Chuẩn bị nền tảng cho chủ đề nghiên cứu (Phần 1)

Setting your project's foundation

Intro

- **Aims**:
  - To introduce techniques for choosing an appropriate project, and to discuss the skills needed to write a satisfactory project proposal.
- **Learning objectives:**
  - Choose an appropriate project.
  - Write a project proposal.
  - Make effective decisions when choosing your project supervisor.

Intro

- The field of computing is extremely diverse,
  - covering a vast range of topic areas from sociological and management issues to highly technical hardware and software developments,
- It is not always easy to decide on a suitable project for your degree course

Choosing a **project**: Criteria

1. You must be capable of doing the proposed project in the time available
2. Choose a project that interests you
3. Consider your personal development and choose a project that will assist you in your goals
4. Your project should have a serious purpose and a clear outcome that will benefit someone
5. Your project has a clear outcome (in terms of deliverables) that focuses your work and direction
6. Your project links suitably with your degree course
7. Your project is of sufficient scope and quality to fit the requirements of your course
8. Your project idea is something that interests you, but not a personal issue about which you may have a subjective view that could cloud your perspective and influence your results
9. The resources you require for your project are available or can be obtained; for example, software, hardware, a particular client, user or organisation

Techniques and Information Sources

- Lecturers'/departmental lists
- Industrial projects
- Past projects
- Talking with colleagues
- Reading around subject areas
- Clustering
- Brainstorming
- Chapter breakdown

Additional considerations

- ***The 'so what?' test***
- ***Justification***
- ***Numerating your understanding***
- ***Contacts***
- ***What do you already know?***
- ***Ethical issues***
  - Data protection
  - Recruiting participants
  - Vulnerable groups

Preparing a project proposal

- It is normal, in most institutions, for you to prepare a proposal for your project so it can be assessed for acceptability
- There are no universal standards for project proposals, although all proposals should include certain pieces of information.
  - This content emerges from your proposal's *implicit content* and *explicit sections*

Preparing a project proposal

- When preparing your proposal, follow these two golden rules:
  - Follow any guidelines precisely.
    - Most institutions require specific information; for example, project title, project objectives, resource requirements and so forth.
    - Failure to complete these sections may mean your proposal is rejected without even being read, *for example, because you failed to get an academic signature or did not complete an essential section properly*.
  - Proofread thoroughly and get someone else to check it.
    - Any errors or omissions will appear sloppy and put your commitment and proposed project in a bad light

Implicit content

- In general, your proposal should address five principal areas
- **Introduction to the subject area.**
  - This will provide the reader with an understanding of the field in which your project lies and an idea of where and how your project fits into this field.
  - This aspect will set your project into an overall *context* and will show that it is bound within a recognised field.
- **Current research in the field.**
  - This will emphasise that your project is not based in a field that is out-of-date and that you are aware of current issues within that field of study.
  - It will also imply that you have done some preliminary research into the topic area and are not approaching your project with little background or motivation.

Implicit content

- **Identify a gap.**
  - You should be able to identify some aspect of the field that requires further investigation or study.
  - There is no point in repeating the work of others (unless you are evaluating their approaches).
- **Identify how your work fills the gap.**
  - Having identified a gap in the field, your proposal should show how your project intends to fill this gap, or at least go some way to investigating it further.
  - This will emphasise the *contribution* your project will make.
- **Identify risks and solutions.**
  - It is also useful in a project proposal to highlight any risks your project might face, and ways you envisage dealing with them.
  - If you do not identify potential risks to your project, your proposal's assessor will not know whether you have considered the risks.
  - If they feel you have not accounted for potential risks to your project, your proposal may not be accepted, as they may not appreciate that you have potential contingency plans in place.

Explicit sections

- ***Title***
- This should be clear and concise.
- Try to avoid using acronyms if possible.
- Examples of clear and concise titles include:
  - ‘Evaluation of soft systems methods as analysis tools in small software houses’;
  - ‘Artificial neural networks for software development cost estimation’;
  - ‘Development of process models for building graphical software tools’.

