

# Software Project Management

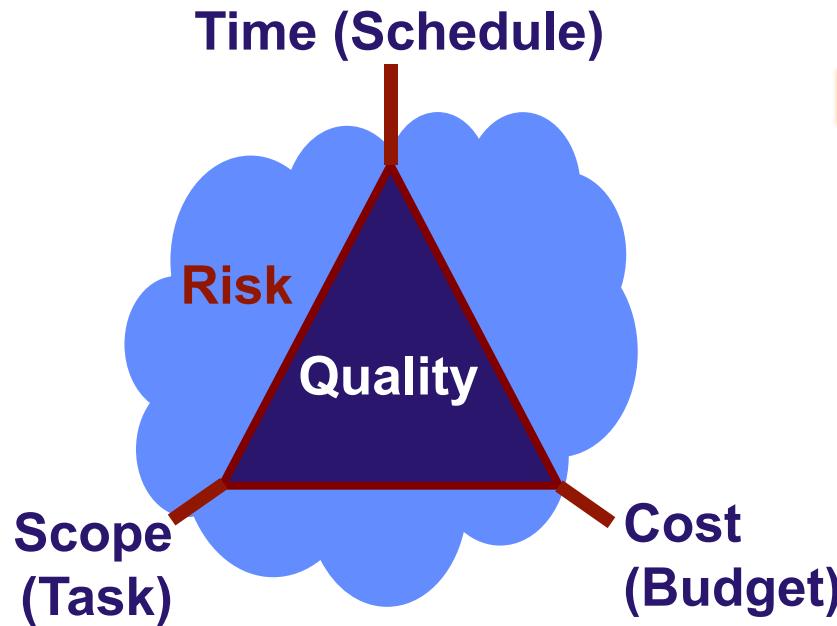


# Structure of this course

	5 process groups				
10 knowledge areas	Initiating	Planning	Executing	Monitoring & Controlling	Closing
1. Integration management					
2. Scope					
3. Time					
4. Cost					
5. Quality					
6. Human resource					
7. Communications					
8. Risk					
9. Procurement					
10. Stakeholder					

# Risk Management Overview

Project risk is an **uncertain** event or condition that, if it occurs, has a **positive** or **negative** effect on one or more project objectives such as scope, schedule, cost, and quality.



Not all risks are negative!

Negative risks ----threats

Positive risks ----opportunities

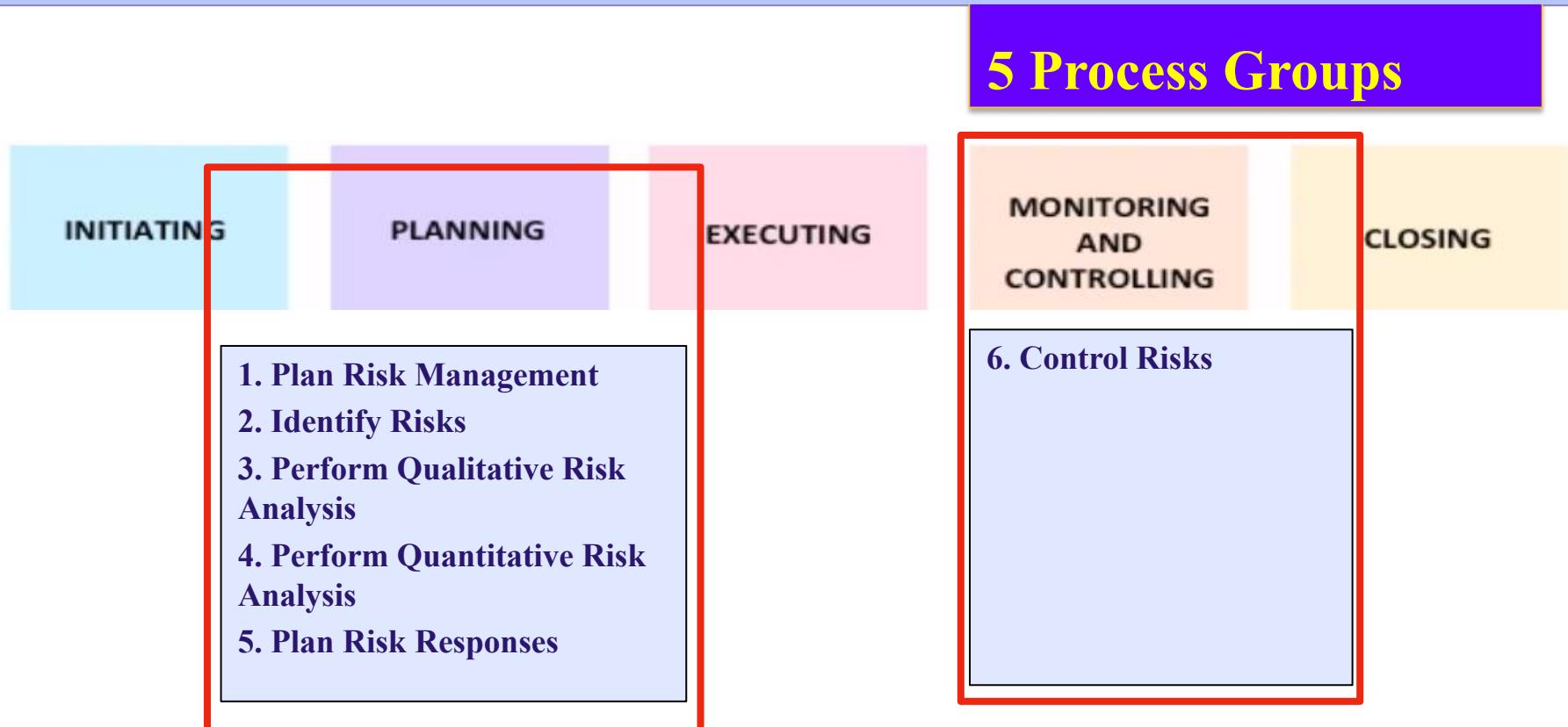
# Risk Management Overview

## □ What is Risk Management

includes the processes of conducting risk management planning, identification, analysis, response planning, and controlling risk on a project.

- The objectives of project risk management are to increase the likelihood and impact of positive events, and decrease the likelihood and impact of negative events in the project.

# Risk Management Overview



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Plan Risk Management

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Identify Risk

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Perform Qualitative and  
Quantitative Risk Analysis

