Chuẩn bị nền tảng cho chủ đề nghiên cứu (Phần 2)

Project planning and risk management

Introduction

- Aims:
  - To introduce techniques and approaches to project planning and risk management.
- Learning objectives:
  1) **Understand** the five elements of projects that need to be managed.
  2) **Describe** the typical stages of an academic project from a project management perspective.
  3) **Define** a project in terms of aims and objectives.
  4) **Discuss** the activities performed during the initial planning stage of a project.
  5) **Understand** the use of project management techniques for project planning.
  6) **Manage** risk in your project effectively using a defined risk management process.

Introduction

- Before tackling the actual work you need to complete your project.
  - It is important to have *some idea of how you are going to undertake* that work.
- Without an appropriate project plan in place, you will have little direction,
  - you will lose sight of where your project is going and
  - you will not complete your project on time.

Intro: The project process
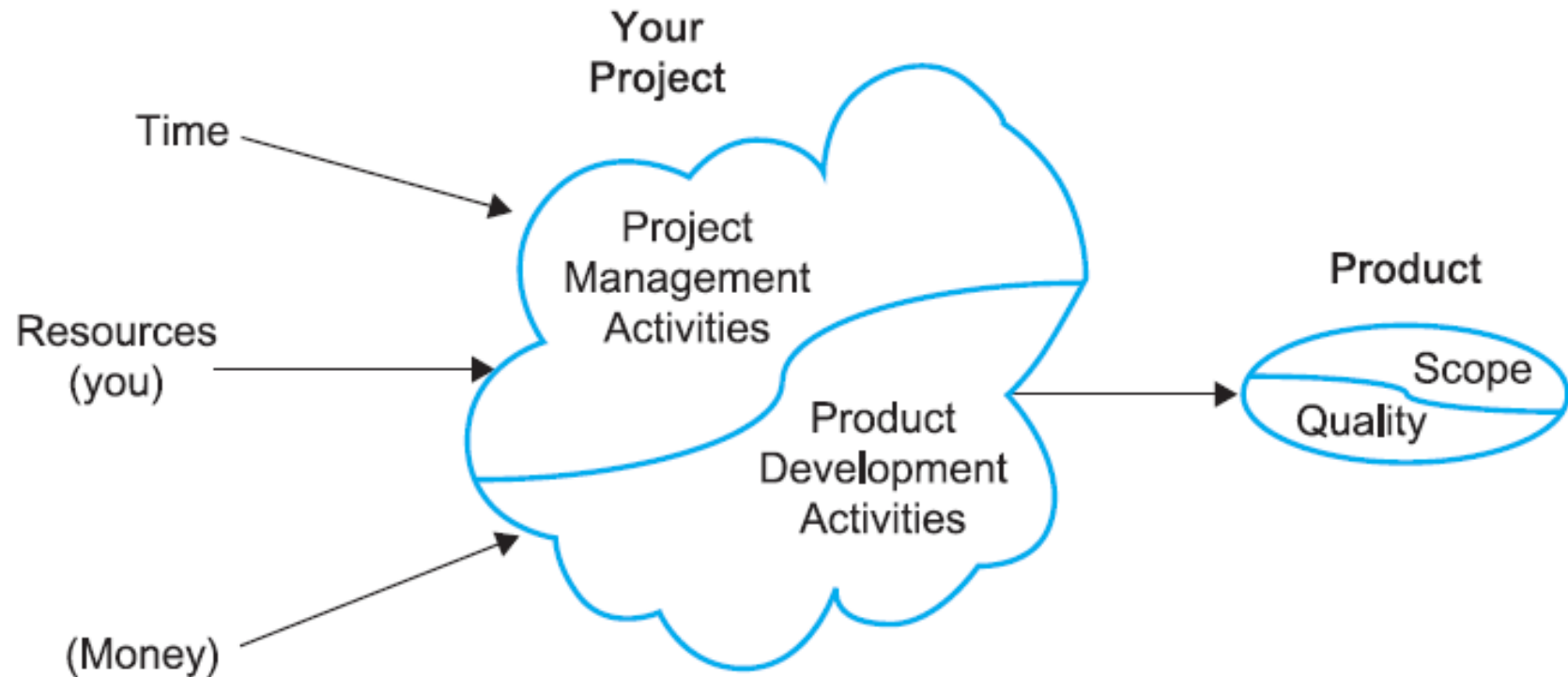
- *time, resources, cost, scope* and *quality*

