

# **Informatik-Projektentwicklung**

## **– Lecture 06 –**

**Prof. Dr. Peter Müller**  
Software Component Technology

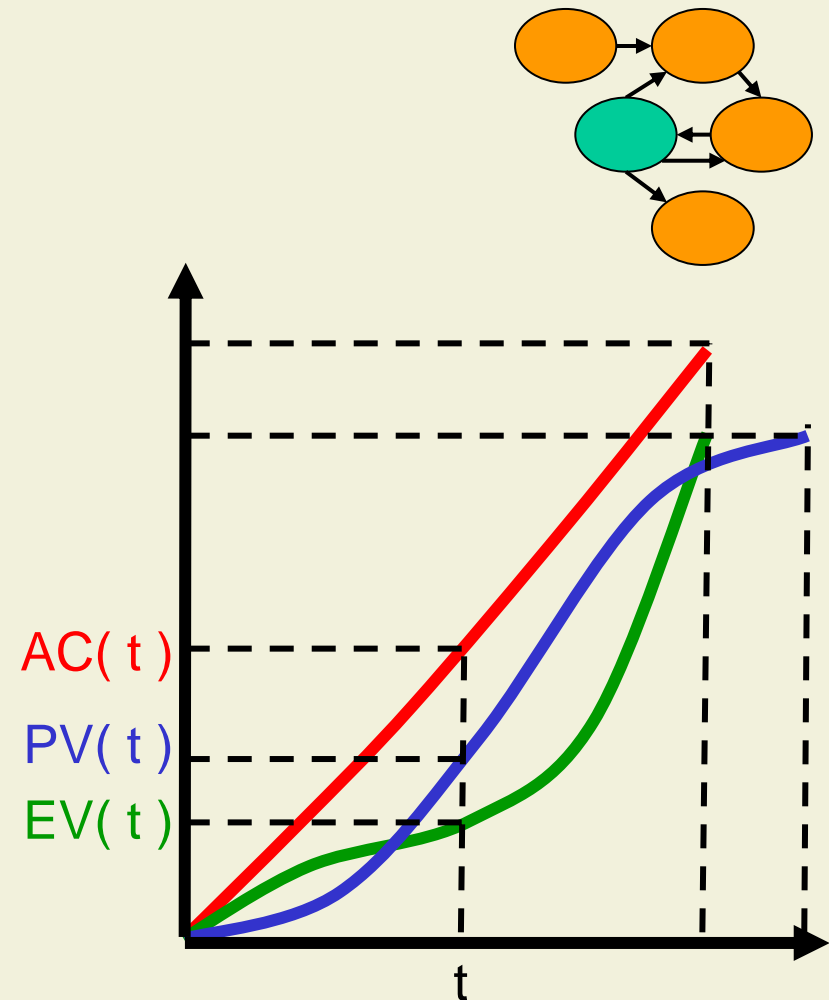
Wintersemester 05/06



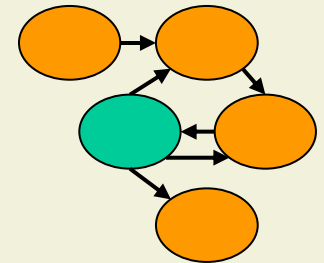
Eidgenössische Technische Hochschule Zürich  
Swiss Federal Institute of Technology Zurich

# Earned Value Method

- Expresses effort, cost, and time as **monetary value**
  - $PV(t)$ : Worth of the activities scheduled (planned)
  - $AC(t)$ : Cost spent
  - $EV(t)$ : Worth of the activities performed
- Compares the amount of work planned to what was actually accomplished to **determine cost and schedule performance**



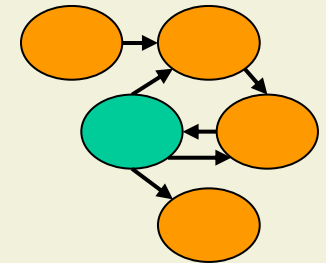
# Cost Management



A Cost Performance Index of 0.89 means:

- a. At this time, we expect the total project to cost 89% more than planned
- b. When the project is completed we will have spent 89% more than planned
- c. The project is only progressing at 89% of that planned
- d. The project is only getting 89 cents out of every dollar invested

# Cost Performance Index (CPI)



- Compares **budgeted cost** to **actual**
- Indicates the **efficiency** of the project

$$CPI = \frac{EV}{AC}$$

- How much do we get out of one Franc we spend?

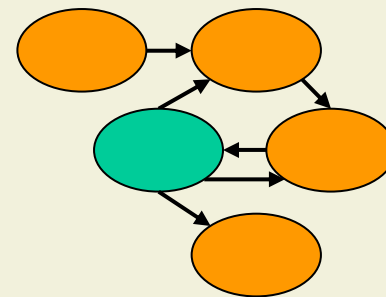
Activity	PV( t )	AC( t )	EV( t )
Paint wall	800	1000	800
Paint ceiling	400	300	300
Total	1.200	1.300	1.100