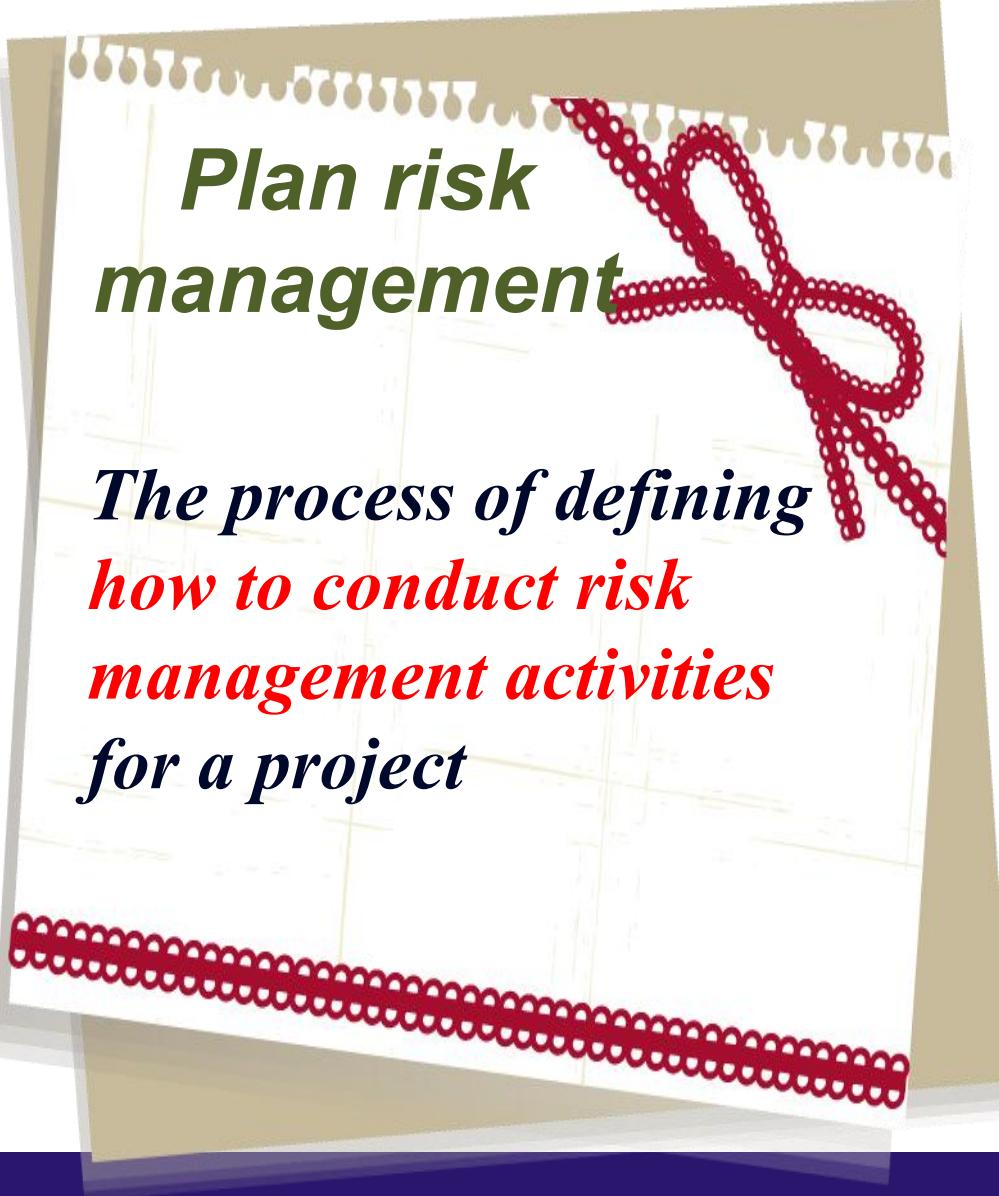
4

Plan Risk Response

5

Control Risk

# Section 8.1: Plan Risk Management



*Plan risk management*

*The process of defining how to conduct risk management activities for a project*

The key benefit of this process is that it ensures that the degree, type, and visibility of risk management are commensurate with both the risks and the importance of the project to the organization.

# 8.1 Plan Risk Management

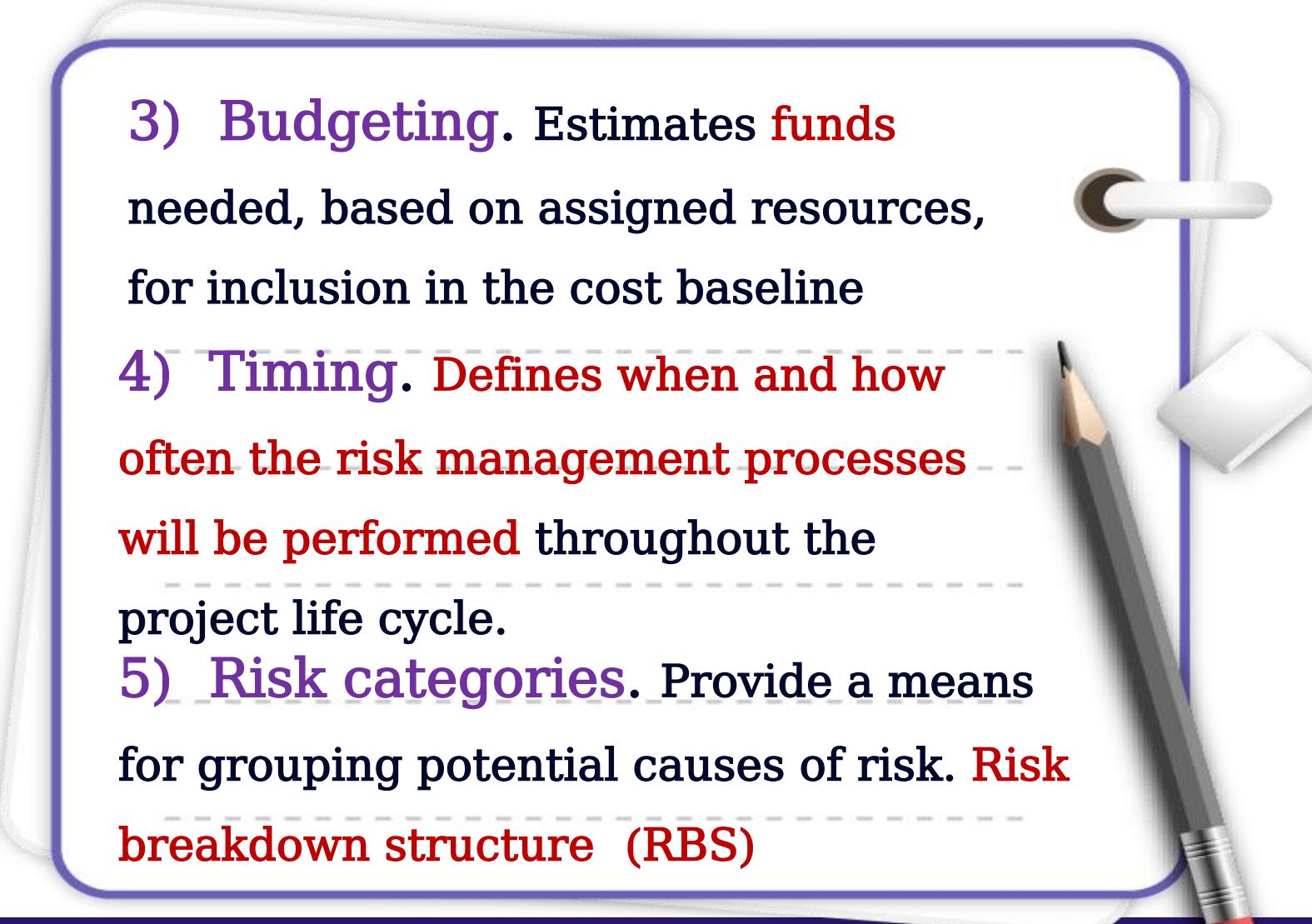


Risk Management Plan describes how risk management activities will be structured and performed.

