Risk Management
Lecture 07

Risk

- Risk – potential problem that might happen!
- Risk concerns future happenings
- Can we change today to make things better in the future?
  - Change minds, opinions, actions, etc.
- Risk involves uncertainty and loss
  - *Risk analysis is to quantify the level of uncertainty and the degree of loss associated.*

Risk management is to understand and manage uncertainty

Reactive vs. Proactive

- Reactive risk strategies seem to be the norm – fire-fighting mode
  - “I’ll deal with it when it happens, if it happens”
    - “Don’t worry, I’ll think of something”
  - Often lead to crisis
- Proactive risk strategies accept uncertainty *(smart strategy with the primary objective to avoid risk)*
  - Potential risks are identified
  - assess probability and impact
  - Try to avoid it or develop a contingency plan to respond in a controlled and effective manner.

Attack Risks

"If you don't actively attack the risks, they will actively attack you"

Tom Gilb

Consequences of Risk

- missed time, cost & quality targets
- liability and legal claims
- upset customers (loss of reputation and market)
- health & safety problems
- Effects on the reputation and so on future customers

Risk management

- *Risk management is concerned with identifying risks and drawing up plans to minimise their effect on a project.*

A risk is a probability that some adverse circumstance will occur

- Project risks affect schedule or resources;
- Product risks affect the quality or performance of the software being developed;
- Business risks affect the organisation developing or procuring the software.

Software risks (i)

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Risk	**Risk type**	**Description**
Staff turnover	Project	Experienced staff will leave the project before it is finished
Management change	Project	There will be a change of organisational management with different priorities
Hardware unavailability	Project	Hardware which is essential for the project will not be delivered on schedule
Requirements change	Project and product	There will be a larger number of changes to the requirements than anticipated
Specification delays	Project and product	Specification of essential interfaces are not available on schedule

Software risks (ii)

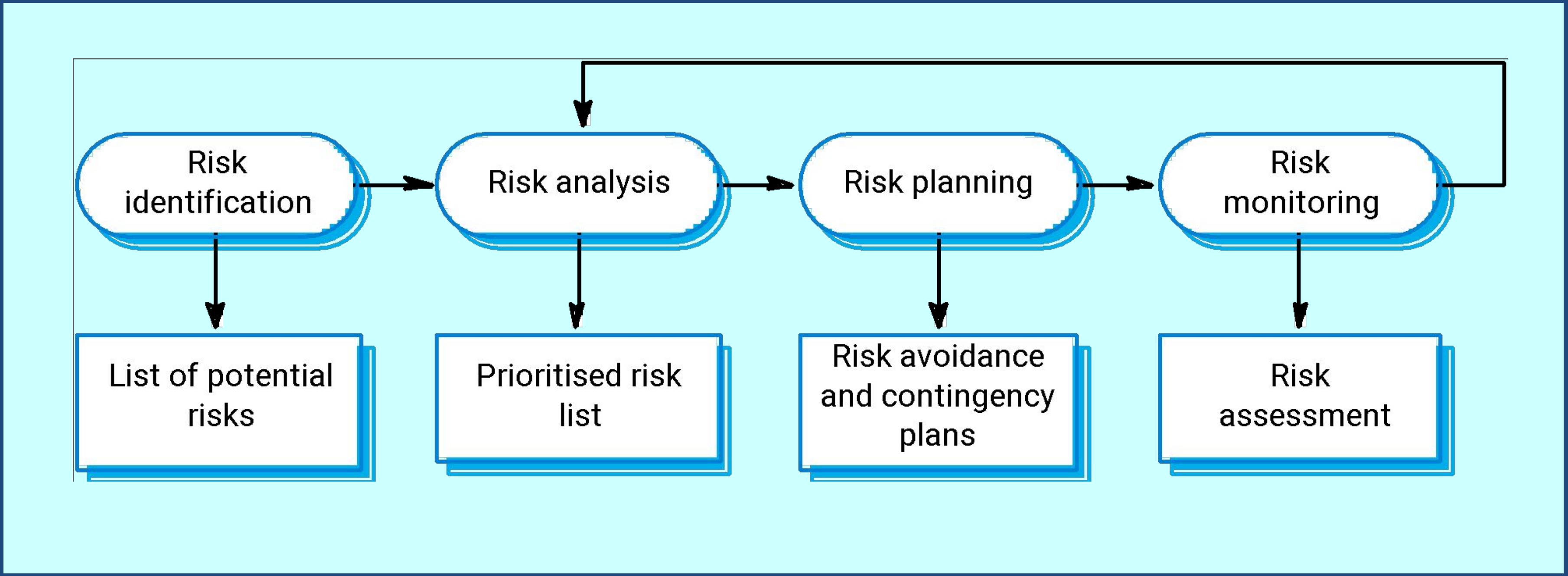
Sommerville

Risk	**Risk type**	**Description**
CASE tool under-performance	Product	CASE tools which support the project do not perform as anticipated
Technology change	Business	The underlying technology on which the system is built is superseded by new technology
Produce competition	Business	A competitive product is marketed before the system is completed
Size underestimate	Project and product	The size of the system was underestimated

The risk management process

- *Risk identification*
  - Identify project, product and business risks;
- *Risk analysis*
  - Assess the likelihood and consequences of these risks;
- *Risk planning*
  - Draw up plans to avoid or minimise the effects of the risk;
- *Risk monitoring*
  - Monitor the risks throughout the project;

The risk management process



Risk identification *Sommerville*

- Technology risks.
- People risks.
- Organisational risks.
- Tools risks.
- Requirements risks.
- Estimation risks.