$$CPI = \frac{1.100}{1.300} = 85\%$$

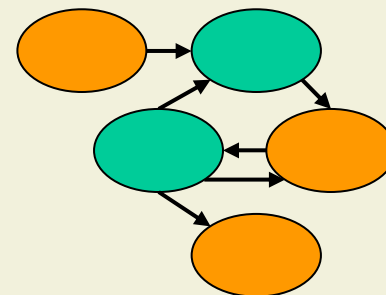
# Agenda for Today

## 6. Change and Risk Management

### 6.1 Change Management

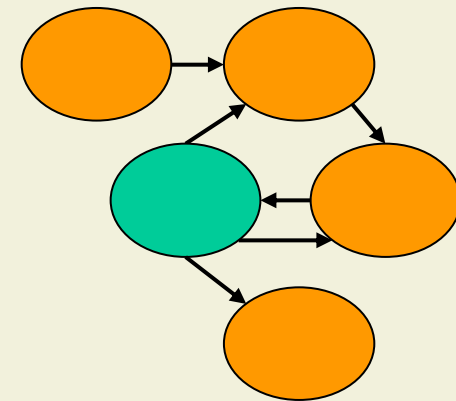


### 6.2 Risk Management

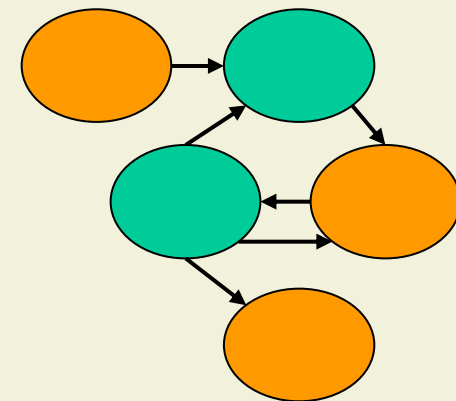


# 6. Change and Risk Management

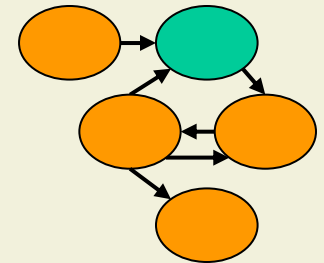
## 6.1 Change Management



## 6.2 Risk Management

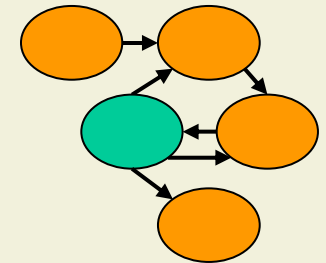


# Baseline



- Definition:  
*The originally approved plan plus or minus approved changes.*
- Baselines are used to compare the actual performance and forecasts of the project with the original plan

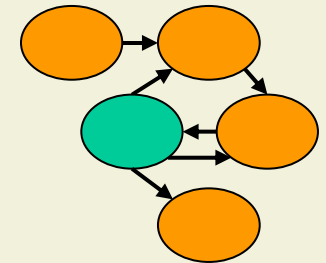
# Change



- Definition:  
*Any deviation from a previously approved baseline.*
  
- Internal origins of changes
  - Design, implementation, cost, etc.
- External origins of changes
  - Scope of work, requirements, schedule, cost
- Other origins: Issues, Risks

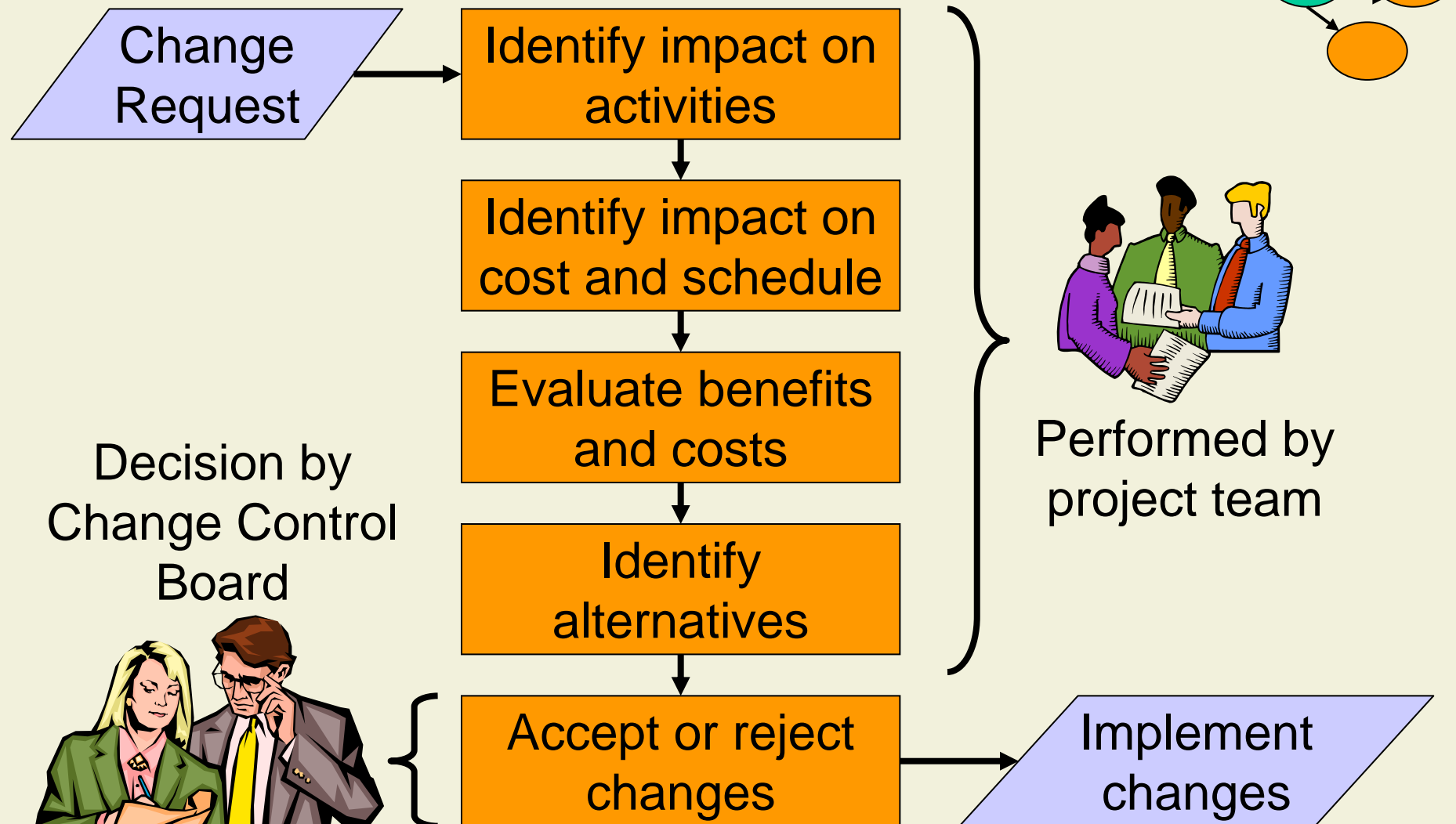


# Why Change Management?

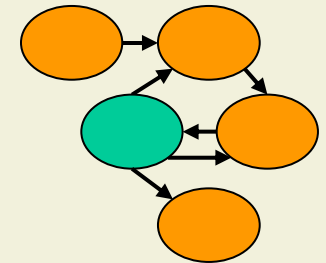


- Prevent scope creep
- Allow the impact of all changes to be understood and managed
  - Impact on triple constraint
- Allow each change to be accepted, rejected, or deferred by the appropriate authority
  - Management
  - Customer
  - Contractual partners

