MARSH RISK CONSULTING

RISK. DISPUTES. STRATEGY.

ERM for Construction
Oregon RIMS Chapter

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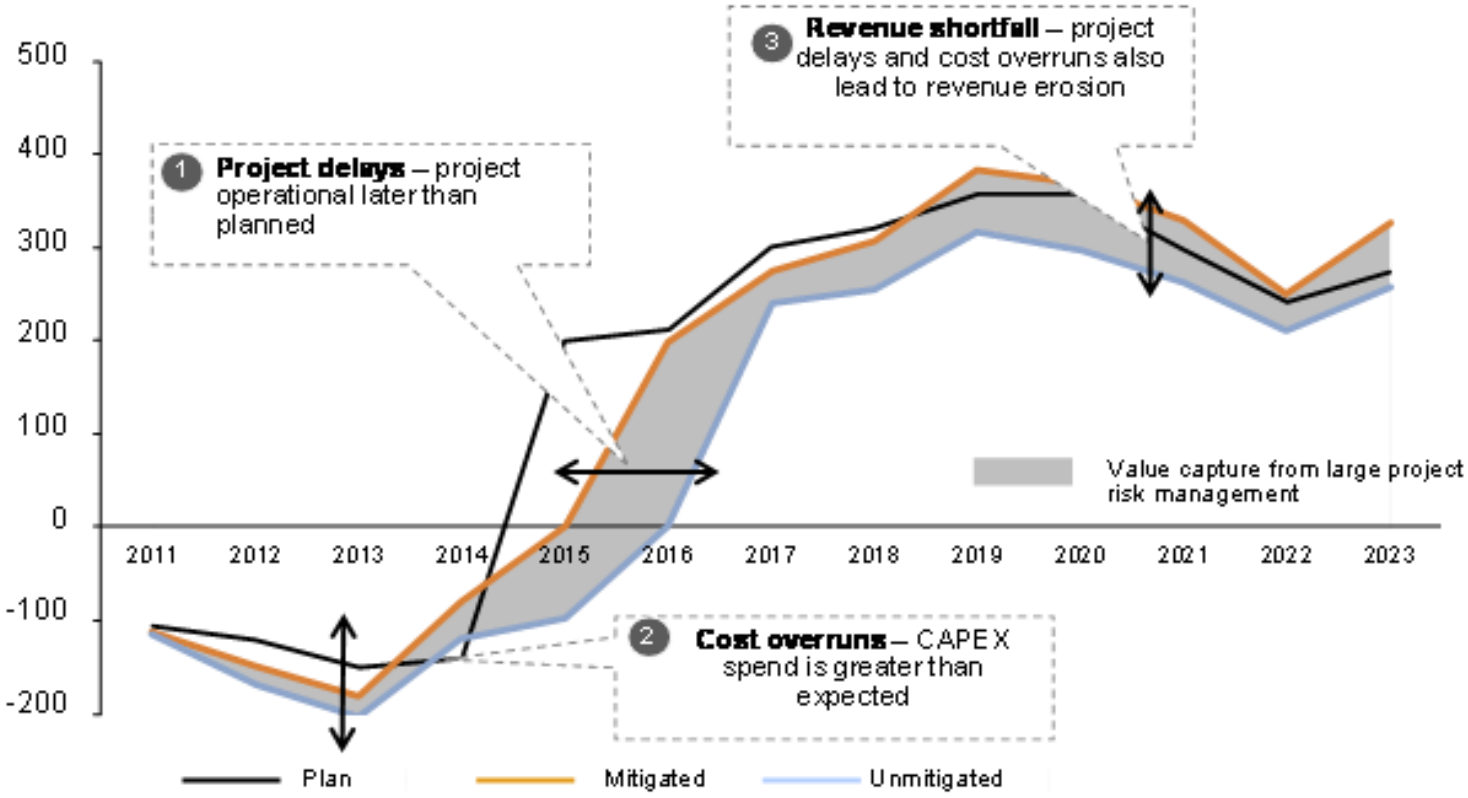
Agenda

- Risk Management Best Practice Overview
- Case Study
- Claims Avoidance Within Risk Management
  - Project Controls embedded in risk management
  - Change Management best practice

Section 1

RISK MANAGEMENT BEST PRACTICE OVERVIEW

Case for Project Risk Management



1 Project delays

- Timing flexibility and scheduling re-sequencing
- Single source project management data (one timeline, one cost plan)
- Quick issue escalation from technical level to project management