Risks and risk types *Sommerville*

Technology	- The database used in the system cannot process as many transactions per second as expected. - Software components which should be reused contain defects which limit their functionality
People	-Key staff are ill at critical times in the project -It is impossible to recruit staff with the skills required for the project -Required training for staff is not available
Organisational	- Organisational financial problems force reductions in the project budget. - The organisation is restructured so that different management are responsible for the project
Tools	- CASE tools cannot be integrated - The code generated by CASE tools is inefficient
Requirements	- Changes to requirements which require major design work are proposed - Customers fail to understand the impact of requirements changes
Estimation	All underestimated - The time required to develop the software; The rate of defect repair; The size of the software

Risk analysis

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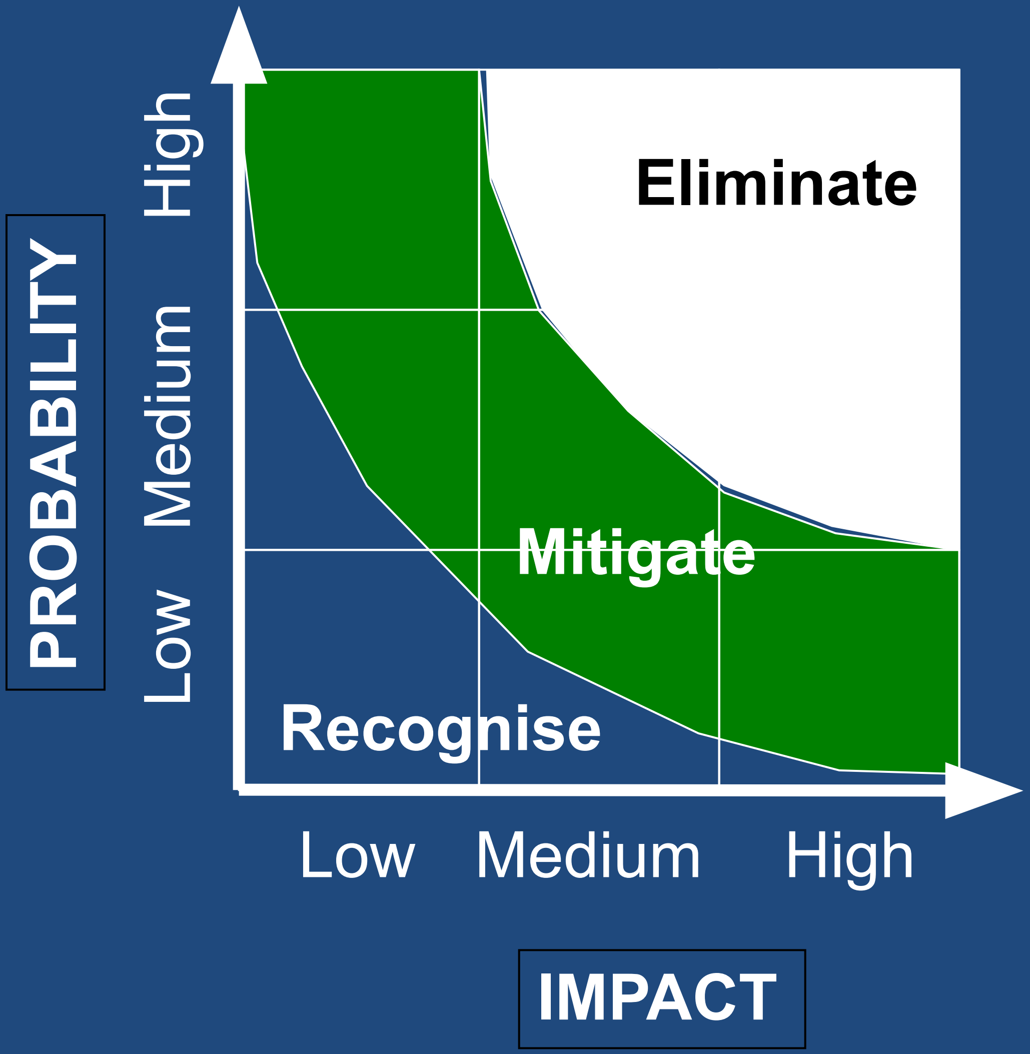
- Assess probability and seriousness of each risk.
- Probability may be very low, low, moderate, high or very high.
- Risk effects might be catastrophic, serious, tolerable or insignificant.