- ***Aims and objectives***
- Aims identify at the highest level what it is you hope to achieve with your project – what you intend to achieve overall.
  - An aim is a broad statement of intent that identifies your project's purpose.
- Objectives, on the other hand, identify specific, measurable achievements that build towards the ultimate aim of your project.
  - They are more precise than aims as they are 'quantitative and qualitative measures by which completion of the project will be judged'.
  - They represent major components of your project that direct your work activity.

- **<u>Examples of aims and objectives:</u>**
- *Aim:*
  - *Evaluate artificial intelligence techniques for modelling weather patterns.*
- *Objectives:*
  - *Identify and evaluate existing weather pattern modelling techniques.*
  - *Identify artificial intelligence approaches suitable for modelling weather patterns.*
  - *Design and develop at least three artificial intelligent systems for modelling weather patterns.*
  - *Compare and contrast the developed systems with one another and existing approaches to modelling weather patterns*

- ***Expected outcomes/deliverables***
- This section of your proposal will identify precisely what you intend to submit at the end of the project.
- It may well identify a written report that covers particular points and makes certain recommendations.
- A chapter breakdown may be included where appropriate.
- It can describe programs and user documentation and it might include models and algorithms that will be developed to address specific problems.
- You might also be delivering a functional specification for a piece of software, a prototype, or a test plan

additional

- ***Keywords***
- Keywords are used to identify the topic areas your project draws on.
- People use keywords to see at a glance what subjects your project relates to which might not be clear from your project's title alone.
- Libraries and databases use keywords to help classify material.
- You might be limited on the number of keywords you can use; for example, four or five.
- Remember, keywords are not necessarily single words but can be simple phrases as well; for example, artificial intelligence or software engineering

- ***Introduction/background/overview***
- This section provides an overview of your project and introduces the background work to it.
- In this section you might wish to include reasons why you feel you are a suitable candidate for performing the project, why the topic interests you specifically, and why you chose the project in the first place.
- This section might also include an introduction to the industry or organisation being investigated or evaluated.
- Overall, this section will set the scene for the project.

- ***Related research***
- This section identifies other work, publications and research related to your topic.
- It will demonstrate that your project does not exist in an academic vacuum but relates to other research topics and fields of current interest.
- Related research can also help demonstrate your understanding of your topic area, showing the reader that you are aware of what is currently happening in the field and are conversant with other topics that impinge upon it.

- ***Type of project***
- You might wish to identify the type of project you are undertaking, for example, *research-based, development, evaluation,* etc.
- However, make sure these terms are recognized and provide more detail if appropriate

Research questions

- Your project proposal may also include the research question you intend to investigate and, hopefully, answer to some extent within your project.
- Computing projects do not necessarily set out to answer particular questions, but for some projects (particularly research degree projects) a statement of your research question is essential.
- Examples of research questions are:
    1. Does the size of an organisation affect its commitment to software quality standards?
    2. What is the relationship, if any, between software maintainability and coding structure standards?
    3. Is there an optimum solution to the prediction of software development costs?
    4. How do large organisations maintain quality standards in the development of internal software?

hypotheses

- While research questions on their own are ‘open-ended opportunities to satisfy one’s curiosity’, they are often linked closely with one or more hypotheses.
- A hypothesis is ‘a tentative proposition which is subject to verification through subsequent investigation’.
- Although you do not have to define hypotheses alongside a research question, they do present potential ‘answers’ to the question(s) you have posed and provide definitive statements that will focus your research.
- For example, suppose your project intended to answer the fourth research question posed above.
  - One of the following hypotheses might be investigated based on that research question:
  - Hypothesis #1:. Large organisations invariably employ recognised standards to maintain internal software quality
  - Hypothesis #2: Large organisations generally have quality departments which oversee the implementation of procedures that ensure the quality of internal software.