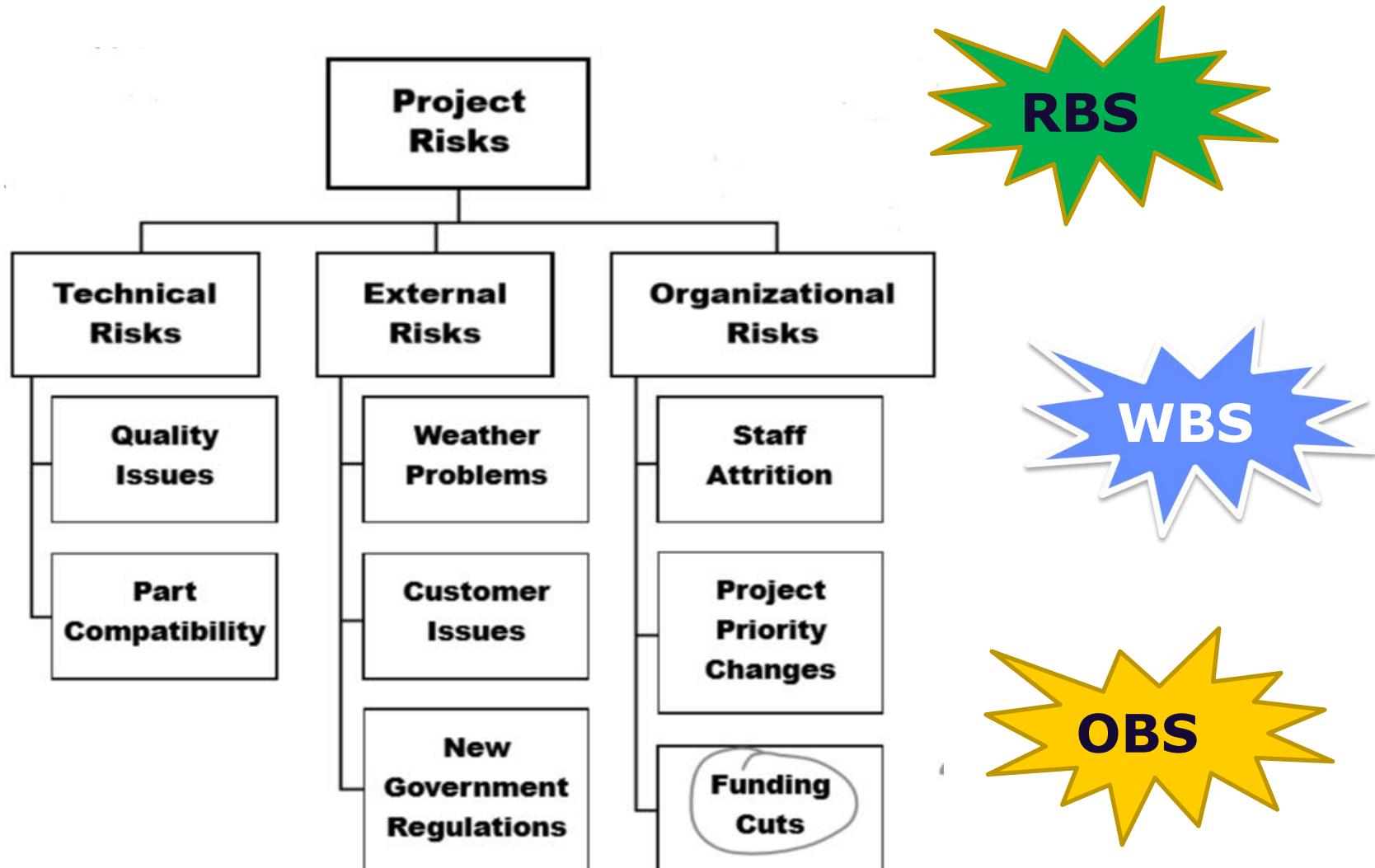
- 1) **Methodology.** Defines the approaches, tools, and data sources that will be used to perform risk management on the project
- 2) **Roles and responsibilities.** Defines the lead, support, and risk management team members for each activity in the risk management plan



# 8.1 Plan Risk Management

- 
- 3) **Budgeting.** Estimates **funds** needed, based on assigned resources, for inclusion in the cost baseline
  - 4) **Timing.** Defines when and how often the risk management processes will be performed throughout the project life cycle.
  - 5) **Risk categories.** Provide a means for grouping potential causes of risk. **Risk breakdown structure (RBS)**

# 8.1 Plan Risk Management



# 8.1 Plan Risk Management

## 6) Definitions of risk probability and impact.

### Defined Conditions for Impact Scales of a Risk on Major Project Objectives

(Examples are shown for negative impacts only)

Project Objective	Relative or numerical scales are shown				
	Very low / 0.05	Low / 0.10	Moderate / 0.20	High / 0.40	Very high / 0.80
Cost	Insignificant cost increase	< 10% cost increase	10 – 20% cost increase	20 – 40% cost increase	> 40% cost increase
Time	Insignificant time increase	< 5% time increase	5 – 10% time increase	10 – 20% time increase	> 20% time increase
Scope	Scope decrease barely noticeable	Minor areas of scope affected	Major areas of scope affected	Scope reduction unacceptable to sponsor	Project end item is effectively useless
Quality	Quality degradation barely noticeable	Only very demanding applications are affected	Quality reduction requires sponsor approval	Quality reduction unacceptable to sponsor	Project end item is effectively useless

# 8.1 Plan Risk Management

## 7) Probability and impact matrix.

**Probability and Impact Matrix**

Probability	Threats					Opportunities				
	0.90	0.05	0.09	0.18	0.36	0.72	0.72	0.36	0.18	0.09
0.70	0.04	0.07	0.14	0.28	0.56	0.56	0.28	0.14	0.07	0.04
0.50	0.03	0.05	0.10	0.20	0.40	0.40	0.20	0.10	0.05	0.03
0.30	0.02	0.03	0.06	0.12	0.24	0.24	0.12	0.06	0.03	0.02
0.10	0.01	0.01	0.02	0.04	0.08	0.08	0.04	0.02	0.01	0.01
	0.05/ Very Low	0.10/ Low	0.20/ Moderate	0.40/ High	0.80/ Very High	0.80/ Very High	0.40/ High	0.20/ Moderate	0.10/ Low	0.05/ Very Low

# Anatomy of a Risk

Once you're done with Risk planning, there are four more risk management processes that will help you and your team

- come up with the list of risks for your project,
- analyze how they could affect your project,
- and plan how you and your team will respond if any of the risks materialize when you're executing the project.

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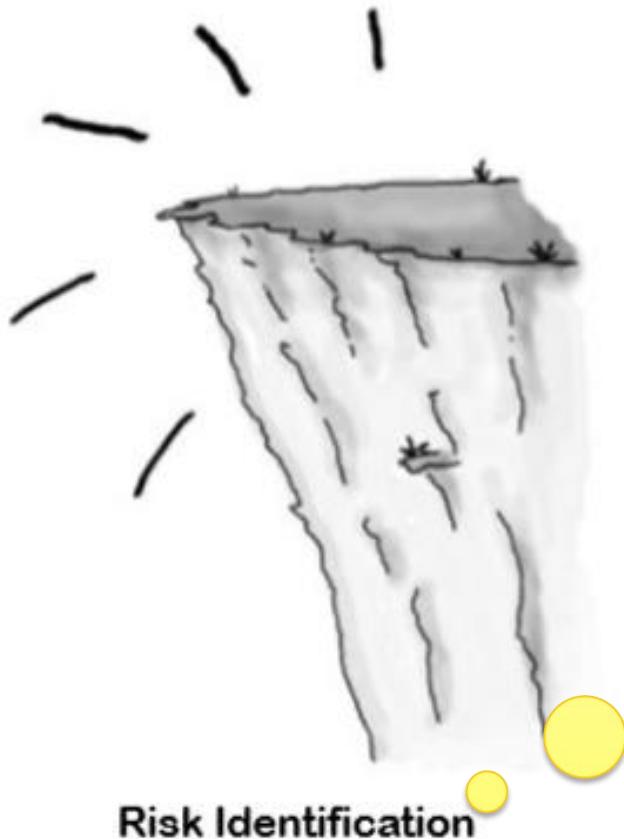
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# Anatomy of a Risk



The first thing you need to do when planning for risks is to gather the team together and come up with a list of every possible risk you can think of

RBS will make it much easier

# Anatomy of a Risk



Qualitative Risk Analysis

Once you've got a list of risks, you'll need to get a good idea of the probability and impact of each risk

Probability and impact guidelines is used to assign a probability and impact to each risk!

