Value for Money Analysis: Choosing the Best Project Delivery Method

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Overview

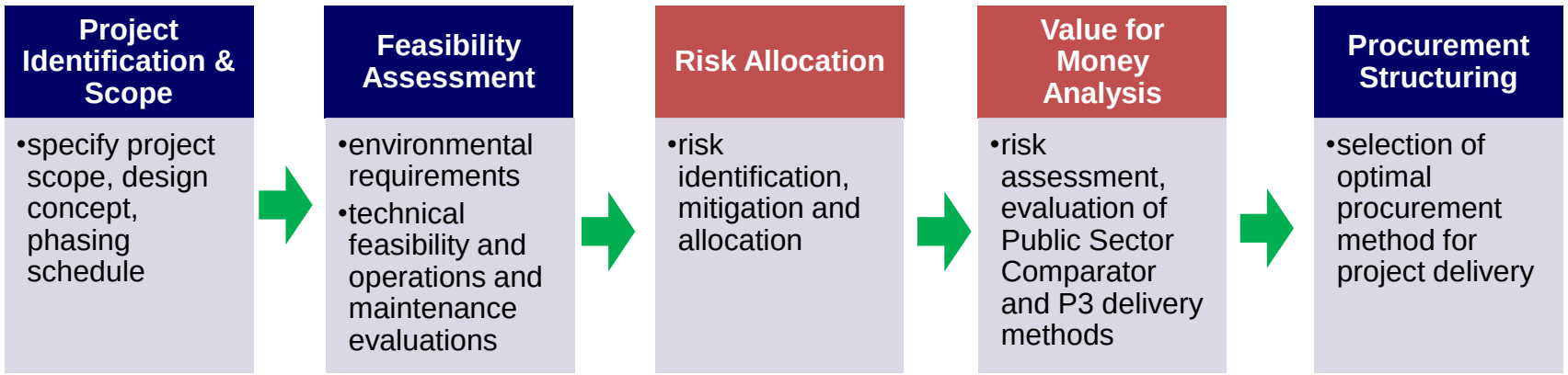
- What is a VfM analysis
- Why is it used
- Key VfM components and principles
- Life cycle cost risk assessment for VfM
- Financing/revenue cost risk assessment for VfM
- Quantitative outputs

What is a VfM Analysis

- A fair and transparent analysis of alternative delivery types
- Value for Money = optimum combination of life cycle costs and quality to meet owner's requirements and objectives
- VfM analysis = process to compare two or more ways to deliver a project to determine which is most likely to meet the requirements and objectives at the best cost over the project's life

What is a VfM Analysis

- Examines **quantitative** (project-level monetary) and **qualitative** (external monetary and non-monetary) factors
- Prepared after project scope and initial feasibility assessment, before procurement



Why is VFM Analysis Used

- To help public owner decide on most suitable delivery method
- To generate political support and stakeholder consensus for chosen delivery method, through systematic and transparent use of tool
- To deepen understanding of full project life cycle costs early in life of project

Why is VFM Analysis Used

- Most useful for projects that:
  - Are large-scale and long term, warranting large P3 procurement costs
  - Have complex risk profiles
  - Can reap efficiencies and innovations by delivering under a single contract
  - Are suitable for performance- or outcome-based specifications
  - Have competitive market interest for alternative delivery
  - Can benefit from private sector risk management, financing and expertise

Key Components of a VfM Analysis

- Public Sector Comparator (PSC) – whole life cost estimate of traditional method of project delivery, including O&M costs. Detailed benchmark for comparisons
- Shadow Bid – whole life cost estimate of alternative method of project delivery, including O&M costs
  - Design-Build
  - Design-Build-Finance
  - Design-Build-Finance-Operate-Maintain

Key Components of a VfM Analysis

- Quantitative assessment – quantifies total life cycle cost of PSC and Shadow Bid, including:
  - Development phase and procurement costs
  - Design and construction capital costs (CapEx)
  - O&M costs (OpEx)
  - Reconstruction and rehab costs (CapEx)
  - Overhead costs - project management, administration and oversight
  - Competitive neutrality adjustments – e.g, for taxes
  - Revenue deductions for user fee projects

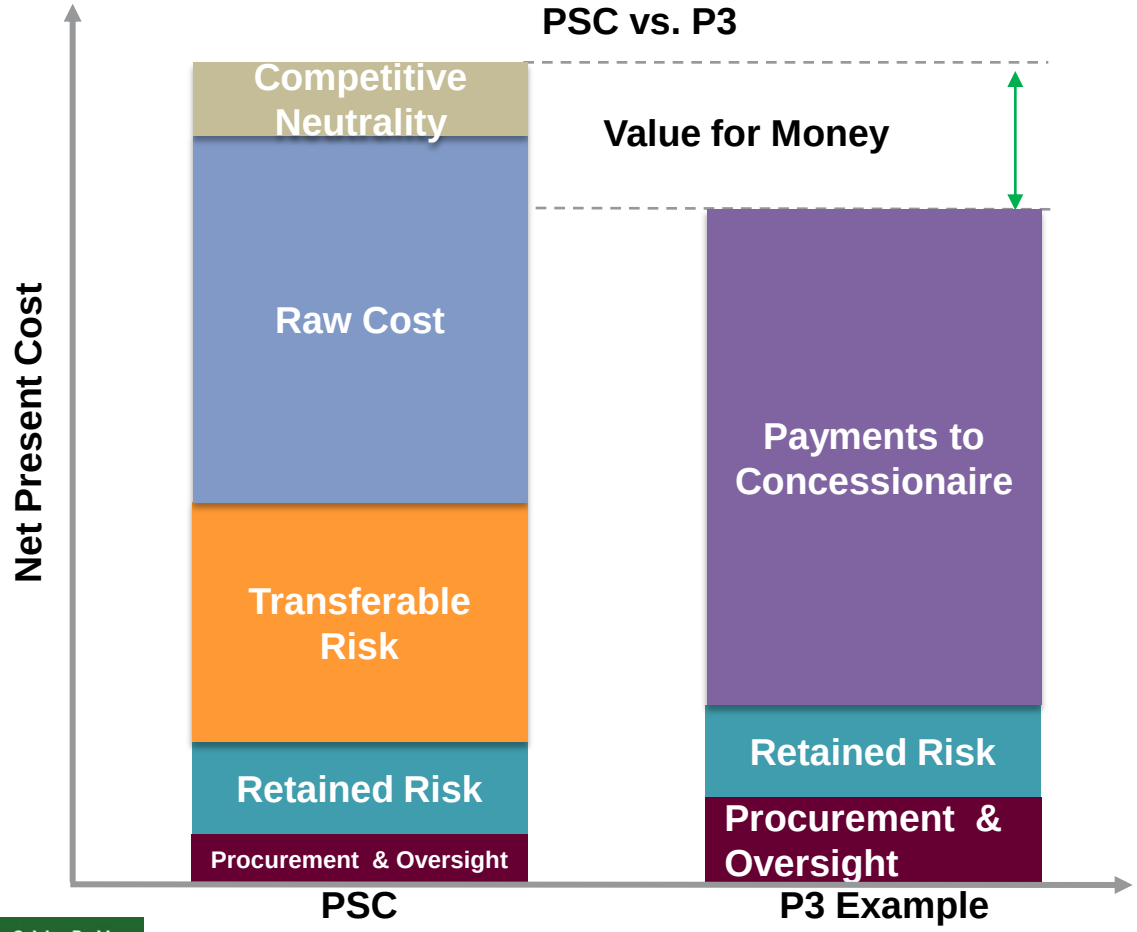
Key Components of a VfM Analysis

- Quantitative assessment:
  - Starts with base cost estimate, without contingency
  - Identifies project risks
  - Quantifies consequences for each risk by assigning low, most likely and high costs
  - Estimates probability of each risk occurring
  - Calculates value of each risk

    (consequence = probability x risk event)

Key Components of a VfM Analysis

- Sample quantitative assessment results



Key Components of a VfM Analysis

- Qualitative assessment
  - Assess other important factors not captured by internalized project economics
  - Depending on owner objectives, these can have equal or greater importance than quantitative results.

