

Project Management

Lecture 7- Risk Management

Dr. Andre Samuel

Agenda

Session 3- 5:00 pm to 7:00 pm

5:00 pm to 6:15 pm

Project Risk Management

- Risk Identification
- Risk Analysis and Mitigation
- Risk Register

6:15 pm to 6:30 pm

Coffee/Tea Break

6:10 pm to 7:00 pm

Look at the Assignment

- Reflective- where are we?
- What to work on during the weekend?

In this Lecture

- Risk Management
 - Risk Identification
 - Risk Analysis
 - Risk Reduction/Mitigation

Fundamentals!

- Everything we do carries risk
- Project which break new ground attract many risks
- **Project risks can be predictable or completely unforeseeable**

- Risks can occur at any stage in a project
- For very large projects it is necessary to **appoint a Risk Manager**, who develops and monitors a comprehensive Risk Strategy
- Project Support Office is a logical place for the risk management function to reside

Crown Point airport in Tobago



Source: Gatechecked (2020)

Trinidad- Toco Port



Perspective Sketch, Birds Eye View



View of Moorings to Ferry Terminal and Port Admin



View of Coast Guard Building



Machernian Maccine Model Quoruina



View Over Harbour



View From Capitainerie to Ferry Terminal Building



PERPECTIVE VIEW '1'

