Risk Analysis

probability of occurrence of an undesirable event.

Risk management

This lecture will touch upon:

- Definition of ‘risk’ and ‘risk management’
- Some ways of categorizing risk
- Risk management
  - Risk identification – what are the risks to a project?
  - Risk analysis – which ones are really serious?
  - Risk planning – what shall we do?
  - Risk monitoring – has the planning worked?
- We will also look at PERT risk and critical chains

- **Risk is the probability of occurrence of an undesirable event.**

- **Risk Analysis in Software Engineering is the process of analyzing the risks associated with your Testing Project**

Risk management

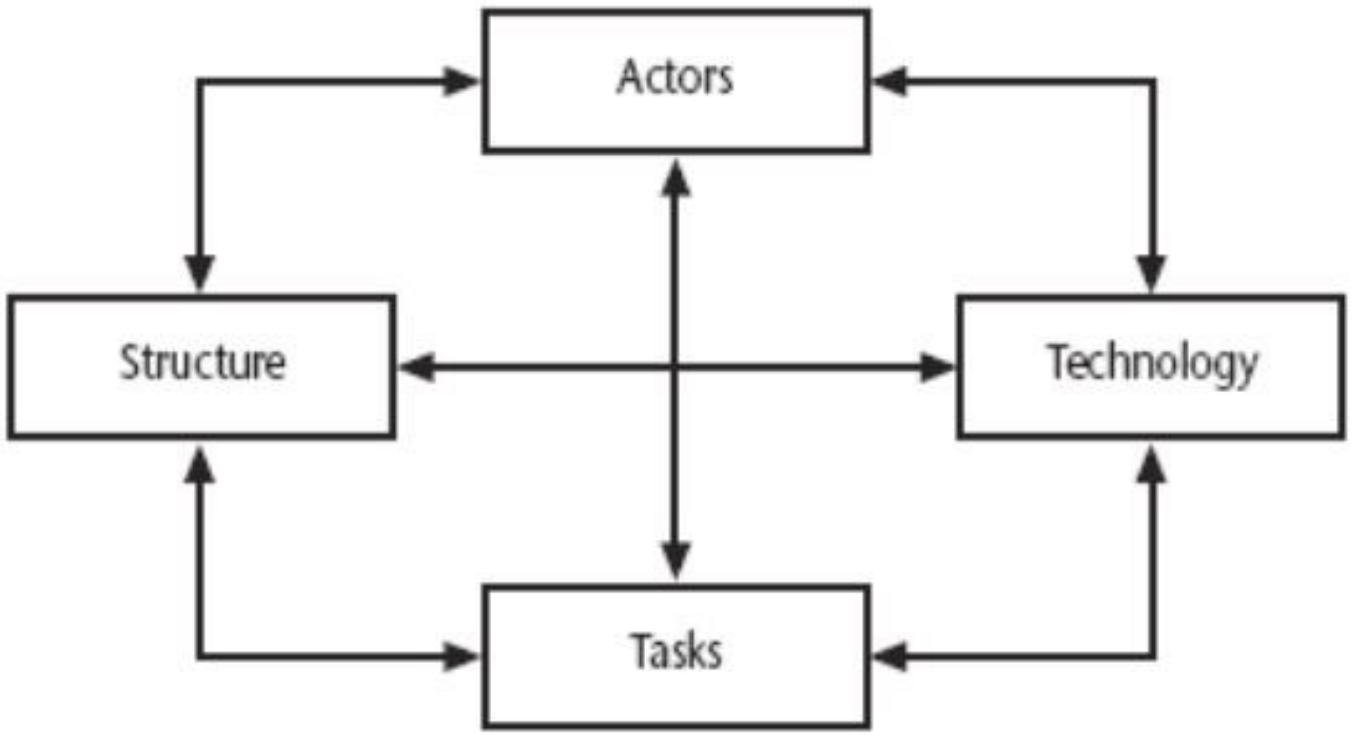
- Early forecast of **unwanted** situation in your project
- Estimating **potential loss** of such situation
- **Making decision** to deal with such situation
- Avoid the future **consequences**

Some definitions of risk

'the chance of exposure to the adverse consequences of future events' PRINCE2

- Project plans have to be based on *assumptions*
- *Risk* is the possibility that an assumption is wrong
- When the risk happens it becomes a *problem* or an *issue*

Categories of risk



A framework for dealing with risk

The planning for risk includes these steps:

- Risk identification – what risks might there be?
- Risk analysis and prioritization – which are the most serious risks?
- Risk planning – what are we going to do about them?

