



SOCIÉTÉ CANADIENNE  
D'ANALYSE DE LA VALEUR  
CANADIAN SOCIETY  
OF VALUE ANALYSIS

# **Introduction to Risk Management for Project Management**

Alain LeBlanc, CD, B. Eng., M. Sc., M. Eng.

November 14th, 2011

CSVA Annual Conference  
Toronto, Ontario, Canada

# Overview

- The presentation will cover the different aspects of risk management process from risk identification, assessment to mitigation plan.
- Risk assessment will focus primarily on a semi-quantitative approach estimating the risk impact in terms of recurring cost, schedule and other value criteria of the product or project.

# Lecturer Background – Alain LeBlanc

Graduate from the Royal Military College of Canada in Mechanical Engineering, with post-graduate studies at Queen's and McGill Universities. Three-year as assistant professor in engineering at the Royal Military College of Canada.

Over 30 years of experience in value engineering, risk and project management in the Canadian Forces, in large utility projects and in aerospace product development and supply chain management. Presently assuming the responsibility of Production Readiness Manager as part of a new program operation management team at Pratt & Whitney Canada.

Member of the CSVA since its foundation in 1993 and held different board positions including four years as president. CSVA Annual Conference chairman in 1998, 1999 and 2003.

Recipient of the SAVE International Award Best Paper of the Year in 2006 and the President's Citation in 2004.

# RISK Management

*“I cannot imagine any condition which could cause this ship to flounder. I cannot conceive of any vital disaster happening to this vessel.”*

E.J. Smith, Captain of the Titanic, 1912



# Overview

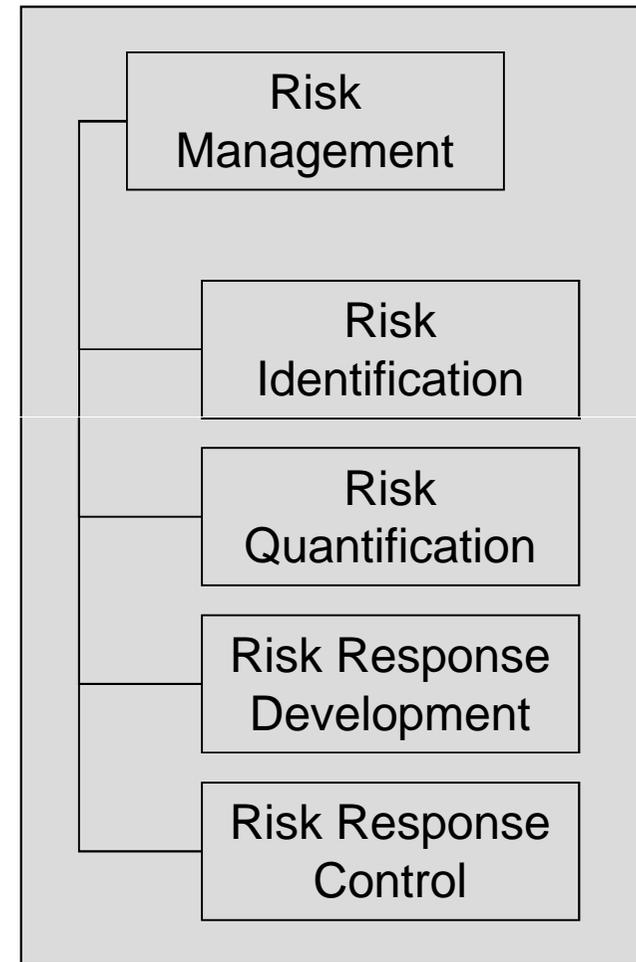
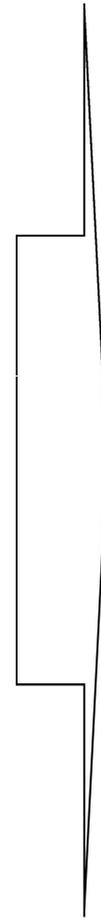
1. Introduction to risk management
2. Risk management planning
3. Risk identification
4. Risk assessment
5. Risk response
6. Risk control and feedback
7. Conclusions
8. Risk references

***'To win without risk is to triumph without glory.'***

-Pierre Corneil (French author)

# Alignment with PMI Book of Knowledge

1. Introduction to risk management
2. Risk management planning
3. Risk identification
4. Risk assessment
5. Risk response
6. Risk control and feedback
7. Conclusions
8. Risk references



Reference: PMI Book of Knowledge, 1996

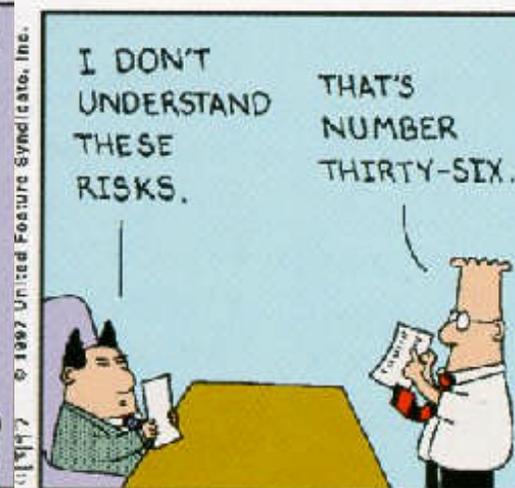
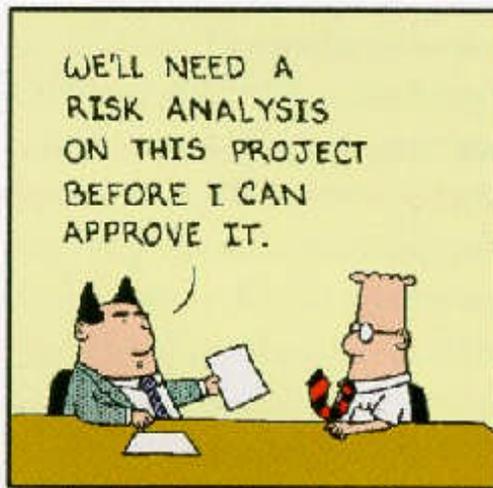
# Overview

- 1. Introduction to risk management**
2. Risk management planning
3. Risk identification
4. Risk assessment
5. Risk response
6. Risk control and feedback
7. Conclusions
8. Risk references

***'If you don't risk anything, you risk even more'***

- Erica Jong (American writer and feminist 1950's)

**DILBERT® by Scott Adams**



www.unitedmedia.com  
S. Adams

© 1997 United Feature Syndicate, Inc.

