



# Risk Analysis and Major Project Miscommunications

**Paul McNutt - DAAG 2006**

# Decision Quality FACT Model

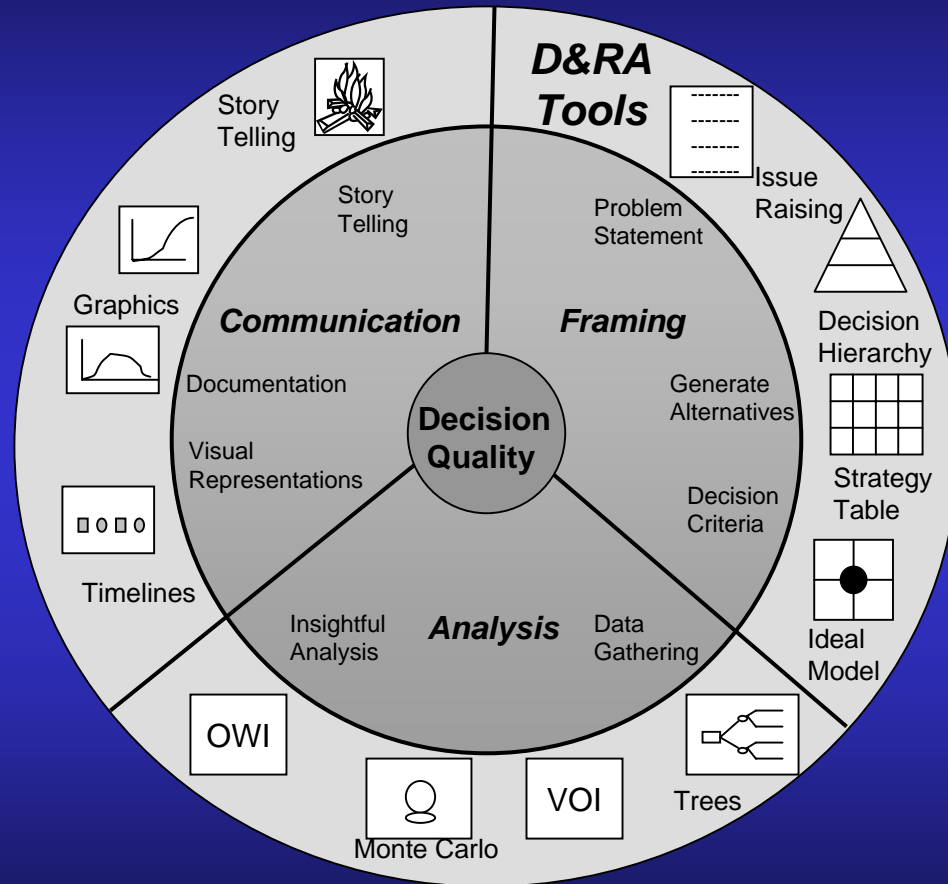
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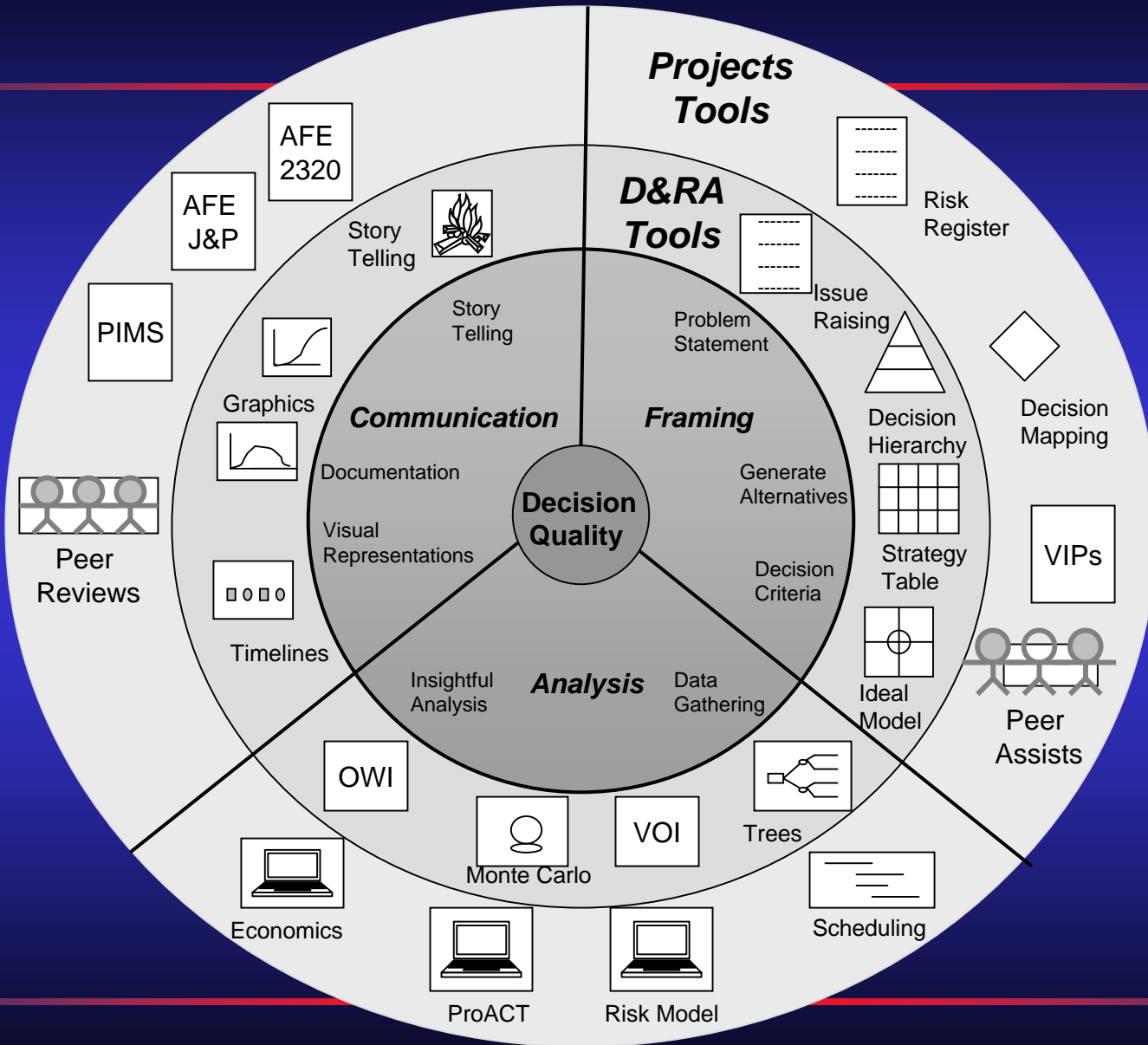
# Decision Quality FACT Model