Figure 4.1 A generic overview of the project process

Intro: **The project's stages**

- From a project management perspective, all projects progress through **five** main stages during their lifetime;
  - from the time the project is established as an initial idea to the time the project is finally completed
- **Details:**
  - **1.** *Definition*
  - **2.** *Planning*
  - **3.** *Initiation*
  - **4.** *Control*
  - **5.** *Closure.*

Project definition

- The purpose of project definition is to clearly specify *what it is your hope to achieve with your project.*

- Your project definition must identify
  - the *aims* and
  - *objectives* of your intended work

Project definition

- Advantages:
  - If you have difficulty defining your project in terms of aims and objectives then you will have difficulty deciding on the work you ought to be doing and what your focus will be…
  - It gives you a clear target for which to aim.
  - This provides a continual reference point against which you can assess your progress.
  - It provides you with a means of evaluating your success at the end.

Defining your aims

- Your project should be defined at two levels.
- At the top level you define your project's aim or *goal*.
- All projects have one major aim that they hope to achieve.

Defining your aims

- Examples of typical aims for computing projects are:
  - to evaluate the effectiveness of requirements capture techniques in small software development companies in India;
  - to develop and evaluate a user interface for statistical software packages;
  - to design a methodology for GUI development of technical courseware material;
  - to investigate and produce an evaluation of fourth generation languages for database development.

Setting objectives

- Objectives identify significant measurable achievements you hope to make that build towards the ultimate aim of your project.

- Having identified and defined your project's aim you should continue to define your project in terms of its objectives

Project's Aim:

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

Project's Objectives:

1. Complete a literature search and literature review of existing stock market prediction techniques.
2. Develop a suitable artificial neural network model.
3. Identify and collect suitable data for analyses and evaluation.
4. Evaluate the model using appropriate statistical techniques.
5. Complete final report.

SMART objectives

- The objectives identified above still require further refinement.
- This is achieved through the application of the SMART technique.
- There are a number of definitions of the SMART acronym, the most applicable to student projects being:
    - **S**pecific
    - **M**easurable
    - **A**ppropriate
    - **R**ealistic
    - **T**ime-Related.

SMART objectives

- For each of the objectives you identify in your project you should apply these criteria to ensure that those objectives are clearly defined. For example, take Objective 1 from example project:

"1. Complete a literature search and literature review of existing stock market prediction techniques."

- Applying the SMART criteria:

  - Is this *specific*? Does this provide us with enough idea of what we should be doing? (Yes)

  - Is it *measurable*? How can we measure progress on this objective? How will we know when the objective is completed? How much literature must we access in order to conclude that the literature search is complete? (Probably not)

  - Is it *appropriate*? Is it an appropriate objective to have, bearing in mind the long term goal of our project? (Yes)

  - Is it *realistic*? In the time we have available can we realistically expect to complete this task? (Probably – although until we start this task we won't know how much work we will need to do on it)

  - Is it *time-related*? Have we identified how long the task will take and when we expect to complete it by? (We don't know yet but we will attempt to pin this down during project planning)

Project planning

- Project planning assists you by identifying the work you need to perform, clarifying the order in which you should tackle the work, and revealing how long you need to do it.
- Project planning is performed through a series of six steps that utilise a number of project management techniques:
  - **1.** *Work breakdown*
  - **2.** *Time estimates*
  - **3.** *Milestone identification*
  - **4.** *Activity sequencing*
  - **5.** *Scheduling*
  - **6.** *Re-planning*
- Three techniques that are suitable for these stages are *Work Breakdown Structures, Activity Networks* and *Gantt charts*.

Step 1 – Work Breakdown

- Work breakdown structures (WBSs) are used to break your project down into lower and lower levels of detail to reveal exactly what work you will need to do to complete your project.