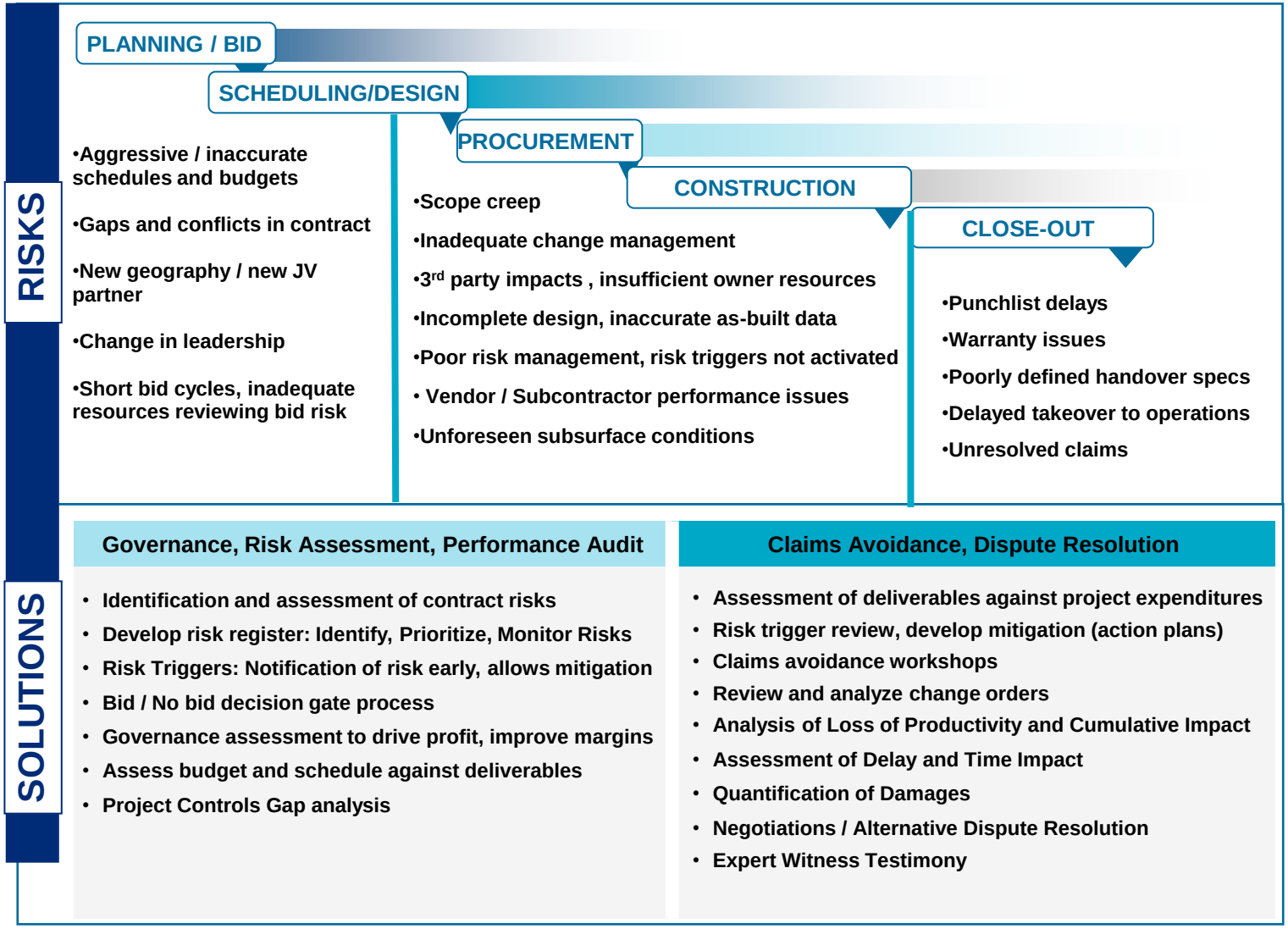
2 Cost overruns

- Minimise rework cost through forward looking quality assurance
- Increase efficiency productivity through training initiatives
- Alignment of KPIs to project performance to manage costs

3 Revenue shortfall

- Strong accountability for project management for financials
- Organisational improvements and BU incentives
- Ensure project flexibility to exploit revenue upside during operations