# Notions of Risk

What is risk?

*‘Risk is the level of exposure to **uncertainties** that the enterprise **must understand and effectively manage** as it executes its strategies to achieve its business objectives and **create value**’*

(Unknown source)

Uncertainties! The key word in risk management!

# Uncertainties (risk items)

- Uncertainty are any project activity, event or design element for which success is not guaranteed.
- Or simply... the possibility of not delivering what we' ve planned to deliver.
- Risks can be external and internal
  - Internal : uncertainties that project can control
  - External : beyond the control of the project

# Known and Unknown Uncertainties

- Known known's ; these uncertainties that one has the knowledge to properly predict the outcome of the project deliverable (s)
  - The project is a complete repeat of the previous one
- Known unknown's
  - The most common area of risk management. This is also a typical area of project management where project, for example, is launched without an appropriate level of readiness.
- Unknown known's
  - These uncertainties where one has not investigate or search for the knowledge base, internally or externally, that could affect either negatively or positively a project.
- Unknown unknown's
  - Context in which there is no historical knowledge – AIDS is a good example when it was first known

**Total uncertainty**

# Is RISK good? or bad?

- We must promote the ability to look at risk as challenge, *or opportunity*, and take on more risk
- Risk management is not about risk elimination by canceling projects, or other initiatives, but about taking measured risks
- Risk management serves the purpose of supporting decision making and setting right and achievable objectives

# What is RISK Management ?

- A simple terms, it is answering to these sample questions:
  - What could go wrong? What could we miss?
  - How severe is it?
  - What can be we do about it?
  - How do I make this work in my business?

Risk management does not have to be complicated!

# Project RISK Management?

*‘The systematic process of **identifying, analyzing, and responding** to project risks. It includes maximizing the probability and consequences of **positive** events and minimizing the probability and consequences of **adverse** events to project objectives.’ (PMI Book of Knowledge, 1996)*

The fundamental about project risk management is to know when to take risk as a Project Manager, to know if the risk is acceptable or unacceptable?

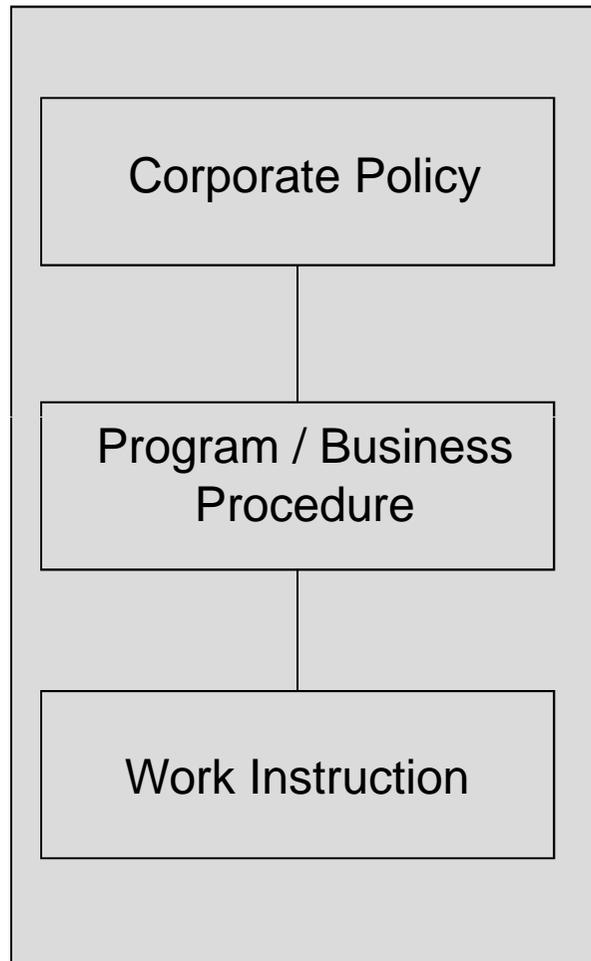
# Overview

1. Introduction to RISK management
- 2. RISK management planning**
3. RISK identification
4. RISK assessment
5. RISK response
6. RISK control and feedback
7. Conclusions
8. RISK references

***'The policy of being too cautious is the greatest risk of all.'***

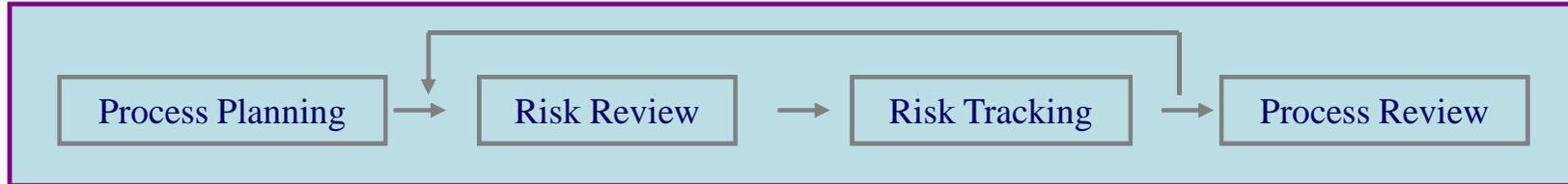
-Jawaharlal Nehru (First Prime Minister of Independent India)