- You should begin a WBS by breaking your project down into its main objectives that you identified during your project's definition
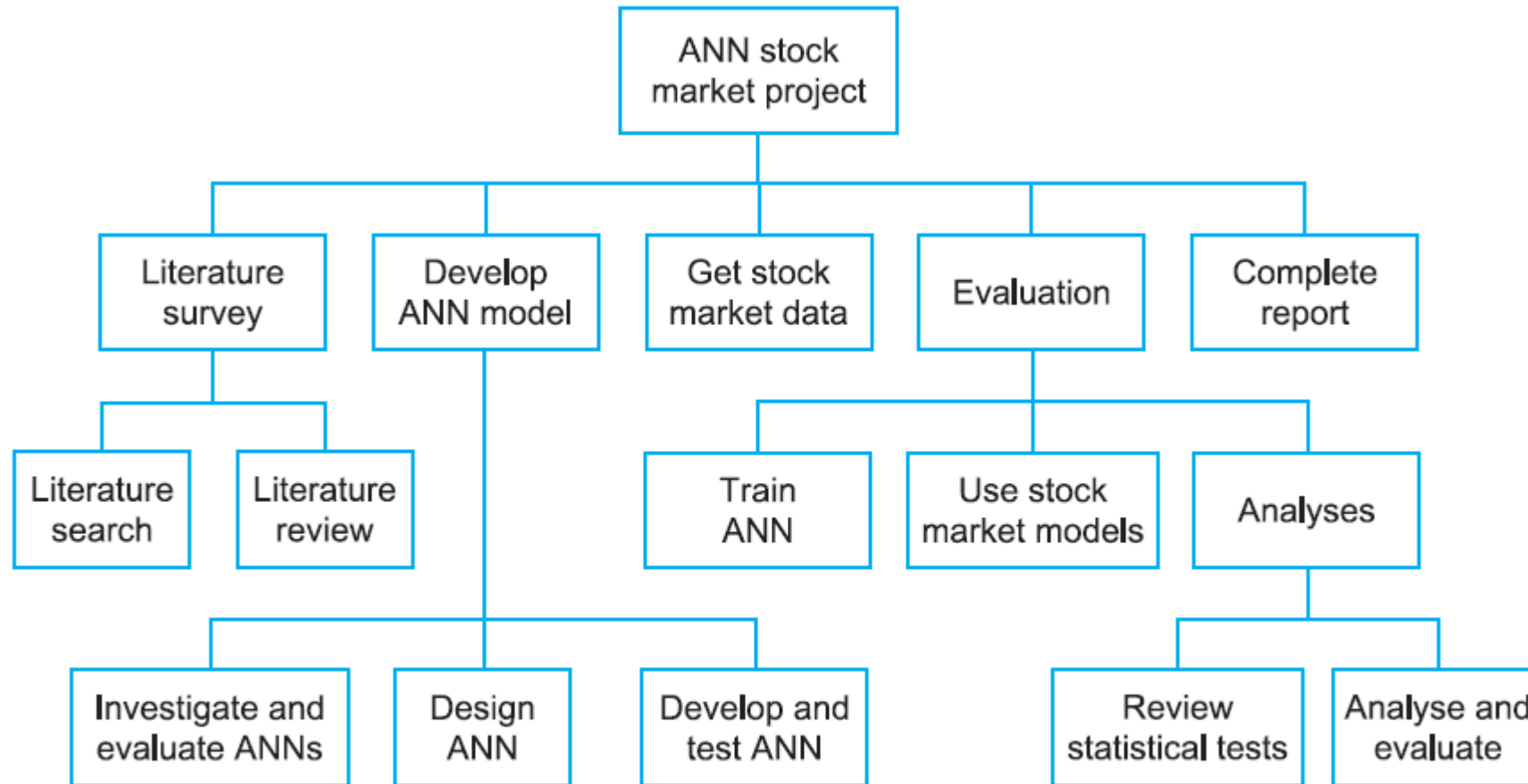
Step 1 – Work Breakdown: example

Figure 4.2 An example of a work breakdown structure

Step 2 – Time estimates

- When a project's aims and objectives are identified it provides little indication of exactly how long the project will take to complete.

- You would hope that your project is of a suitable scope to keep you busy during the allotted time and is of sufficient depth for you to obtain a good grade.

- However, it is not until you break the project down using a WBS that you really begin to see just how much work is involved.

