COMP 516
Research Methods in Computer Science

Dominik Wojtczak

Department of Computer Science
University of Liverpool
Questions

1. What sources of information could be used to devise a research-oriented project?

2. Given a collection of proposals for research-oriented projects, what criteria could you use to select the most suitable one?
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2. Given a collection of proposals for research-oriented projects, what criteria could you use to select the most suitable one?
Sources of Information

- Proposals by academic staff or departments
- Past projects
- Brainstorming
- Your own goals and learning objectives
- Reading about / working in the subject area
- Systematic analysis of the subject area
  - Research Territory Maps
    Show how topics related to each other
  - Relevance Trees
    Break down a particular subject or research question into lower and lower levels of detail
  - Spider Diagrams
    Combines features of Research Territory Maps and Relevance Trees
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Figure 3.1 A high-level RTM for the field of software engineering
Relevance Trees: Example

Figure 3.2 An example relevance tree for the field of artificial intelligence
Spider Diagrams: Example

Figure 3.3  An example spider diagram for the field of software engineering
Choosing a Project

- The project needs to be within your capabilities
- The project needs to have sufficient scope
- The project needs to interest you
- The project needs to have a serious purpose
- The project needs to have a clear outcome
- The project needs to be related to your degree programme
- The resources required are available or can be obtained
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- awared since 1991, for achievements that "first make people laugh, and then make them think"

- 2006 Chemistry: "Ultrasonic Velocity in Cheddar Cheese as Affected by Temperature".

- 2006 Mathematics: for calculating the number of photographs that must be taken to (almost) ensure that nobody in a group photo will have their eyes closed.

- 2007 Linguistics: for determining that rats sometimes can’t distinguish between recordings of Japanese and Dutch played backward

- 2010 Physics: for demonstrating that, on icy footpaths in wintertime, people slip and fall less often if they wear socks on the outside of their shoes.
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Suitability Tests for Projects

- ‘So what?’ test
  Is the topic meaningful?
  Will it be of value for anyone?
  What contribution will it make?

- Justification
  Can you explain your project and justify it in simple terms?

- Estimating your understanding
  Can you put a figure on what you know about your chosen subject?

- Contacts
  Are the contacts you require for your project (including your supervisor) available, accessible, and willing to help?

- Project proposal
  Can you write a substantive proposal for your project?
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- **Introduction to the subject area**
  - Sets the context for the project
  - Should motivate the relevance of the subject area

- **Overview of current research in the area**
  - Demonstrates current activities in the subject area
  - Shows your understanding of current research

- Identify a gap
  - Identify a need for further investigation or re-interpretation

- Identify how your work fills the gap
  - Explain how your project fills the gap

- Identify risks and solutions
  - Highlight the benefits that can be derived from your project
  - Account for the risks to your project
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- **Title**
  Clear, Concise, Preferably no acronyms

- **Aims and Objectives**
  Aims: Broad statement(s) of intent
  Identify the project's purpose

  Objectives: Identify specific, measurable achievements
  Quantitative and qualitative measures by which completion of the project can be judged

- **Expected outcomes/deliverables**
  Identify what will be produced/submitted in the project

- **Keywords**
  Identify the topic areas that the project draws on
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- **Introduction/Background/Overview**
  - Overview of the project (Identification of research questions and hypotheses, elaboration of aims)
  - Motivation for the project
  - Motivation for you conducting the project

- **Related Research**
  Identifies other work and publications related to the topic

- **Methods**
  Identifies the research methods and project methods that will be used (e.g. theoretical investigation, case study)
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Project Plan
- More or less detailed ‘timetable’ for the project
- Deadlines for deliverables
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Choosing the right project is an important stage crucial to your success.

There are a number of techniques that can assist you.

In a project proposal or project specification:
- stick to the required structure and
- address all the guiding questions as precisely as possible.

Further reading:
Sharp et al. (2002) proposes five questions that might help you to choose a project supervisor; see (Dawson 2005; p. 52).
The Presentation

Presentation & short bibliography on an agreed subject (15%)

- subject to be agreed by Friday 19 October 2012
- slides and bibliography due by 17:00 Friday 2 November 2012
- accounts for 15% (estimate 20 hours to complete)
- presentation: 3 slides, 5 minutes talk each + 1 minute for questions
- all of them take place during the 8 lectures between the 5th and 20th of November
- the order will be chosen randomly, 7 speakers per lecture
- the starting point for your essay (55%)
  - the topic can be changed if really necessary
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a good essay will

- help the reader to gain an understanding of the concepts involved in the subject area of the essay
- provide an overview of the current state, possibly together with some historical information of the subject area
- cover debates, different points of views, open questions, directions of future research and development in the subject area

especially good are topics where there is debate between two sides holding opposing views, e.g. pros and cons of software patents

in such a case the essay should present both sides and try to evaluate their arguments
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  - provide an overview of the current state, possibly together with some historical information of the subject area
  - cover debates, different points of views, open questions, directions of future research and development in the subject area

- especially good are topics where there is debate between two sides holding opposing views, e.g. pros and cons of software patents

- in such a case the essay should present both sides and try to evaluate their arguments
The Presentation and Essay

- any current research topic or current technological development in Computer Science

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Example topics

- Advances in the Optimization of Network Data Traffic
- Data Mining and Privacy
- E-Voting
- The GNU General Public License
- The Modern GPU

more topics at
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http://www.liv.ac.uk/english-language-centre/academic_english_classes_for_all_international_students_and_staff/

or click “Useful resources for COMP516” at
https://cgi.csc.liv.ac.uk/~dominik/teaching/comp516