Risk Management During the Project Lifecycle

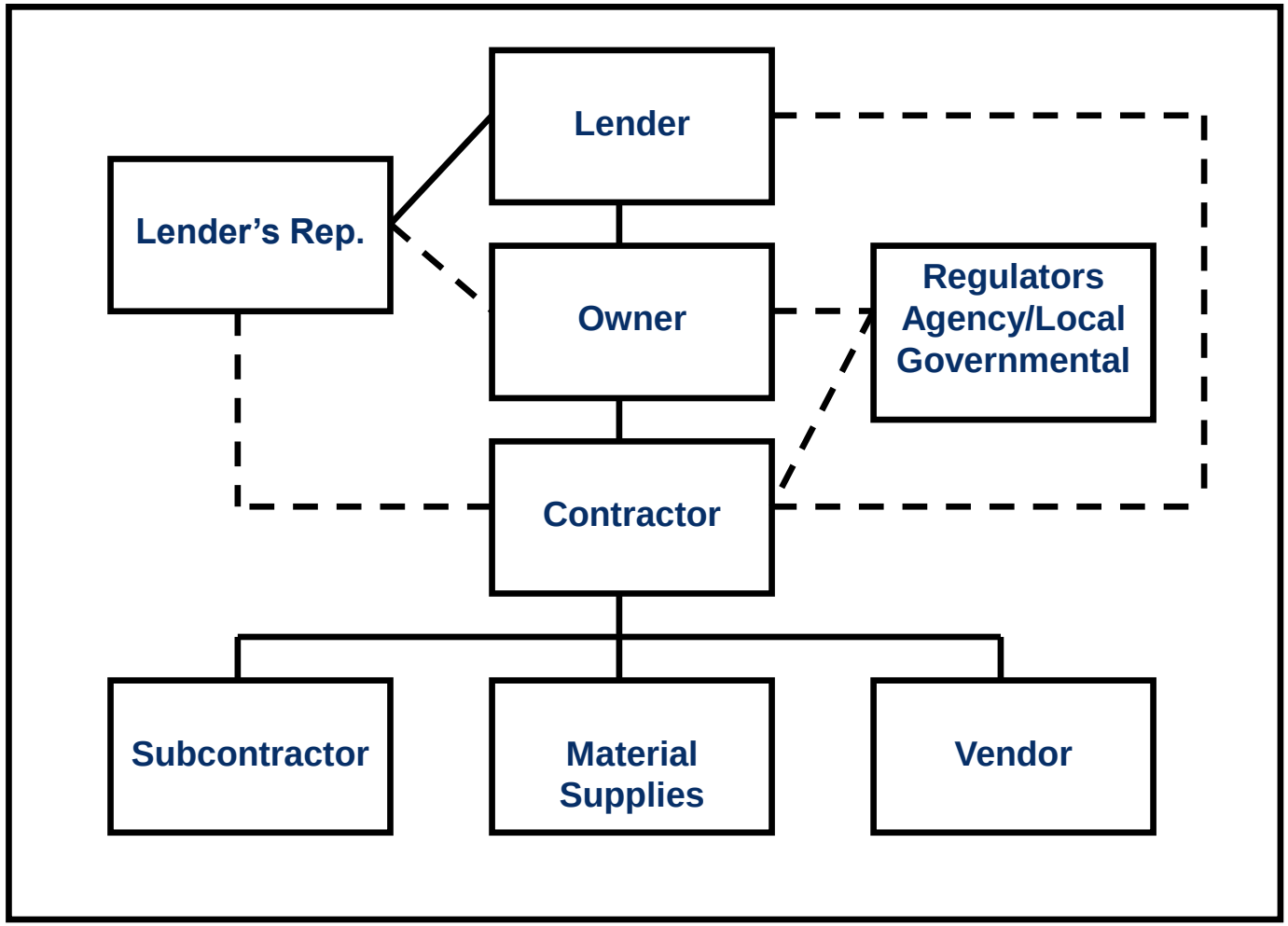


Project Risk Management: Owner's Perspective
Best Practices

1. Ensure that cost and schedule estimates are correct to an acceptable level of accuracy.
2. Identify and evaluate execution risks.
3. Identify the Project Success Goals (PSGs), or key objectives
4. Identify and assess risks to achieving PSGs
5. Track risks and actions taken to address the risks
6. Prioritize the risks and actions to be taken
7. Manage risks due to change and variance with plan
8. Monitor and manage Cost of Risk

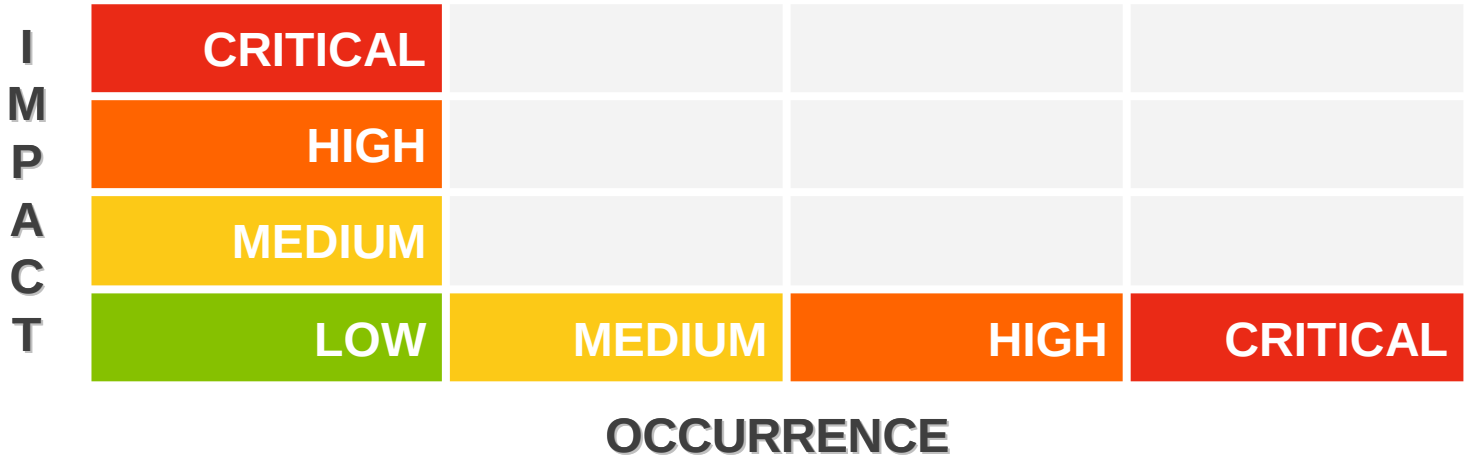
Outside Influences can Drive Schedule and Cost

Project Contract & Scope Relationship Diagram



Qualitative Risk Evaluation

- While Quantitative method provides more opportunity to quantify and manage risks, most organizations will likely use a Qualitative approach due to its simplicity.
- Risks are simply evaluated for
  - Likelihood of occurrence
  - Severity of Impact