Step 2 – Time estimates

Activity	Estimated Duration
Literature search	8 weeks
Literature review	4 weeks
Investigate and evaluate ANNs	4 weeks
Design ANN	4 weeks
Develop and test ANN	2 weeks
Get stock market data	1 week
Train ANN	1 week
Use stock market models	2 weeks
Review statistical tests	2 weeks
Analyse and evaluate	4 weeks
Complete report	8 weeks
Total Effort	40 weeks (approximately 10 months)

Table 4.1 Time estimates for example stock market ANN project

Step 3 – Identify milestones

- Milestones are significant steps towards the completion of a project.
  - They help you to appreciate your progress by providing you with intermediate reference points.
- To identify milestones you should focus on your project's work breakdown structure and identify any key stages that appear to be significant breakthroughs in your project's progress.
- Milestones can also be associated with the production of various reports, documents or sub-systems
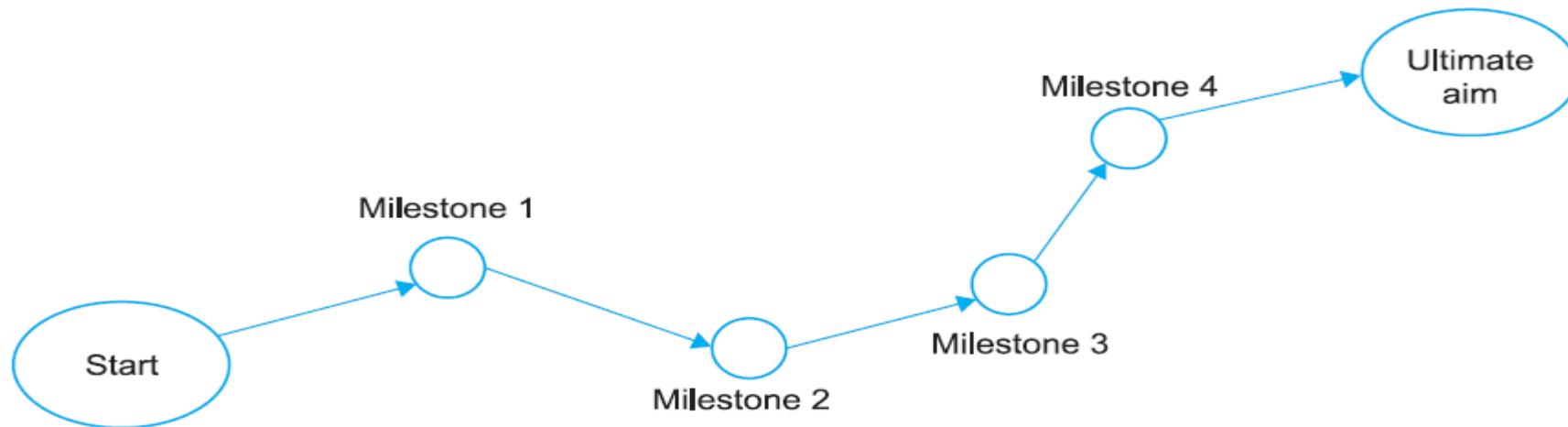

Figure 4.3 Milestones leading to the project's ultimate aim

Step 4 – Activity sequencing

- You now have an understanding of the work you need to perform in the project and the effort required to complete *the individual tasks* involved.

- An *activity network* can now be used to identify the order in which you should perform that work.