# Anatomy of a Risk



You can make better decisions with more precise information.  
This process is to assign numerical values for the probability and impact of each risk

# Anatomy of a Risk



Risk Response Planning

All that's left now is to plan responses to each risk! This is where you decide whether to avoid, mitigate, transfer, or accept .... And how you'll do it!

All four of these Risk Management processes are in the planning process group --- you need to plan for your project's risks before you start executing the project.

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# Section 8.2: Identify Risk

## *Identify risk*

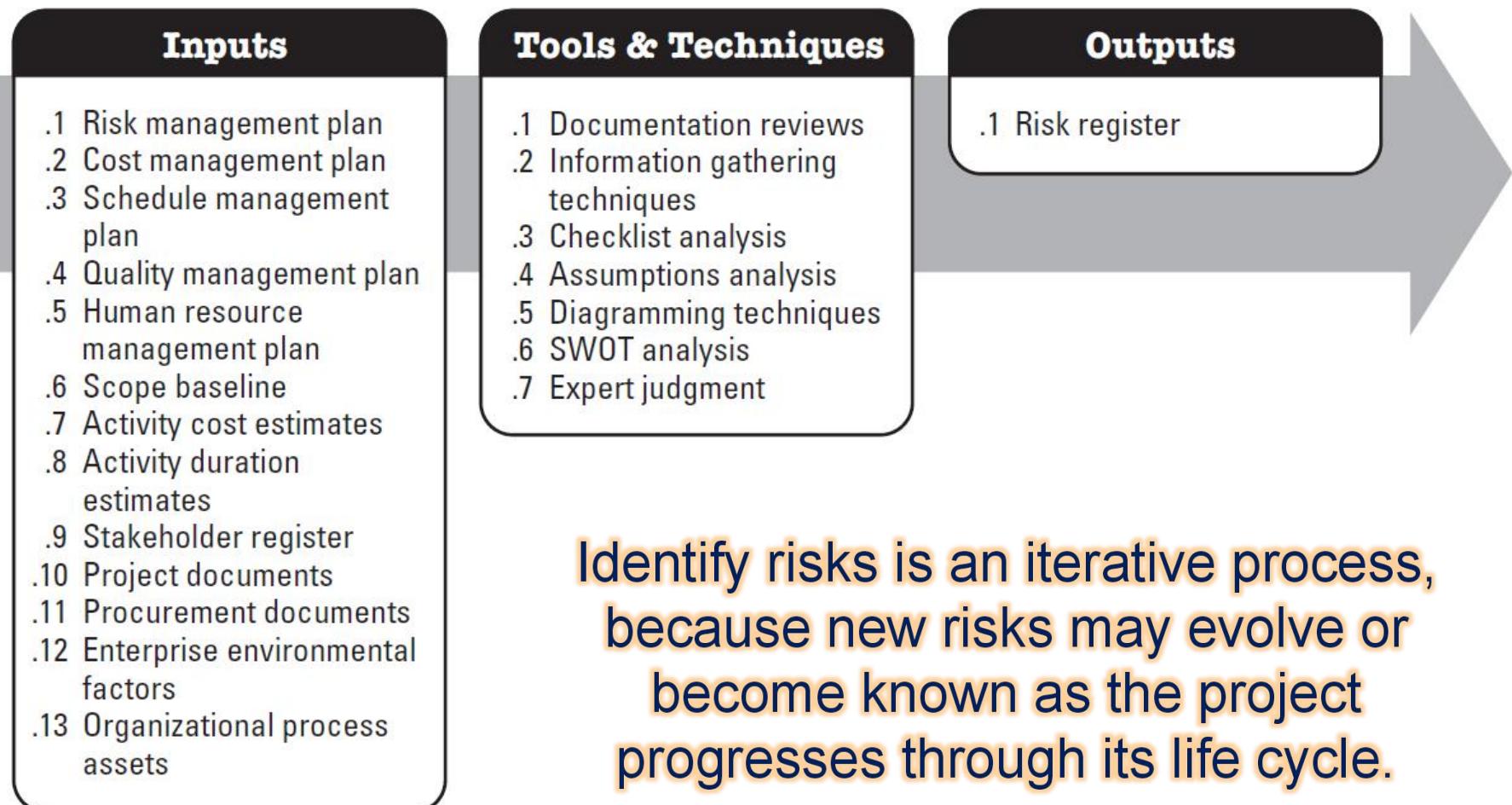
*The process of determining which risks may affect the project and documenting their characteristics.*



**Risk Identification**

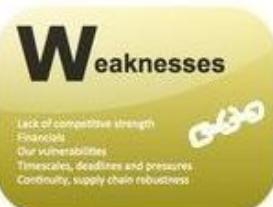
The key benefit of this process is the **documentation** of existing risks and the **knowledge** and **ability** it provides to the project team to anticipate events.

## 8.2 Identify Risk



# 8.2 Identify Risk

## Tools and Techniques

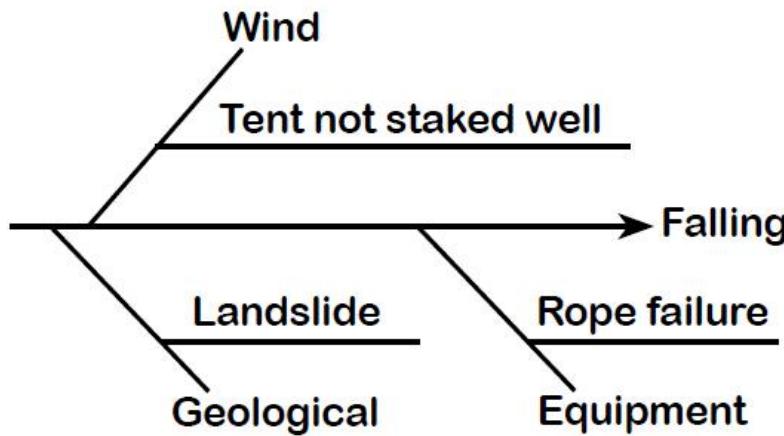


## Information gathering techniques

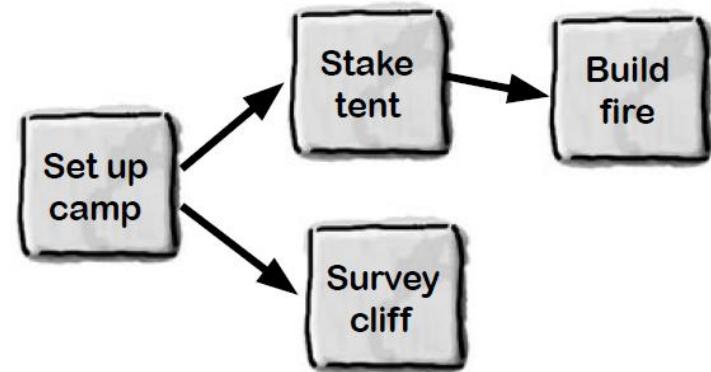
- Brainstorming is the first thing you should do with your team
- The Delphi technique is a way to get opinions and ideas from experts.
- Interviews are a really important part
- SWOT analysis lets you analyze Strengths, Weaknesses, Opportunities, and Threats
- Root Cause analysis is analyzing each risk and figuring out what's actually behind it.

# 8.2 Identify Risk

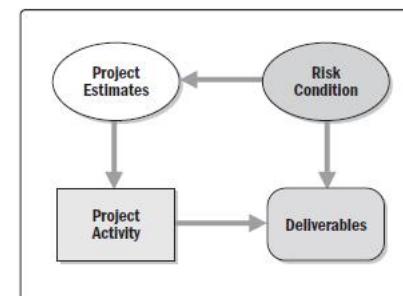
## □ Diagramming Techniques



Fishbone or Ishikawa Diagram



Flowchart



Influence Diagram

# 8.2 Identify Risk



## ■ Risk Register

- The risk register is a document in which the results of risk analysis and risk response planning are recorded.