# Risk Management Organization



- Risk management flow down structure
- Risk categorization assigned
- Clear roles and responsibilities
- Mechanisms of risk evaluation and prevention in place
- Go no-go decision making gated process
- Available tools and methodologies
- Corporate knowledge system

# RISK Management Planning



- Process Planning
  - Perspective, stakeholders, procedures, etc.
- Risk Review
  - Identify, qualify, quantify
  - Risk Response : Avoid, mitigate, transfer, accept
- Risk Tracking
  - Execute response plans
- Process Review
  - Performance metrics, response effectiveness
  - Assess investment outcome

# RISK R&R in Project Management

- Project manager
  - Is accountable for the risk management process
  - Set risk management direction
  - Integrate risk management with other project management activities
- Project team members
  - Perform the risk management activities
  - Report status on risk events
- Risk management process owner
  - Ensure risk management standard across projects
  - Seek, develop and implement risk management tools
  - Provide training
  - Monitor risk management process performance

# Overview

1. Introduction to risk management
2. RISK management planning
- 3. RISK identification**
4. RISK assessment
5. RISK response
6. RISK control and feedback
7. Conclusions
8. RISK references

*'There are things known, and there are things unknown. And between are the doors.'*  
- Jim Morrison

# RISK Identification

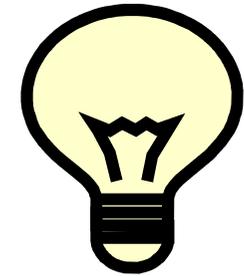
- Identification of potential risk events that may affect any project, using a consistent and structured approach
- Essentially, one should ask questions about potential uncertainties as follows:
  - IF something occurs... then what ...
- Ensure description is clear for next process steps to avoid the following situations : Who said what? What does this mean?

Early, at all levels, regularly

# Examples

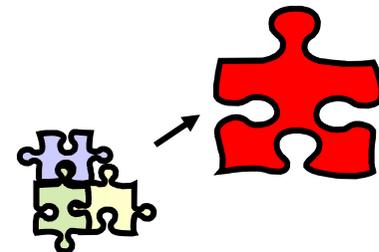
- IF the supply of goods are not available on time to be transported before the thawing season, THEN we will need to find another more costly transportation alternative
- IF the endurance test failed, THEN we will need to use a more sophisticated material
- IF the environmental studies require further debate than planned, THEN we could face significant delay in the construction schedule

# RISK Identification



How to do it?

- Brainstorming
- Surveys and questionnaires
- Interviews and focus groups
- Delphi technique
- Lessons learned review
- SWOT Analysis



# Brainstorming

Excellent team approach to risk identification. It allows the group to ventilate their concerns.

Some of the rules are:

- No judgment or evaluation during idea generation
- Everyone contributes
- Get to the point
- Quantity over Quality
- All ideas are welcome
- Build on ideas

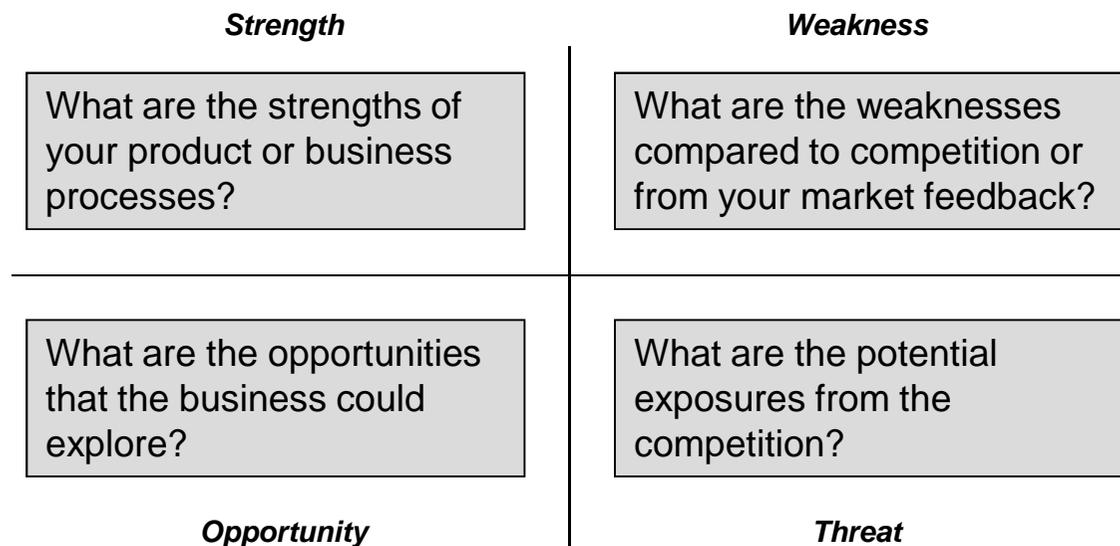
# Delphi Technique

- Acquiring expert judgement on matter without forcing them outside their comfort zone
- Based on an iterative set of questionnaires to achieve convergence on specific subjects
- Normally used when experts are geographically distant and that project schedule allows it
- Used when a handful of people knows about a specific subject

Very accurate qualitative approach to risk review

# SWOT Analysis

- Strength, Weakness, Opportunity and Threat (*SWOT*) analysis is a useful summary technique for summarising the key issues arising from an assessment of a businesses "internal" position and "external" environmental influences.

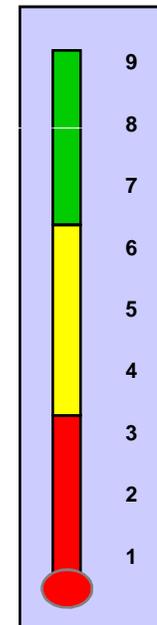


# RISK Identification

Some inputs to a structured risk identification:

- WBS (prime input for project)
- Product Specification (prime for product)
- SOW
- Scope statement
- Readiness Index
- Cost and schedule estimates
- Internal guidelines
- Others

{ Technology  
Supply Chain  
.....