# Change Control Process

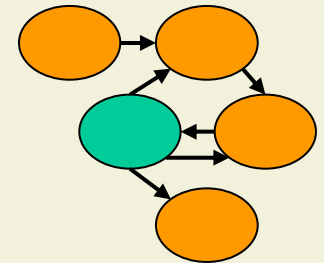


# Follow-Up Actions



- If accepted
  - Plan incorporation into the system
  - Create new baselines
  - Modify the schedule and allocate resources
- If rejected
  - Communicate and document the decision
- If deferred
  - Perform further analysis
  - Consider further alternatives
  - Hold until a specified time

# Scope Change Control: Summary



## ■ Purpose

- To influence the factors that create scope changes to ensure changes are agreed upon
- To determine that a scope change has occurred
- To manage the actual changes when and if they occur

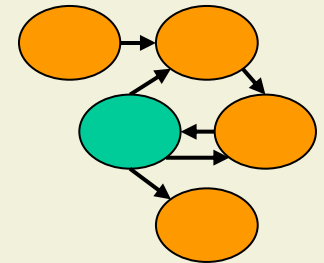
Inputs	Tools & Techniques	Outputs
1. Work breakdown structure 2. Performance reports 3. Change requests 4. Scope management plan	1. Scope change control 2. Performance measurement 3. Additional planning	1. Scope changes 2. Corrective action 3. Adjusted baseline

# Examples

- Change Request

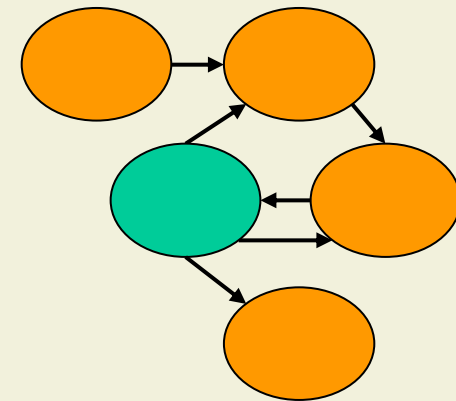


- Change Process

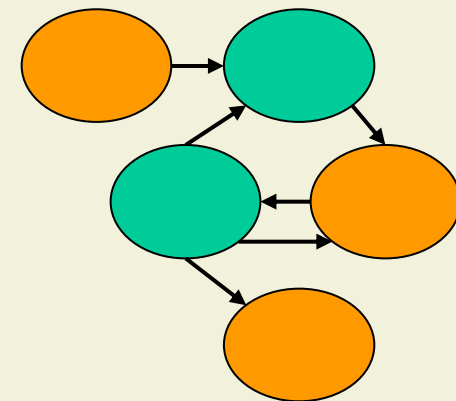


# 6. Change and Risk Management

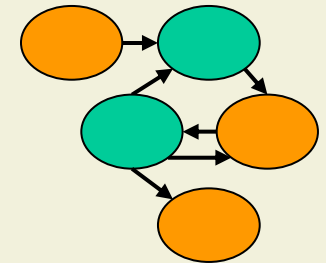
## 6.1 Change Management



## 6.2 Risk Management



# Risk



- Definition:

*An uncertain event or condition that, if it occurs, has a positive or negative effect on a project objective*

- Risks have three components

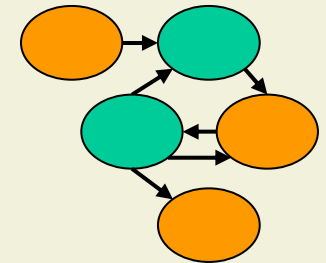
- A possible future event (uncertainty)
- Probability of the occurrence of that event (likelihood)
- Impact of that event (consequence)

*"Reports that say that something hasn't happened are always interesting to me, because as we know, there are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns — the ones we don't know we don't know."*