Risk monitoring – what is the current state of the risk?

How to Perform Risk ANALYSIS?

1. Identify the Risks
2. Analyze Impact of each Identified Risk
3. Take counter measures for the identified & Analyzed risk

Identify Risk

Organizational Risk | Technical Risk | Business Risk

Project Risk

- **Uncertain** event or activity that can impact the project's progress

Product Risk

- The possibility that the system or software might **fail** to satisfy or fulfill the expectation of the customer, user, or stakeholder

Organizational Risk **human resource** or your Testing team.

Test Manager

- **Manages** the whole project and takes **full responsibility** for the project's success

Test Administrator

- Builds up and ensures test environment and assets are **managed** and **maintained**

Test Designer

- Responsible for defining the test approach and ensuring it's successful implementation

Tester

- Executes the test case on software product to ensure quality, design integrity and proper functionality.

Risk identification

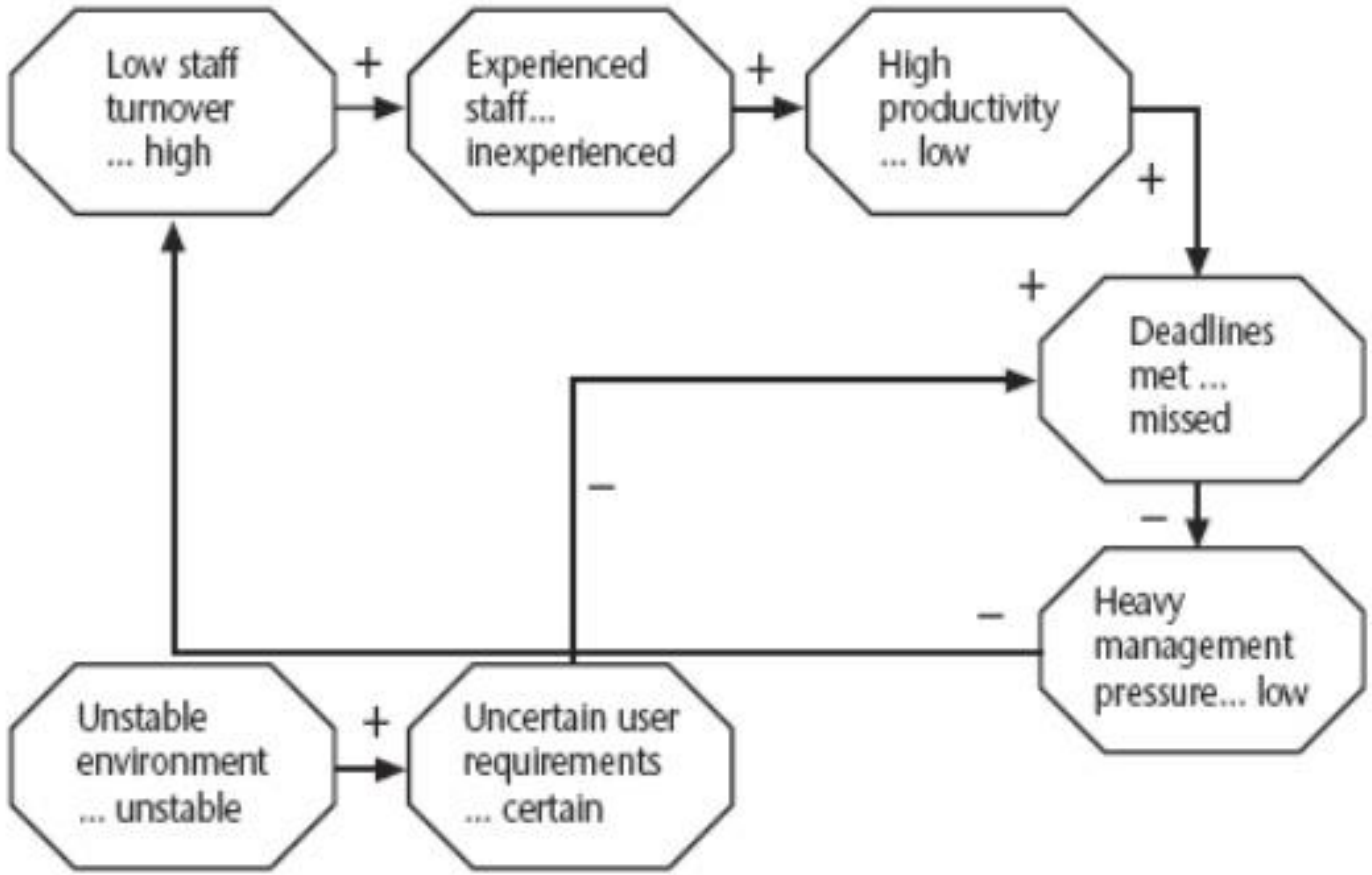
Approaches to identifying risks include:

- Use of checklists – usually based on the experience of past projects
- Brainstorming – getting knowledgeable stakeholders together to pool concerns
- Causal mapping – identifying possible chains of cause and effect

Boehm's top 10 development risks

Risk	*Risk reduction techniques*
Personnel shortfalls	Staffing with top talent; job matching; teambuilding; training and career development; early scheduling of key personnel
Unrealistic time and cost estimates	Multiple estimation techniques; design to cost; incremental development; recording and analysis of past projects; standardization of methods
Developing the wrong software functions	Improved software evaluation; formal specification methods; user surveys; prototyping; early user manuals
Developing the wrong user interface	Prototyping; task analysis; user involvement

Causal mapping



Risk Analysis

- The **probability** of occurrence
- The **impact** on the project

Risk exposure (RE)

= (potential damage) x (probability of occurrence)

Ideally

Potential damage: a money value e.g. a flood would cause £0.5 millions of damage

Probability 0.00 (absolutely no chance) to 1.00 (absolutely certain) e.g. 0.01 (one in hundred chance)

RE = £0.5m x 0.01 = £5,000

Crudely analogous to the amount needed for an insurance premium

Probability	
High (3)	Has very high probability to occur, may impact to the whole project
Medium (2)	50% chance to occur
Low (1)	Low probability of occurrence
Impact	
High (3)	Cannot continue with project activity if it is not solved **immediately**
Medium (2)	Cannot continue the project activity if it is not solved
Low (1)	Need to solve it but it is possible to take alternative solution for a while

Risk	Probability	Impact	Priority = Probability* Impact
Project deadline not met	3	3	9
Electricity Failure	1	2	2

Priority		Risk Management Method
High	6 -9	*Take mitigation action immediately and monitor the risk every day until its status is closed.*
Middle	3-5	*Monitor the risk every week at internal progress meeting*
Low	1-2	*Accept the risk and monitor the risk on milestone basis.*

Table 7.1 *Part of Amanda's risk exposure assessment*

	Hazard	*Likelihood*	*Impact*	*Risk exposure*
R1	Changes to requirements specification during coding	8	8	64
R2	Specification takes longer than expected	3	7	21
R3	Staff sickness affecting critical path activities	5	7	35
R4	Staff sickness affecting non-critical activities	10	3	30
R5	Module coding takes longer than expected	4	5	20
R6	Module testing demonstrates errors or deficiencies in design	4	8	32