Risk Analysis

- Estimate risk probability:
  - Very low (< 10%)
  - Low (10-25%)
  - Moderate (25-50%)
  - High (50-75%)
  - Very high (> 75%)
- Establish risk seriousness:
  - Insignificant
  - Tolerable
  - Serious
  - Catastrophic

Risk Map


PROBABILITY
High
Medium
Low
Eliminate
Mitigate
Recognise
Low
Medium
High
IMPACT

Risk analysis (i)

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Risk	**Probability**	**Effects**
Organisational financial problems force reductions in the project budget	Low	Catastrophic
It is impossible to recruit staff with the skills required for the project	High	Catastrophic
Key staff are ill at critical times in the project	Moderate	Serious
Software components which should be reused contain defects which limit their functionality	Moderate	Serious
Changes to requirements which require major design work are proposed	Moderate	Serious
The organisation is restructured so that different management are responsible for the project	High	Serious

Risk analysis (ii)

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Risk	Probability	Effects
The database used in the system cannot process as many transactions per second as expected	Moderate	Serious
The time required to develop the software is underestimated	High	Serious
CASE tools cannot be integrated	High	Tolerable
Customers fail to understand the impact of requirements changes	Moderate	Tolerable
Required training for staff is not available	Moderate	Tolerable
The rate of defect repair is underestimated	Moderate	Tolerable
The size of the software is underestimated		Tolerable
The code generated by CASE tools is inefficient	Moderate	Insignificant

Risk planning

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Consider each risk and develop a strategy to manage that risk.

- *Avoidance strategies*
  - The probability that the risk will arise is reduced;
- *Minimisation strategies*
  - The impact of the risk on the project or product will be reduced;
- *Contingency plans*
  - If the risk arises, contingency plans are plans to deal with that risk;

Risk management strategies (1) *Sommerville*

Risk	**Strategy**
Organisational financial problems (Contingency plan)	Prepare a briefing document for senior management showing how the project is making a very important contribution to the goals of the business
Recruitment problems	Alert customer of potential difficulties and the possibility of delays, investigate buying-in components
Staff illness (Minimisation strategy)	Reorganise team so that there is more overlap of work and people therefore understand each other's jobs
Defective components (Avoidance strategy)	Replace potentially defective components with bought-in components of known reliability

Risk management strategies (2) *Sommerville*

Risk	**Strategy**
Requirements changes	Derive traceability information to assess requirements change impact, maximise information hiding in the design
Organisational restructuring	Prepare a briefing document for senior management showing how the project is making a very important contribution to the goals of the business
Database performance	Investigate the possibility of buying a higher-performance database
Underestimated development time	Investigate buying-in components, investigate the use of a program generator

Risk monitoring *Sommerville*

- Assess each identified risks regularly to decide whether or not it is becoming less or more probable.
- Also assess whether the effects of the risk have changed.
- Each key risk should be discussed at management progress meetings.

Risk indicators

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Risk Type	***Potential indicators***
Technology	*Late delivery of hardware or support software, many reported technology problems*
People	*Poor staff morale, poor relationships amongst team members, job availability*
Organisational	*Organisational gossip, lack of action by senior management*
Tools	*Reluctance by team members to use tools, complaints about CASE tools, demands for higher-powered work stations*
Requirements	*Many requests for requirements change, customer complaints*
Estimation	*Failure to meet agreed schedule, failure to clear reported defects*

RMMM Example

Pressman

- Consider that staff turnover is a high risk
  - Impact is serious on cost and schedule

Risk Mitigation, Monitoring, and Management:

- An effective risk strategy must consider three issues:
  - Risk Avoidance
  - Risk Monitoring
  - Risk Management and contingency planning

Avoidance /Risk mitigation strategies

Pressman

- Meet with current staff to determine causes for turnover (e.g. conditions, pay, competition)
- Mitigate causes under our control before the project starts

Avoidance (cont) *Pressman*

- Once started, assume turnover will occur and develop techniques to ensure continuity when people leave
  - Organise teams so that information about each activity is widely dispersed
  - Define documentation standards and establish mechanisms to ensure timely writing of documents
  - Peer review all work to ensure no specialist corner
  - Assign backup staff for every critical engineer

Monitoring *Pressman*

- As the project proceeds, monitor factors which may provide an indication of risk
  - General attitude of staff based on project pressures
  - The degree to which the team has jelled
  - Interpersonal relationships
  - Potential problems with compensation and benefits
  - The availability of jobs elsewhere (inside or outside the company)
- Monitor mitigation techniques
  - Backup, documentation, etc

Management *Pressman*

- Contingency planning assume that the mitigation efforts will fail
- A number of staff announce they are leaving
- If the mitigation strategy has been followed
  - Back-up is available
  - Information has been documented
  - Knowledge is dispersed across the team

RMMM *Pressman*

- Risk Mitigation, Monitoring, and Management (RMMM) is an additional cost to the project
- Evaluate cost of RMMM steps against benefits
  - Note probability of risk vs. impact
  - If aversion cost is greater than estimated risk, ignore the risk
  - 80:20 rule – 80% of overall risk can be accounted for by 20% *(highest risks exposure, top project priority)* of the identified risks