Donald Rumsfeld, 2003

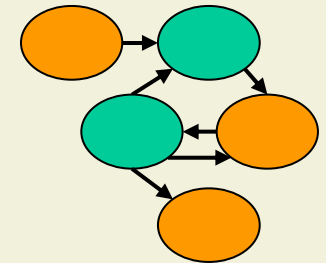


# Risk Classification



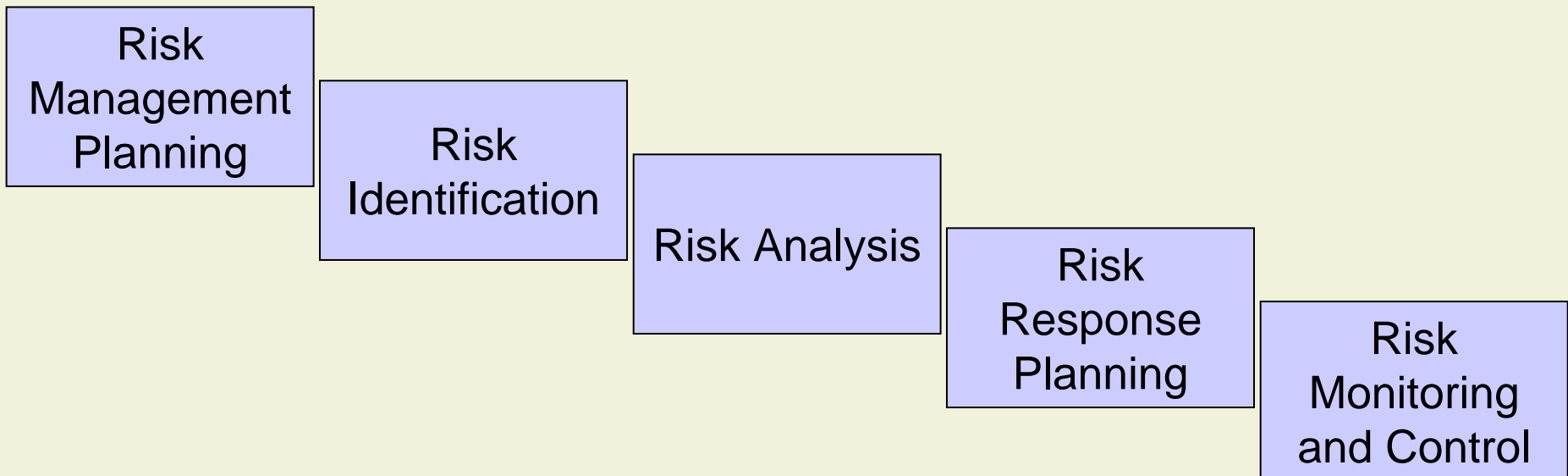
- Known risks
  - Unclear requirements
  - Inexperienced team
- Unknown risks: Foreseen based on experience
  - Difficult communication with customer
  - Fluctuation within team
- Unknowable risks: Cannot be foreseen
  - Half of the team gets fish poisoning at first social event
  - Earthquake wipes out production plant

# Risk Management

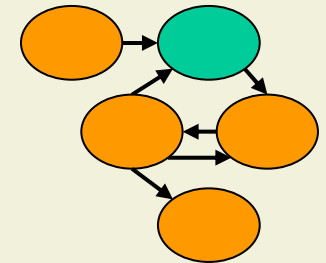


- Definition:

*Systematic process of identifying, analyzing, and responding to project risk. It includes minimizing the consequences of adverse events to project objectives.*



# Risk Mgmt. Planning: Summary

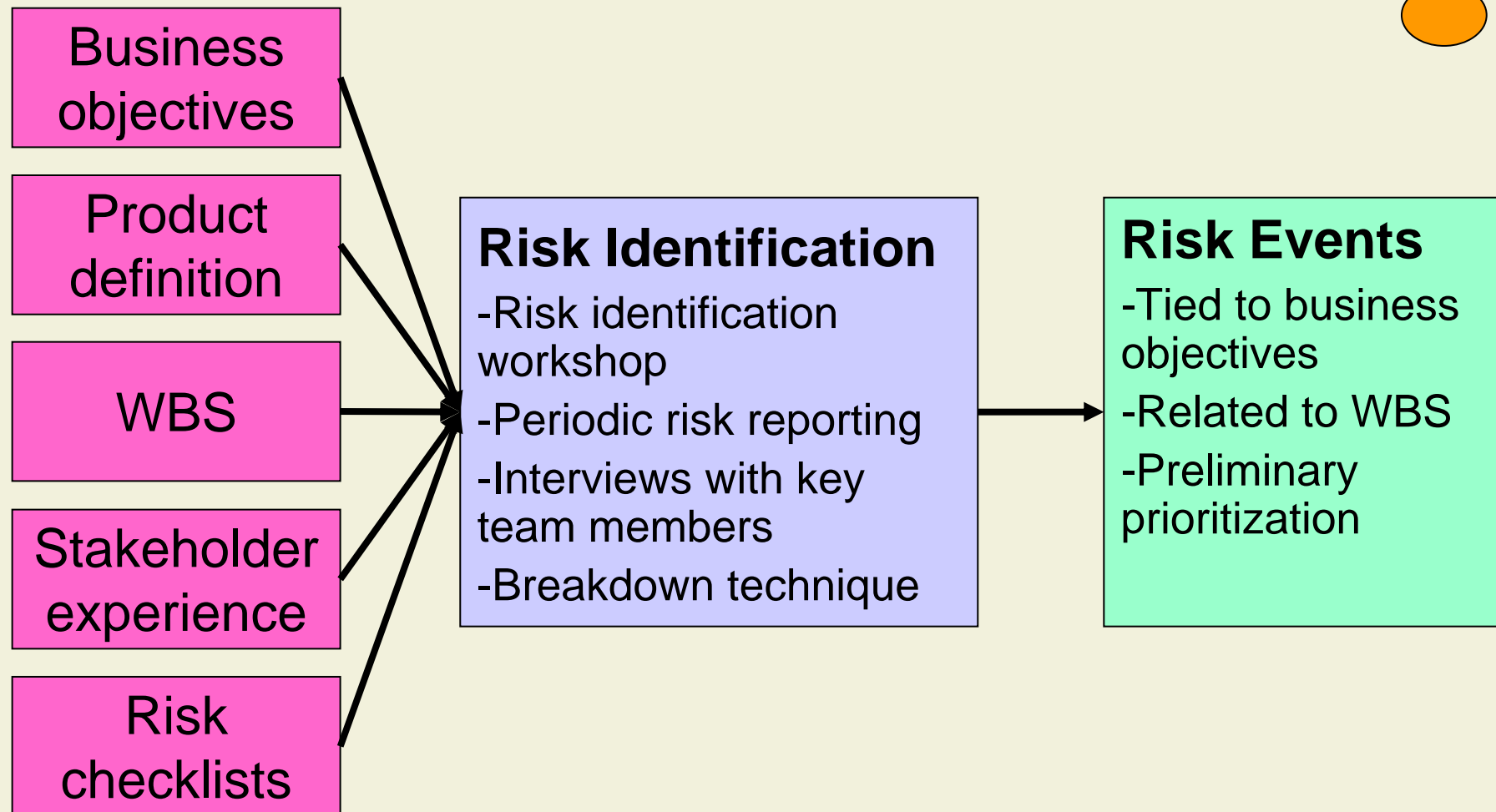
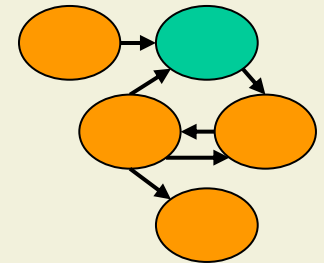