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# Decision Quality FACT Model



# One of the first “Major Projects”

- Now the whole world had ***one language and a common speech***.....Then they said, "Come, let us build ourselves a city, with a tower that reaches to the heavens, so that we may ***make a name*** for ourselves and not be scattered over the face of the whole earth."
- The LORD said, "If as one people speaking the same language they have begun to do this, then nothing they plan to do will be impossible for them. Come, let us go down and ***confuse their language so they will not understand each other.***"

Genesis 11 "Tower of Babel"

# Background for Presentation

- **Upstream Exploration & Production Specific**
  - Major Projects >\$1 Billion
  - All projects have partnerships
    - International Oil Companies (Exxon, Shell, Chevron...)
    - National Oil Companies (PdVSA, Statoil, Gazprom...)
    - Independents (Anadarko, local indies by country...)
- **Development Projects**
  - Estimation of project spend happens at multiple gates
    - Chase Stage Gate (Pre-AFD)
    - Detailed Engineering Gate (AFD)
    - Final Investment Decision Gate (AFE)
  - Bulk of capital investment in any asset is at this stage
  - Most major projects are in this process for a decade

# Problem Statement

- **Cost and schedule estimates for large projects are low and inconsistent at each stage gate**
- **\$17B capital portfolio is currently almost 10% over sanction estimate after adjustments for foreign exchange and radical commodity (steel) escalation**
- **This results in....**
  - Project managers inheriting unattainable goals
  - Senior management seeing rising costs and slipping schedule from Pre-AFD to AFD to AFE to Supplement
  - Capex portfolio underperforming, more funds required
  - Production forecasts that are regularly not met



# A Simple Two-Step Process to Generate Your Business Case

Step One:

Understand what is beyond your control



Step Two:

You get to control which assumptions get mangled

# Game Theory...Rackets

- **Stakeholder Perspective**

- Government: whoever promises the most for the least the soonest wins
- Partners: “If we were running this project, the cost would be less”

- **Management Perspective**

- “Why are 90% of our P50s being exceeded? By the way, we have to have the expected superior return on investment”
- “If we fund it, they will spend it”