Step 4 – Activity sequencing

- Activity networks were first developed towards the end of the 1950s and are sometimes referred to as PERT networks, CPM or network diagrams
- Two forms of activity network were developed at that time –
  - Activity-on-the-arrow networks and
  - Activity-on-the-node networks.
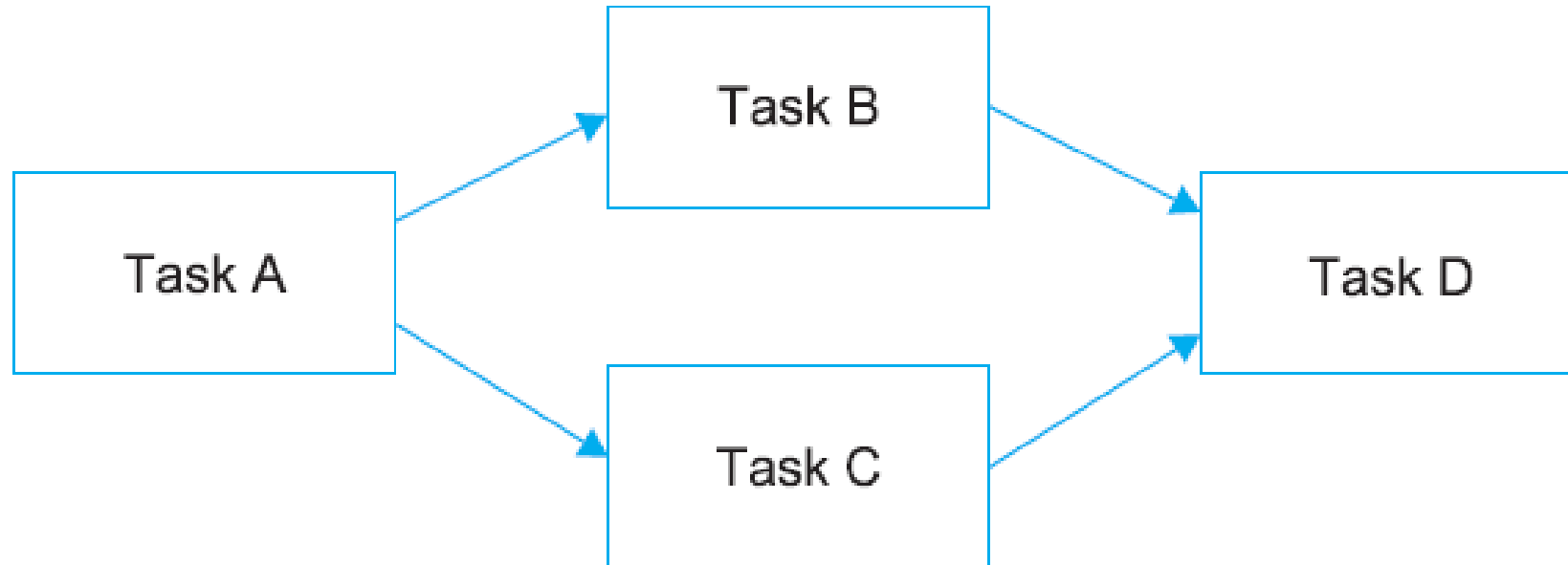
Step 4 – Activity sequencing

Figure 4.4 An example of a simple activity-on-the-node diagram
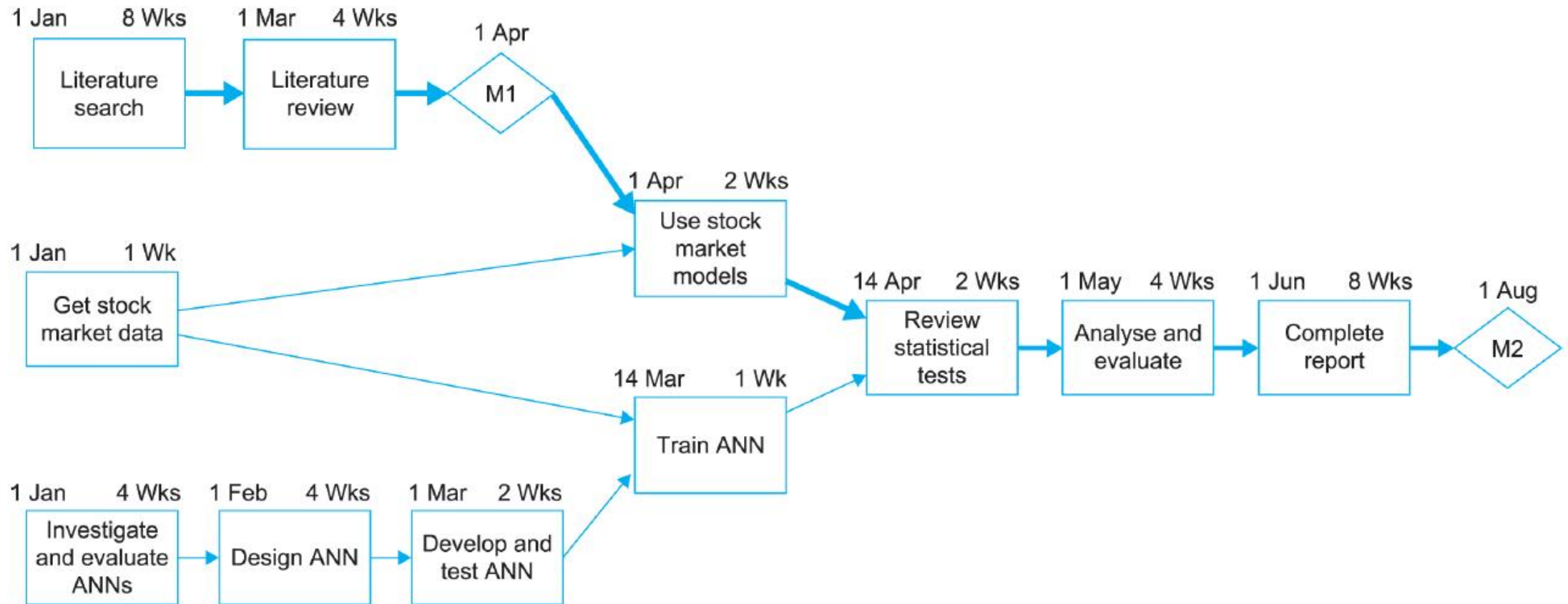
Step 4 – Activity sequencing