## ■ Purpose

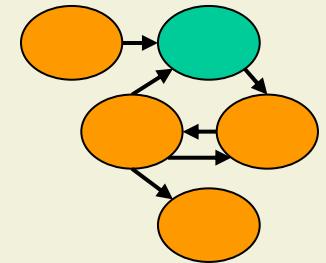
- To decide how to approach and plan the risk management activities for a project

Inputs	Tools & Techniques	Outputs
<ol style="list-style-type: none"> <li>1. Organization's risk mgmt. policies</li> <li>2. Defined roles and responsibilities</li> <li>3. Stakeholder risk tolerance</li> <li>4. WBS</li> </ol>	<ol style="list-style-type: none"> <li>1. Planning meetings</li> </ol>	<ol style="list-style-type: none"> <li>1. Methodology</li> <li>2. Timing</li> <li>3. Scoring and interpretation</li> <li>4. Thresholds</li> <li>5. Reporting formats</li> </ol>

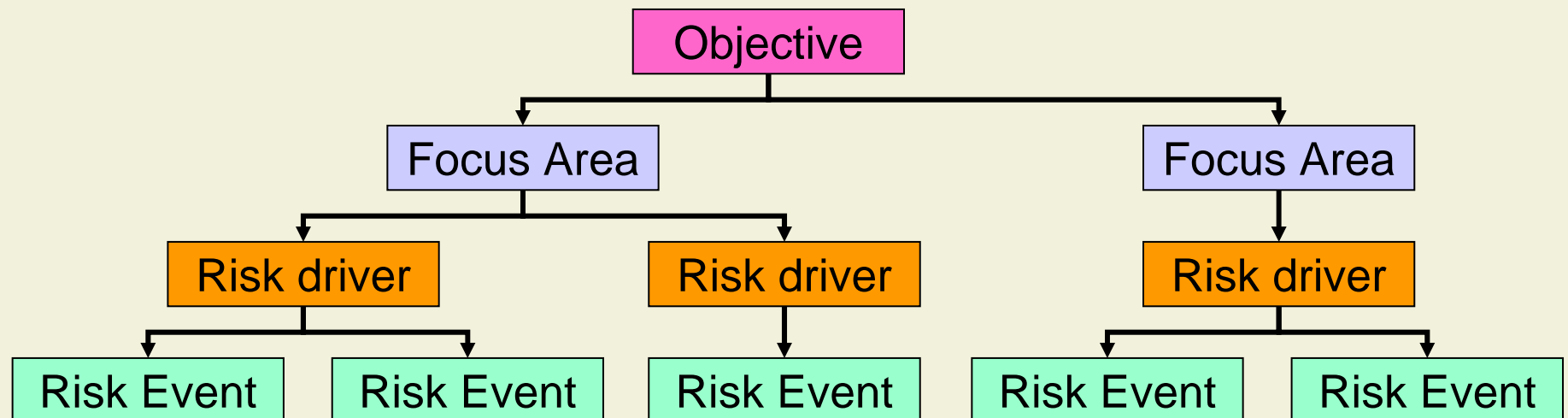
# Risk Identification



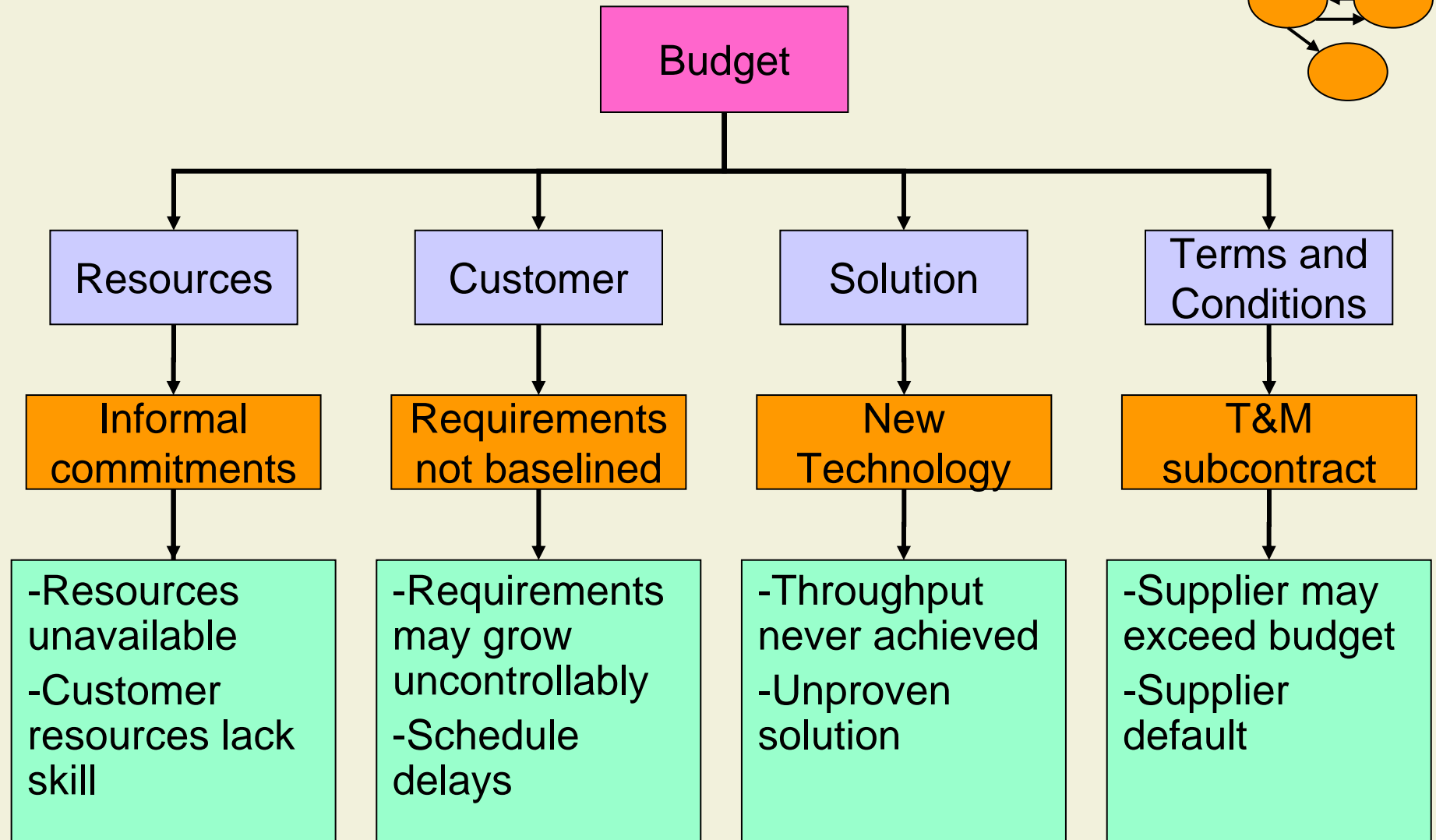
# Breakdown Technique



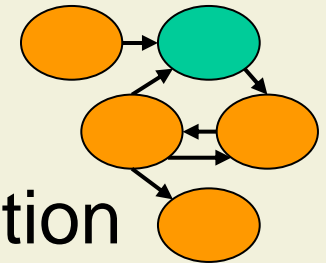
- Identify risks systematically
  - Project objectives: Win, Budget, Satisfy
  - Focus area: A breakdown of the project's potential sources of risk
  - Risk driver: A condition that increases the probability that a risk event will be present



# Breakdown Example

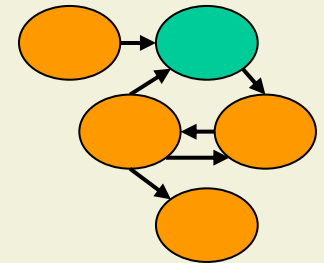


# Risk Analysis



- Often called risk assessment or risk evaluation
- Determine
  - **Probability** of the risk to occur
  - **Impact** on the project objectives in case the risk occurs
  - **Severity** (Severity = Probability x Impact)
- Identify risks to be mitigated
  
- Qualitative analysis
- Quantitative analysis
  - Based on estimates and simulations