- **Project Team Perspective**

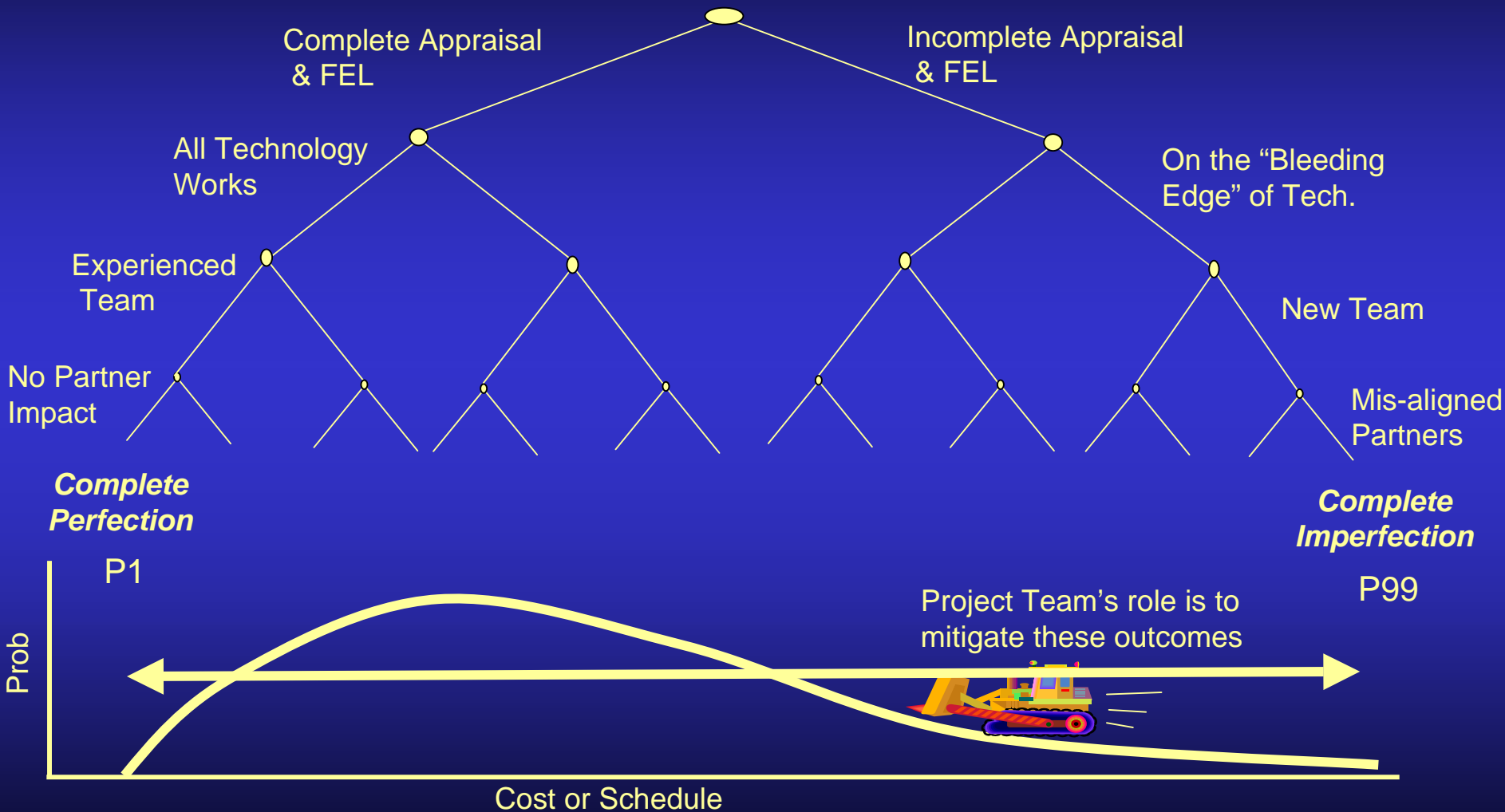
- “P50” = combination of assumptions/outcomes yielding the expected superior return on investment
- Simplifying assumptions are used to generate cost and schedule to save time, but are not often communicated