# RISK Register

- A risk register is a repository tool for recording and consolidating risk events and their subsequent assessment and response.
- Must be initiated at the start of the of the risk management process
  - Risk data becomes project information
  - Project information becomes corporate knowledge
  - Corporate knowledge is documented and preserved in corporate project files for future reference

# RISK Register

The risk register starts with the risk identification

Risk Number	Category	WBS No. or other	WBS Element	Source	Date	Uncertainty Name	Description
Project A - 001	Development	23	Road	Test	Date identified	Compressor endurance test	IF the endurance test failed, THEN we will need to use a more sophisticated material
Project A - 002	Construction	54	Road	Environment	Date identified		IF the environmental studies require further debate than planned, THEN we could face significant delay in the construction schedule
Project A - 003	Aftermarket	57	Controls	Supplier	Date identified		
Project A - 004	Construction	32	Machinery	Human Resources	Date identified		
Project A - 005	Construction	24	Component	Supplier	Date identified	Transportation of heavy stock	IF the supply of goods are not available on time to be transported before the thawing season, THEN we will need to find another more costly transportation alternative
Project A - 006	etc.	etc	etc	etc	Date identified		

# RISK Identification

What to avoid?

- Identification of issues rather than uncertainties
- Focusing on the importance rather than uncertainties of the subject
- Poor script - lack of proper description
- Not allowing sufficient time for the process
- Lack of a structure approach
- Red herring issues
- Not wearing a RISK hat

# Overview

1. Introduction to risk management
2. Risk management planning
3. Risk identification
- 4. Risk assessment**
5. Risk response
6. Risk control and feedback
7. Conclusions
8. Risk references

***'Courageous risks are life-giving, they help you grow, make you brave, and better than you think you are.'***

-Anonymous

# Risk Levels : New Automobile Design

What would you act on ? In which order ?

... a 0.5% chance of not meeting highway safety tests

... a 25% chance of not meeting original deadline for delivery to dealers

... a 75% chance we will exceed weight target (by 50 to 100 lbs)

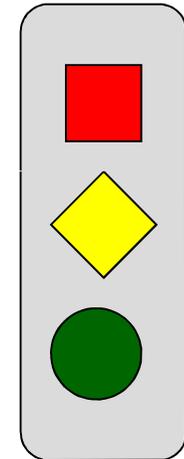
... a 99% chance of not meeting passenger cabin height (0.5 inch short of target) (Routhier & Delisle, 2001)

# **RISK Assessment**

The process of analysing and evaluating risk, to determine the likelihood of an uncertainty to occur and the impact it will cause to the business plan

# RISK Qualitative Assessment

1. Clean up your risk item list
  - Ensure risk items cannot be broken further down
2. Priority list based on the team experience and knowledge
  - Qualitative : high (red), medium (yellow) and low (green)
  - Normally based on the impact on the project
  - Highly influenced from lessons learned
  - Can be very influential
3. Visual forms to communicate risk issues



Note: Difficult to quantify the impact in terms of cost exposure, delay, ...

# RISK Quantitative Assessment

1. For each uncertainty,
  - establish a success plan (also called plan A), what is the planned successful outcome?
  - establish a fall-back plan (also called plan B), what is the plan if plan A cannot be achieved with the current resources and other associated criteria?
2. Determine likelihood of failure of plan A.
3. Determine severity of failure for reverting to plan B.

$$\text{Risk} = \text{Likelihood of failure} \times \text{Severity of failure}$$

# Likelihood of Failure

- Likelihood of failure is dependent on the *readiness* to meet the set expectations
- Questioning against the following four potential “gaps” is generally a good quantitative probability assessment of most situations:
  - Knowledge of requirements
  - Stability of requirements
  - Capability to deliver
  - Capacity to deliver

# Likelihood of Failure Matrix

Considering Plan A, and with respect to your customer, organization or your suppliers, ask ... ?					
		Knowledge of requirements	Stability of requirements	Capability to deliver	Capacity to deliver
<b>Improbable Remote</b>	<5%	<i>Requirements are based on international standards</i>		<i>Requirements are entirely within current experience</i>	
<b>Unlikely</b>	25				<i>Supplier has adequate capacity and resources available</i>
<b>Likely</b>	50%		<i>Major expectations are stable and frozen in specifications or SOW</i>		
<b>Very Likely</b>	75%	<i>Requirements are not clearly written and understood</i>		<i>Knowledge is available but as never been applied to that extent</i>	
<b>Certain</b>	90%		<i>Product or product expectations are volatile</i>		<i>There are critical resources not allocated or available</i>

**Requirements : Customer and social needs, market demand, etc**

# Severity of Failure

- How will failure to address the uncertainty affect the project or product value?
- Link to critical project or product value elements and their relative importance to the customer:
  - Schedule
  - Investment cost
  - Recurring Cost
  - Product or Service Performance
  - Cost of non-Quality
  - Customer or contractual penalty
  - ...