Risk Register Development

					RISK IMPACT TO INDICATED PSG						
PHASE	KD #	RISK#	RISK DEFINITION	RISK LIKELIHOOD	PSG1	PSG2	PSG3	PSG4	PSG5		
				Note on Probability of Occurrence: Critical= 90% to 100% High = 61% to 89% Medium = 35 % to 60% Low = 5% to 34% Very Low= L.T. 5%	Citizenship - Maintain Goodwill & Relationship with the End Users – security of supply	Assured Sales Revenue - Long Term Commitments (PPA's) Executed	Competitive - Cost Competitive	Completion - Have Facility Operational for Electrical Generation by First Semester 2017	Operations - Provide Operational Flexibility (back-up and security)	ATTRIBUTES	Action Plan Prepared?
		1C3	US Government issues FERC permit 8 months later than expected due to environmental protests and hearing requirements	Medium	High		High		Low	Outage causes additional costs to be incurred (diesel) and reduces operational flexibility. Note assumes there is no limit in the PPA with regard to supply of diesel electricity.	y
		1C4	FSRU Platform not constructed on time due to problems getting financing - arrives 6 months late - run on diesel	Low	Low		High		Low	The FSRU project have a 6 month clearance Delay may causes additional costs to be incurred (diesel) and reduces operational flexibility	y
		1C5	FSRU Platform Vendor loses financing and fails to provide vessel	Very Low	Medium		High		Low	The suppliers are world class companies Delay may causes additional costs to be incurred (diesel) and reduces operational flexibility	y
		1C6	FSRU Platform Vendor is 6 months late in providing vessel due to subcontractor failing - run on diesel	Very Low	Low		High		Low	The FSRU project have a 6 month clearance Delay may causes additional costs to be incurred (diesel) and reduces operational flexibility	
		1C7	FSRU Platform Vendor produces a vessel that fails to regas at rates required due to design issues (operates at 90% nameplate)	Very Low	Low		Very Low		Low	The FSRU capacity is for 1000 MW	
		1C8	FSRU Platform Vendor unable to secure hook up due to weather conditions for up to 3 weeks - run on alternative fuel Diesel	Very Low	Low		Low		Low	Delay may causes additional costs to be incurred (diesel) and reduces operational flexibility	
		1C9	FSRU Platform fails to get Chilean Concession permit due to failure to meet Chilean concession requirements (Delay for four weeks)	Very Low	High		Low	Low		Delay may causes additional costs to be incurred (diesel) and reduces operational flexibility. Plan may not be ready on time.	
		1C9A	FSRU Platform fails to get Chilean Concession permit due to failure to meet Chilean concession requirements (Delay for eight weeks)	Very Low	Low		Critical	Low	Low		y
		1C10	FSRU Platform fails first safety inspection and Chilean Agency shuts it down for 4 months.	Low	Low		Critical	Medium	Low	The FSRU project have a 6 month clearance Delay may causes additional costs to be incurred (diesel) and reduces operational flexibility Note: Risk assumes that cost of FSRU and other fixed costs cannot be passed on to PPA.	y
		1C11	FSRU has severe financial difficulty (bankruptcy) causing non performance of delivery	Very Low	Critical		Critical	Critical		The FSRU project have a 6 month clearance. The contract will have step in right option for GA If financial difficulty occurs before start up it may affect start up date	Y

Action Planning

Ideally, each risk should have something identified to be monitored that is *already measured by project controls* (or could be) to determine if a risk is starting to manifest.

Relationship of Action Plans to Risk Ratings		
Action Plan Type	**Likelihood of Occurrence**	**Severity of Impact**
Monitor	Low-Medium	Low-Medium
Preventative	Low-Medium	High
Mitigation	High	Low-Medium
Combination	High	High

- Definition of the Measurement taken to trigger Action
- Who is responsible for the Action to be taken – appoint risk owners
- Description of the Action to be taken

Section 2

ERM for Construction
Case Study
Vestas-American Wind Technology, Inc.

Construction:

Risk Register Objectives

- Intelligent Management of Risk
  - Proactive
  - Threats & Opportunities
  - Quantify & Define and Execute Response

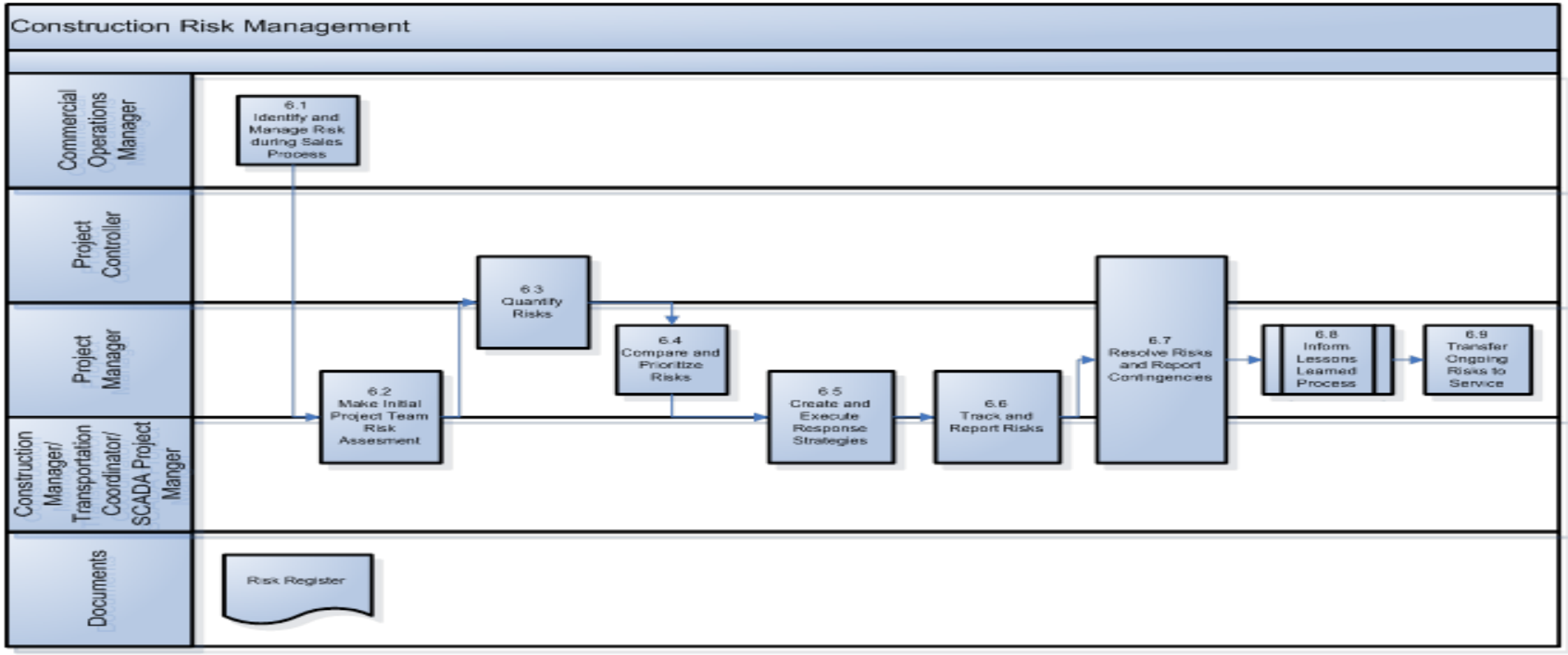
- Define Basis of Contingency
  - Substantiation