# The Perfect Storm

## Factors that Further Fuel the Problem

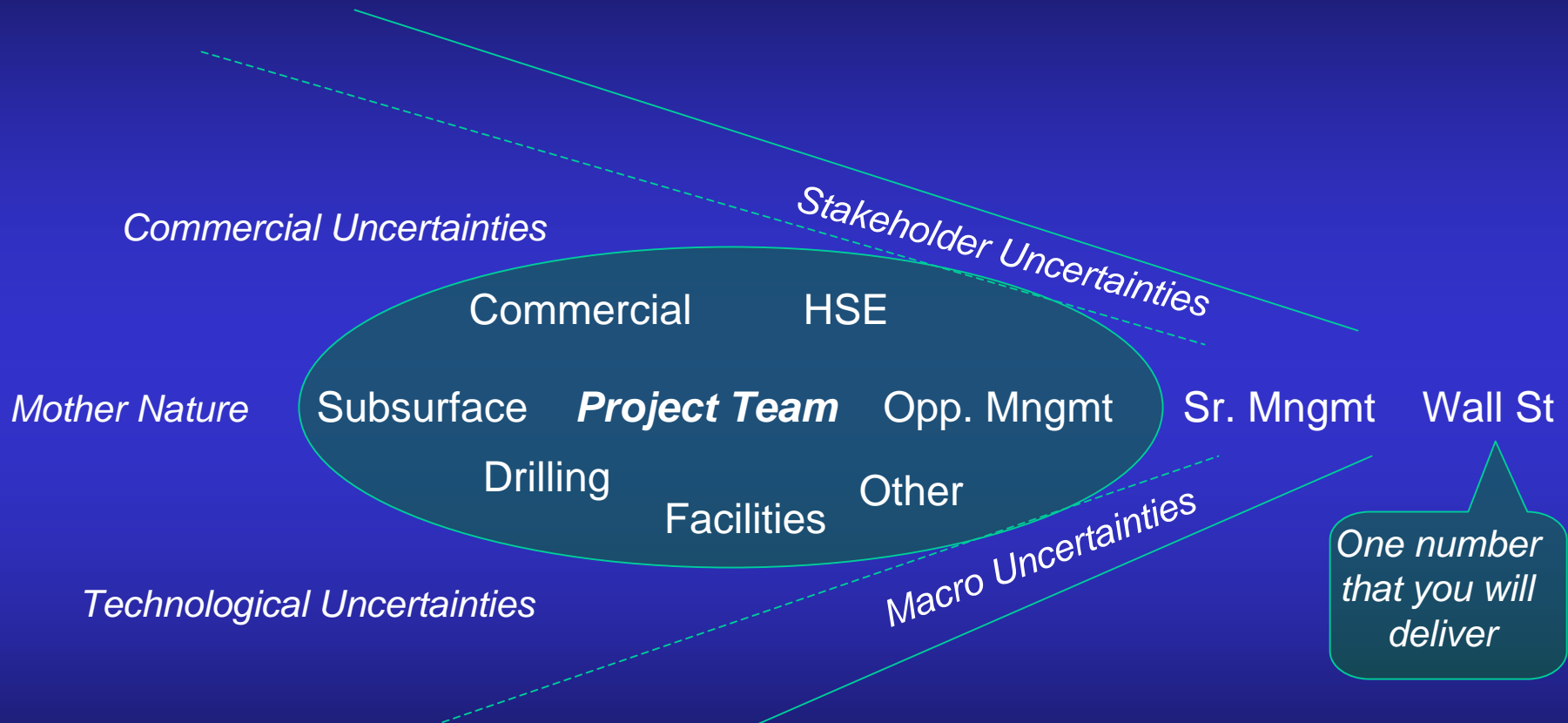
- **At chase stage (Pre-AFD):**
  - Resource owner states unreal expectations (lo cost, tight schedule)
  - Highly competitive bidding
  - Little to no appraisal and scoping information available
- **At AFD**
  - Compressed schedule to meet preset goal
  - Lack of fully resourced, quality team
  - Highly complex, interdependent project in remote, challenging area
- **At AFE**
  - Earlier numbers floated are low and fast
  - Appraisal and FEL not complete, new data being assimilated
  - Decision makers not aligned in objectives and criteria
- **Where large uncertainty exists, teams are likely to present optimistic scenarios as the base case**

# The "Shape" of the Problem



# The Project Team's Role

The world is not interested in the storms you encountered, but whether or not you brought in the ship – R. Armesto



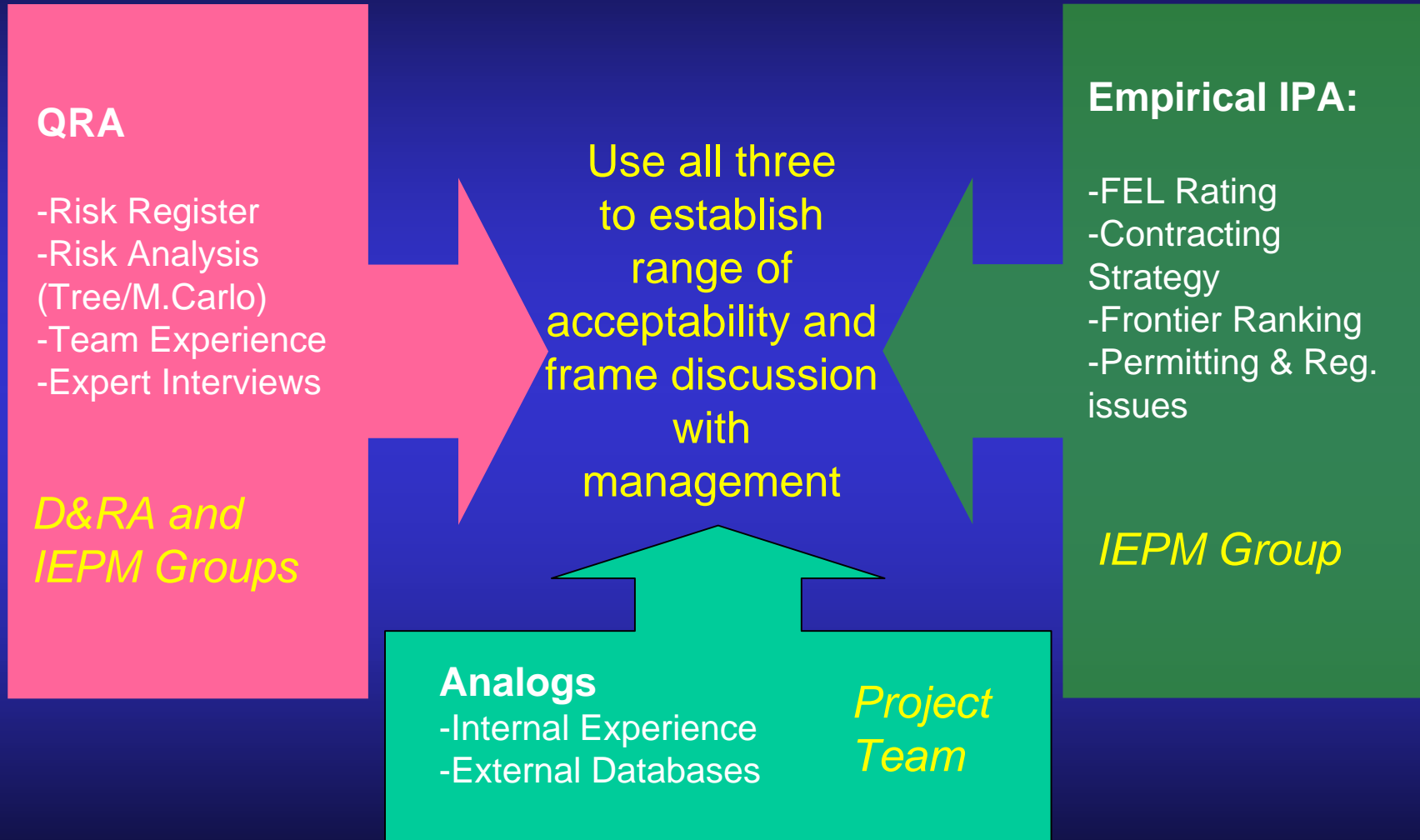
The project team's role is to **distill uncertainties** into simplified estimates that **when aggregated yield predictable** results that match portfolio forecasts.