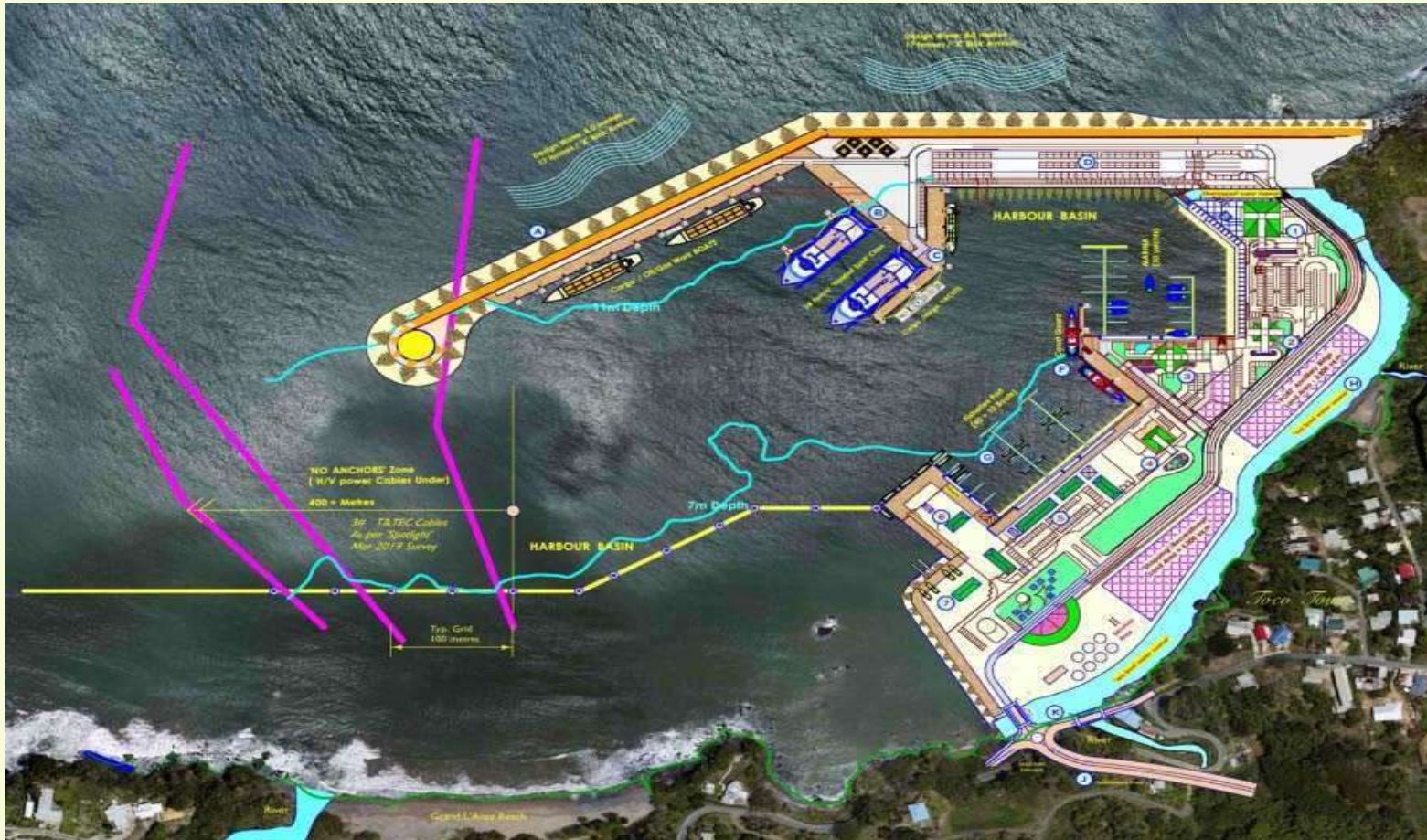
MULTI USE
TOCO PORT
TRINIDAD

ADD/TP
PE
208

27th
MAY 2019

Source: Guardian (2019)

Trinidad- Toco Port



Source: Cari-Bois (2020)

Types of Risks

Contractual Risk
Financial Risk
Design Risk
Procurement Risk
Tender Risk
Safety and Health Risk
Security Risk
Human Resource Risk

Importance of Risk Management

- Potential effects range from **trivial inconvenience to project disaster**
- A risk even that **occurs late in a project can be more costly** than a similar event nearer the start of the project

- Simply because as time passes there will be a **greater value of work in progress and higher sunk costs at risk of loss or damage**
- We read in the newspaper about cost overruns and schedule slips on a wide variety of large scale development projects. **Is it because of RISKS?**

Challenger - A Case Study in Risk Management

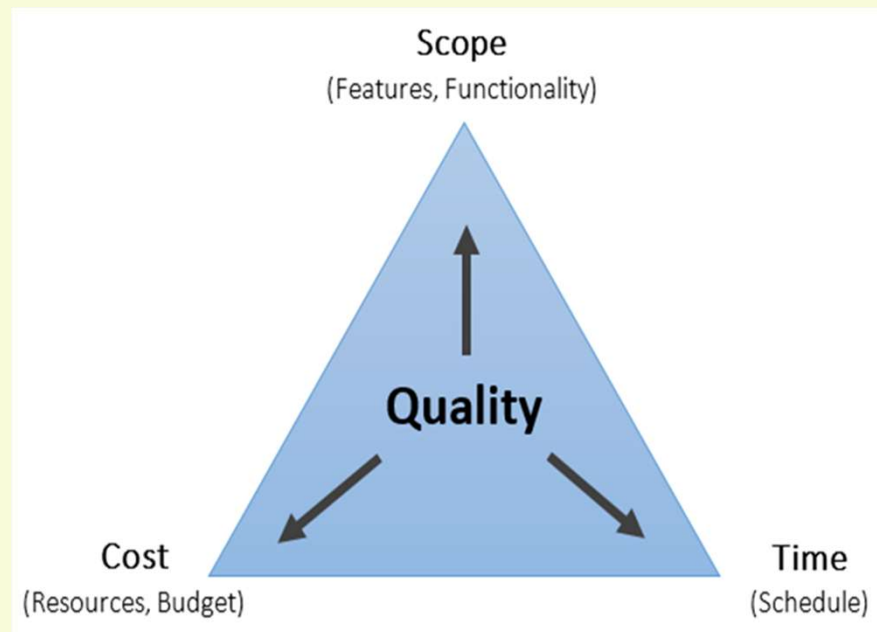


NASA's SpaceX Crew-1 For All Recap



What is a Risk?