The goal is to produce the risk register. That's the main weapon against risk.

Identified Risks	Potential Responses	Root Causes
Landslide caused by loose gravel and dirt on the nearby mountain	Put up barrier or dig trench	Geological data review found loose topsoil nearby
High winds can lead to cliff disaster	Reinforce tent stakes; obtain weatherproof equipment	National weather service predicts 35% chance of high winds
Truck rental is unavailable	Pay to reserve equipment at a second company	Higher than expected demand for equipment in the area this season
Equipment failure during project	No responses were found by the team	Recent industry report cites higher-than-expected failure rates for critical equipment

Risk Register

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# 8.3 Perform Qualitative Risk Analysis

## *Perform Qualitative Risk Analysis*

*The process of prioritizing risks for further analysis or action by assessing and combining their probability of occurrence and impact*

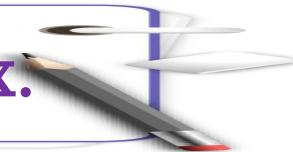


**Qualitative Risk Analysis**

The key benefit of this process is that it **enables project managers** to reduce the level of **uncertainty** and to focus on **high-priority risks**.

# 8.3 Perform Qualitative Risk Analysis

## Probability and impact matrix.



**Probability and Impact Matrix**

Probability	Threats					Opportunities				
	0.90	0.05	0.09	0.18	0.36	0.72	0.72	0.36	0.18	0.09
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0.50	0.03	0.05	0.10	0.20	0.40	0.40	0.20	0.10	0.05	0.03
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0.10	0.01	0.01	0.02	0.04	0.08	0.08	0.04	0.02	0.01	0.01
	0.05/ Very Low	0.10/ Low	0.20/ Moderate	0.40/ High	0.80/ Very High	0.80/ Very High	0.40/ High	0.20/ Moderate	0.10/ Low	0.05/ Very Low

# 8.3 Perform Qualitative Risk Analysis

## updated risk register



	<b>Identified Risks</b>	<b>Potential Response</b>	<b>Root Cause</b>	<b>Category</b>	<b>Priority</b>	<b>Urgency</b>
1.	Landslide caused by loose gravel and dirt on the nearby mountain	Put up barrier or dig trench	Geological data review found loose topsoil nearby	Natural	Low	Medium
2.	High winds can lead to cliff disaster	Reinforce tent stakes; obtain weatherproof equipment	National weather service predicts 35% chance of high winds	Natural	High	Medium
3.	Truck rental is unavailable		Higher than expected demand for equipment this season	Equipment	High	High
4.	Storms predicted through the first two weeks of project schedule time	Create reserves to account for time lost due to storms	El Niño weather pattern	Natural	Medium	Low
5.	Supply shortage if we don't accurately predict food needs		Nearest store is 30 miles away	Equipment	Low	High
6.	If someone gets sick it could be a problem getting medical care	Bring a doctor with us on the project	Nearest hospital is 50 miles away	Human	Low	Medium

# 8.3 Perform Quantitative Risk Analysis

## *Perform Quantitative Risk Analysis*

*The process of numerically analyzing the effect of identified risks on overall project objectives.*



**Qualitative Risk Analysis**

The key benefit of this process is that it **produces quantitative risk information** to support decision making in order to reduce project uncertainty.

## 8.3 Perform Quantitative Risk Analysis



- 1 Data *gathering* and representation techniques
- 2 Quantitative risk *analysis* and modeling techniques

# 8.3 Perform Quantitative Risk Analysis

Quantitative analysis means taking measurements and coming up with exact numbers to describe your risks