# **COP's Proposed Approach**

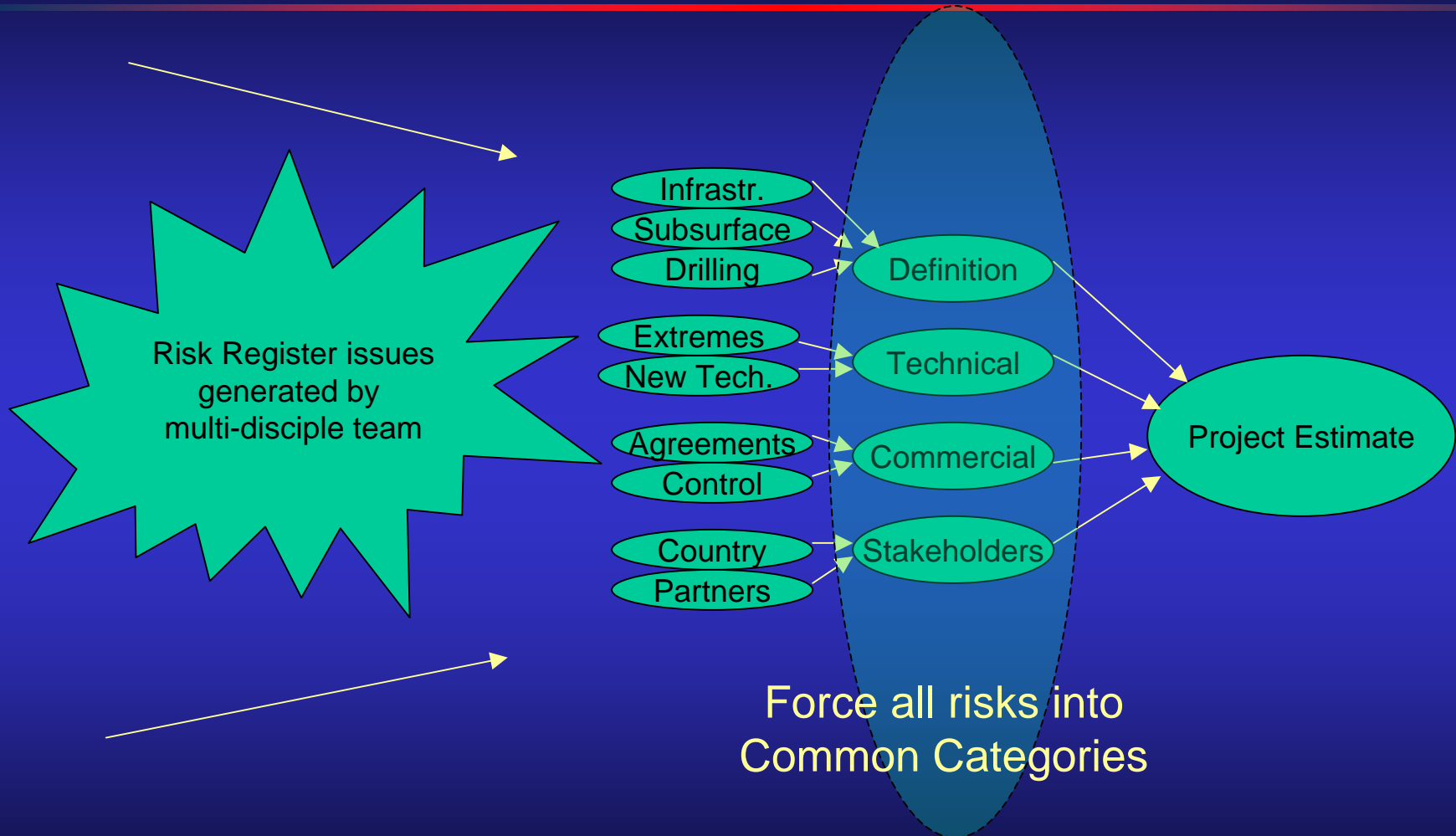
## **Implement Opportunity Risk Management**