Figure 4.5 An example of an activity network

Step 5 – Scheduling

- Gantt charts are similar to activity networks in that they attempt to represent a project in diagrammatical form.

- Unlike activity networks, they do not show the relationships between tasks, but they do explicitly show the durations of activities and identify instances when tasks are performed simultaneously.

- Just like activity-on-the-node networks, Gantt charts represent a project's activities as rectangles or nodes, and milestones by diamonds.

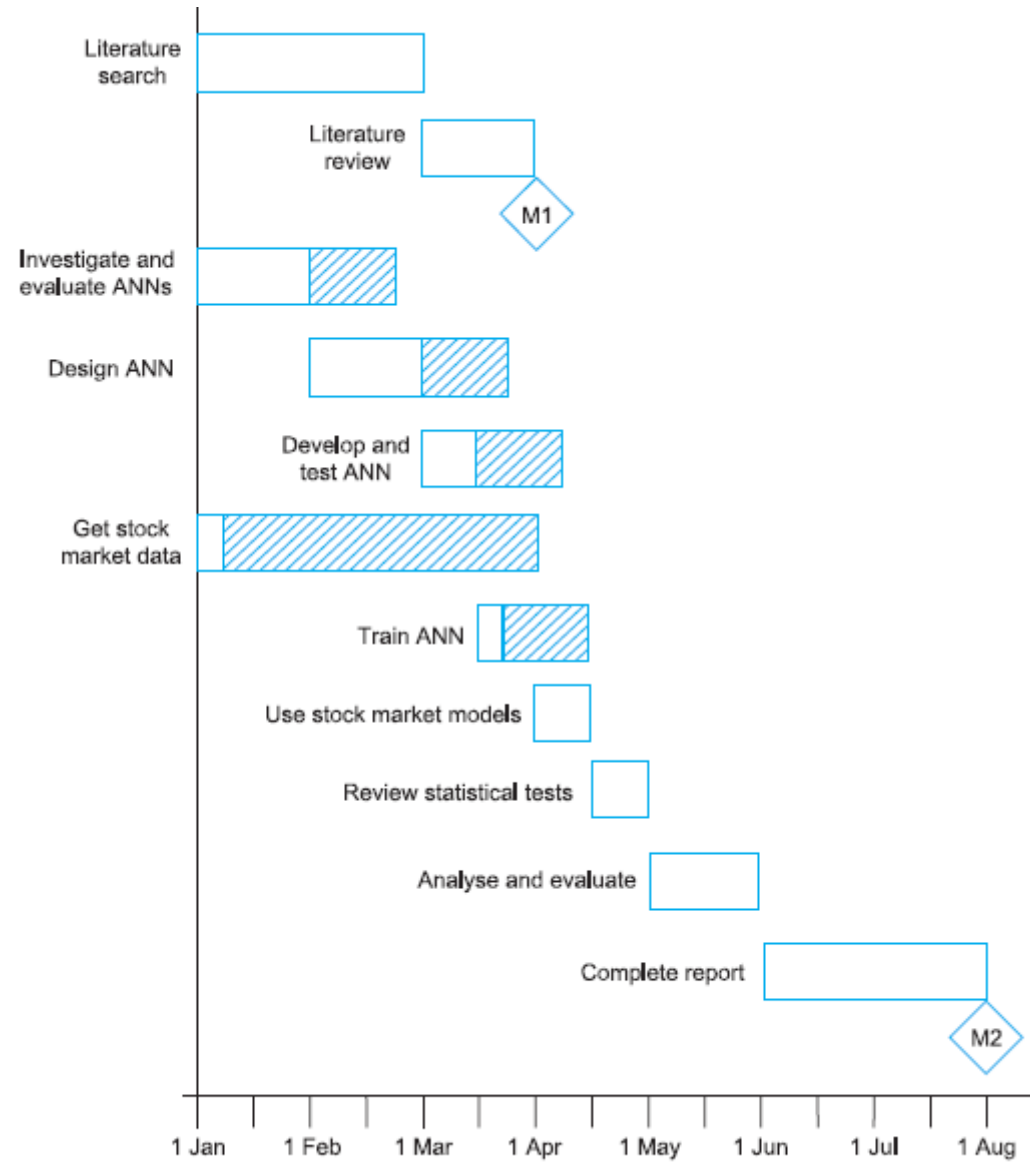 - In this case, however, the size (length) of an activity's node represents the duration of that activity.