Key Components of a VfM Analysis

- Qualitative assessment of project delivery timing. Project acceleration can affect:
  - Economic development and competitiveness
  - Employment growth
  - Enhanced service for users – mobility, travel time savings, safety improvements
  - Environment - e.g. air quality improvement, energy consumption, greenhouse gas emissions, noise, etc.
  - Local tax revenue

Key Components of a VfM Analysis

- Qualitative assessment of risk exposure and program certainty
  - Risk tolerance of the project owner
  - Improvement in risk management and innovation – can be factored into quantitative assessment
  - Schedule certainty
  - Long term cost predictability and certainty early in life of project
  - Long term payment commitments early in life of project

Key Components of a VfM Analysis

- Qualitative assessment of viability and achievability
  - Ability to address stakeholder interests, political barriers
  - Affordability assessment
  - Public sponsor human resources –expertise, experience, capacity
  - Strength of competition in PSC vs. P3 markets
  - Legal and regulatory distinctions and restrictions
  - Up-front capital formation
  - Feasibility of risk transfers

Key Principles for VfM Analysis

- Identification of all project risks
  - Technical
  - Environmental
  - Political/legal
  - Financial
- Risk allocations for all identified risks
  - Public – retained by public owner
  - Private – transferred to private party
  - Shared – neither better situated to manage the risk
- Risk mitigation measures for identified risks
- Whole life cost comparison
- Financing cost assessment – costs to arrange and service debt, incorporated separately from cash flows
- Avoid double-counting

Key Principles for VfM Analysis

- "Apples-to-apples" (like-to-like) comparison
  - Must compare same project definition and scope
  - Must compare same time period
  - Should choose a time period that recognizes full life cycle of project, including periodic rehabilitation, reconstruction, expansion
  - Must assess and estimate same set of cost items and risks
  - Does NOT mean must use same assumptions. Assumptions must be appropriate for the particular method of project delivery
  - Must recognize regulatory, legal and other practical constraints particular to each method of project delivery
- Example:

Fact	*DBFOM*	*DB*	*Appropriate Input for VfM*
Greenfield interstate project	Tolled	Freeway	Choose one for both delivery methods
Legal authority exists to procure	Yes	No	Either eliminate DB for lack of authority or build in an assumed time period for DB authority to be obtained
Estimated design-construction period	3.5 yrs.	4.0 yrs.	Apply each
Public sector will defer maintenance, increasing rehab & reconstruction costs	No	Yes	Use VfM analysis period for both that includes date for rehab & reconstruction; include estimated costs
Best financing plan	Bonds, Grants and equity	Sales tax revenue bonds, toll revenue bonds, pay-go funds	Apply each

Cost Risk Assessment Process Goals

- ***Define and review or validate cost and schedule base estimates*** for each delivery type.
- ***Replace (or greatly reduce) the traditional project "contingency"*** with key identifiable risks that can be more clearly understood and managed.
- ***Identify and quantify key project risks*** that can cause a significant deviation in the cost and/or schedule.
- **Allocate Risks** between private and public partners.
- ***Perform a Monte Carlo simulation analysis to model the collective impact*** of base and risk issues for each delivery type.
- ***Produce an estimate of a reasonable range and distribution*** for each delivery type
- ***Develop Probabilistic Cash Flows*** *for VfM input*.

Addressing Cost and Schedule Concerns

Usual Questions

- How much will it cost?
- How long will it take?
- Why does it cost that much?
- Why does it take that long?

Analysis Needs

- Risk Identification
- Qualitative and Quantitative Risk Analysis
- Mitigation Strategy
- Risk Monitoring & Control
- Risk Allocation