- Project Risk is an **uncertain event or condition**
- If it occurs, has a positive or negative effect
- On one or more project objectives:



- A risk has a cause,
- And if it occurs a consequence /impact e.g.
 - Event- not enough personnel assigned to a task
 - Cause- having limited personnel assigned to the project
 - Consequence/Impact- increase in project cost, delays or poor quality

Primary Components for a Risk

- A **Probability** (likelihood) of occurrence of the event
- **Impact** of the event occurring (amount at stake)
- **Risk = f (Likelihood, Impact)**
- In general, as either the likelihood or impact increases, so does the risk

Alternative View

- Risk constitutes a lack of knowledge of future events
- Future events that are favourable are called opportunities, whereas unfavourable events are called risks
- We denote the cause or source of the event as the **HAZARD**
- Hazards can be overcome by knowing them and taking action to overcome them, **SAFEGUARDS**

- So we can say, risk increases with hazards but decreases with safeguards
- **Risk = f (Hazard, Safeguard)**
- The implication is that good project management should be structured to identify hazards and to allow safeguards to be developed to overcome them

Risk Event and Trigger

- For each risk a trigger must be documented.
- The trigger identifies the risk symptoms or warning signs.
- It indicates that a risk has occurred or is about to occur.
- The risk trigger also gives an indication of when a certain risk is expected to occur

Example of Risk Triggers

Risk Event	Risk Trigger
Schedule delay to be expected if the hardware is delivered late.	Confirmed hardware delivery dates not available at project initiation.
Time, cost, and scope deviation to be expected if requirements will not be final at project kick-off.	R-Spec is not ready for customer review 1 week before project kick off.

Risk Management Process

- Risk Management is the act or practice of dealing with risk.
- It includes planning for risk, assessing risk issues (**identifying and analyzing**),
- Developing risk handling strategies (**risk reduction**) and
- **Monitoring** risks to determine how they have changed



- Proper risk management is **proactive** rather than **reactive** e.g. schedule indicates 6mths for an activity, but engineers think that 9mths is more realistic.
- If PM is proactive, they will develop a Strategy right now (**risk averter**), whereas
- If PM is reactive (**risk seeker**) then they will do nothing until the problem occurs
- By that time, PM will have lost valuable time when contingencies could have been developed
- Hence proper risk management will attempt to reduce likelihood of the event and the magnitude of impact

- There is no single textbook answer on how to manage risk
- The project manager must rely on sound judgment and use of the appropriate tools in dealing with risk
- The ultimate decision on how to deal with risk is based in part upon the project manager's and stakeholder's tolerance for risk

Risk Identification

- Involves **determining what risks** might affect the project and documenting their characteristics
- Participants include project team, risk mgt team, customers, end users, outside experts
- Identification is iterative process

Where to start?

- Documentation

- Cost analysis
- Plan/WBS decomposition
- Schedule
- Requirement document
- Lessons learned report
- Resource plan
- Procurement plan
- Assumptions and constraints

Risk Categories

- **External- unpredictable-** gov't regulations, natural hazards, acts of god
- **External- predictable-** cost of money, borrowing rates, raw material availability

External risks are outside the PM control

- **Internal (nontechnical)-** labour stoppages, cash flow problems, OSHA
- **Technical-** changes in technology, design issues, operations issues, change in industry standards

- **Legal-** licenses, patent rights, lawsuits, contractor failure/performance
- **Project Mgt-** poor allocation of time and resources, inadequate quality of plan, poor use of pro mgt disciplines
- **Organizational-** inconsistent objectives of cost, time, scope, lack of prioritization, inadequacy or interruption of funding