- Communicate Project Risk Exposure & Status
  - Sales to Operations
  - Prioritization Tool

- Continuous Improvement
  - Feedback loop
  - Predictability

Active Risk Management is Critical to Project Success

Process Overview



Sales Facilitates & Drives the Process

Identify Threats & Opportunities

Identify Threats / Opportunities

Identified by (Initials)	Log Date	Type	Status	Risk Area (Supply vs Service Agr.)	Title	Customer Impact	Description of Risk	Description of Impact, Calculations & Assumptions
TEST	5-Aug-12	Threat	Open	Construction	**EXAMPLE:** Truck detention exposure	None	**EXAMPLE:** The contract specifies a 4 hr offloading period for trucks versus the 2 hr offloading period in the transport subcontract creating a 2 hr window of detention exposure. This is an intentional hedge to create potential savings on total trucking budget.	**EXAMPLE:** In the event trucks are offloaded in more than 2 hrs, but less than 4 hrs Vestas will incur detention costs. Impact assumed to be 150K ~ $148.5K = 110 turbines x 9 trucks/turbine x .5 hrs/truck x $300 /hr (average of hourly truck detention rates). Likelihood assumed to be 75% based on site conditions and BOP contractor
Initials of person who identified the risk	Date risk identified	Define risk as a threat or opportunity	Open= active risk, Realized= risk event occured Closed= no longer active	Select whether primary impact area is Construction or Service	Provide a short descriptive title	If applicable, select the qualitative impact to the customer based on the potential financial and/or relationship risk	Describe the risk itself in detail.	Describe the potential impact of the risk for the project in detail (what will result if the risk occurs) and provide supporting calculation details/ assumptions

- Subject matter experts identify & analyze:
  - Risks/ threats and opportunities
  - Impacted area internal to Vestas & to customer
  - Key experts required:
    - Construction Mgmt., Transportation, Planning, SCADA, Service Ops
- Identified via:
  - Support of negotiations
  - Past experience
  - Review of contract/ exhibits
- Calculations & assumptions have to be documented!
  - Aids Finance to quantify impact and ultimately setting contingency amounts
  - Drive to increased consistency/ baseline assumptions

Subject Matter Experts Own the Input

Analyze & Respond

Analyze Threats / Opportunities					Response Strategy		
Worst Case Impact ($ or n/a)	Likelihood (0-100%)	Level (0-10)	Customer Impact	Weighted Impact	Treatment	Description & Status of Treatment	Treatment Cost
$150,000	75%	3.0	None	$112,500	Multiple Types	**EXAMPLE:** Use appointment times and daily communication to facilitate timely offloading. Hold recommended contingency in post calc until deliveries complete to cover actual detention incurred. It is assumed both potential impact and likelihood are reduced as a result of mitigation measures.	$1,000
Quantify the worst cost impact to Project P&L ONLY (ie potential delivery LDs) Use positive values. If no monetary impact set "0". If non quantifiable enter ie. "n/a", "tbc", etc	Specify likelihood of risk event to occur (100% if risk event occurred)	Risk level value calculated based on the risk impact & likelihood using the Risk Matrix Tab		Represents the amount (impact x likelihood) recommended to be held in contingency to cover the risk.	Select the method or combination of methods being used to minimize the threat or maximize the opportunity	Describe what actions are planned or being used to treat the risk. If relevant, provide a status of the actions. If a threat, describe actions used to limit or eliminate the threat. If an opportunity, describe actions used to maximize it.	Specify the cost associated with the risk treatment (ie insurance cost, add. Manpower)

Materiality Threshold

- Project **< 100M USD**
  - Impact at least **50K** USD & probability at least **5%**
- Project **>100M & <250M USD**
  - Impact at least **100K** USD & probability at least **5%**
- Project **>250M USD**
  - Impact at least **250K** USD & probability at least **5%**

Response for threats

- **Transfer-** Place responsibility on another party via contract
- **Mitigate-** Lessen the likelihood or impact of the risk
- **Avoid-** Remove the risk entirely
- **Accept-** Determine that this is a risk we are willing to take