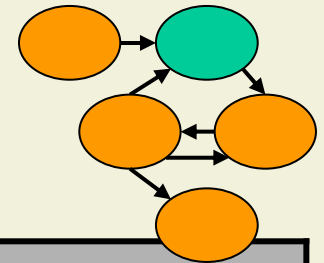
# Probability Criteria



Qualitative Rating	Quantitative Rating	Description
Very High	>84%	Almost assured to happen
High	60-84%	Likely to happen
Medium	35-59%	Somewhat likely to happen
Low	10-34%	Not very likely to happen

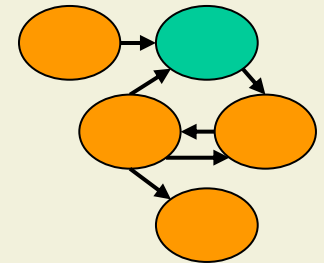


# Impact Criteria



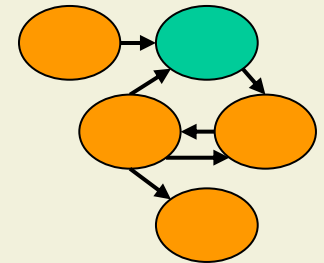
Risk Rating	Description
Very High	Has potential to cause cancellation of the project
High	Likely to cause significant disruption to schedule, increase in cost, or degradation of performance
Medium	Has potential to cause some disruption to schedule, increase in cost, or degradation of performance
Low	Has little potential to cause some disruption to schedule, increase in cost, or degradation of performance

# Severity of Individual Risks



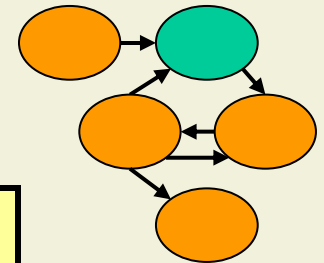
Severity		Impact			
		Very High	High	Medium	Low
Probability	Very High	Unacceptable	Very High	High	High
	High	Very High	High	High	Medium
	Medium	High	High	Medium	Medium
	Low	High	Medium	Medium	Low

# Risk Ranking



- Prioritize risk according to
  - Severity
  - Timing
  - Time required to mitigate (preliminary estimate)
  - Etc.
- “Top 10” Approach
  - Develop mitigation strategies for top 10 risks
  - Use the top 10 as an agenda item for regular project meetings

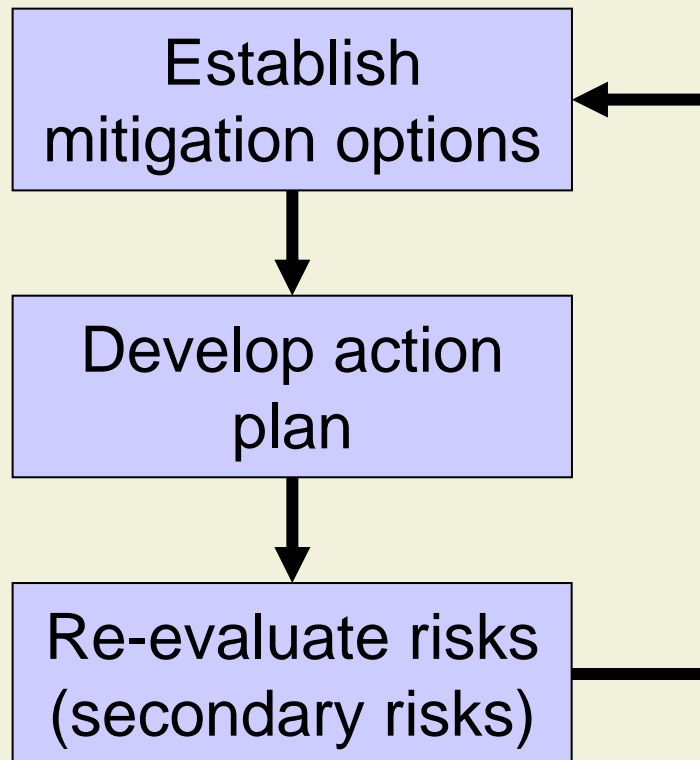
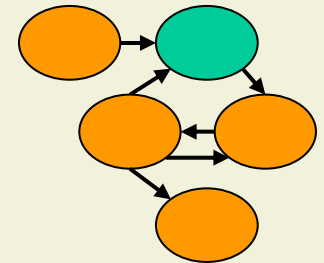
# Risk Documentation



