

# COMP 516 Research Methods in Computer Science

Dominik Wojtczak

Department of Computer Science  
University of Liverpool

1 / 20

## Steps of project planning

- 1 Work breakdown
- 2 Time estimates
- 3 Milestone identification
- 4 Activity sequencing
- 5 Scheduling
- 6 Replanning

3 / 20

# COMP 516 Research Methods in Computer Science Lecture 14: Project planning (2) and Risk management

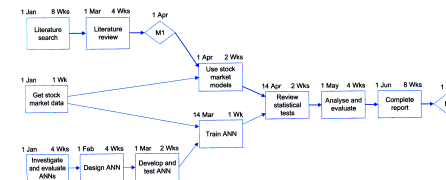
Dominik Wojtczak

Department of Computer Science  
University of Liverpool

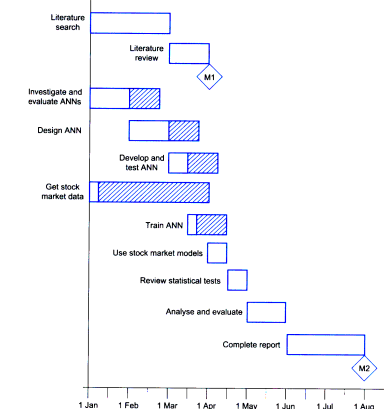
2 / 20

## Scheduling

Activity	Effort	Duration
Literature search	2 weeks	8 weeks
Literature review	2 weeks	4 weeks
Investigate and evaluate ANNs	2 weeks	4 weeks
Design ANN	2 weeks	4 weeks
Develop and test ANN	2 weeks	2 weeks
Get stock market data	1 week	1 week
Train ANN	1 week	1 week
Use stock market models	1 week	2 weeks
Review statistical tests	1 week	2 weeks
Analyse and evaluate	4 weeks	4 weeks
Complete report	8 weeks	8 weeks
Total	26 weeks	40 weeks



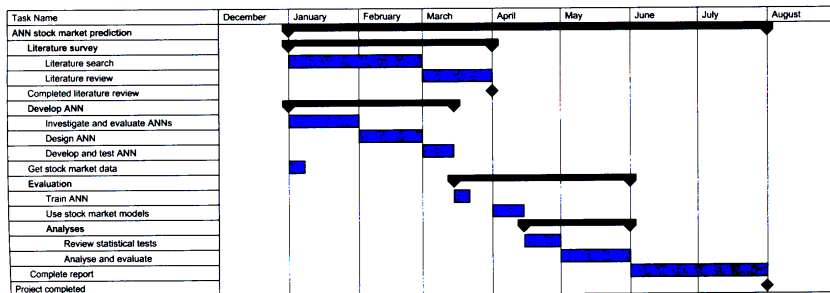
## Gantt Chart



- Activities are represented by rectangles
- Milestones are represented by diamonds
- Size indicates duration relative to the timeline
- Shaded areas indicate slack

4 / 20

## MS Project Gantt Chart



### MS Project

- allows to represent the hierarchy of the **work breakdown structure**
- allows to represent activities and milestones (in the expected way)
- does not allow to represent slack
- does not allow to represent interdependencies across high-level tasks

5 / 20

## Replanning

- Needs to be done if you try to achieve too much in too little time
- **Approach:** Iterate the following steps until happy with the schedule
  - Rethink the interdependencies between activities
  - Redo estimates for effort and duration of each tasks
  - Reschedule tasks
  - Rethink the aims and objectives of your project
  - Redo work breakdown structure
- No plan is perfect; no plan is set in stone

6 / 20

## Rolling Wave Planning

- Phased iterative approach to project planning
  - ↪ fits well for incremental development
- **Approach:**
  - 1 Define **planning packages** for your project with
    - resource requirements
    - macro level deliverables
    - macro level dependencies
  - 2 Execute the following loop
    - 1 Determine which planning package has to be done next (first)
    - 2 Make a detailed plan for this planning package
    - 3 Execute the plan
    - 4 Re-adjust the remaining planning packages based on what happened

7 / 20

## Risk Management: Introduction

### Risk management

- involves the identification of risks at the project's outset
- control of those risks as the project progresses
  - ↪ **risk management process**

### Four main stages of the **risk management process**

- 1 Identify risks
- 2 Assess impact of risks
- 3 Alleviate critical risks
- 4 Control risks

8 / 20

## Identifying Risks: Types of Risk

	Event-driven	Evolving
Technical	Project requirements change; Hard disk crashing	Project beyond your technical capability; Problem dependent on developing a complex algorithm
Non-Technical	Supervisor leaving; Illness	Underestimating effort required for a task; Literature not arriving on time

9 / 20

## Identifying Risks

### Risk triggers (risk symptoms)

Events happening during the course of a project that might indicate problems or that one of the identified risks is increasingly likely to occur

### Examples:

- Missing preliminary milestones in your project
- Struggling with a straightforward implementation of a component
- Problems with arranging a meeting a client

10 / 20

## Assessing the Impact of Risks (1)

**Risk impact** = Likelihood × Consequence

**Example:** Severe earthquakes in Britain

- Likelihood is low
- Residential building → Consequences are low  
Nuclear power plant → Consequences are catastrophic
- ↪ Nuclear power plants are earthquake proof,  
residential buildings are not

11 / 20

## Assessing the Impact of Risks (2)

- 1 Assess each risk according to the following scales:

Risk Likelihood	Score
Low	1
Medium	2
High	3

Risk Consequence	Score
Very low	1
Low	2
Medium	3
High	4
Very high	5

- 2 Compute risk impact for each risk using the formula  
**Risk impact** = Likelihood × Consequence

- 3 Rank all risks according to their risk impact

12 / 20

## Assessing the Impact of Risks (3)

### 4 Determine critical risks

#### (a) 80/20 rule:

20% of your risks cause 80% of your problems

→ 20% top ranking risks are **critical**

#### (b) RAG grading:

Red Risks with impact greater than 10

→ critical risks

Amber Risks with impact between 6 and 10

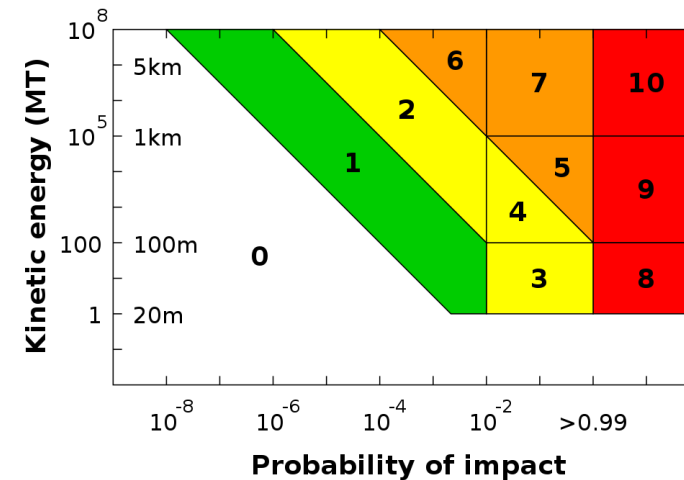
→ deserve some attention

Green Risks with impact smaller than 6

→ can be ignored

13 / 20

## Torino scale



- 99942 Apophis – the only object that had grade 4 for a short time in 2004; will pass quite closely to Earth on the 13th April 2029

14 / 20

## Alleviating Critical Risks (1)

### ■ Contingency

Accepting that the risk is going to occur and putting something in place to deal with it when it does

#### Examples:

- Hard disk crash → have a backup
- Time over-run → allow slack for each task

### ■ Deflection

Passing the risk on to someone or something else

#### Example:

- Required software → use of existing software instead of developing it yourself

15 / 20

## Alleviating Critical Risks (2)

### ■ Avoidance

Reducing the likelihood that the risk will occur at all

#### Examples:

- Use of programming languages  
→ use one that you know instead of one that you don't
- Development of a complex algorithm  
→ modify an existing algorithm

16 / 20

## Risk Assessment Report

Project: Introduction of IT-assisted teaching at a college

Risk	Likelihood	Consequence	Risk management approach	Risk symptoms
<b>Infrastructure</b>				
IT infrastructure cannot cope with requirements	Med(2)	High(4)	Equip sufficiently and involve IT Dept	Speed of equipment response
Data projector failing during teaching	Low(1)	Very High(5)	Have a stand-by data projector	None
<b>Staff</b>				
Lack of commitment by staff	Med(2)	High(4)	Clear communication plan; staff development events	Non- or variable attendance of events
Loss of key staff	Med(2)	Med(3)	Succession planning; critical procedures should be documented in a manual	Notice period / Request to attend interview
<b>Delivery</b>				
Staff not available at times training is delivered	High(3)	High(4)	Flexible delivery and session on different days and at different times	Timetables

17 / 20

## Controlling Risks

Planning a **risk strategy**

- How will you go about managing/controlling the risks identified?

E.g. how and when would you notice a time over-run?

**Checkpoints:** Checking critical risks

- at regular intervals (e.g. weekly)
  - at the end of particular project stages
  - at meetings with your supervisor
- How and when will you check the **risk triggers** identified?
  - How and when will you invoke your **contingency plans**?
  - How and when will you update your **critical risk list**?
- Risk likelihood and risk consequences change over time

18 / 20

## Take-home Question

Consider our running example, that is, the project with the aim to

*Develop and evaluate an Artificial Neural Network to predict stock market indices*

which is conducted by undertaking the following tasks

Activity	Effort	Duration
Literature search	2 weeks	8 weeks
Literature review	2 weeks	4 weeks
Investigate and evaluate ANNs	2 weeks	4 weeks
Design ANN	2 weeks	4 weeks
Develop and test ANN	2 weeks	2 weeks
Get stock market data	1 week	1 week
Train ANN	1 week	1 week
Use stock market models	1 week	2 weeks
Review statistical tests	1 week	2 weeks
Analyse and evaluate	4 weeks	4 weeks
Complete report	8 weeks	8 weeks
Total	26 weeks	40 weeks

What might a **risk assessment report** look like for this project?

19 / 20

## Project Planning: Summary

- **Project planning** consists of two stages:

- 1 Defining what it is you want to achieve
- 2 Planning how you will achieve it

- **Project planning** proceeds in six steps

- 1 Work breakdown
- 2 Time estimates
- 3 Milestone identification
- 4 Activity sequencing
- 5 Scheduling
- 6 Replanning

- **Risk management** is performed in parallel with project management and involves four stages:

- 1 Risk identification
- 2 Risk quantification
- 3 Risk alleviation
- 4 Risk control

20 / 20