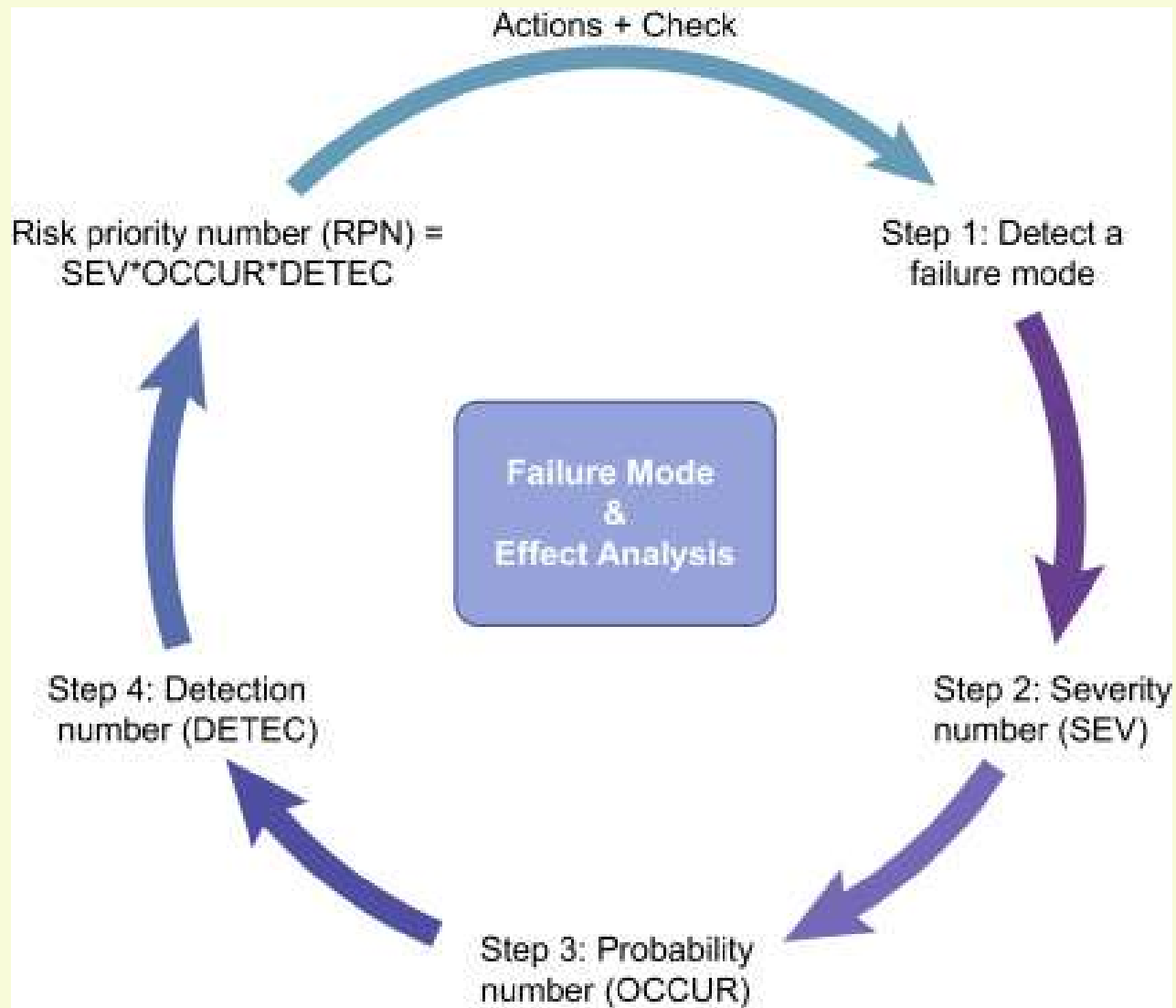
Tools and techniques for Identification

- Documentation review
- Brainstorming
- Delphi technique
- Interviewing
- Checklists
- Cause and Effect - Ishikawa or Fishbone diagram
- Assumption analysis

Risk Analysis Techniques

- Failure Mode and Effect Analysis (FMEA)
- Failure Mode Effect Criticality Analysis (FMECA)
- Risk Score/Risk Exposure = Probability x Impact
- **Risk Matrix (Probability/Impact Matrix)**
- **Risk Register**

FMEA



FMEA

- Identifying all of the probable failure modes
- Assign a value on a 1-10 scale for the:
 - severity ,
 - probability of occurrence ,
 - and probability of detection

	Description	Low Number	High Number
Severity	Severity ranking encompasses what is important to the industry, company or customers (e.g., safety standards, environment, legal, production continuity, scrap, loss of business, damaged reputation)	Low impact	High impact
Occurrence	Rank the probability of a failure occurring during the expected lifetime of the product or service	Not likely to occur	Inevitable
Detection	Rank the probability of the problem being detected and acted upon before it has happened	Very likely to be detected	Not likely to be detected