Estimation Approach: Traditional Vs. Risk Based

Fixed Contingency %

Project Deterministic Estimate

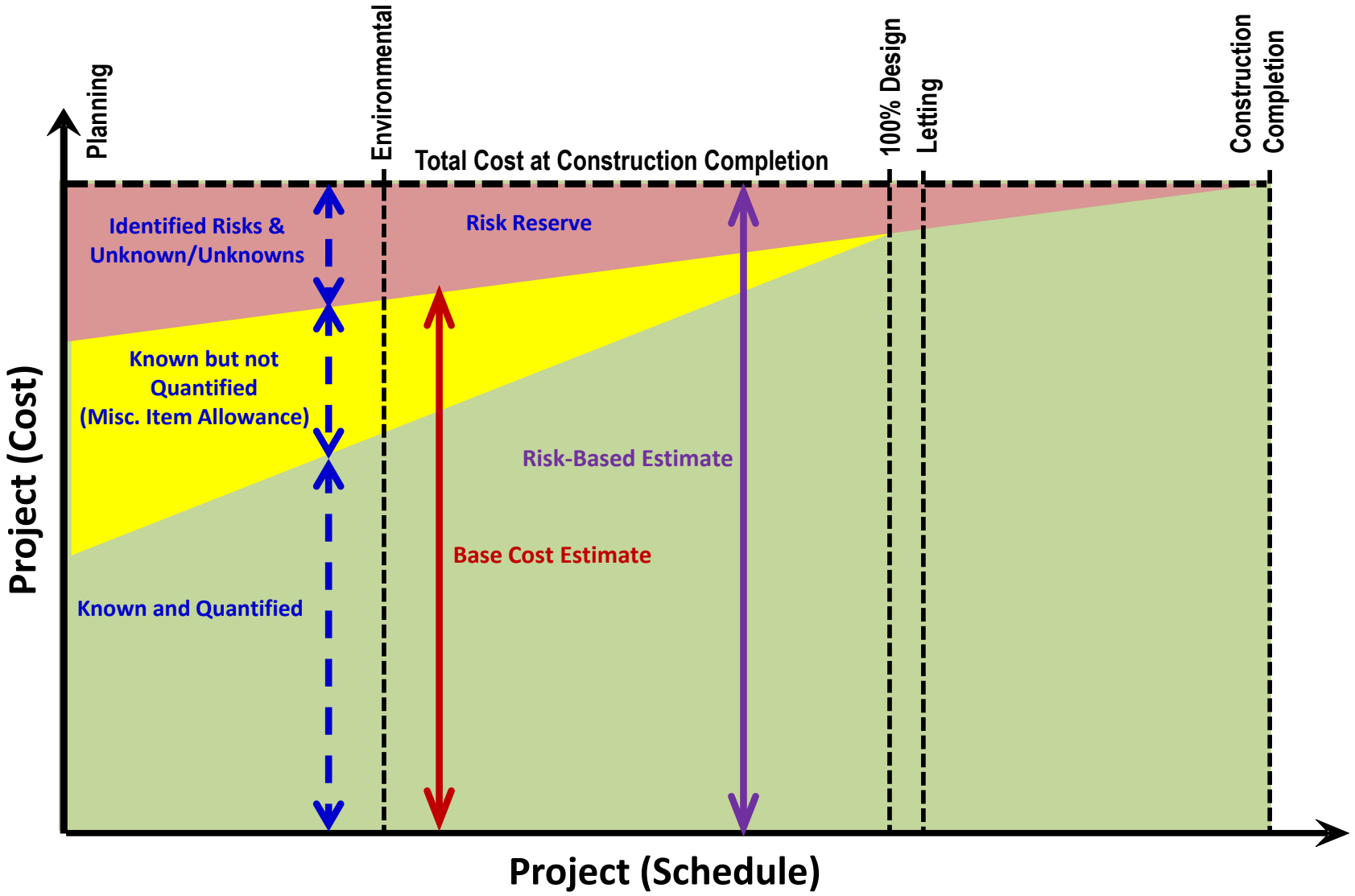
Project Base Cost

Geotech Risks 20%

Construction Risks 40%

Environmental Risks 30%

Design Risks 5%


Planning
Environmental
Total Cost at Construction Completion
100% Design Letting
Construction Completion
Identified Risks & Unknown/Unknowns
Risk Reserve
Known but not Quantified (Misc. Item Allowance)
Risk-Based Estimate
Base Cost Estimate
Known and Quantified
Project (Cost)
Project (Schedule)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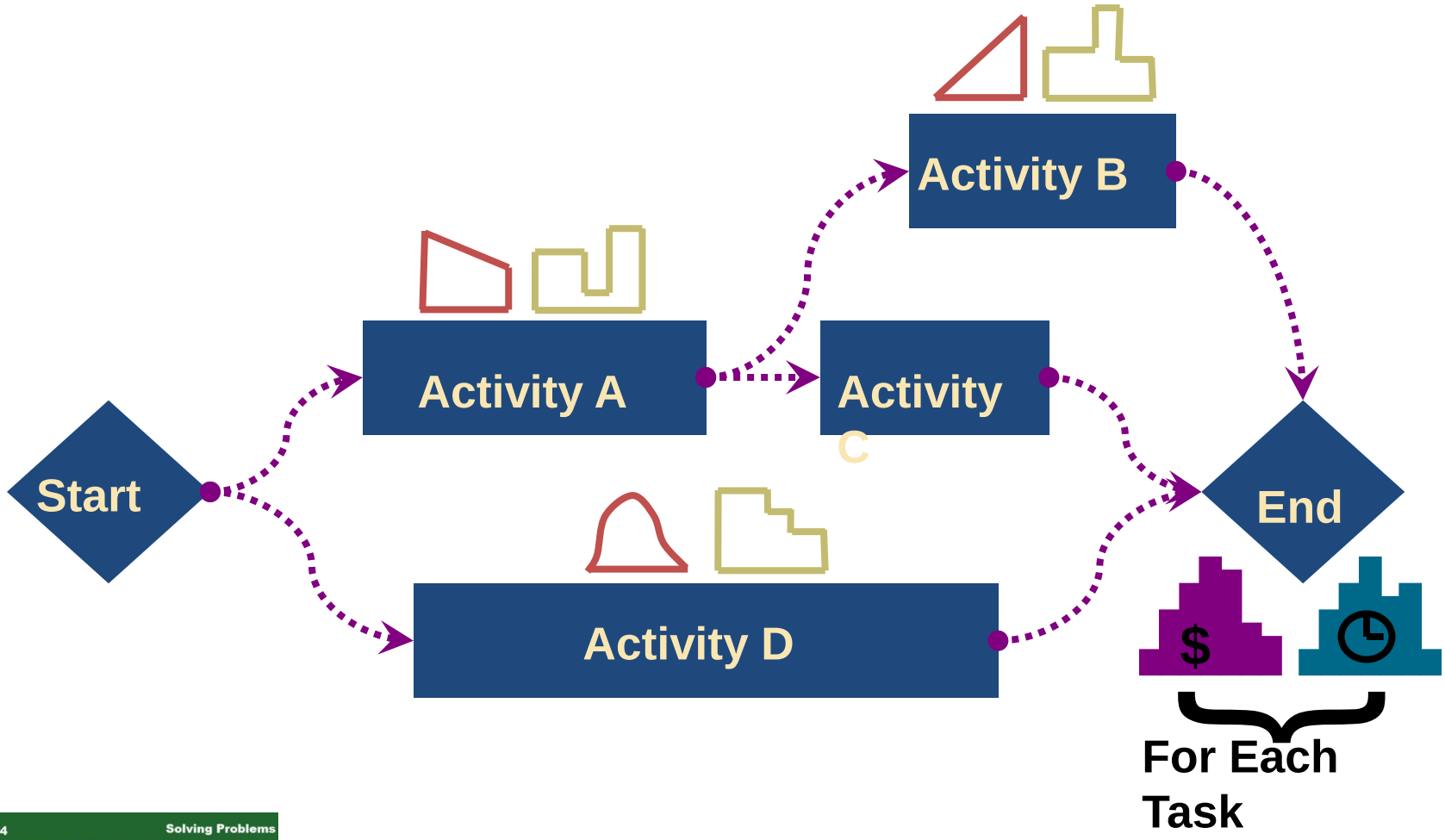
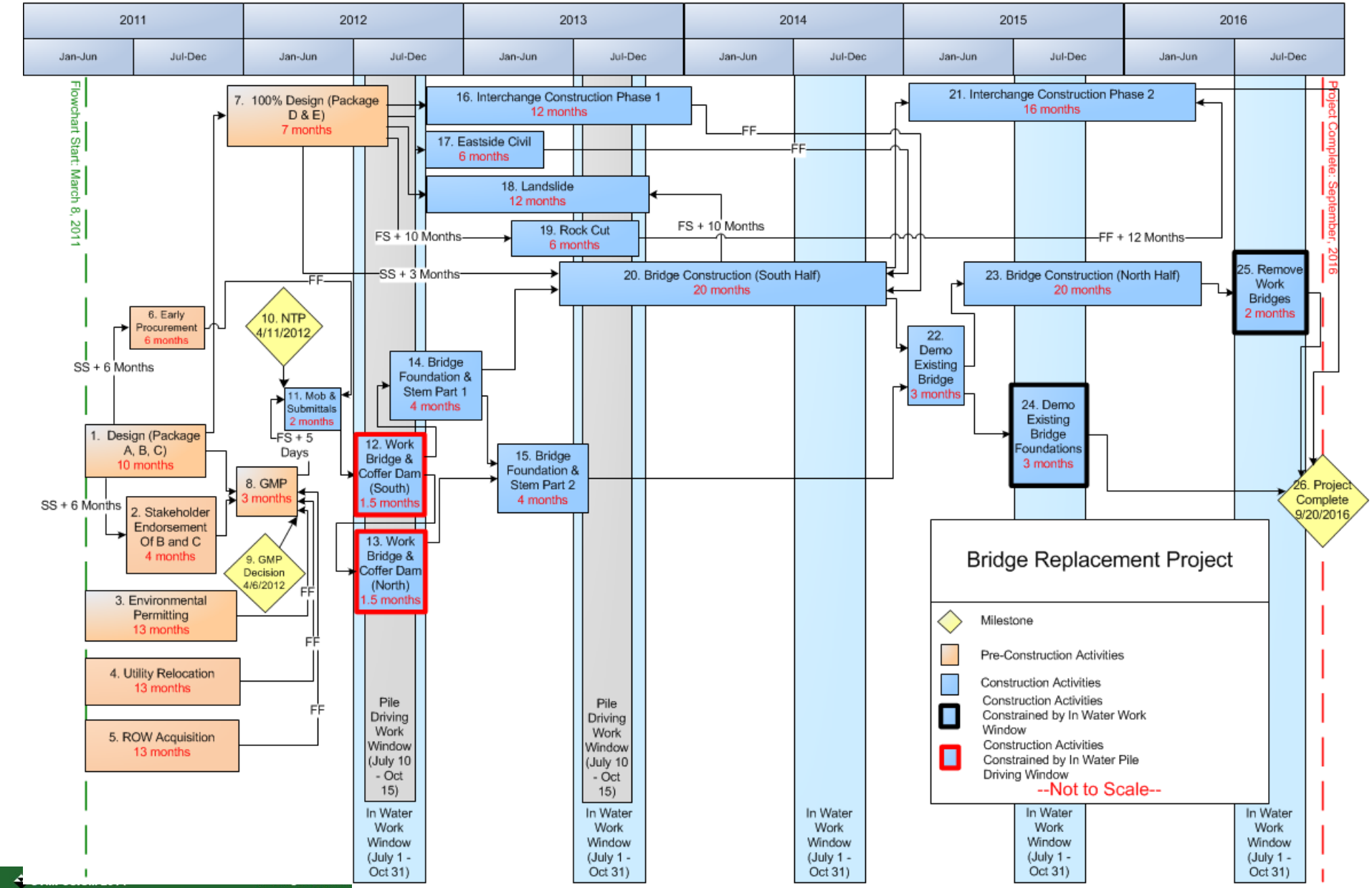
Building a Risk Analysis Backbone




