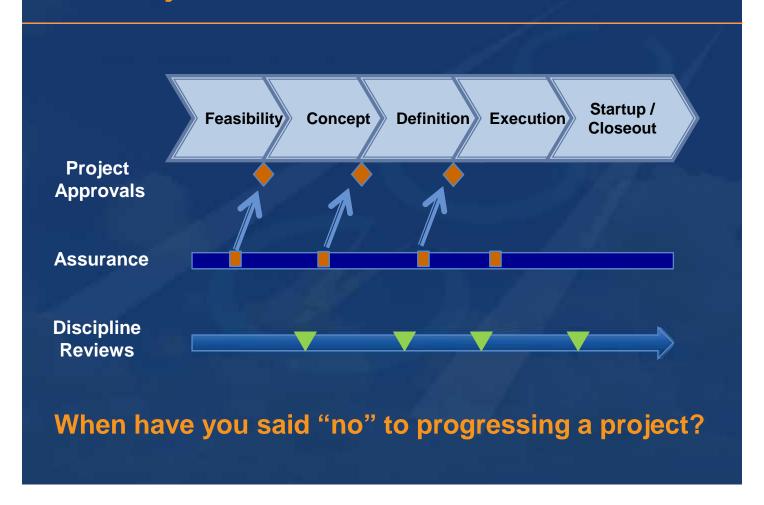
Only 15% actually implement response plans and close out the risks

Where are you typically in the risk process?

Three Themes of the Industry Problem



Project Governance and Assurance



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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ENGINEERING & CONSTRUCTION CONTRACTING ASSOCIATION



Recent US Megaproject Disappointments

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

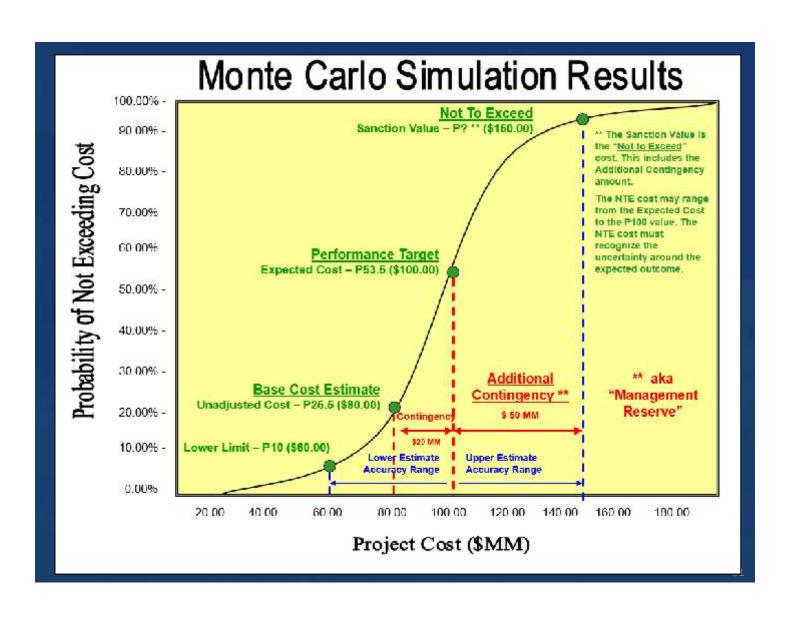
Project

- 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.





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

What's Included in the Base Cost Estimate?

- Prime scope
- Design Basis
- Schedule
- · Execution Strategy / Plan
- Norms / Rates / Historical Costs
- Present Market Assessment
- Project Management
- Current Legislation / Policy
- Equipment Specifications
- · Material Take-offs
- HUC Scope
- Drilling
- Offices
- Temporary Services
- Central Services
- Indigenous Contractors
- · Historical Spend
- · Single concept & strategy
- Schedule Float

Required Allowances to Achieve Most Likely Outcome!

- Design Development
- Expected Market Conditions
- · Weather Downlime
- Location Factors
- Known & Identified Uncertainties
- Identified Risks & Mitigations
- Weight Allowances
- · Minor Scope Change

Understanding Contingency!

"Performance Target"

Contingency is an allowance for goods and services which at the current state of the project definition cannot be accurately quantified, due to uncertainty in the scope and estimating norms included in the estimate basis, but which history and experience show will be necessary to achieve the objective (cost, time and quality) of the project.

Contingency Will Typically Cover:

- Minimal Scope Change
- Schedule Extension
- Tectarical Development
- Market Change
- Exchange Rate Change
- Estimating Errors & Omissions
- Hework
- Weather Delays (No Damage)
- Dropped Objects (No Damage)
- Industrial Disputes
- Normal Growth
- Acceleration
- Rate Increases
- Labor Productivity
- Minor Location Change

What is Additional Contingency (aka Management Reserve)?

"Not to Exceed Value"

The Sanction value of a Project will be set at a "not to be exceeded value". This value will be determined by executive judgment after taking into account the expected cost and the impact of the risks that have been assessed. The difference between the expected cost and the not to be exceeded cost is termed "Additional Contingency or Management Reserve".

Additional Contingency Will Not Cover:

- Force Majeure
- Major Changes
- Political Upheaval
- Major Location Change
- Capacity Changes >10%
- Major / National Strikes
- Major Legislation Change
- Major Cost Inflation Change
- Major Industrial Disputes
- Bankruptcy Major Contractor
- Natural Disasters
- Terrorists Act / Wars