Response for opportunities:

- **Exploit-** Ensure the opportunity is realized
- **Share-** Allocate full or partial ownership to another party who is best equipped to capitalize on it
- **Enhance-** Increase the probability or the degree of impact
- **Accept-** Be willing to take positive impact

Quantifying Risk & Setting Contingency Budget

- Impact must be quantified
  - PM and Controller work collectively
  - Soft risk should be quantified, if possible
    - Safety
    - Negative impacts to customer

- Controller serves as a review function
  - Validate assumptions
  - Guide quantification

- Contingency budget
  - Sum of weighted impact amounts
  - Reflected in pre-calc
  - Reviewed by Controller

- Finance to complete a final review
  - As part of Final Exec. Review

Finance Plays a Critical Role

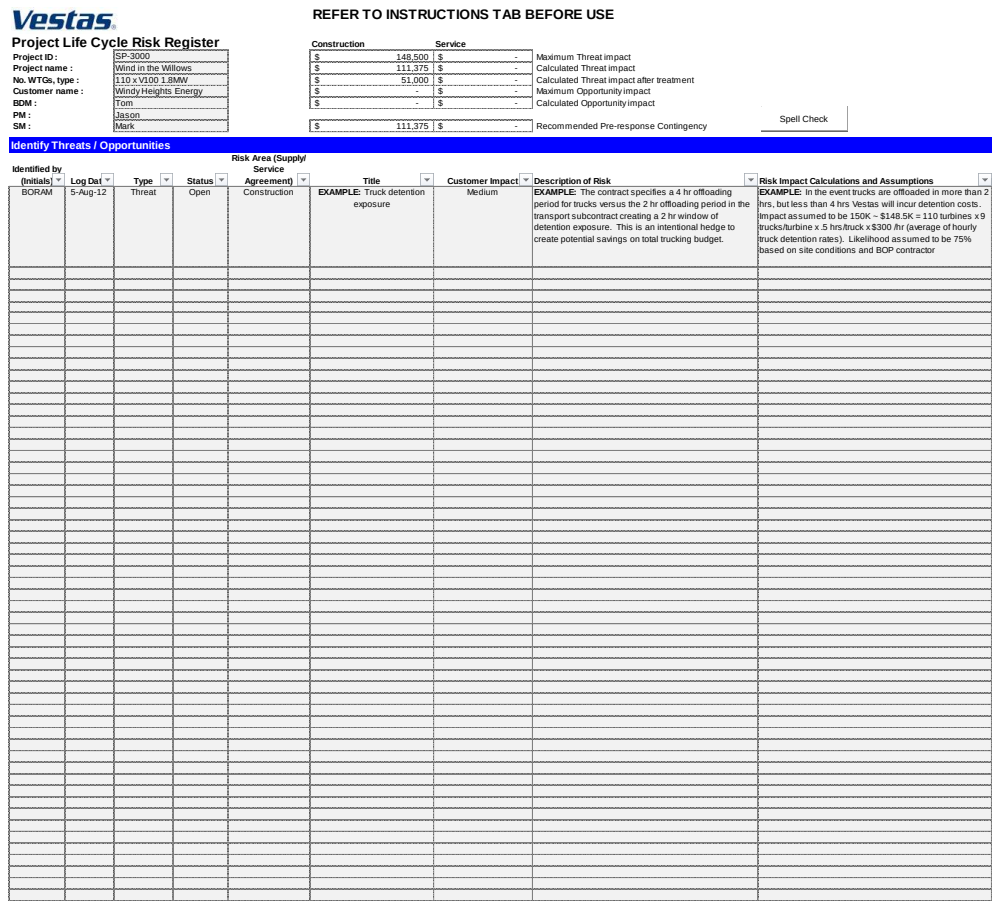
Post Response Analysis

Post Response Impact Analysis (After Treatment Implemented)

Worst Case Impact ($)	Likelihood (0-100%)	Level (0-10)	Weighted Impact	Expected / Actual Results	Owner (Initials)	Due Date
$100,000	50%	1.0	$51,000	**EXAMPLE:** Some detention occurs, but there is still an overall savings on the transport budget as a result of the hedge.	TEST	5-Oct-12
Quantify impact after risk treatment has been implemented (ie. reduced potential delivery LDs) Use positive values. If no monetary impact set "0". If non quantifiable enter ie. "n/a", "tbc", etc	Specify likelihood of risk event to occur after risk treatment has been implemented from 0-99% (100% if risk event occurred)			Describe expected results after risk treatment is implemented as well as actual results once treatment is complete	Assign a risk owner	Date when risk is expected to be treated and thus closed

- Actual impact:
  - Project Controller to quantify via review/ analysis of “actual spends”
  - PM to register final results in Risk Register
- Risks closed prior to Handover
  - Must be “reconciled” with the person who entered
  - Explanation documented in the Expected/ Actual Results section

PLCRR – Project Life Cycle Risk Register



Vestas

Project Life Cycle Risk Register

REFER TO INSTRUCTIONS TAB BEFORE USE

Project ID :	SP-3000
Project name :	Wind in the Willows
No. WTGs, type :	110 x V100 1.8MW
Customer name :	Windy Heights Energy
BDM :	Tom
PM :	Jason
SM :	Mark