2011
2012
2013
2014
2015
2016
Jan-Jun
Jul-Dec
Flowchart Start: March 8, 2011
Project Complete: September, 2016
7. 100% Design (Package D & E)
7 months
16. Interchange Construction Phase 1
12 months
17. Eastside Civil
6 months
18. Landslide
12 months
19. Rock Cut
6 months
20. Bridge Construction (South Half)
20 months
21. Interchange Construction Phase 2
16 months
23. Bridge Construction (North Half)
20 months
25. Remove Work Bridges
2 months
6. Early Procurement
6 months
10. NTP 4/11/2012
11. Mob & Submittals
2 months
14. Bridge Foundation & Stem Part 1
4 months
22. Demo Existing Bridge
3 months
24. Demo Existing Bridge Foundations
3 months
26. Project Complete 9/20/2016
1. Design (Package A, B, C)
10 months
2. Stakeholder Endorsement Of B and C
4 months
8. GMP
3 months
9. GMP Decision 4/6/2012
12. Work Bridge & Coffer Dam (South)
1.5 months
13. Work Bridge & Coffer Dam (North)
1.5 months
15. Bridge Foundation & Stem Part 2
4 months
3. Environmental Permitting
13 months
4. Utility Relocation
13 months
5. ROW Acquisition
13 months
FF
FS + 10 Months
SS + 3 Months
FF + 12 Months
SS + 6 Months
FS + 5 Days
Pile Driving Work Window (July 10 - Oct 15)
In Water Work Window (July 1 - Oct 31)
Bridge Replacement Project
Milestone
Pre-Construction Activities
Construction Activities
Construction Activities Constrained by In Water Work Window
Construction Activities Constrained by In Water Pile Driving Window
--Not to Scale--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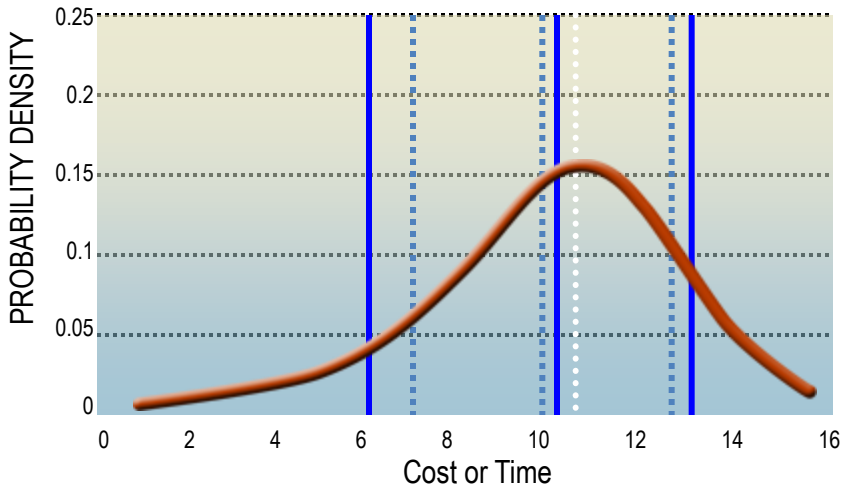
Establishing Ranges for All Key Risks

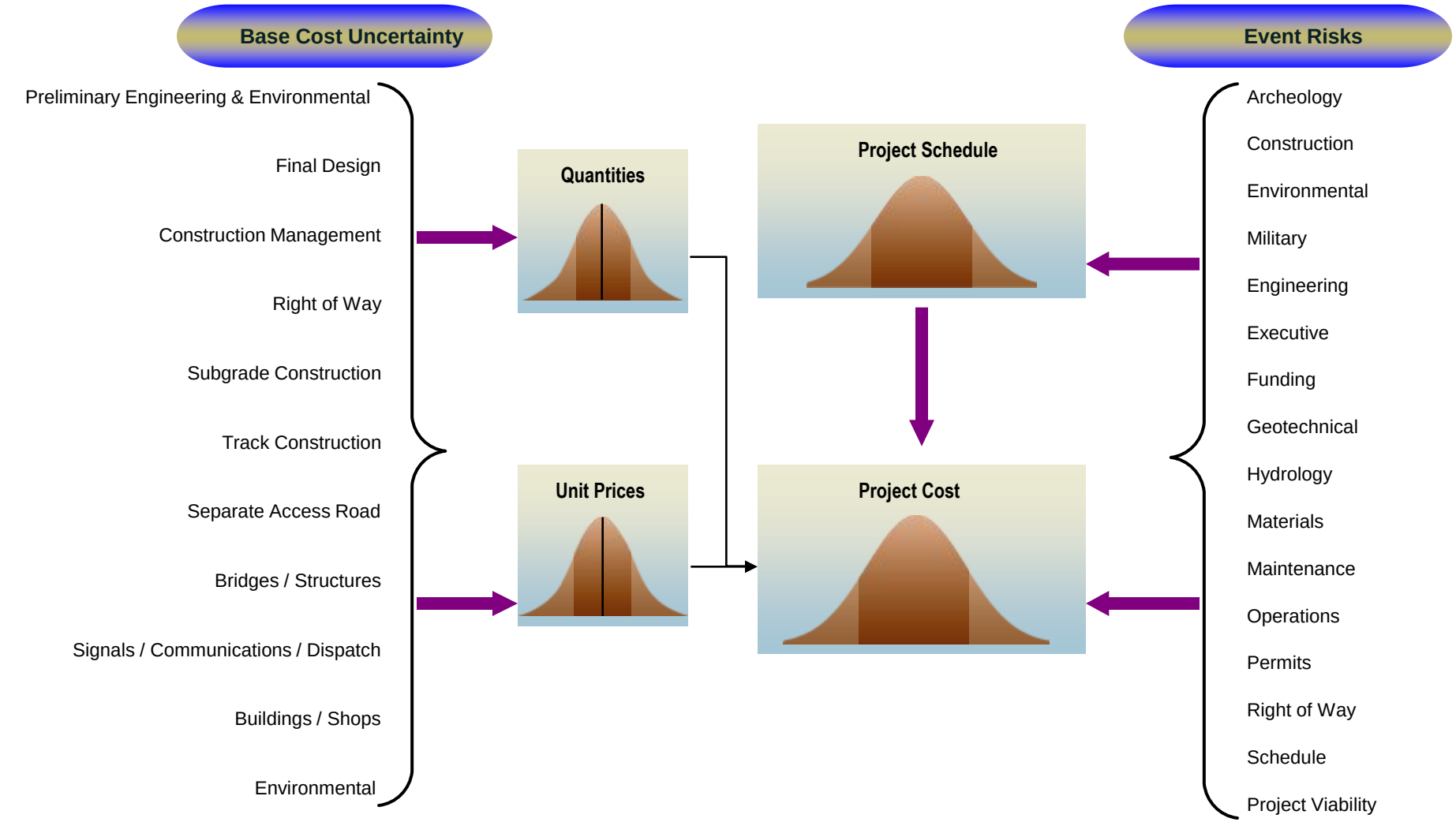
Impact

Probability of Occurrence	Most Likely	10% Lower	10% Upper
50%	10	6	13

80% Confidence Interval



Accounting for Cost and Schedule Risks



Consensus-Based Workshops

- Structured Workshops to Build Consensus Among Various Stakeholders
- Engagement of Internal and External Subject-Matter Experts
- Sessions by Functional Assignment to:
  - Identify Risks
  - Quantify Risks
  - Discuss Risk Response and Mitigation Strategies

Risk Elicitation

- Focus on issues that matter
- Describe the event properly
- What will trigger the event?
- How likely is it to occur?
- What are the potential impacts (cost/schedule)?
- If the event occurs what are the impacts
  - on the low end?
  - on the upper end?
  - most likely?
  - Risk Allocation - Who is best to manage it?
- Is the event dependent on or correlated with other events?

Quantitative Risk

Project:

Sub-Project: *Issues with design and constructability of Maintenance facility*

Risk ID: 3 STG 900.07

Risk Trigger:

Pre-Response Quantification

Probability
80%

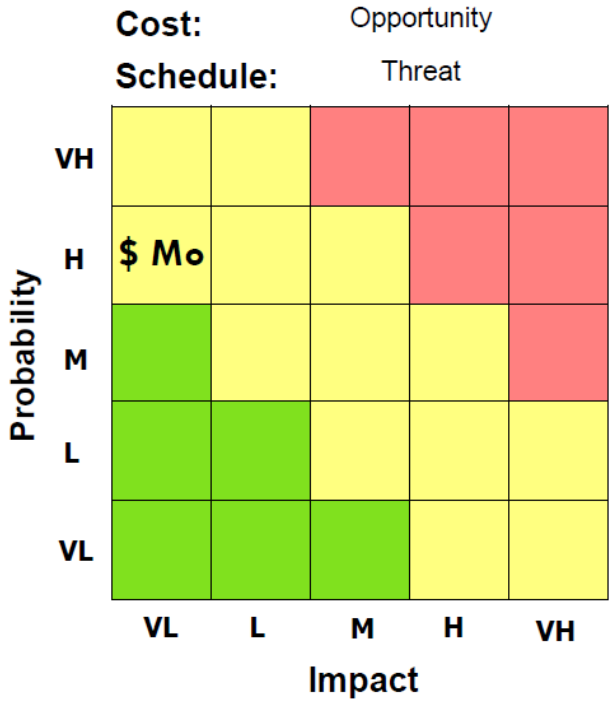
Cost

Min ($M)	Most Likely ($M)	Max ($M)	Expected Value Impact ($M)	Project Risk Rank
($0.750)	($0.200)	$0.250	**($0.173)**	9