Risk ID	WBS Number	Risk Event	Owner	Area of Impact (W/B/S)
1	2.04.05	Requirements will grow uncontrollably	PM	B/S

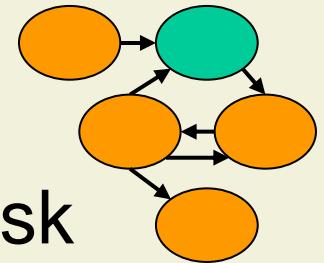
Probable Impact Date	Risk Probability	Risk Impact	Severity	Rank
20.07.2004	High	Very high	Very high	1

# Risk Response Planning



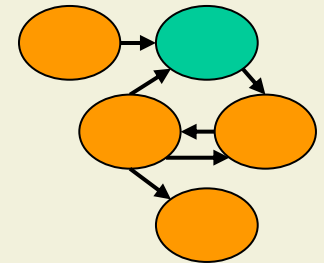
- Risk Response Planning is often called **risk mitigation**

# Mitigation Strategies



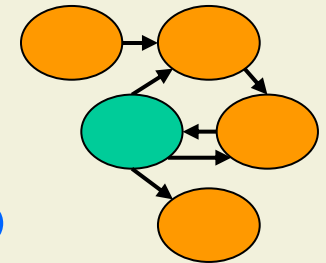
- **Avoid** the path or project to eliminate the risk
- **Ignore / Accept** the risk and its consequences if it occurs
- **Transfer** all or part of the risk to another party
- **Contain** the risk by specific actions to lower the probability and / or impact
- **Establish contingency**: Set funds aside to be used if the risk occurs or when later containment is deemed appropriate

# Extended Documentation



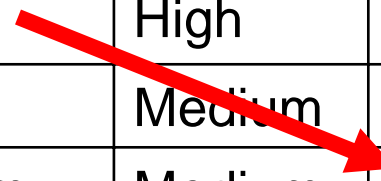
Risk ID	Mitigation Strategy	Mitigation Task	Responsible	Status
1	Contain	Use phased approach	PM	in progress

# Execution and Post Mitigation



- Mitigation tasks have to be **integrated into project plan** (WBS)
- Execution has to be **closely monitored**
- Risk has to be **re-assessed** to check whether mitigation is successful

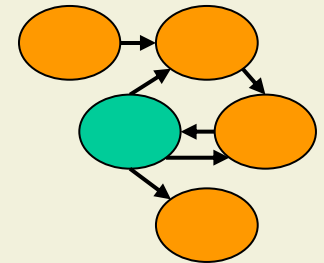
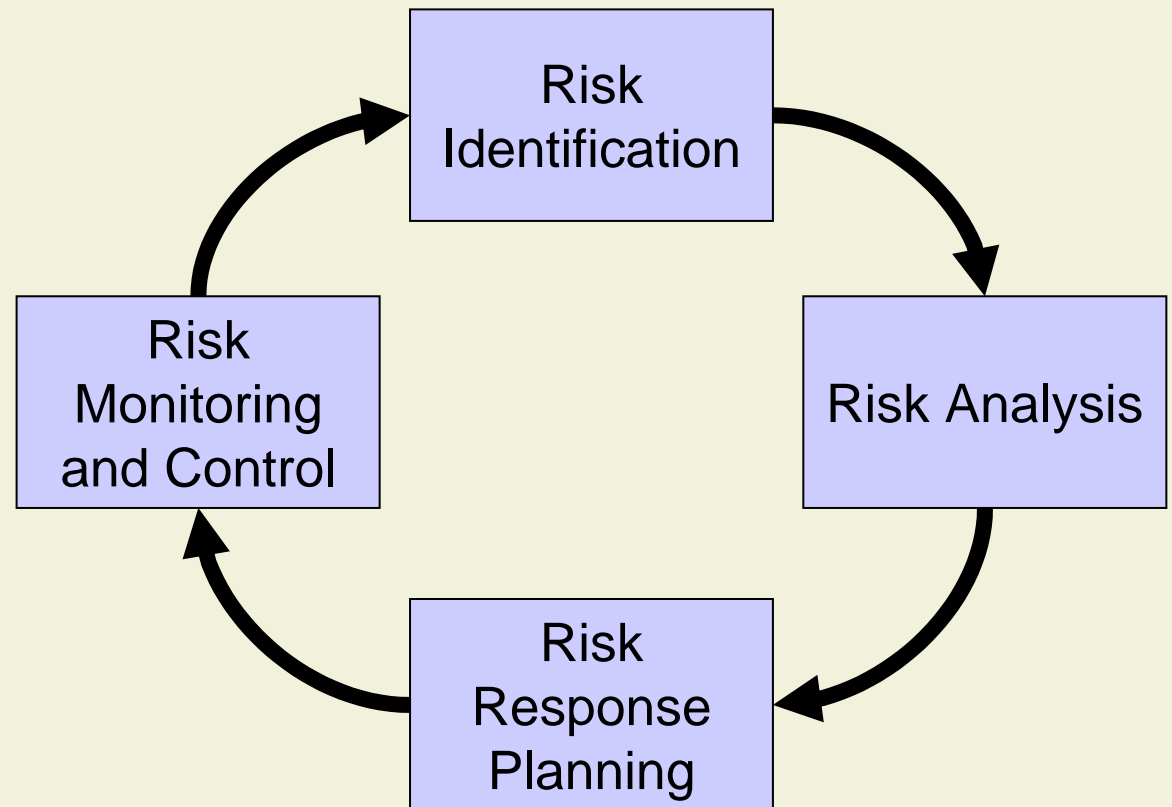
Severity		Impact			
		Very High	High	Medium	Low
Probability	Very High	Very High	Very High	High	High
	High	Very High	High	High	Medium
	Medium	High	High	Medium	Medium
	Low	High	Medium	Medium	Low