FMEA Example

Calculate Risk Priority Number (RPN)

$$RPN = \text{severity} \times \text{occurrence} \times \text{detection}$$

FAILURE MODE & EFFECTS ANALYSIS (FMEA)				Date: <u>1/1/2018</u>
Process Name: Left Front Seat Belt Install		Process Number: SBT 445		Revision: <u>1.3</u>
Failure Mode	A) Severity Rate 1-10 10=Most Severe	B) Probability of Occurrence Rate 1-10 10=Highest Probability	C) Probability of Detection Rate 1-10 10=Lowest Probability	Risk Preference Number (RPN) AxBxC
1) Select Wrong Color Seat Belt	5	4	3	60
2) Seat Belt Bolt Not Fully Tightened	9	2	8	144
3) Trim Cover Clip Misaligned	2	3	4	24

Risk Matrix

		IMPACT				
		VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH
PROBABILITY	VERY LIKELY	Yellow	Orange	Red	Red	Red
	LIKELY	Green	Yellow	Orange	Red	Red
	POSSIBLE	Green	Yellow	Yellow	Orange	Red
	UNLIKELY	Green	Green	Yellow	Yellow	Orange
	RARE	Green	Green	Green	Green	Yellow

Risk Register- see template on VLE

Sample Risk Management Register for Project XXXX																																																				
Risk Identification							Qualitative Risk Assessment				Risk Response Plan		Monitoring and Control																																							
#	RMP No.	Status	Risk Category	Risk Event	Cause/Trigger	Effect	Threat or Opportunity	Primary Objective	Probability	Impact	Risk Matrix	Response Strategy	Response Actions	Responsible Entity	Interval or Milestone Check	Status: Date and Review Comments																																				
1		Active	External	Project not fully funded	Budget Constraints- allocation in doubt or subject to change	Project delayed	Threat	Time	High	Very High	<table border="1"> <tr><td>VH</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>H</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>M</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>L</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>VL</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>VL</td><td>L</td><td>M</td><td>H</td><td>VH</td></tr> </table>	VH						H						M						L						VL							VL	L	M	H	VH	Mitigate	Project may be divided into 2or 3 phases with options in the contract	Program Engineer	Monthly	xx/xx/2008
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2		Active	Design	Inaccurate cost estimate	Unit pricing effected by rock excavation and disposal site issues	EE is underestimated	Threat	Cost	Medium	Medium	<table border="1"> <tr><td>VH</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>H</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>M</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>L</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>VL</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>VL</td><td>L</td><td>M</td><td>H</td><td>VH</td></tr> </table>	VH						H						M						L						VL							VL	L	M	H	VH	Mitigate	Increased unit price for excavation to match rock excavation price	Geotechnical Manager	At completion of subsurface exploration	xx/xx/2008
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3		Active	Construction	Unidentified utility impacts	Unidentified utilities	Project cost increases	Threat	Cost	Low	Low	<table border="1"> <tr><td>VH</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>H</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>M</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>L</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>VL</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>VL</td><td>L</td><td>M</td><td>H</td><td>VH</td></tr> </table>	VH						H						M						L						VL							VL	L	M	H	VH	Transfer	Contingency plan. Contractor is responsible for coordination.	Utility Engineer	Monthly	xx/xx/2008
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4		Active	External	Permit delays	Permits expire. Permits or agency actions are delayed or take longer then expected.	Fines, penalties and project delays	Threat	Time	Medium	Low	<table border="1"> <tr><td>VH</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>H</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>M</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>L</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>VL</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>VL</td><td>L</td><td>M</td><td>H</td><td>VH</td></tr> </table>	VH						H						M						L						VL							VL	L	M	H	VH	Transfer	Consultant responsible for coordinating permits and identifying permit requirements.	Environmental Engineer	Monthly	xx/xx/2008
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Risk Reduction/Mitigation/Handling

- Consider the most cost effective option, use of decision trees can indicate appropriate choice
- Use prioritized list of risks from analysis
- Determine Risk thresholds
- Determine Risk owners

Strategies

- Acceptance
- Avoidance
- Transference- Insurance, Contracts, Bonding
- Mitigation/Reduce:
 - Eliminate the risk
 - Measures to reduce probability of risk occurrence
 - Measures to reduce impact of risk on project objectives
 - Contingency Plans
 - Make an allowance by increasing the time and or cost budgets
 - Plan to change the scope

Risk Monitoring tools

- Risk response audits
- Risk reviews