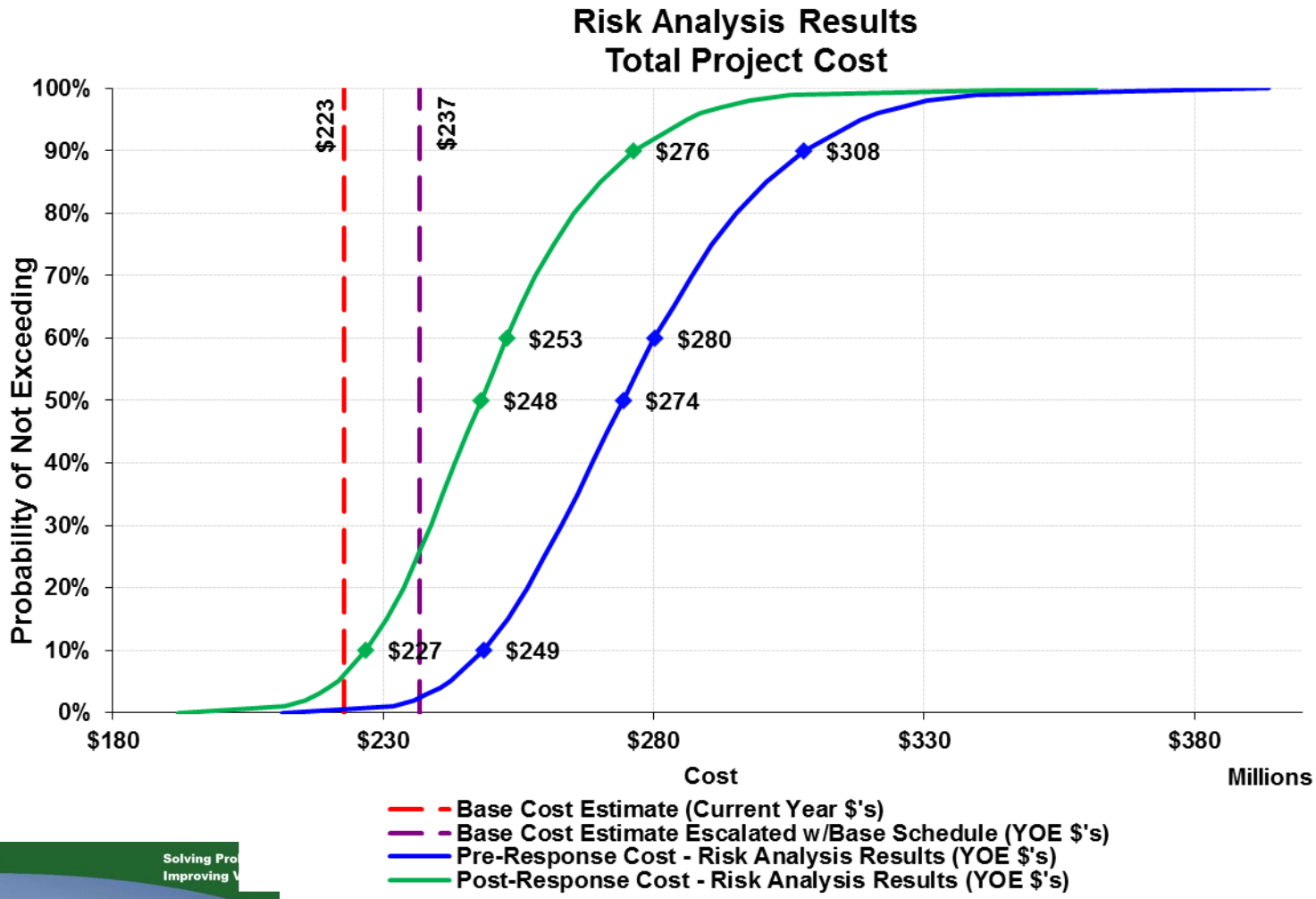
Schedule

Min (MO)	Most Likely (MO)	Max (MO)	Expected Value Impact (MO)	Program Risk Rank
1.00	2.00	3.00	**1.60**	44

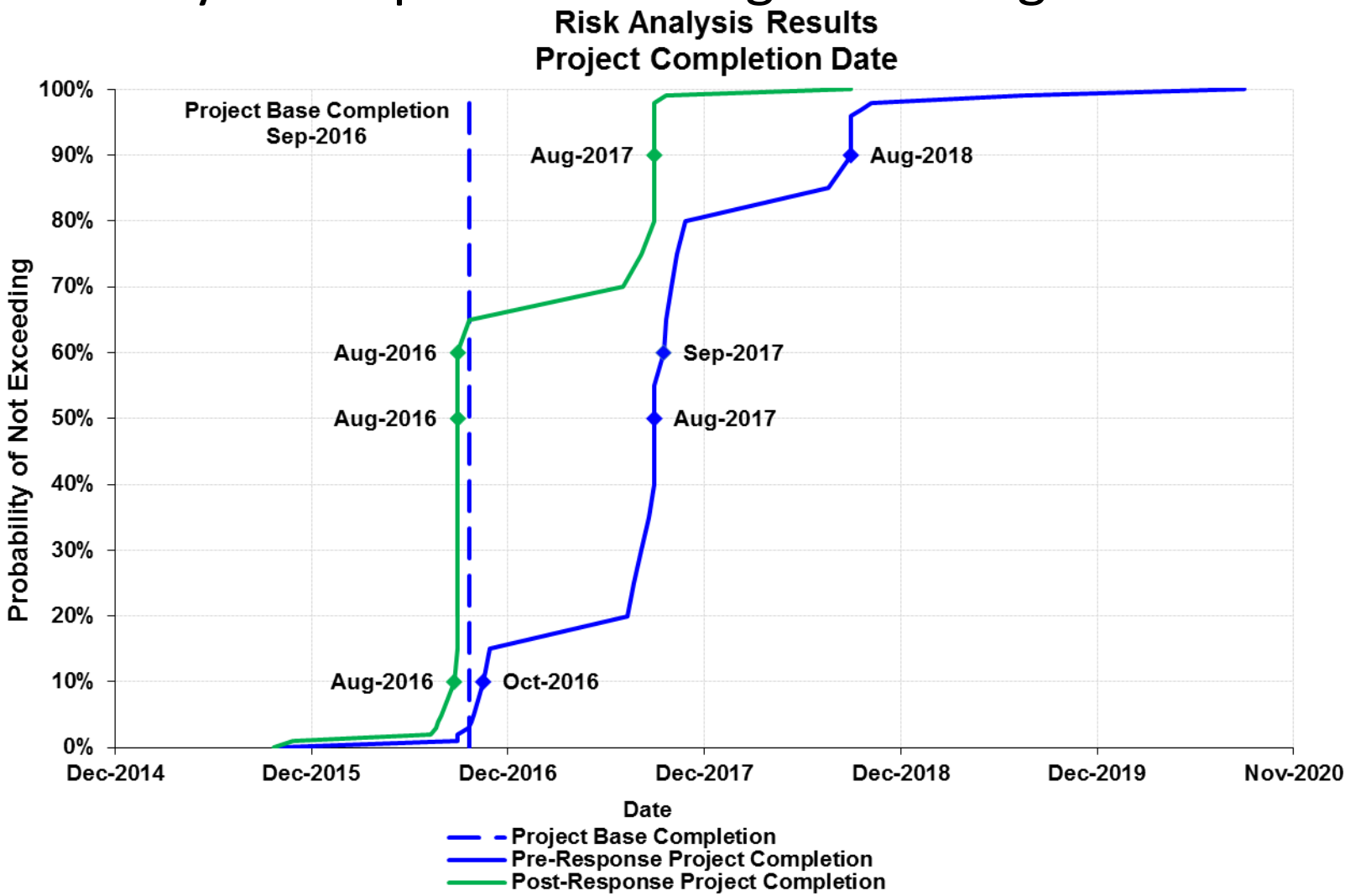
Wall is nearly 70' tall, there could be issues with groundwater, excavation of spoils in front of the wall. Soil is very fine and if it's too saturated may not be able to get equipment into and out of the area. If soldier pile wall is used there could be localized caving due to running of the fine sand, would have to design to seal this off to prevent caving. Risk covers all uncertainties related to the Maintenance Building, Related Walkways and Mooring Dock Facilities. Groundwater is upwelling in the lake and supporting salmon spawning and resource agencies want this to continue. this may require raising the facility and associated docks. By raising it could be less dewatering Medina may push back on a facility that is higher. The soldier pile wall costs in the