- **Internally calculate cost range with Quantitative Risk Assessment (QRA)**
  - Define Traditional Range
  - Define Fully Risked Range
- **Use IPA empirical data to generate a check point**
- **Normalize analog information to validate range**
- **Combine all estimation methods using judgment**

# Internal Analysis, External Empirical Study, and Analogs all help to establish cost curve and P50



# Quantitative Risk Assessment





# A Consistent Vocabulary is Essential

- **Definition: “degree of readiness”**
  - readiness including subsurface appraisal and level of FEL
- **Technical: “degree of difficulty”**
  - how remote, challenging, first-of-a-kind is the project
- **Commercial: “degree of complexity”**
  - commercial agreements, financing, and other impacts
- **Stakeholders: “degree of control”**
  - partners, governments, owners rights groups, NGOs

# COP Risk Classification System

Less Traditional,  
Indirect,  
less tangible,  
harder-to-quantify,  
“Strategic”

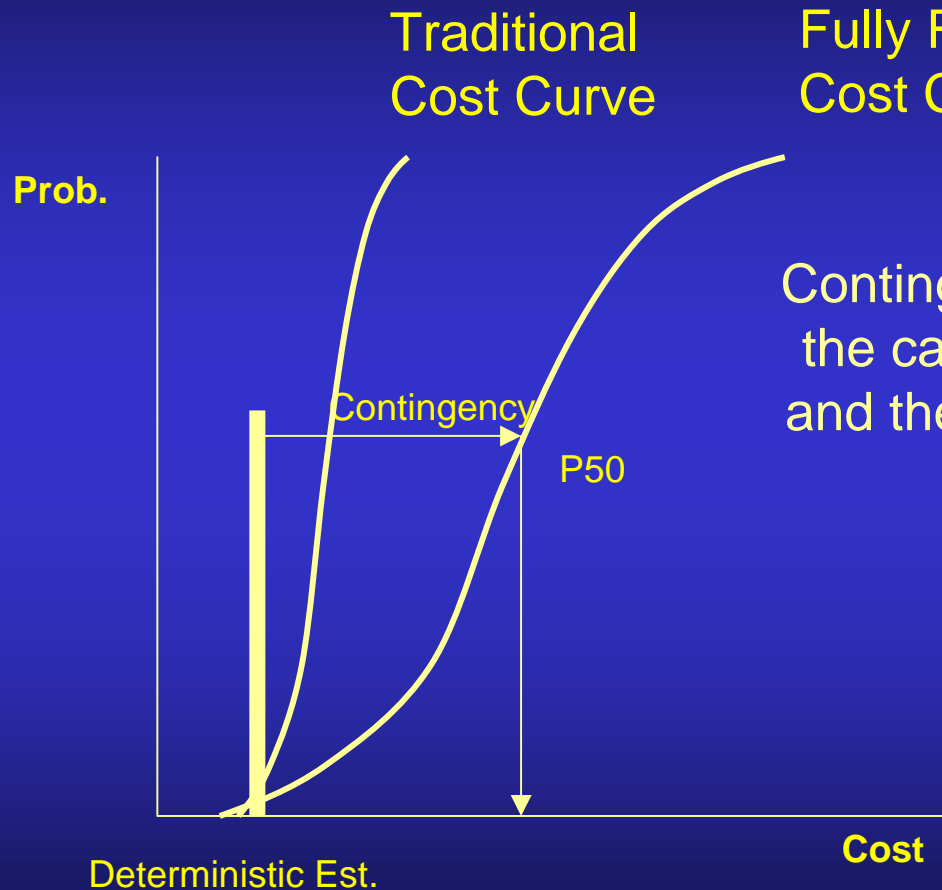
Traditional,  
Direct,  
Tangible,  
easy-to-quantify,  
“Tactical”

<p>Financing Tests Impact</p> <p><b>Commercial</b></p> <p>Value-add Opportunity Impact Team Composition</p>	<p>History of NGO Interference</p> <p><b>Stakeholder</b></p> <p>Alignment      Permitting</p>
<p>Are Contracts in Place?</p> <p><b>Definition</b></p> <p>Appraisal Info Integration FEL Complete?</p>	<p>Fluid Composition</p> <p><b>Technical</b></p> <p>Arctic Water Depth</p>

Internal to COP

External to COP

# Quantitative Risk Assessment



Contingency is the difference between the calculated P50 from a cost curve and the original deterministic estimate