- ***Methods***
- This section describes the research and project methods you will use in performing your project.
- This section should not identify methods that you might be investigating as part of your project, but those methods you are actually using.
- It might include development methods that you are using as part of a systems development (for example, SSADM); survey methods for a case study evaluation and evaluation methods for comparing two or more systems.
- Research methods would include those introduced in previous lecture, such as *action research*, *case study*, *survey* and *experiment*.

- ***Resource requirements***
- You might need to identify any resource requirements for your project, such as hardware, software and access to particular computers.
- If you have access to particular resources, this fact should be pointed out in this section.
- Quite clearly, if the resources for your project are not available in your department, or are too expensive to obtain, your project will be unacceptable.
- However, if you know you need a particular piece of software or hardware, you must find out its cost and include this information within this section.
- A proposal that omits this information may be rejected if the assessor does not know how inexpensive or available the item is and might assume it is beyond your project's budget

- ***Project plan***
- It is very useful to present a project plan as part of your proposal.
- This emphasises that the project is ‘doable’ in the time allowed; it shows that you have some idea of the work involved and you have a clear pathway to follow in order to complete that work.
- The best way to present a project plan is by using a visual representation such as a *Gantt chart*.
- While the presentation of a Gantt chart is important, for the purposes of your project proposal, limit your chart to a single page.
- A multi-page project plan is difficult to read and, for a proposal, only a general overview is required.

Example

Title:
Software migration.

Project type:

Aims and objectives:
- Migrate a series of software applications from a mainframe to a client/server systam within a local company.

Outcomes and deliverables:
- Connectivity to the mainframe for approx 1000 PCs;
- Full integration into a client server environment;
- Education of users;
- Coding and testing completed.

Research methodology:
PRINCE II.

Hardware and software requirements:
All available at local comnpany.

Example

Title:
Project management issues of software migration.

Project type:
Evaluation project, industry based.

Aims and objectives:
Aim: To evaluate the use of the PRINCE II method as a means of managing the migration of software from a mainframe to a client server system.
Objectives: An evaluation of tools and methods to assist the technical aspects of the migration and organisational management aspects.
Evaluation of similar companies performing migration for comparative purposes.
The migration of a series of applications at a local company (to which access has been obtained) will be used as a vehicle for critically evaluating the PRINCE II method in particular.

Outcomes and deliverables:
A report detailing the following:
- an explanation of the perceived benefits of such a migration;
- an analysis of the difficulties experienced;
- a critical evaluation of the PRINCE II methodology and its application;
- an outline methodology for future migration projects;
- a discussion and evaluation of alternative tools and methods for software migration.

Research methodology:
Case study, action research.

Hardware and software requirements:
All available at a local company.

Choosing your supervisor

- Academic departments have different ways of assigning project supervisors to students.
- There are only a finite number of projects a supervisor can effectively supervise and you may find you are allocated someone who knows little about your field five questions that students should ask of potential supervisors:
  - **1.** ‘What are their records in terms of student completions?’
  - **2.** ‘What are their views on the management of student research – and, in particular, the supervisor’s role in it?’
  - **3.** ‘How eminent are they in their specialisms?’
  - **4.** ‘In addition to being knowledgeable about their subjects, have they high competence in research methodology?’
  - **5.** ‘How accessible are they likely to be?’

Summary

- Choosing the right project is probably the most important stage of any project.
- A number of techniques have been presented that you can use to assist you with choosing a suitable project.
- When preparing a proposal there are two golden rules; follow any guidelines precisely and proofread it thoroughly.
- A project proposal should include, at least implicitly: *background*, *related research*, *identification of a gap, how your project fills that gap* and *risks and contingency plans*.
- Project proposals should include, at the very least, the sections *project title, aims and objectives* and *expected outcomes/deliverables*.
- Questions have been presented that you should ask yourself before you choose your project supervisor (if this is possible within your own institution).

Questions