*First gather the data*

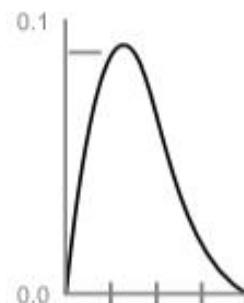
*Interviewing*

*Probability distribution*

*Expert judgment*



Beta Distribution



Triangular Distribution



# 8.3 Perform quantitative Risk Analysis

Figuring out how much the risk will end up costing you



*Then analyze it*

**Sensitivity analysis**

**Expected monetary value analysis**

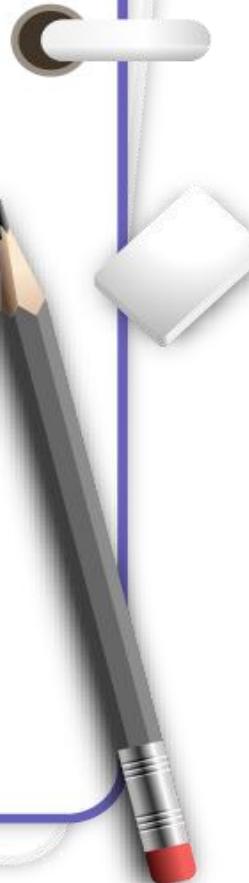
**Modeling and simulation**

# 8.3 Perform quantitative Risk Analysis

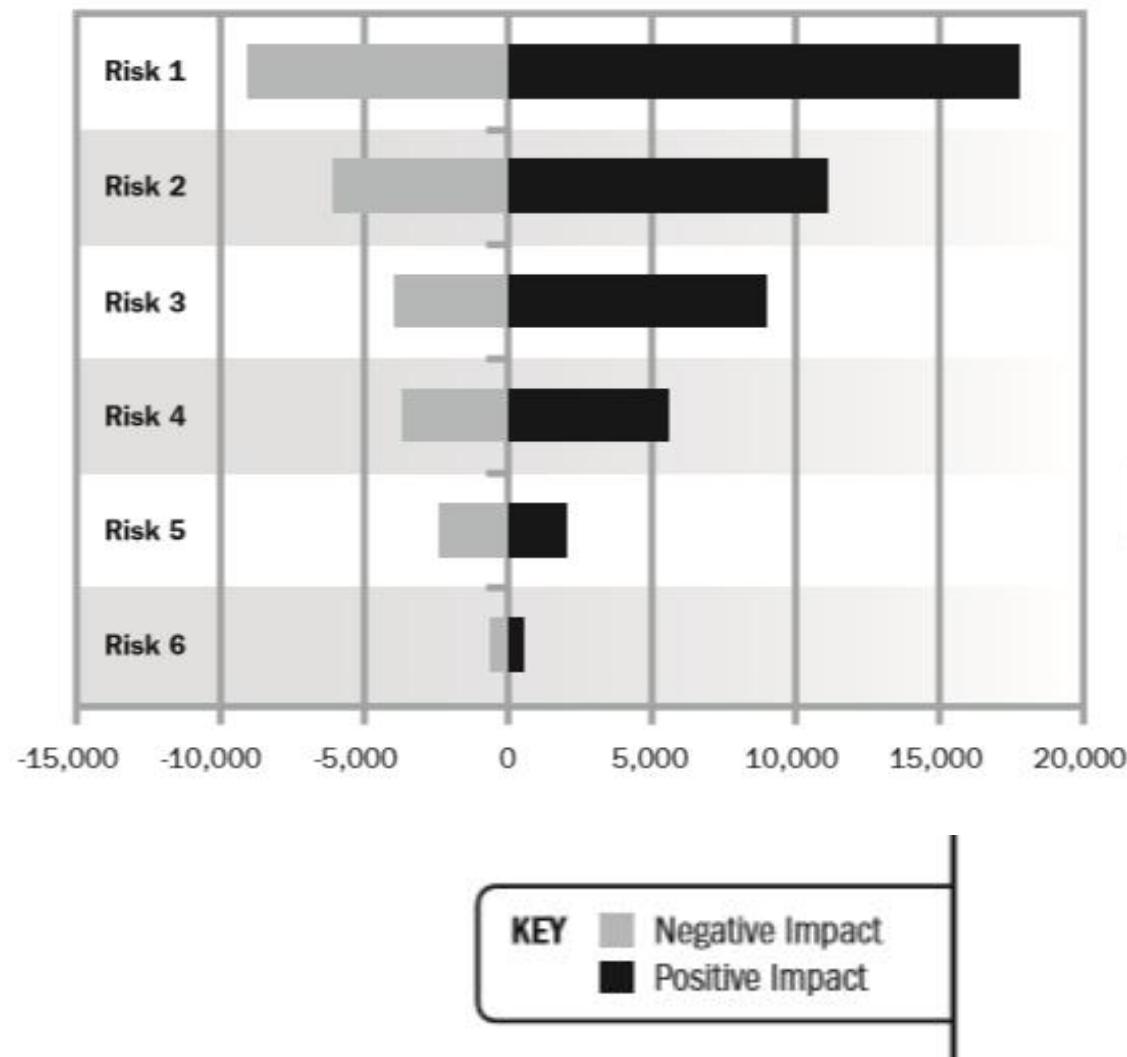
## Sensitive Analysis

*Helps to determine which risks have the most potential impact on the project.*

*It helps to understand how the variations in project's objective correlate with variations in different uncertainties.*



## 8.3 Perform quantitative Risk Analysis



## 8.3 Perform quantitative Risk Analysis

### *Expected monetary value analysis*

*Expected monetary value (EMV) analysis is*

*a statistical concept that calculates the*

*average outcome when the future includes*

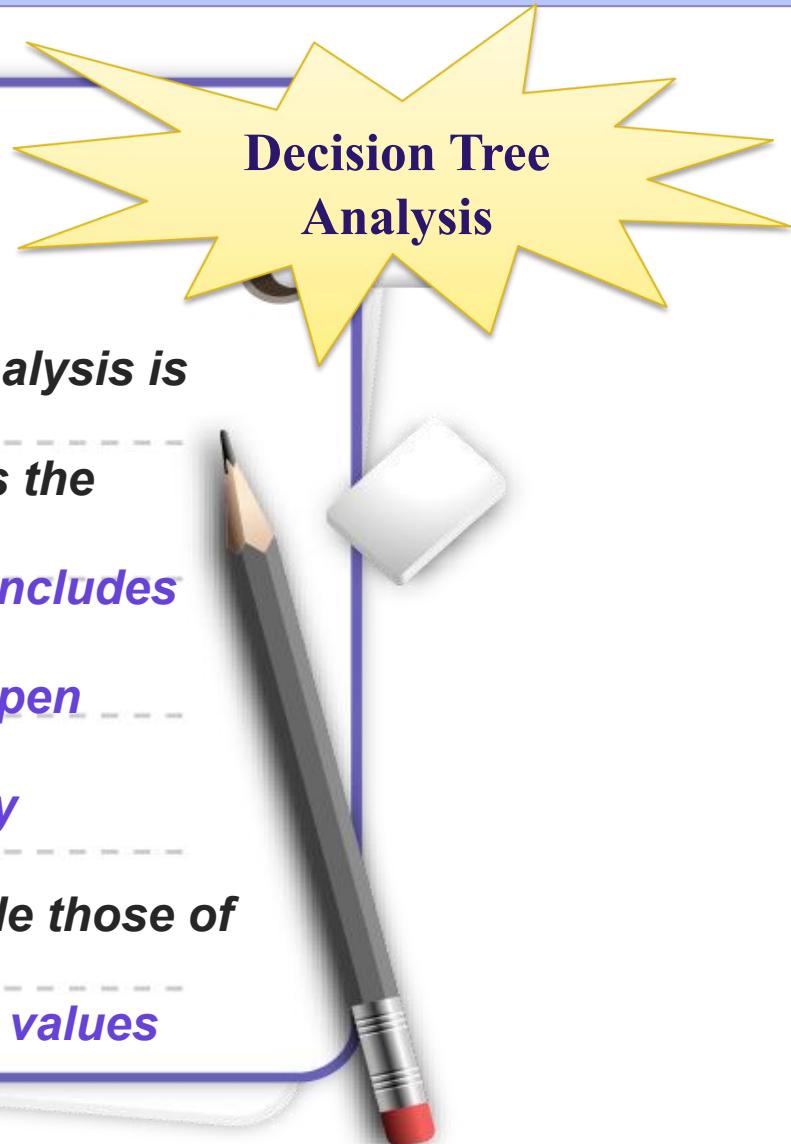
*scenarios that may or may not happen*

*EMV of opportunities are generally*

*expressed as positive values, while those of*

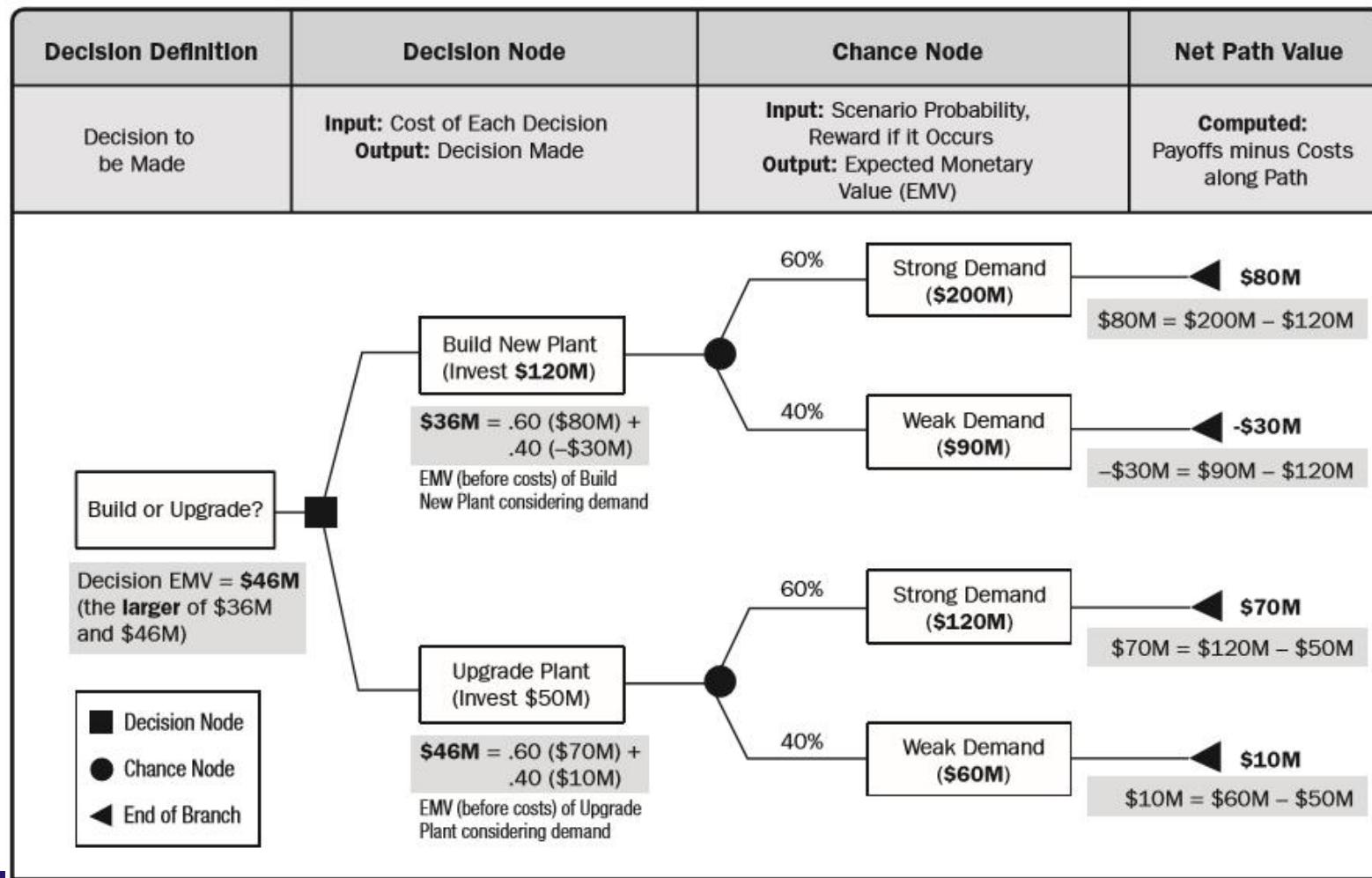
*threats are expressed as negative values*