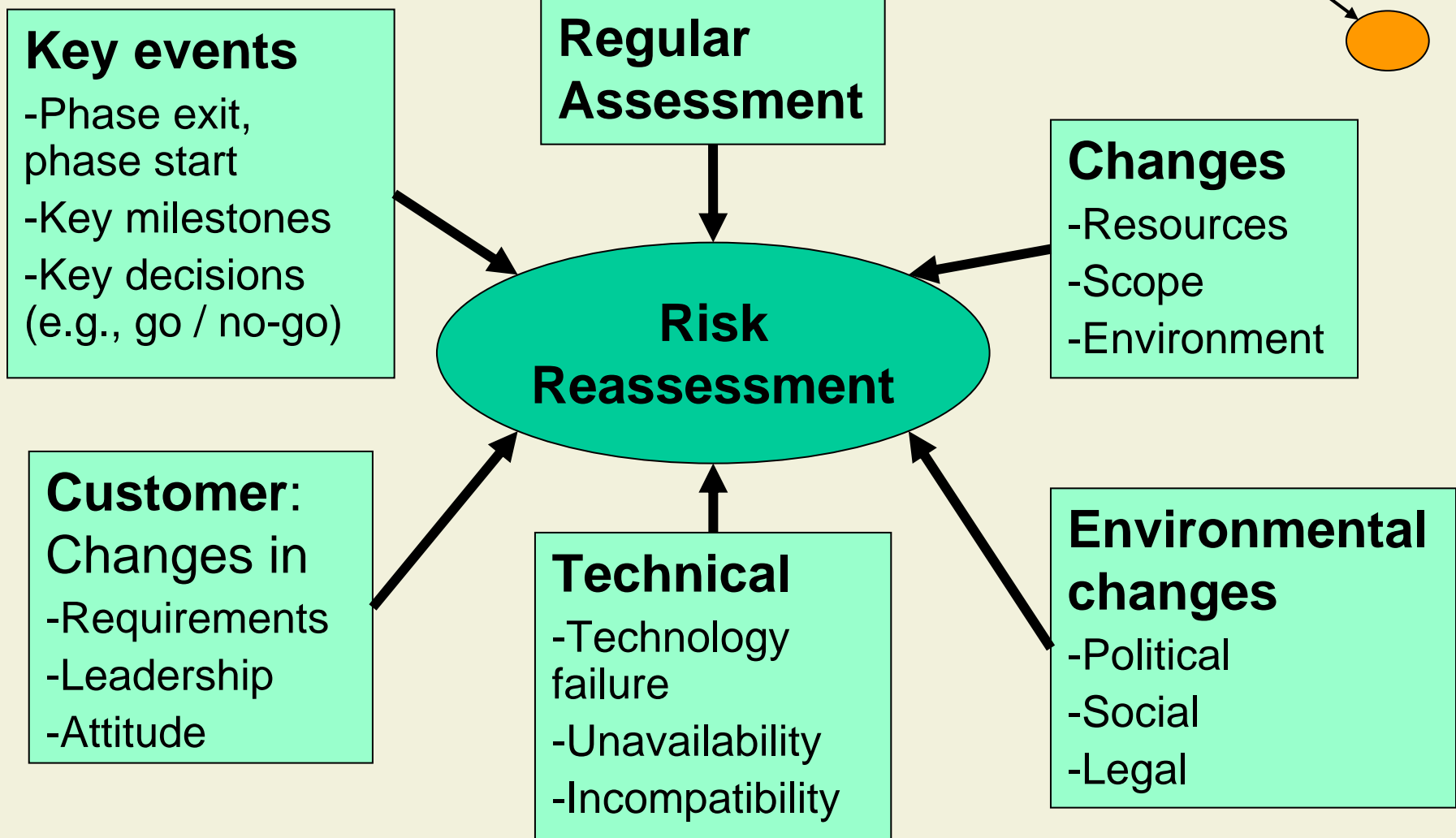
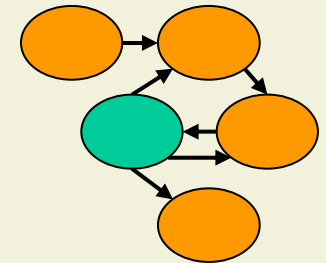


# Risk Monitoring

- **Implement, track, and reassess** mitigation strategies
- **Communicate** risk plan status to stakeholders
- **Update** documents

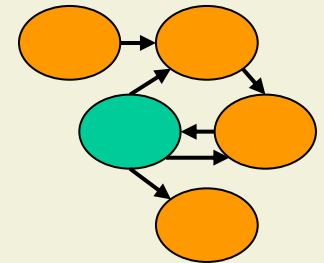


# Triggers for Risk Reassessment



# Examples

- Risk Process



- Risk Inventory



	Initiating	Planning	Executing	Controlling	Closing
Integration		Project Plan Dev.	Project Plan Execution	Integr. Change Ctrl	
Scope	Initiation	Scope Planning Scope Definition		Scope Change Ctrl	
Time		Act. Definition, Act. Sequencing, Schedule Dev.			
Cost		Resource Planning Cost Estimating Cost Budgeting			
HR					
Comm.					
Risk		Identification Analysis Response Planning		Monitoring and Control	
Procurement					

**BACKUP**