# Severity of Failure

	Little		Negligible		Marginal		Significant		Critical
	min	max	min	max	min	max	min	max	More than...
<b>Project Schedule</b>	Nil	1	1	2	2	3	3	4	4
<b>Investment Cost</b>	Nil	1	1	2	2	3	3	4	4
<b>Product recurring cost</b>	Nil	1	1	2	2	3	3	4	4
<b>Product performance</b>	Nil	1	1	2	2	3	3	4	4
<b>Cost of non quality</b>	Nil	1	1	2	2	3	3	4	4
<b>Customer penalty</b>	Nil	1	1	2	2	3	3	4	4

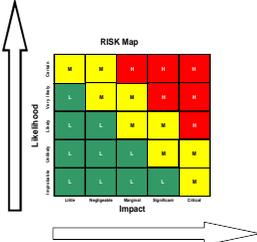
# RISK Quantitative Assessment

Uncertainty Name	Description	Plan A	Plan B	Likelihood Matrix					Impact Matrix					Risk Level	
				Knowledge of requirements	Stability of requirements	Capability to deliver	Capacity to deliver	Likelihood of Failure	Project Schedule	Investment Cost	Product recurring cost	Customer penalty	Product performance		Other
Uncertainty 1	Description 1	Plan A1	Plan B1												
Uncertainty 2	Description 2	Plan A2	Plan B2												
Uncertainty 3	Description 3	Plan A3	Plan B3												
Uncertainty 4	Description 4	Plan A4	Plan B4												

Define Plan A

Define Plan B

# RISK Quantitative Assessment

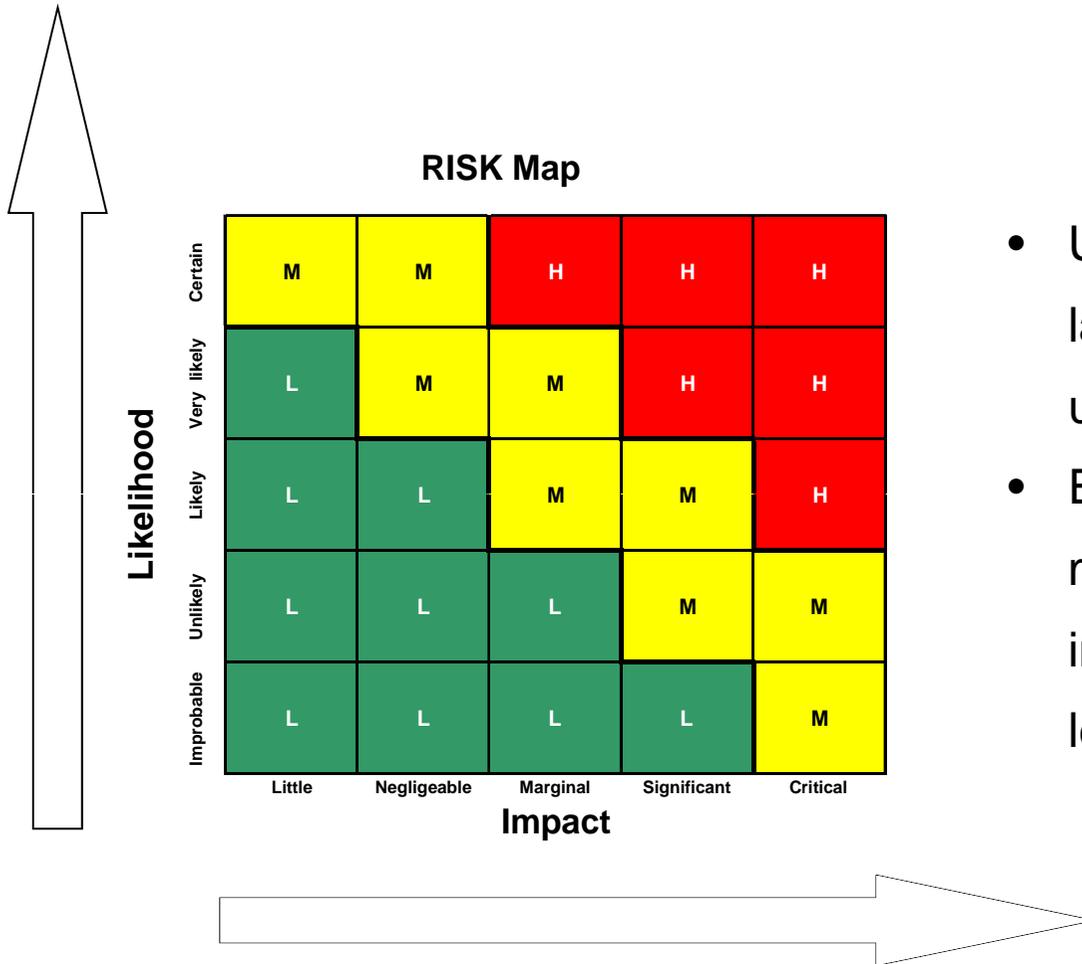


Uncertainty Name	Description	Plan A	Plan B	Likelihood Matrix					Impact Matrix							Risk Level	
				Knowledge of requirements	Stability of requirements	Capability to deliver	Capacity to deliver	Likelihood of Failure	Project Schedule	Investment Cost	Product recurring cost	Customer penalty	Product performance	Other	Impact		
Uncertainty 1	Description 1	Plan A1	Plan B1	Certain		Likely		Certain	Significant		Marginal						High
Uncertainty 2	Description 2	Plan A2	Plan B2	Likely				Certain		Critical					Critical		High
Uncertainty 3	Description 3	Plan A3	Plan B3		Very Likely			Very Likely	Marginal		Significant						Medium
Uncertainty 4	Description 4	Plan A4	Plan B4				Improbable	Improbable	Critical								Medium