### **Decision Tree Analysis**



# 8.3 Perform quantitative Risk Analysis

A decision is being made whether to invest \$120M US to build a new plant or to instead invest only \$50M US to upgrade the existing plant.



# Test

*Take a look at this table of*

Risk	Probability	Impact
Navigation equipment failure	15%	costs \$300 due to getting lost
Unseasonably warm weather	8%	saves \$500 in excavation costs
Wild animals eat rations	10%	costs \$100 for replacement run

1. Calculate the EMV for each of these three risks

**Navigation equipment failure:**  $15\% \times (-\$300) = \$-45.00$

**Unseasonably warm weather:**  $8\% \times \$500 = \$40.00$

**Wild animals eat rations:**  $10\% \times (-\$100) = \$-10.00$

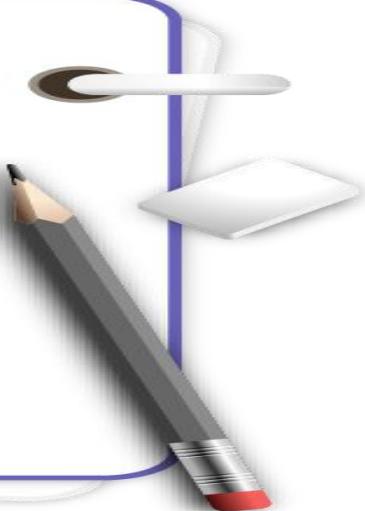
2. If these are the only risks on the project, calculate the total EMV

**Total EMV =  $-\$45.00 + \$40.00 + (-\$10.00) = -\$15.00$**

## 8.3 Perform quantitative Risk Analysis

### *Modeling and simulation*

*A Project simulation uses a model that translates  
the specified detailed uncertainties of the project  
into their potential impact on project objectives.*



**Monte Carlo**  
*The biggest city of Monaco*  
*Famous of Gambling*

Monte Carlo analysis lets you run a lot of simulations to come up with data about what could happen on your project.

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# 8.4 Plan Risk Responses

## *Plan Risk Responses*

*The process of developing options and actions to enhance opportunities and to reduce threats to project objectives.*

The key benefit of this process is that it addresses the risks by their priority, inserting resources and activities into the budget, schedule and project management plan as needed.

# 8.4 Plan Risk Response



- 1 Strategies for negative risks or threats
  - avoid, transfer, mitigate, and accept
- 2 Strategies for positive risks or opportunities
  - exploit, share, enhance, and accept.
- 3 Contingent response strategies
- 4 Expert judgment



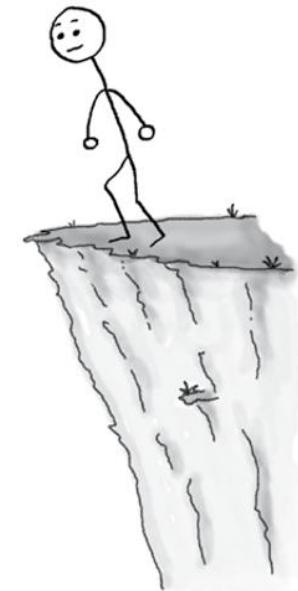
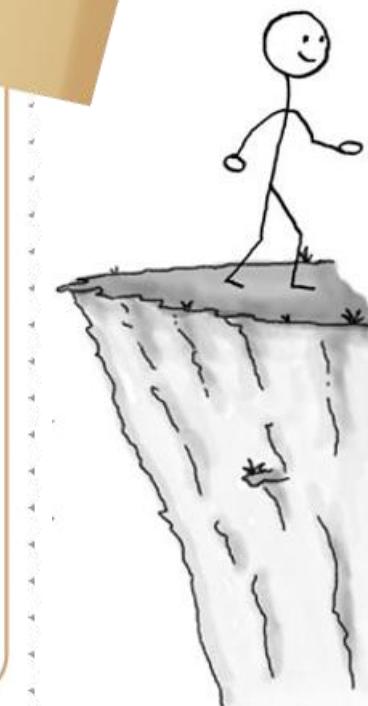
# 8.4 Plan Risk Response

## **Strategies for Negative Risks or Threats**

**Avoid**

*The project team acts to eliminate the threat or protect the project from its impact.*

*It usually involves changing the project management plan to eliminate the threat entirely*



**The best thing that you can do with a risk is avoid it**

# 8.4 Plan Risk Response

## *Strategies for Negative Risks or Threats*

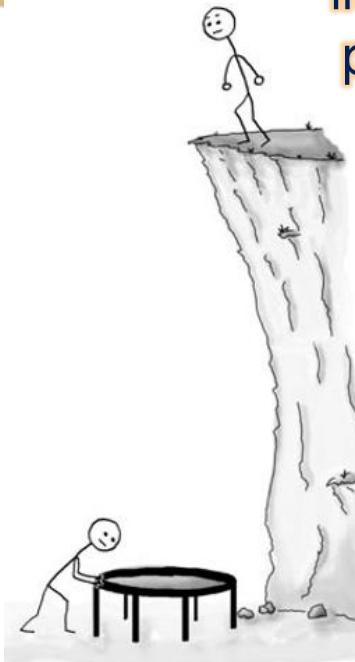
### **Mitigate**

*The project team acts to reduce the probability of occurrence or impact of a risk.*

*Taking early action to reduce the probability and/or impact of a risk occurring on the project is often more effective than trying to repair the damage after the risk has occurred*

If you can't avoid the risk, you can mitigate it.

This means some sort of action that will cause it to do as little damage to your project as possible



# 8.4 Plan Risk Response

## **Strategies for Negative Risks or Threats**

### **Transfer**

*The project team shifts the impact of a threat to a third party, together with ownership of the response.*

*Transferring the risk simply gives another party responsibility for its management-----it does not eliminate it.*



One effective way to deal with a risk is to pay someone else to accept it for you.

The most common way to do this is to buy insurance.

# 8.4 Plan Risk Response

## Strategies for Negative Risks or Threats

*Accept*

*The project team decides to acknowledge the risk and not take any action unless the risk occurs*

*The strategy is adopted where it is not possible or cost-effective to address a specific risk in any other way.*



*When you can't avoid, mitigate, or transfer a risk, then you have to accept it.*

*But even when you accept a risk, at least you've looked at the alternatives and you know what will happen if it occurs*

# 8.4 Plan Risk Response

## *Strategies for Positive Risks or Opportunities*

### *Exploit*

For risks with positive impacts where the organization wishes to ensure that the opportunity is realized.

This strategy seeks to eliminate the uncertainty associated with a particular upside risk by ensuring the opportunity definitely happens

You could assign your best resources to it.