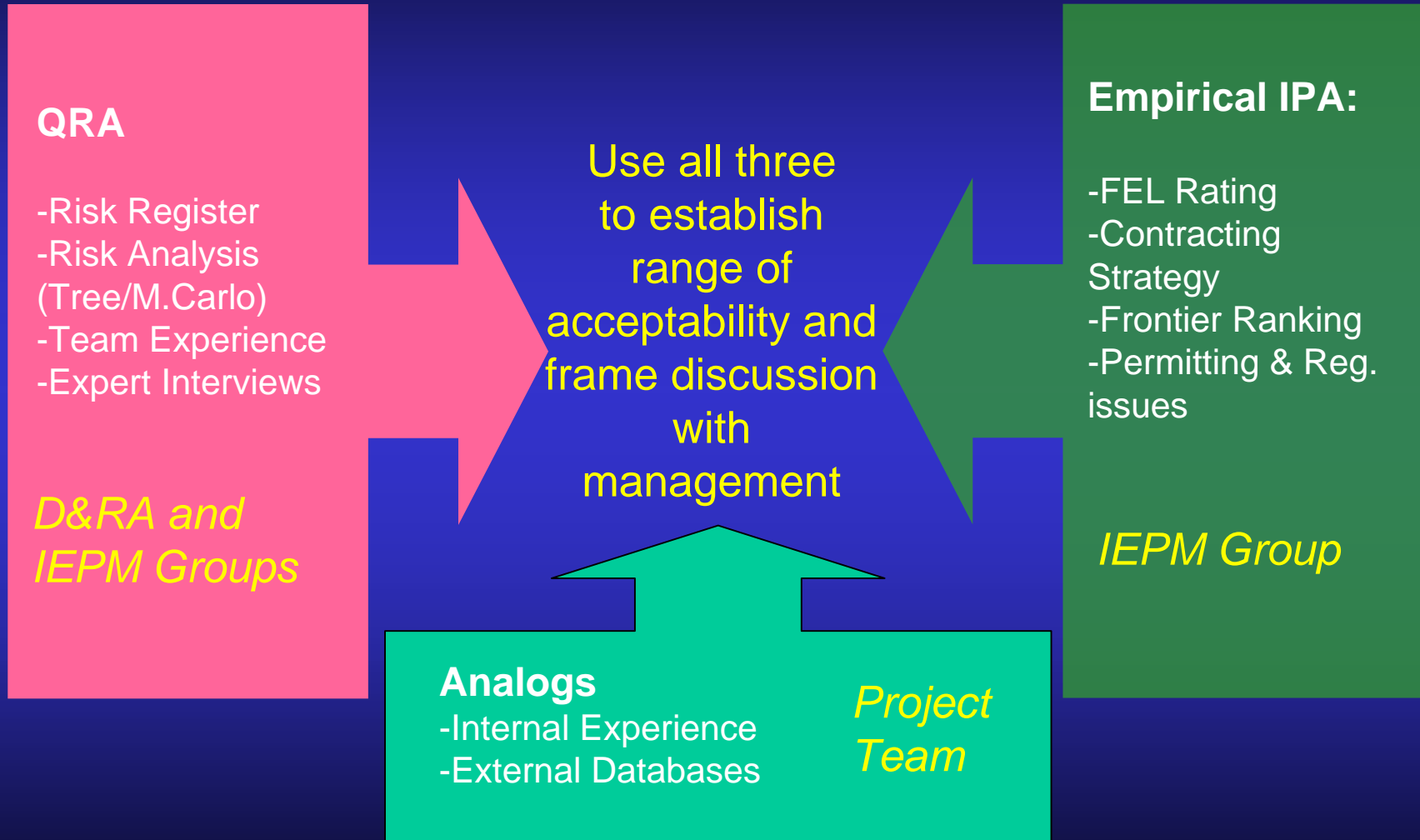
# Use IPA Database to Evaluate Contingency Requirements

- **Independent Project Analysis (IPA) was contracted to develop an empirical method to estimate contingency**
- **IPA has developed contingency look up tables based on level of definition, new technology, owner experience, and contractor strategy**
- **QRA results are compared with empirical contingency data to establish P50 cost estimate**

# Use of Analog Information

- **The best analog information should be sought out and presented as a third check point against the QRA P50 and the IPA generated estimate. Sources include:**
  - Internal: Region experience, World Wide Upstream experience
  - External: Partners, IPA, PACE, Wood Mackenzie, etc..
- **Where direct analogs are scarce, judgment should be used to scale-up or normalize the most representative analog**

# Internal Analysis, External Empirical Study, and Analogues all help to establish cost curve and P50



# Communication Format

## Traditional Includes

- **Definition**
  - P50 BoD only
  - No cont. wells
- **Technical**
  - Assumes xyz tech.
  - 150 “ice days”
- **Commercial**
  - Agreements done
  - 2.5% Esc.
  - Fixed Forex
- **Stakeholder**
  - No delays
  - No scope changes