Construction	Service	
$ 148,500	$ -	Maximum Threat impact
$ 111,375	$ -	Calculated Threat impact
$ 51,000	$ -	Calculated Threat impact after treatment
$ -	$ -	Maximum Opportunity impact
$ -	$ -	Calculated Opportunity impact
$ 111,375	$ -	Recommended Pre-response Contingency

Spell Check

Identify Threats / Opportunities

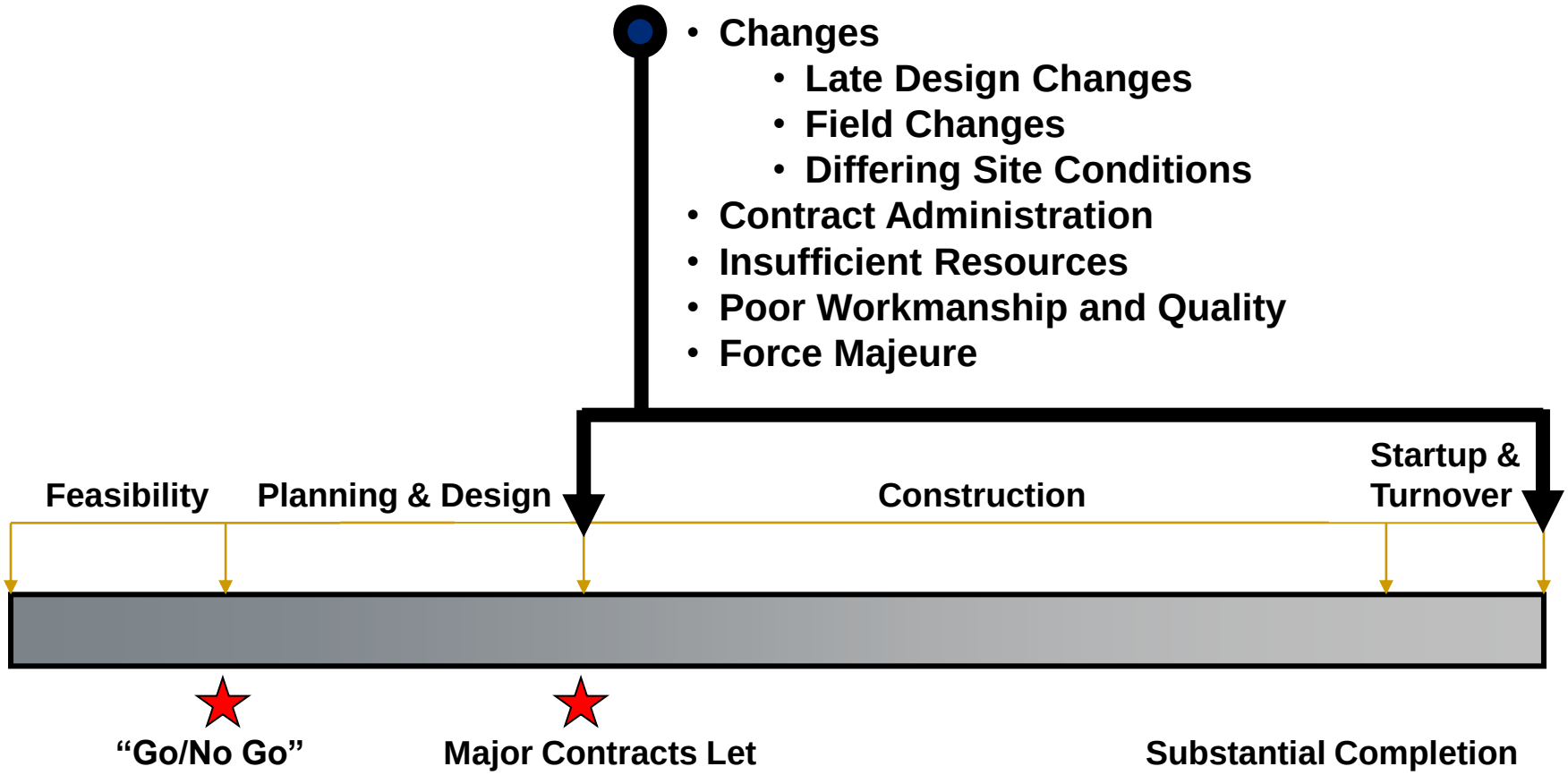
Identified by (Initials)	Log Dat	Type	Status	Risk Area (Supply/ Service Agreement)	Title	Customer Impact	Description of Risk	Risk Impact Calculations and Assumptions
BORAM	5-Aug-12	Threat	Open	Construction	**EXAMPLE:** Truck detention exposure	Medium	**EXAMPLE:** The contract specifies a 4 hr offloading period for trucks versus the 2 hr offloading period in the transport subcontract creating a 2 hr window of detention exposure. This is an intentional hedge to create potential savings on total trucking budget.	**EXAMPLE:** In the event trucks are offloaded in more than 2 hrs, but less than 4 hrs Vestas will incur detention costs. Impact assumed to be 150K ~ $148.5K = 110 turbines x 9 trucks/turbine x .5 hrs/truck x $300 /hr (average of hourly truck detention rates). Likelihood assumed to be 75% based on site conditions and BOP contractor