# 8.4 Plan Risk Response

## *Strategies for Positive Risks or Opportunities*

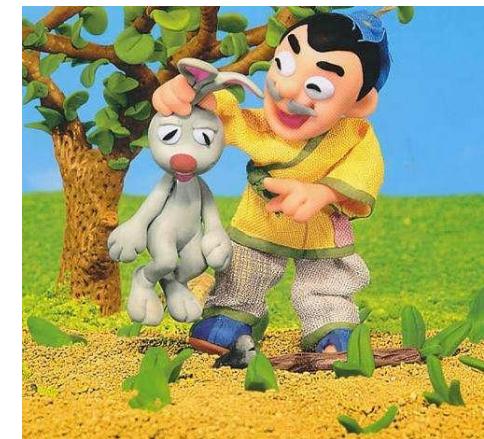


*Increase the probability and/or the positive impacts of an opportunity.*

*Identifying and maximizing key drivers of these positive-impact risks may increase the probability of their occurrence*

**When you try to make the opportunity more probable by influencing its triggers.**

If getting a picture of a rare bird is important, then you might bring more food that its' attracted to

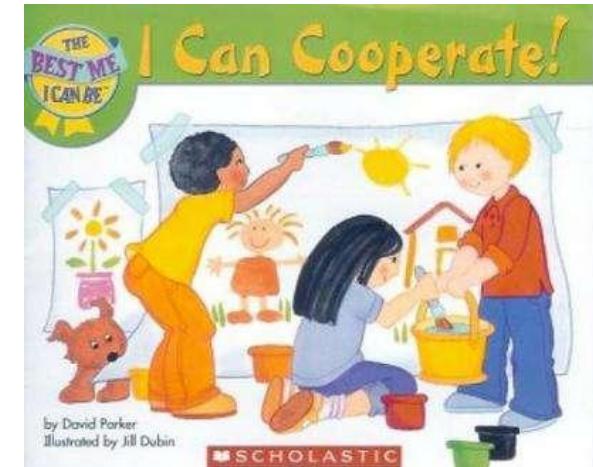


# 8.4 Plan Risk Response

## Strategies for Positive Risks or Opportunities

*Share*

*Sharing a positive risk involves allocating some or all of the ownership of the opportunity to a third party who is best able to capture the opportunity for the benefit of the project.*



Sometimes it's harder to take advantage of an opportunity on your own. Then you might call in another company to share in with you.

# 8.4 Plan Risk Response

## *Strategies for Positive Risks or Opportunities*



Just like accepting a negative risk, sometimes an opportunity just falls in your lap. The best thing to do in that case is to just accept it!

# Test

*Which risk response technique is being used in these situations?*

1. If the weather's good, then there's a chance you could see a meteor shower. If the team gets a photo that wins the meteor photo contest, you can get extra funding. You have your team stay up all night with their telescopes and cameras ready.

Exploit

2. You hear that it's going to rain for the first three days of your trip, so you bring waterproof tents and indoor projects for the team to work on in the meantime.

Mitigate

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# 8.5 Control Risks

## *Control Risks*

*The process of implementing risk response plans, tracking identified risks, monitoring residual risks, identifying new risks, and evaluating risk process effectiveness throughout the project.*

The key benefit of this process is that it **improves efficiency** of the risk approach throughout the project life cycle to continuously **optimize risk responses.**

## 8.5 Control Risks



- 1 Risk reassessment
- 2 Risk audits
- 3 Variance and trend analysis
- 4 Technical performance measurement
- 5 Reserve analysis
- 6 Meetings

## 8.5 Control Risks

### ***Risk reassessment***

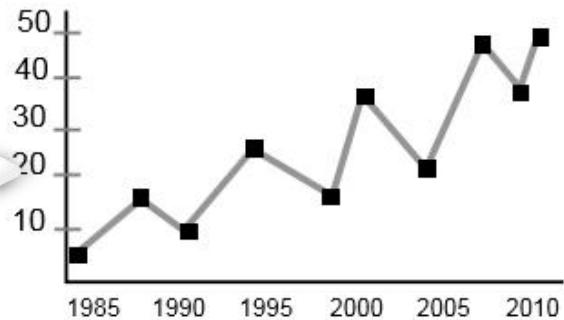
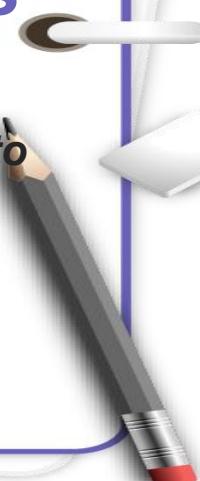
***You should have some regularly scheduled reassessment meetings to go over all of the information you have to date and see if your risk register still holds true.***



# 8.5 Control Risks

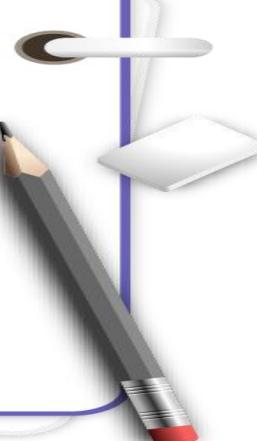
## *Variance and trend analysis*

*Comparing the actual project performance to the plan is a great way to tell if a risk might be happening.*



## *Reserve analysis*

*Just like you keep running tabs on your budget, you should always know how much money you have set aside for risk response*

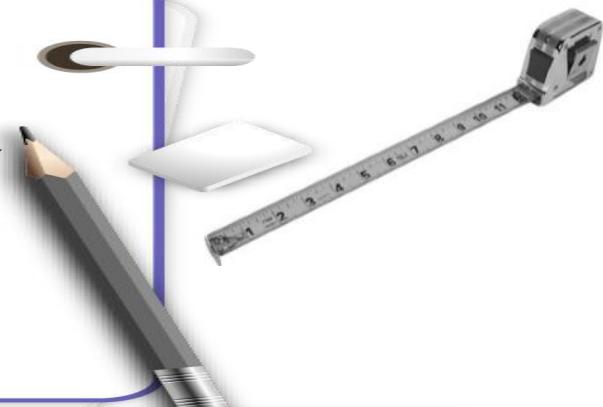


# 8.5 Control Risks

Never stop looking for new risks and adapting your strategies for dealing with them

## ***Risk audits***

*You have an outside party come in and take a look at your risk response strategies to judge how effective they are.*



## ***Technical performance measurement***

*Comparing the performance of your project with its planned performance. So if you expected to hit a specific milestone, you could check performance information on your product at that time to see if it measured up to the plan*

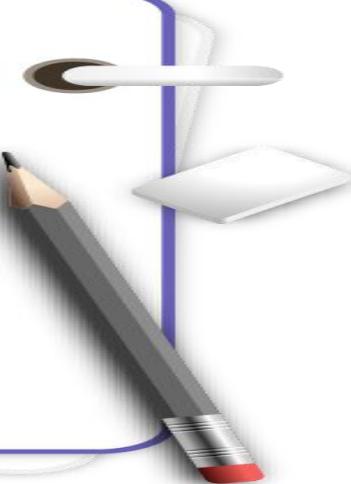


# 8.5 Control Risks

## ***Status meeting***

***The most important way to keep the team up to date on risk planning. They should happen throughout the entire project.***

***The more you talk about risks with the team, the better.***



Status meetings are a really important way of noticing when things might go wrong, and of making sure that you implement your response strategy in time.



It's also possible that you could come across a new opportunity by talking to the team

# Chapter 8 Summary

A

**Understand the concept of Risk and Risk management**

B

**Understand the six risk management processes**

C

**Mastering the tools and techniques used for plan risk response**

D

**Mastering tools and techniques used for control risk**