Define the likelihood of failure

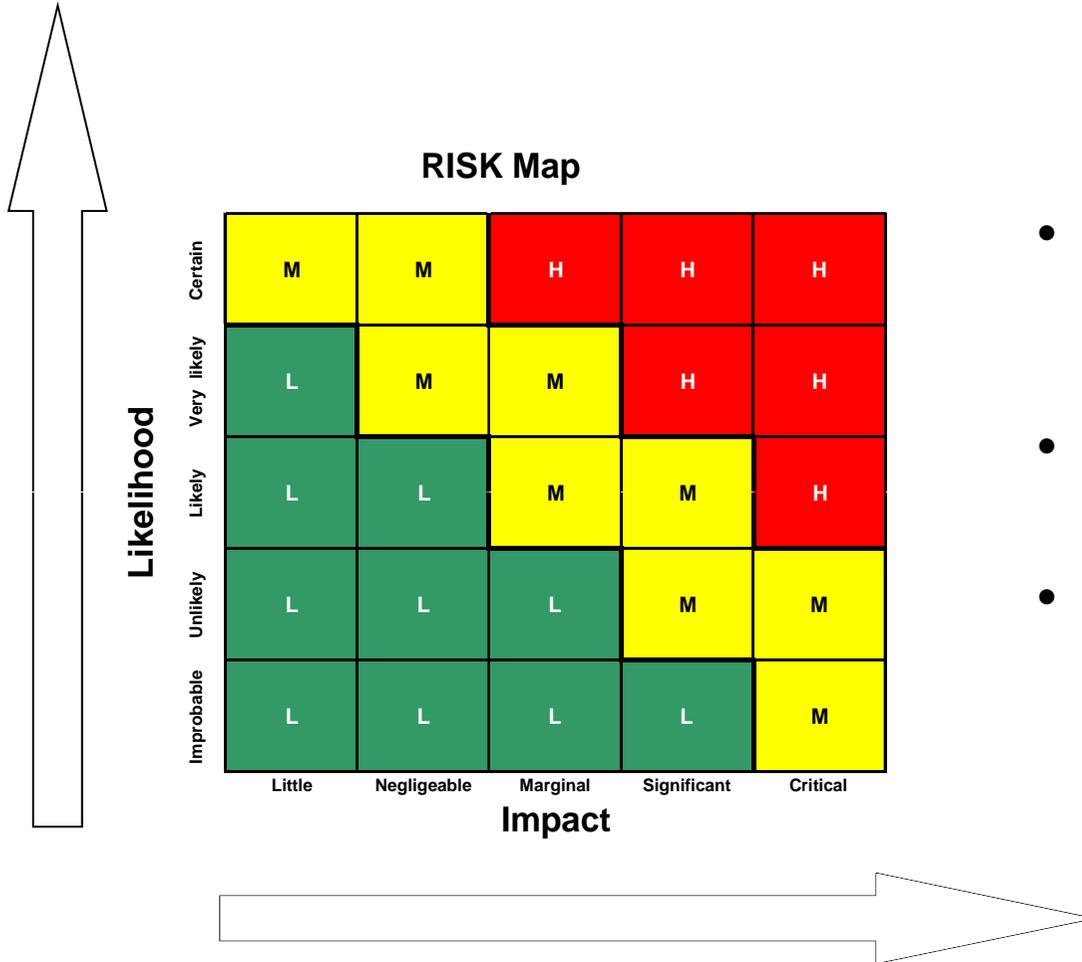
Define the impact of going to Plan B

# RISK Level Determination



- Use the larger likelihood and larger impact against each uncertainty
- Establish your 2-D Risk Map model with the corresponding intersecting colour coded risk level areas

# RISK Map



- Very powerful to summarize project situation
  - Seeing the forest Vs. trees
- Outstanding communication tool
- Can be aligned with customer or stakeholder requirements

# RISK Quantification Approach

## Cost Risk Exposure

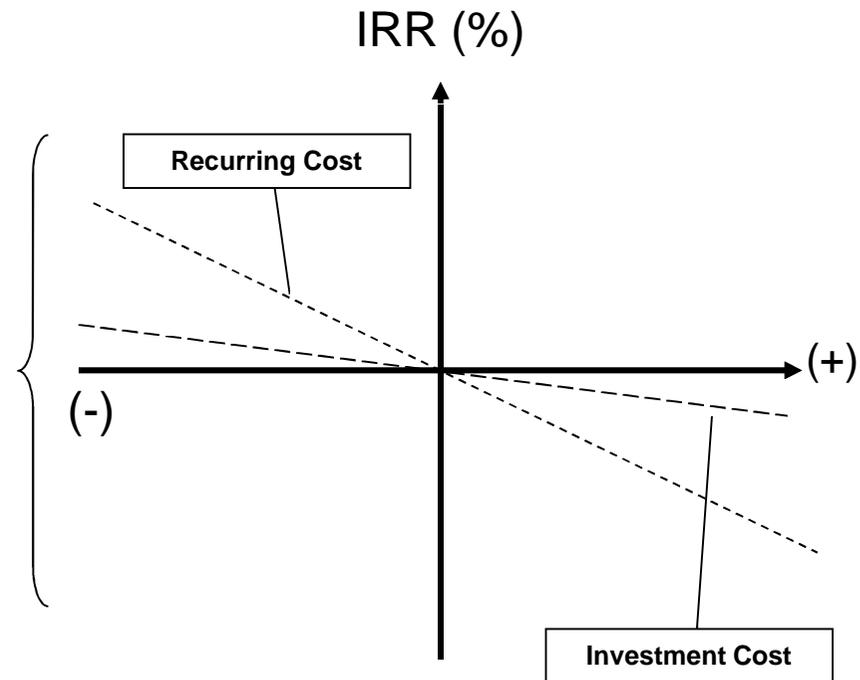
- The summation of all expected monetary values for assessed uncertainties
- Expected monetary value is the multiplication of the probability of a risk to occur and its monetary impact
- All uncertainties can be translated into cost or other measure
- Opportunities are also part of the analysis. Their monetary impacts are called LEVERAGE

# RISK Quantitative Assessment

## Recurring Cost Risk Exposure (and Sensitivity Analysis)

- Determine the risk exposure equivalency factor using a business case sensitivity curve.