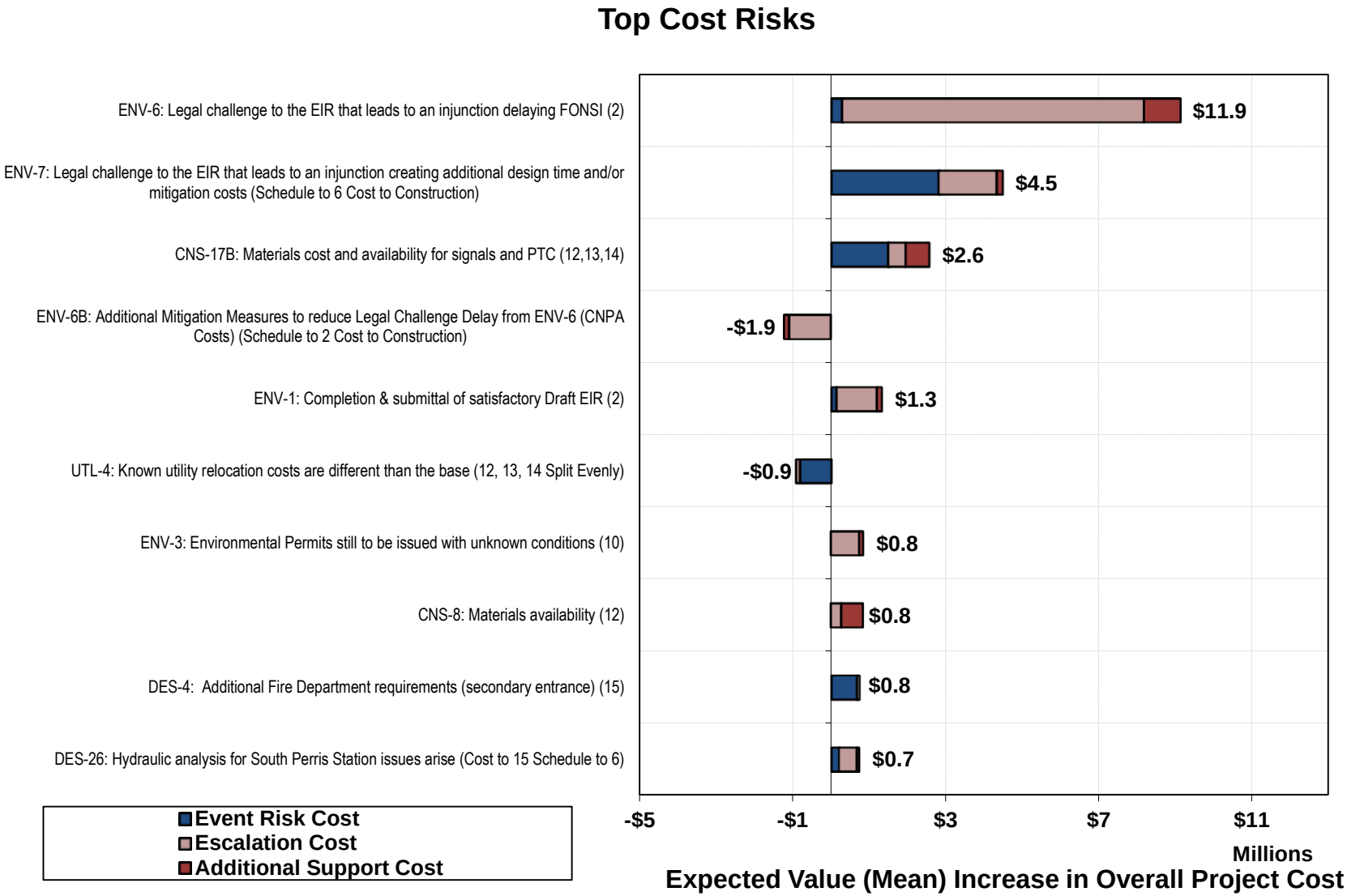
Risk Analysis Output
Answering: How much will it cost?



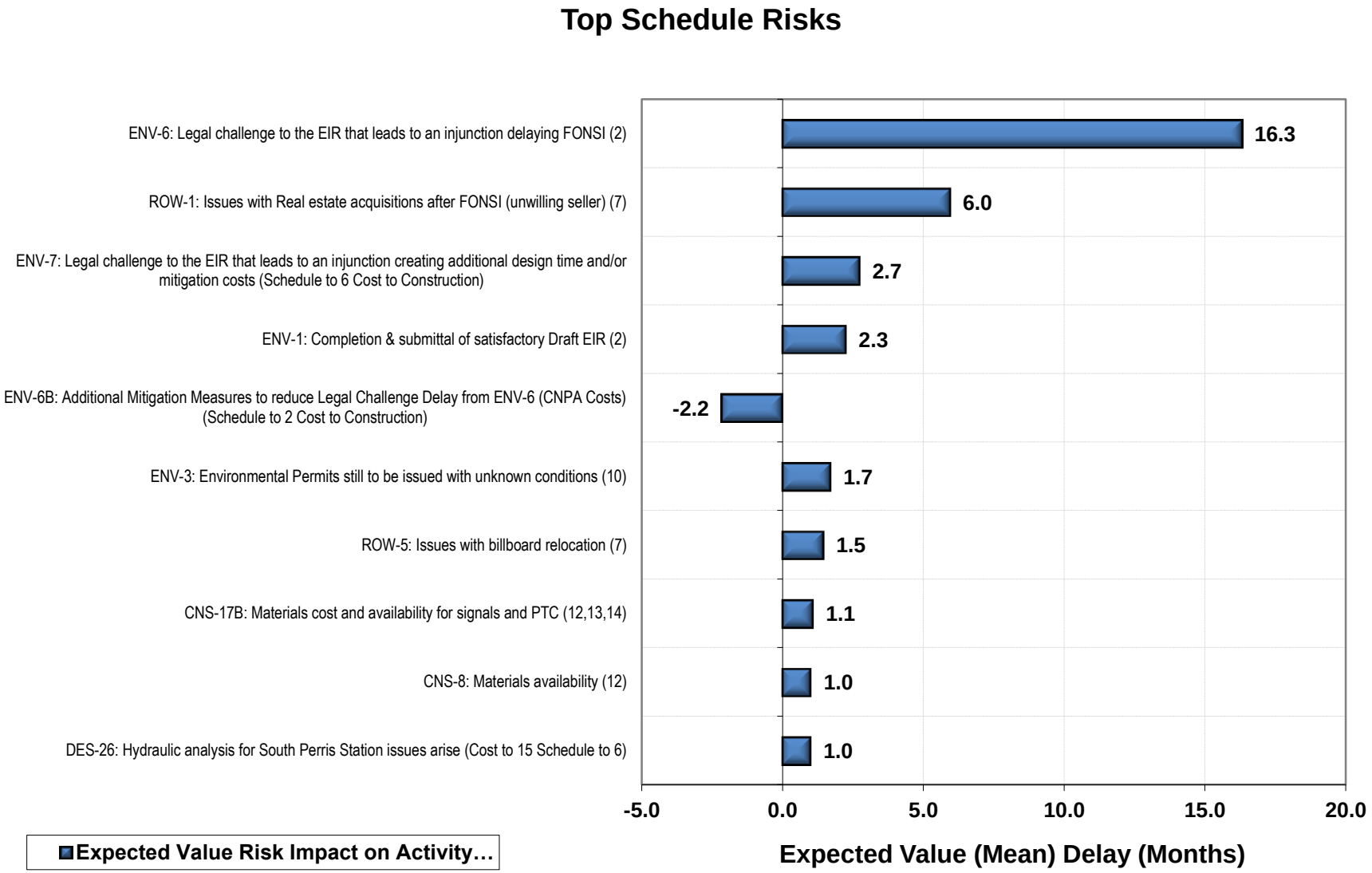
Risk Analysis Output Answering: How long will it take?