Figure 4.6 An example Gantt chart

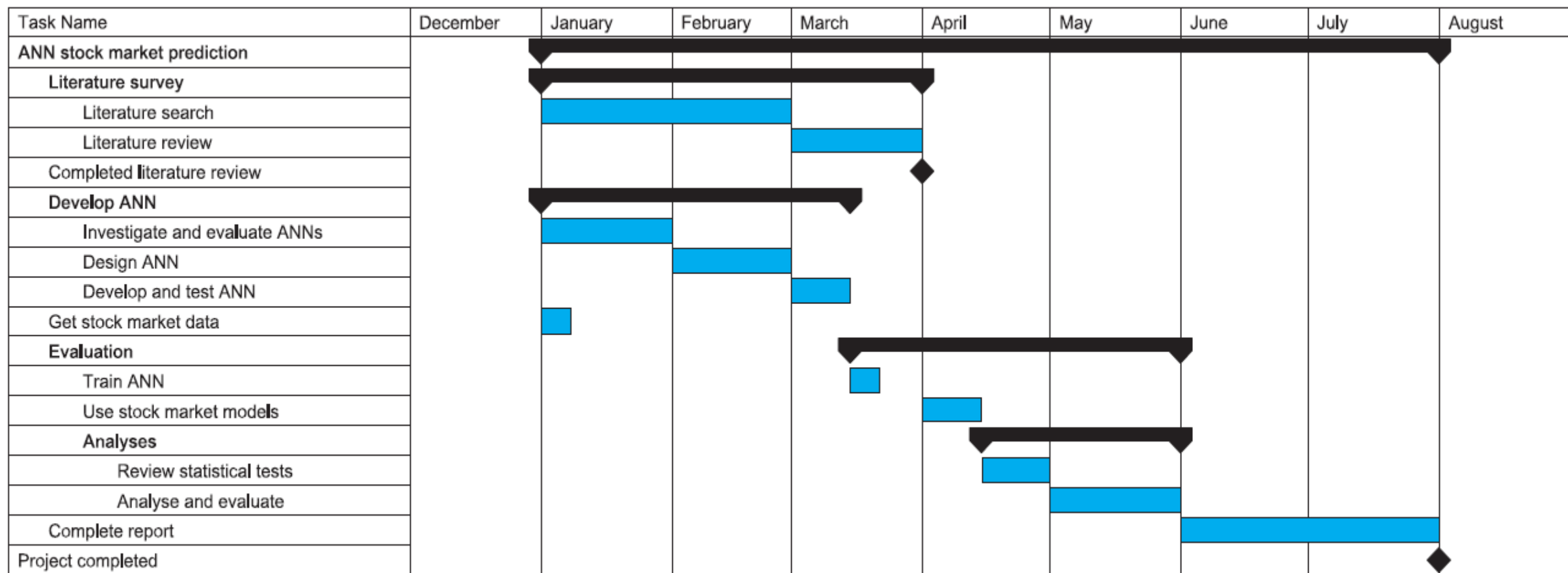| Task Name	December	January	February	March	April	May	June	July	August
ANN stock market prediction									
Literature survey									
Literature search									
Literature review									
Completed literature review									
Develop ANN									
Investigate and evaluate ANNs									
Design ANN									
Develop and test ANN									
Get stock market data									
Evaluation									
Train ANN									
Use stock market models									
Analyses									
Review statistical tests									
Analyse and evaluate									
Complete report									
Project completed									