*Ex.: investment cost increase of \$130,000 can be translated into an equivalent recurring cost increase of \$5 over a period of 10 years.*



# Course structure

1. Introduction to risk management
2. Risk management planning
3. Risk identification
4. Risk assessment
- 5. Risk response**
6. Risk control and feedback
7. Conclusions
8. Risk references

***'Take calculated risks. That is quite different from being rash.'***

- General George S. Patton)

# RISK Response

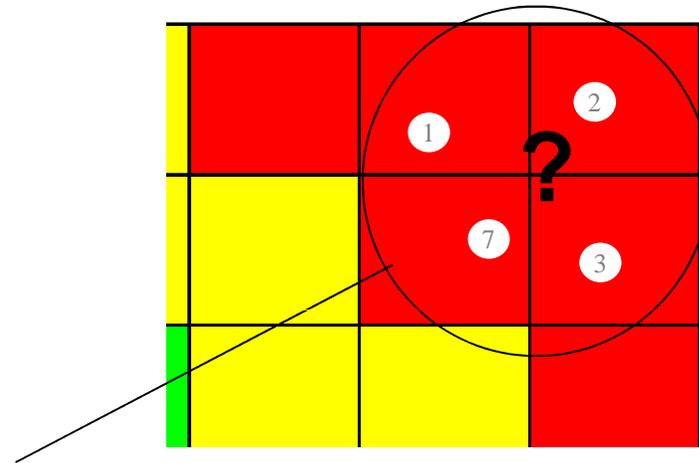
- How to react to risks and opportunities when identified and assessed
- Response plan will depend upon the types of risk, policy and procedure
- Response priority is driven by the risk map
- Risk response plans are integrated into the project plan
- Risk response plan may affect more than one risk item

# Risk Response Type

- Avoid
- Transfer
- Mitigate
- Accept

# RISK Avoidance

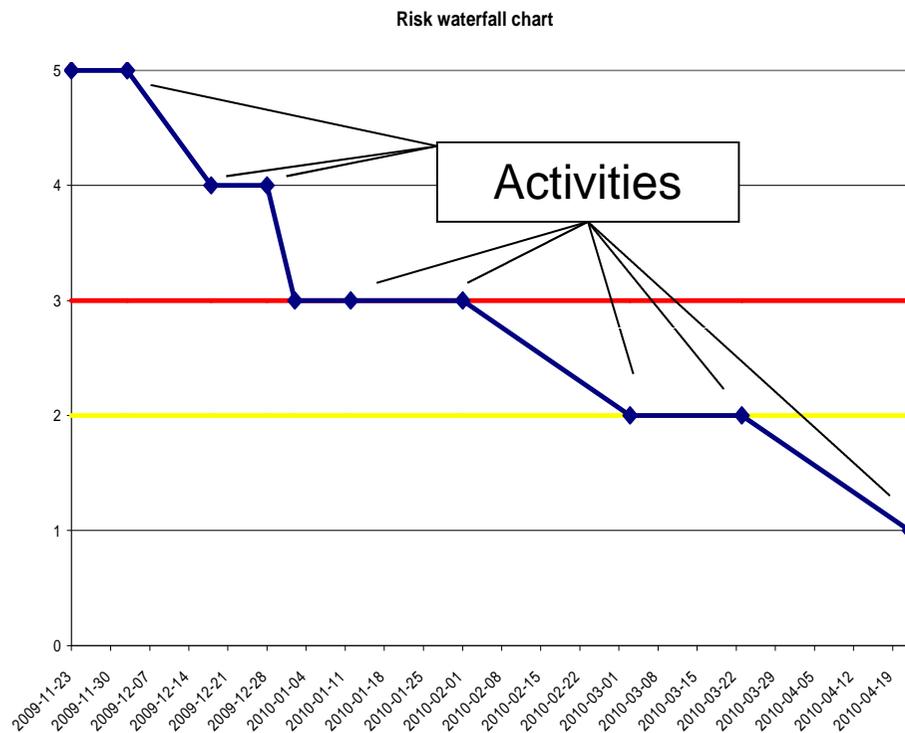
- Selecting a lower risk options or simply removing the item from the deliverable
  - If we have to accept the risk, what contingency strategies are available?
  - How could we avoid this event?
- This is particularly pertinent to uncertainties situated into the risk map RED area



# RISK Mitigation

- Mitigating risk is about taking specific actions to reduce risk, i.e.,
  - Reducing the probability of the risk event happening?
  - Reducing the impact of the risk event on the business?
- Mitigation plans must be integrated into project plan
- If RED risks are identified at project start, cost and schedule contingency must be accounted for
- All RED and YELLOW risks should have mitigation plans, if risk avoidance is not established

# Risk Waterfall Chart



- Visual tool to depict risk closure
- Very useful in project reporting
- Can be demonstrated in terms of activities or dates
- Easy to construct without sophisticated tool

# RISK Transfer

- Risk transfer is about shifting the risk to another party (through law, contract or insurance)
- Partnership is one of the key strategies used for large investment projects
- Risks can also be transferred to:
  - Sub-contractors
  - Vendors
  - Customers
  - Government
- Risk transfer does mean risk is eliminated. Mitigation plans will be required but managed by the third party

# RISK Acceptance

- Risk acceptance is about moving forward, passively or actively, with the potential that a risk could occur, without risk attenuation measure
- The assumption is that the project or the organization will deal with the issue if it arises. Normally, one is assuming that the risk will be managed and will disappear
- If risk occurs, contingency reserves will be used. This can be detrimental to a business as it precludes risk management as a key process

# Contingency Reserve

- Contingency reserve : the amount of money or time needed above the estimate to reduce the risk of overruns of project objectives to a level that is acceptable to the organization (PMI 1996)
  - High risk uncertainty exposures are used to estimate contingencies
  - Medium risk uncertainty exposures should also be taking into consideration
  - Contingency reserve must be included in the project budget and schedule

# Management Reserve

- Management reserve : an amount of money set aside for management that is a proportion of contingency reserves from all projects
- Management reserve is at the discretion of upper management and is set up to deal with uncertainties such as inflation rate, exchange rate prediction, etc

# RISK Response

What to avoid?