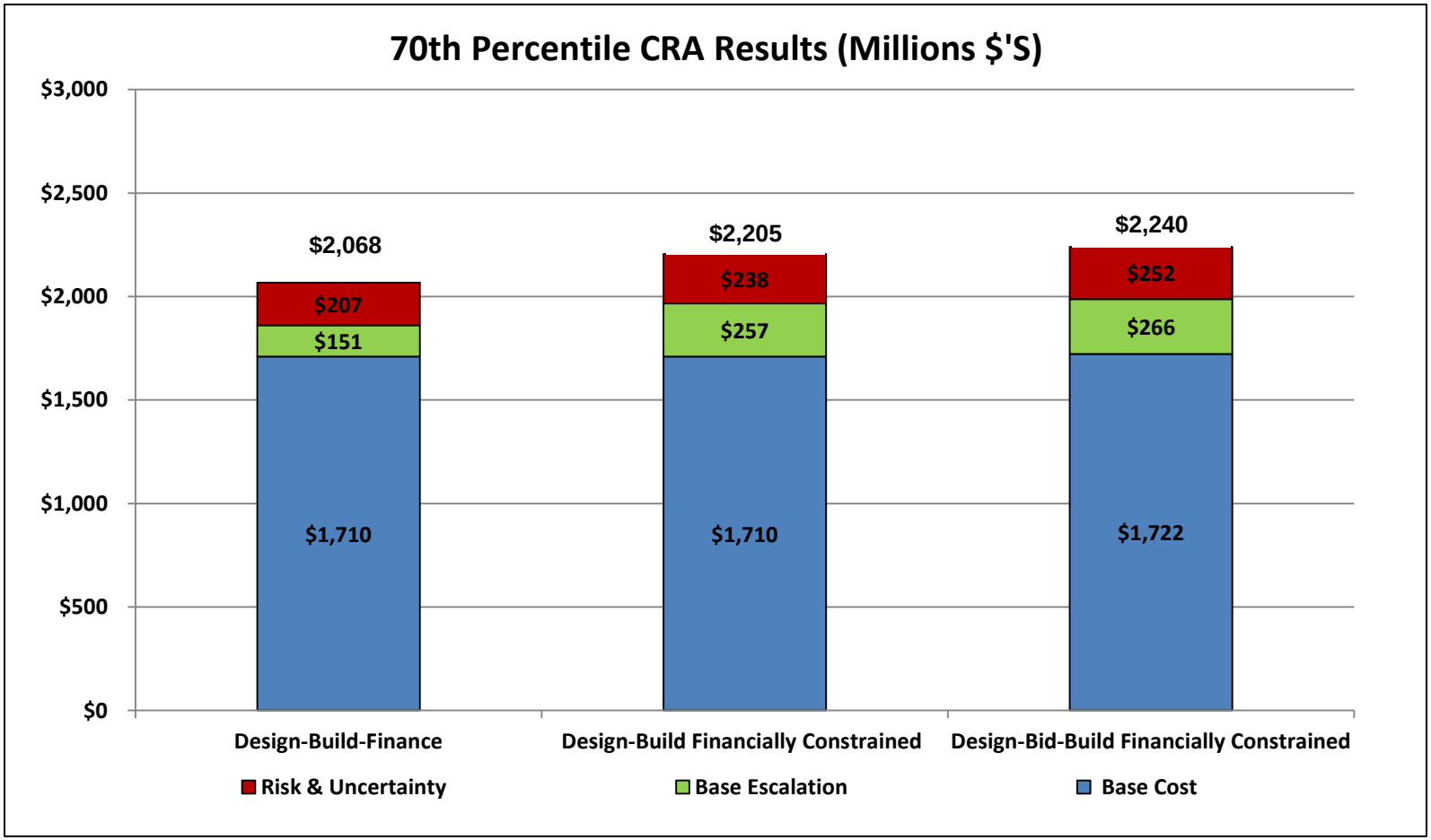
Risk Analysis Output Answering: Why does it cost that much?



Risk Analysis Output Answering: Why does it take that long?

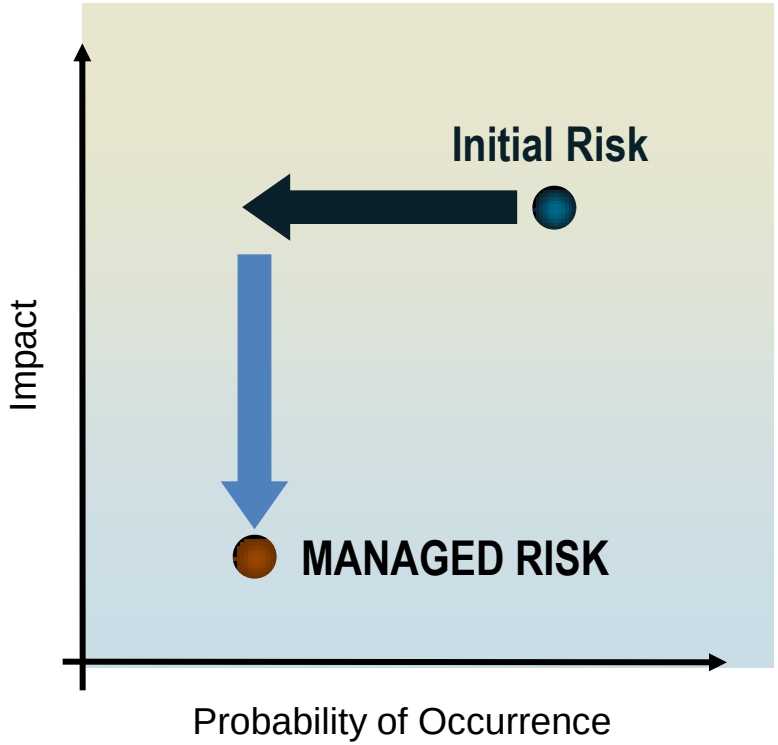


Risk Analysis Output
Supporting the Decision Process



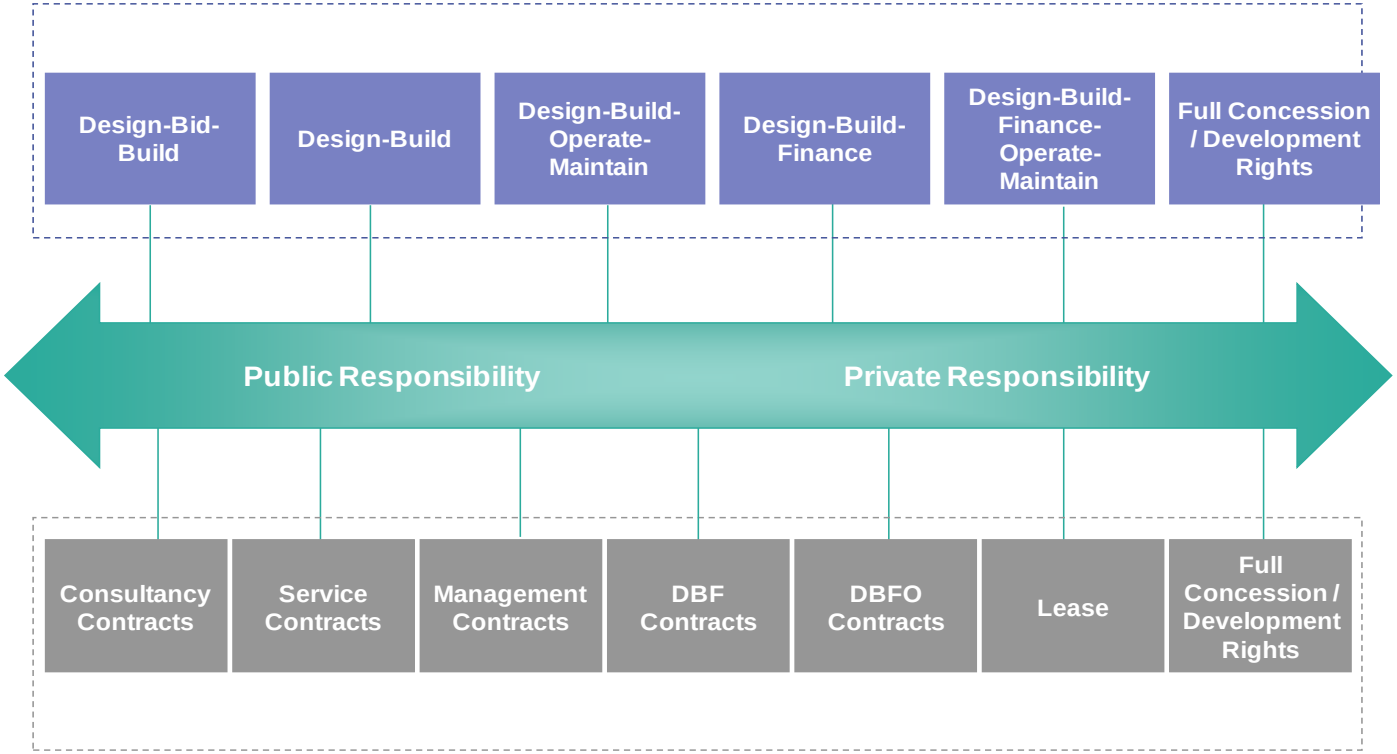
Risk Management

- **Risk Assessment's** aim is to assess the potential impact of various scope, event, and budget risks on the project's cost and schedule.
- **Risk Management's** aim is to identify opportunities and mitigation strategies to reduce both the likelihood of an event occurrence and the potential impact if it occurs.