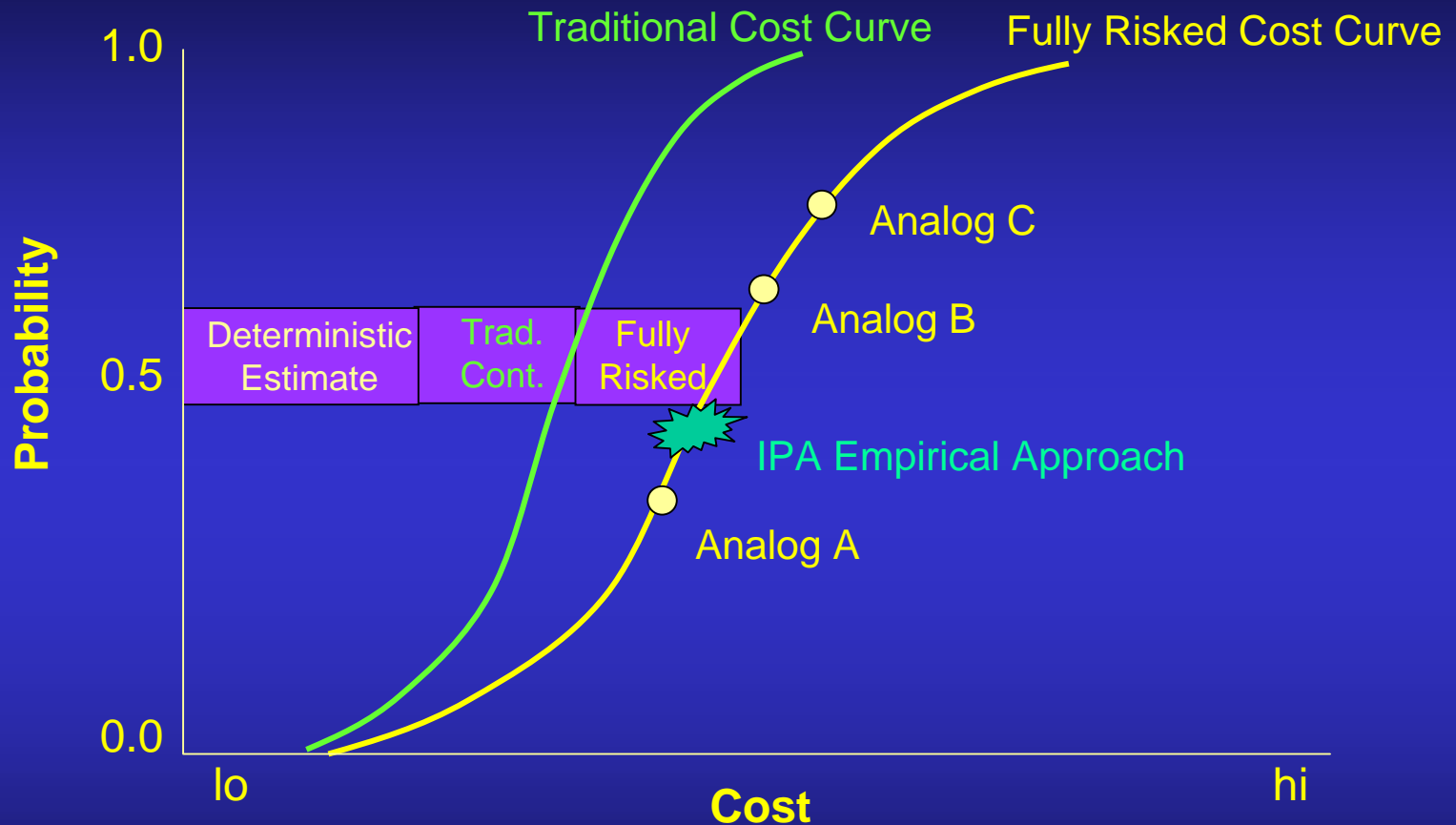
## Fully Risked Includes

- **Definition**
  - Pbad allowances
  - Cont. wells
- **Technical**
  - Risked tech.
  - 100-170 “ice days”
- **Commercial**
  - Some delay
  - Some regional esc.
  - Fixed Forex
- **Stakeholder**
  - Decision delays
  - Some scope changes

## Not Included

- **Definition**
  - Major scope change
  - Double # of wells
- **Technical**
  - 1 in 10000 yr events
  - Catastrophic event
- **Commercial**
  - Complete stop
  - Hi global esc.
  - Team-defined Forex
- **Stakeholder**
  - Force Majeure
  - NGO delays

# Standard Graphic Format



All three methods should provide useful information to make the funding decision



# Thou Shalt Not Assume That...

- I. Subsurface is fully appraised by sanction
- II. Facilities and D&C FEL is complete by sanction
- III. Unproven technologies will test and install successfully
- IV. Mother Nature will be kind and smile upon thee
- V. Agreements and permits are signed by sanction
- VI. COP has control of decisions and is rational
- VII. Sufficient time has been allotted to the project to ensure that quality and cost are the #1 and #2 drivers
- VIII. Partners' decision criteria are aligned and understood
- IX. The resource owner/government's motives are aligned
- X. Everyone interprets P50, Contingency, and Risk the same and we all act as "rational" players