- Maintain high risk uncertainties in the equation
- Manage mitigation plans apart from other plans
  - Integrate into project schedule
- Report on plans for sake of reporting
- Lack of real detail planning
- Carry unnecessary contingency

# Course structure

1. Introduction to risk management
2. Risk management planning
3. Risk identification
4. Risk assessment
5. Risk response
- 6. Risk control and feedback**
7. Conclusions
8. Risk references

# RISK Control and Feedback

- The process of executing the risk management plan. It also includes the response if known or unknown risks or opportunities occur
- Identify areas where risk or opportunity was not identified and why?
- Document events and action taken
- Review the assessment methodology. Was risk understated?
- Assess the response plans effectiveness
- Secure the lessons learned

# RISK Control and Feedback

## Workaround

- Actions associated to crisis management, reacting to unplanned events
- Contingency and management reserves will provide a source of support

## Modification to planned response plan

- Closely monitoring of response plan and re-assessment of known risks and opportunities are part of project management activities

# Course structure

1. Introduction to risk management
2. Risk management planning
3. Risk identification
4. Risk assessment
5. Risk response
6. Risk control and feedback
- 7. Conclusions**
8. Risk references

***'I have not failed. I've just found 10,000 ways that won't work.'***

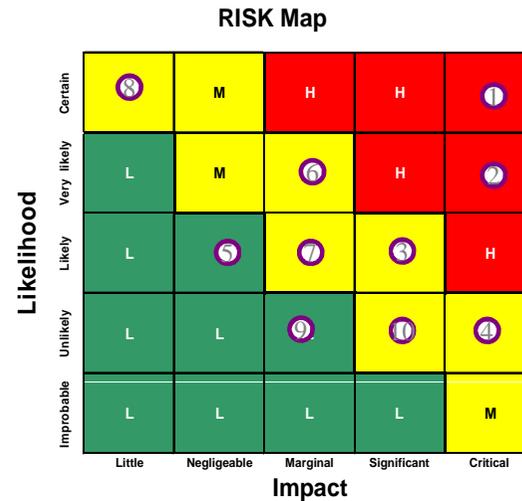
-Thomas Alva Edison (1847-1931)

# RISK Management Overview

Risk Map

**Risk**  
is a measure of the possibility of deviation from the expected

**Risk Management**  
is a discipline for dealing with uncertainty



- Risk Assessment
- Response Plans
- Risk Waterfalls
- Feedback

# Conclusions

- Times are hard, money is tightly controlled
- Customer want new products faster and with entry-into-service risk free
- Cost plus projects are *passé*
- Risk process must be applied at launch
- Integrate response plans with the project plan
- Drive and track with rigour

At the end, you do not want to be the one bringing the bad news!

# Course structure

1. Introduction to risk management
2. Risk management planning
3. Risk identification
4. Risk assessment
5. Risk response
6. Risk control and feedback
7. Conclusions
- 8. Risk references**

***'I have not failed. I've just found 10,000 ways that won't work.'***

-Thomas Alva Edison (1847-1931)

# Computer Software and Applications

- Decision analysis tool
  - @RISK
  - Precision Tree
  - Expert Choice
  - VISA (Visual Thinking International Ltd)
  - HIVIEW
  - EQUITY
  - Risk Plus
- (Project) Risk Management Tool
  - Risk Cost Model
  - RiskTrak ARM Process™
  - NOWECO PRO Act 3.3, Risk Register, and others
  - ProjectConnection`s applications
  - -----

# References

1. Anonymous, *Integrated Risk management, Implementation Guide*, Treasury Board of Canada, ISBN 0-662-65673-3, 2001, 102 pp.
2. Anonymous, *Risk Management Course, Project Management Professional Development Program*, ESI International in association with The George Washington University, 2001
3. Anonymous, *Risk Management Standard*, published in UK by the Institute of Risk Management (IRM), the Association of Insurance and Risk Managers (AIRMIC), and ALARM The National Forum For Risk Management, © ALARM AIRMIC IRM, 2002, 15 p.
4. Anonymous, DoD Handbook MIL-HDBK-500A, *Supplier processes for suppliers processes for aviation and space sectors. Acquisition and sustaining programs*, Department of Defense, USA, Jan 99, 31 p.
5. Bleasdale, Tom. J., *The Risk of Change*, Mott MacDonald Limited (Hatch Mott MacDonald, SAVE International Conference, Jun 03
6. Charette, Robert N., *Software Engineering Risk Analysis and Management*, New York : Intertext Publication, McGraw-Hill, 1989, pp 120-122.
7. Duncan , William R., Director of Standards, PMI Standards Committee, *A Guide to the Project Management Book of Knowledge*, PMI, 1996, 178 p.
8. Goodwin ,Paul and George Wright, *Decision Analysis for Management Judgement*, Second Edition, John Wiley & Sons, 1998, 454 p.
9. A John Hitchings and Scott Wilson, *Risk Assessment*, ICE Management Board and Commercial Management Board Briefing, Apr 02
10. Kloman, H. Felix, *Risk Management Reports*, H. Felix Kloman and Seawrack Press, 2003-06
11. John Hitchings and Scott Wilson, ICE Management Board and Commercial Management Board Briefing, *Risk Assessment*, Apr 02
12. Phillips, Martyn, *A value and risk management approach to project development*, proceeding of ICE, Civil Engineering 150, May 02, pp 67-74
13. Carl L. Pritchard, *Risk Management, Concepts and Guidance*, Second Edition, ESI International, 2001, 342 pp.
14. Routhier, Pierre-Hugues and Eric Delisle, *Risk Management - Overview of Risk Theory and its Applications in VE*, CSAVA Annual Conference, Toronto, Oct. 01
15. Swarz, Bob, *Guidelines for Risk Management Process Review*, MITRE Society, 12 Dec 07

**THANK YOU**

**?**