Figure 4.7 Gantt chart using Microsoft Project

Step 6 – Re-planning

- Now that you have completed all your plans, you may realise you are trying to do too much in the time available.

- Re-planning simply means that you go back through your plans, adjusting and rescheduling them accordingly.

- Project management software tools are particularly useful for making these changes and assessing the impact of your adjustments

Project Initiation Document

- The components used in the project proposal can form the basis of your PID, namely:
    - Title
    - Aim and objectives
    - Expected outcomes/deliverables
    - Introduction/background/overview
    - Project type
    - Related research
    - Research question/hypothesis
    - Methods
    - Resource requirements
    - Project plan.

Risk management

- Risk management is a process that is inexorably linked to project management; it runs in parallel with project management and follows a very similar process.

- Risk management involves the identification of risks at the project's outset and the control of those risks as the project unfolds

- The four main stages of this risk management process are:
    - **1.** *Identify risks*
    - **2.** *Assess impact of risks*
    - **3.** *Alleviate critical risks*
    - **4.** *Control risks.*

Identify risks

- As you are putting together your project plan, you should also be identifying any *sources* of risk to your project.

- These risks can be individual events (*event-driven risks – acute*) that might have an impact on your project (for example, your supervisor leaving, your hard disk crashing, etc.) or

- They may be longer term risks that evolve over time (*evolving risks – chronic*) before eventually coming to a head (for example, underestimating the time it will take you to develop part of your system, deteriorating relationship with your client, etc.).

Identify risks

- Whether the risks to your project are *event-driven* or *evolving,* they can be further classified as either *technical* or *non-technical* risks.

- Technical risks refer to any risks that are associated with the hardware or software you might be using.

- Non-technical risks are all other risks associated with your project.
  - These can include such things as losing your client, your user or your supervisor; illness; over-running your time estimates; discovering work during your literature search that already covers (in depth) what you intended to do; etc.

Assess impact of risks

- Having identified the risks associated with your project in the first stage of the risk management process, you should then calculate their *impact*.

- The impact of any risk on your project is given by the following equation:

Risk impact = likelihood*consequence

Risk Likelihood	Score
Low	1
Medium	2
High	3

Table 4.2 Risk likelihood scores

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

Table 4.3 Risk consequence scores

Alleviate critical risks

- There are three ways that you can deal with the critical risks you have identified in your project:
  - *avoidance, deflection* (sometimes called *transfer*) and *contingency.*
- Avoidance means reducing the chances that the risk will occur at all.
- Deflection means passing the risk onto someone or something else.
- Contingency means accepting that the risk is going to occur and putting something in place to deal with it when it does

Controlling risks

- The first task you must undertake as part of this stage is to decide how you will manage the risks you have identified
  - One strategy you can adopt is to identify specific *checkpoints* in your project's progress, when you will re-visit your critical risk list and adjust it according to your latest understanding
- Part of the process involves checking for those risk *triggers* you identified during risk identification.
- Another part involves invoking your contingency plans when risks occur, while another part requires you to constantly monitor and update your critical risk list

Summary

- Project planning consists of two stages; defining what it is you want to achieve and planning how you will achieve this. Project definition involves identifying your project's aims and objectives.

- Risk management is performed in parallel with project management and involves the following four stages: *risk identification, risk quantification, risk alleviation* and *risk controlling* your project's aims and objectives.

Questions