P3 Example: Structures Overview

A. Delivery Method



B. Payment Mechanism

Milestone Payment | Availability Payment | Shadow Tolls | User Fees

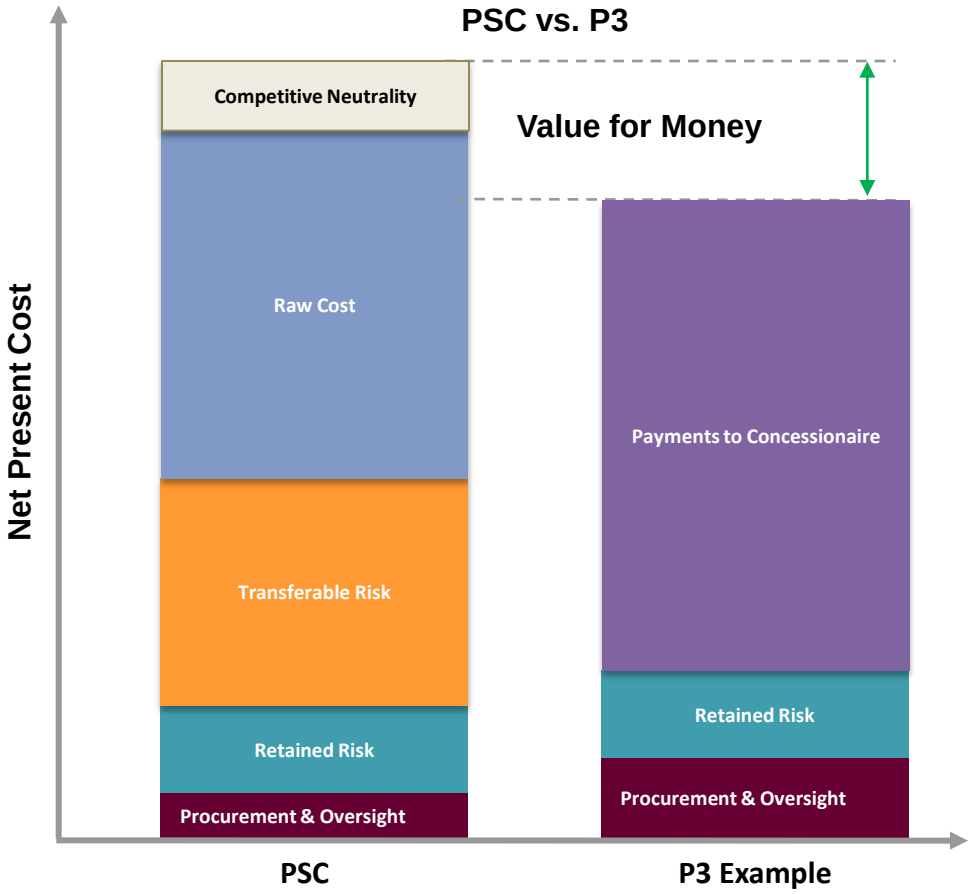
C. Financial Structure

Public Funds | PABs | TIFIA | Bank Debt | Private Equity

What is the objective of Value for Money?

Value for Money Analysis

- Used to identify whether one project delivery option provides value as compared to another based on a quantitative and qualitative basis.
- Provides a basis upon which a public authority can decide to proceed with a particular procurement strategy.
- Typical value for money drivers:
  - Optimal risk allocation
  - Performance bases / incentive driven contract
  - Private sector management skills
  - Competitive leverage
  - Long term nature / whole of life approach



Why should you care about VFM?

- A reflection of construction costs through the pricing of risk
- An assessment of complete life-cycle costs early on in the project development phase
- Integration of service and operational needs with facility design and construction
- Optimal allocation of risk
- Encouraging innovative delivery solutions by use of an “outputs” specification approach
- Clearer focus on respective responsibilities

FACTORS TO CONSIDER

Performing Quantitative VfM Analysis

Risk Adjusted Pro-Forma Cash Flows

- Cash flow Inputs provided by technical team
- Costs and revenues for each year of the analysis
- Risk adjustment of raw costs for each line item
- Split between Agency retained costs and P3 Developer costs
- Construction; O&M; Lifecycle and Revenue

Convert cash flow to nominal dollars

- Depending on the stage of the analysis the inflation adjustment can be very detailed.
- CPI
- GDP per capita
- Construction cost index

Develop Traditional and P3 financing approaches

- PSC
  - Tax-exempt bonding
  - Public agency debt policy restrictions
  - Public agency funding sources (Federal/State/Local)
- P3
  - Private equity investment
  - Private activity bonds
  - Short term bank debt
  - Differences depend on contract structure (revenue risk or availability payment)

Develop Traditional and P3 financial models

- Public Sector Comparator combining nominal cash flows and financing for traditional approach
- P3 financial model developed as a "Shadow Bid" to estimate possible market valuation of the project

Compare results in present value dollars to determine Value for Money

Financing considerations - PSC

Public Sector Comparator

Funding sources include:

- Federal funding sources
- Local Sales Taxes
- Toll revenues

Financing structure is tax exempt and will include:

- Identified funding source such as Grant Anticipation Notes (GAN)
- Commercial paper
- Bonds
- Sales Tax revenue bond (Tax exempt)
- Toll revenue bond (Tax exempt)

Key terms of financing:

- Debt recourse may be general but typically limited to revenue source
- Maximum terms set by agency debt policy (20yrs)
- Repayment style set by agency debt policy (level debt service)
- Color of money factors

Summary:

- Lower overall cost of financing.
- Limitations on ability for financial innovation may exist.
- Implications of recourse nature depends on debt type – for example, General or Limited obligation, toll revenues

Financing considerations – P3

P3 approach

Funded sources may include:

- Subsidy payments during construction
- Milestones
- Availability payments
- Toll revenues

Financing structure will include:

- Private equity
- Bond financing - Taxable or Tax Exempt (PABs)
- Bonds
- Bank financing
- Letters of credit

Key terms of financing:

- Secured by the rights of the P3 contract
- Non-recourse structure
- Debt repayment is sculpted to cash flows
- Equity and debt repayment are linked to asset performance

Summary

- The cost of private finance (equity and debt) is usually higher, however:
  - This is offset by optimal risk transfer; and
  - Most P3 projects are now delivered with Private Activity Bonds (a source of long term tax exempt financing).
- Lender oversight provides additional benefit.
- Non-recourse, off-balance sheet.
- Certainty of funding plan.

Discount Rate

What is a discount rate and how is it used?

- A discount factor (DF) is used to convert future revenues and costs to a single number on a given date – i.e. a NET PRESENT VALUE (NPV)
- NPV is a key input to any quantitative evaluation of project delivery selection
- The DF is an economic and policy decision determined by the public agency
- The DF is typically based on the public agency's cost of debt (or the risk free rate)

What are potential issues with choosing an appropriate discount rate?

- NPV is sensitive to small changes in the DF
- Risk adjustment is captured in the cash flows and the DF
- Risk adjustment is not an exact science

Below are sample discount rates:

Project	Discount Rate
Presidio Parkway (California)	8.5%
Autoroute 30 (Quebec)	6.5%
I-595 Corridor Roadway Improvements (Florida)	5.0%
Brent Spence Bridge Corridor (Ohio / Kentucky)	5.0%

Summary of Quantitative Results Table

- Outputs from both PSC and Shadow bid (P3) models are compared in present value terms
- Total cost of each delivery option is presented by line item
- Typically, two adjustments are made to the PSC:
  - The cost of self-insurance is added to the PSC cash flow; and
  - The "cost" of tax income foregone under the PSC is added back.
- Those costs for activities retained by the Authority are added back to the P3 option – included retained risks and oversight.
- Quantitative value for money is demonstrated by a lower total net present cost

Quantitative Summary of Results (NPV $) – Availability Payment example	
Public Sector Comparator	P3 delivery
Design-build costs	Total availability payments
O&M costs	Milestone payments
Lifecycle costs	
Financing costs	
Other adjustments	
Insurance	Retained costs
Taxes	
Total cost of PSC	Total cost of P3