Section 3

CLAIMS AVOIDANCE WITHIN RISK MANAGEMENT

Claim Avoidance Within Risk Management
Introduction

Awareness of Project Execution Risk: Construction and Startup Phases



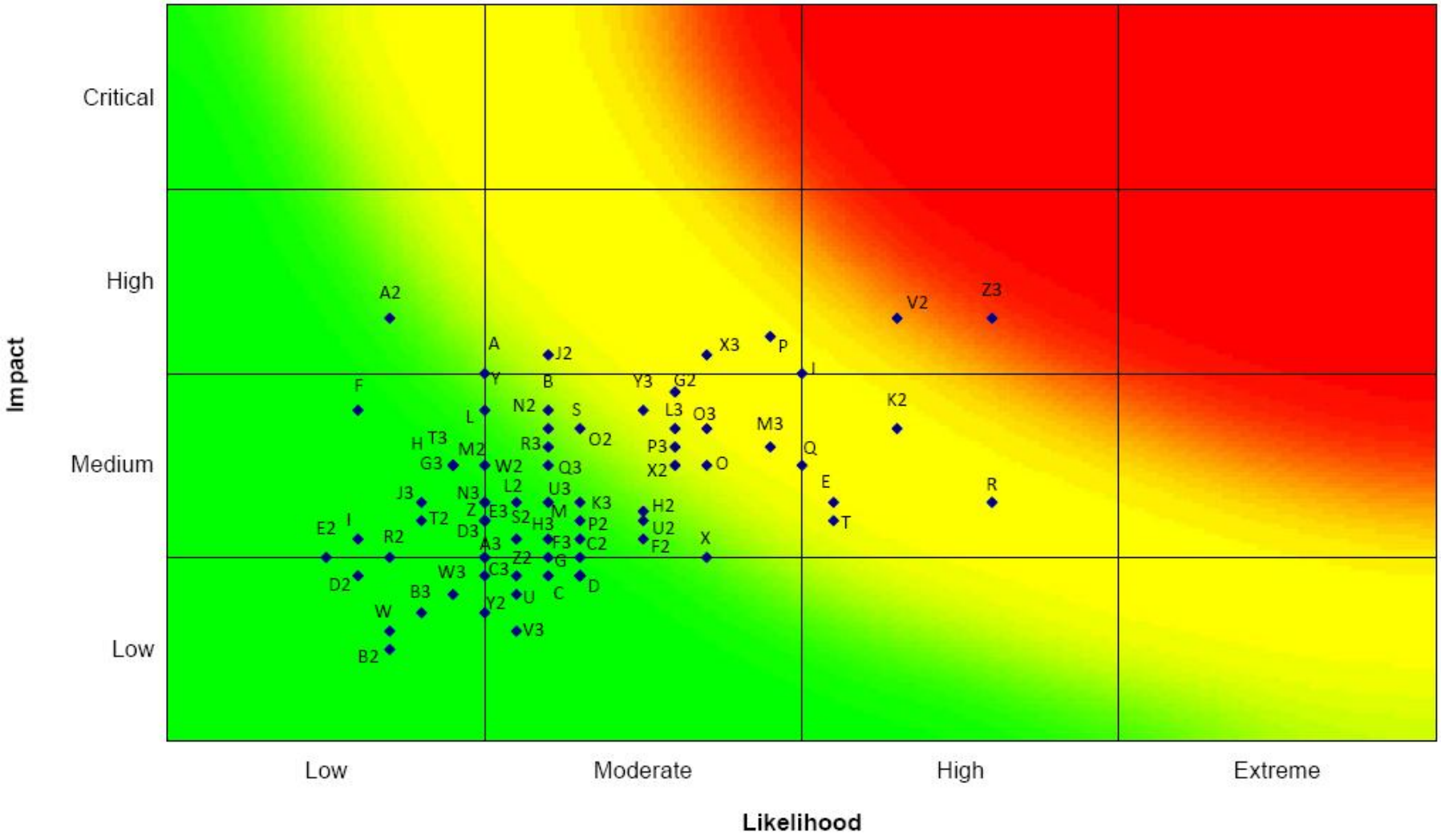
Project control is embedded in Risk Management

- Risk Triggers should be within project controls system
- Failure to recognize or track changes—time/cost impacts
- Recognizing/Communicating critical path risks
  - Contemporaneous schedules
- Failure to up-date progress accurately will affect triggers
  - From baseline schedule through monthly updates
- Cost coding for added scope
- Schedule dates consistent with Job Cost Reports, daily reports

Integrating with Risk Management

- Progress tracking (actual vs planned)
  - Long lead procurement check (prioritized risks)
  - Milestone review (approvals / permitting)
- Daily reports, time sheets, extra work order support
- Meeting minutes, key decisions documented
- Subcontractor payment records, progress reporting
- Cost coding reflects work breakdown structure
  - Extra work (change orders)

Claim Avoidance Within Risk Management



Cost Overrun Risk

- Track and monitor subcontractor labor and equipment records.
- Cross-check all labor/plant records for accuracy and timing.
- Record and give notice of key factors on a contemporaneous basis—trade stacking/out of sequence works, etc.
- Most disruption change orders and resultant claims fail due to 2 factors:
  - Ability to tie impact liability to claimed productivity rates;
  - Poor cost tracking records/conflicting data.
- Use a “measured mile” comparison where possible- which requires adequate project records.

Claim Avoidance Within Risk Management

Claim Management: Summary Advice

- “RECOGNIZE CHANGE WHEN IT OCCURS”
- “NO AUDIT TRAIL – NO RECOVERY”
- “GIVE NOTICE OF COST IMPACTS”
- “BE CONTEMPORANEOUS”
- “CODE EXTRA WORK”
- “DOCUMENT/DOCUMENT”

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