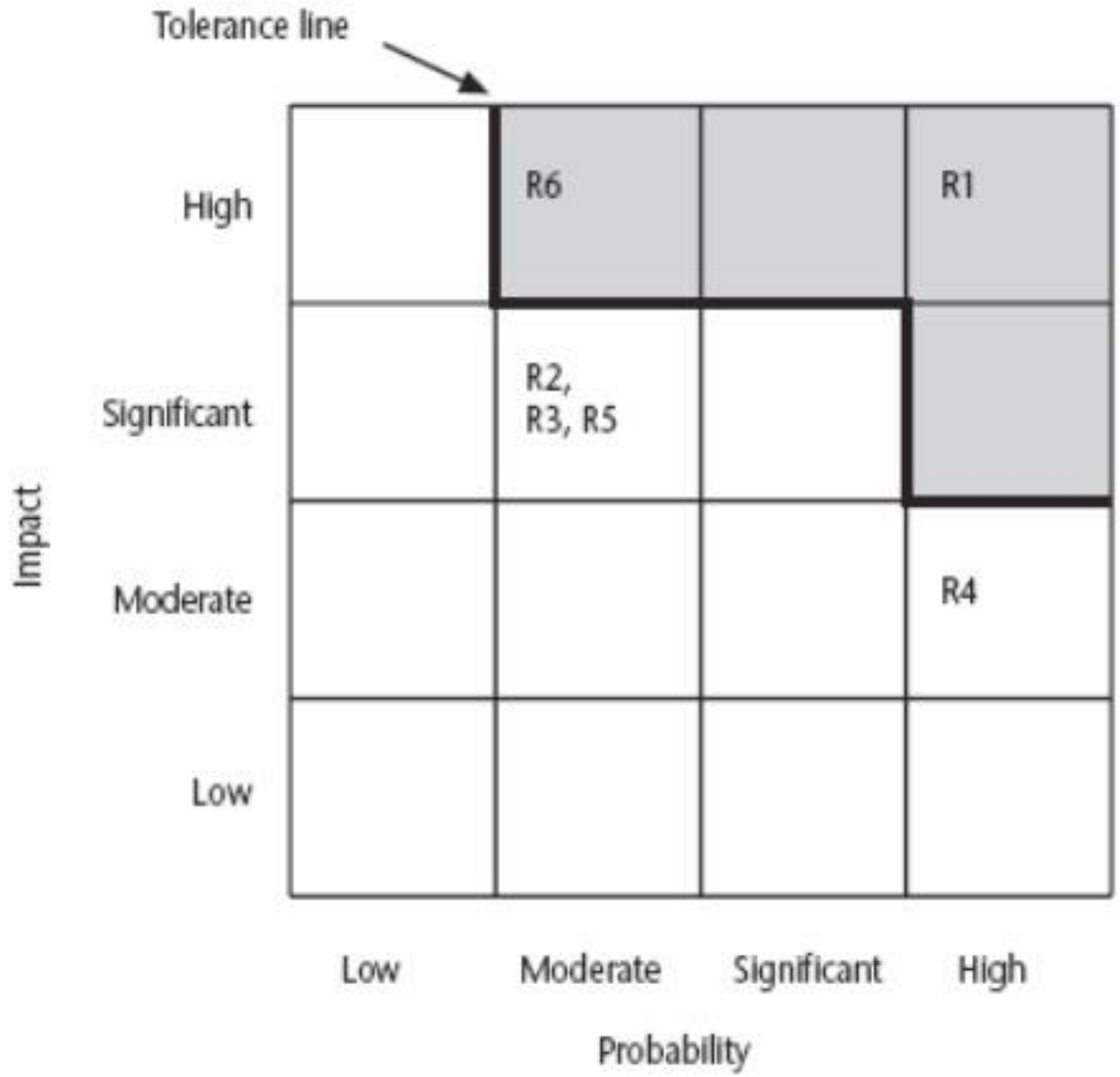
Risk probability: qualitative descriptors

Probability level	*Range*
High	Greater than 50% chance of happening
Significant	30-50% chance of happening
Moderate	10-29% chance of happening
Low	Less than 10% chance of happening

Qualitative descriptors of impact on cost and associated range values

Impact level	*Range*
High	Greater than 30% above budgeted expenditure
Significant	20 to 29% above budgeted expenditure
Moderate	10 to 19% above budgeted expenditure
Low	Within 10% of budgeted expenditure.

Probability impact matrix



Risk planning

Risks can be dealt with by:

- Risk acceptance
- Risk avoidance
- Risk reduction
- Risk transfer
- Risk mitigation/contingency measures

Risk reduction leverage

Risk reduction leverage =

$(RE_{before} - RE_{after})/$ (cost of risk reduction)

RE_{before} is risk exposure before risk reduction e.g. 1% chance of a fire causing £200k damage

RE_{after} is risk exposure after risk reduction e.g. fire alarm costing £500 reduces probability of fire damage to 0.5%

RRL = (1% of £200k)-(0.5% of £200k)/£500 = 2

RRL > 1.00 therefore worth doing

Risk response

The project manager needs to choose strategies that will reduce the risk to minimal. Project managers can choose between the following four risk response strategies