Research Project 2011

Learning Objectives
The research project provides the opportunity to study a topic of interest in more depth. The learning objectives are:

- To allow students to follow up on a topic in software engineering of particular interest.
- To gain familiarity with the scientific literature of software engineering.
- To gain practice at distilling the main points, issues or steps in the development of a technique in a way that can be disseminated to others.

The Task
Your task is to select three papers from the scientific literature on a specific topic of your choice within the area of software requirements and project management. In deliverable 1 you will present a structured review of each of your chosen papers. This is to provide some early feedback. In deliverable 2 you will summarise the main contributions of three papers in a 1200 word essay. The three papers should be related in that: they form a sequence in which a system, technique, or theory is successively developed or improved, or they present arguments or results supporting alternative approaches to solving a problem in software engineering. The papers must be published in recognised peer-reviewed journals, conference proceedings or books. Web sites other than refereed journal and conference archives are not acceptable. At least one of the papers must have been published in the last 3 years (2008 or later).

Deliverables
This assignment is worth 20% of the marks for the unit, and has two deliverables:

**Deliverable 1.** paper review (5%) due by **5pm on Friday 16 September 2011**

a. Submitted on paper to the CSSE Main Office. Deliverable 1 is a structured review of three research papers. See below for details of the format required for each review, and
b. Submit an electronic copy of deliverable 1 (postscript or pdf) to cssubmit by the due date.

**Deliverable 2.** 1200 word essay (15%) due by **5pm on Friday 21 October 2011.**
a. Submit a paper to the CSSE Main Office, stapled with a CSSE Assignment and Report Cover Sheet, and
b. An electronic copy of the full essay (postscript or pdf) should be submitted to cssubmit by the due date.

The School’s Policy on Late Submission (20% penalty per day or part thereof) will apply for both deliverables. For details, see http://www.csse.uwa.edu.au/departmental/publications/latesubmission.html

**Deliverable 1 (5%)**

Choose three related papers on a topic of your choice in the area of software requirements or project management or validation. The papers must be published in a peer-reviewed journal or conference proceedings. Complete a structured review of each paper using the following headings. Each review will be one to two pages. The questions are taken from Bill Griswold’s excellent guide on How to Read An Engineering Research Paper. The guide is available on-line from the SRPM bibliography page. Use sub-headings you’re your answers to each of the six questions below.

1. Give a full reference for the paper you have chosen (see below for details of how to do this)
2. What are motivations for this work? For a research paper, there is an expectation that a problem has been solved that no one else has published in the literature. This problem intrinsically has two parts. The first is often unstated, what I call the **people problem**. The people problem is the benefits that are desired in the world at large; for example some issue of quality of life, such as saved time or increased safety. The second part is the **technical problem**, which is why the people problem does not have a trivial solution; that is, why a new technological or engineering solution may be required. Implicitly there is implication that previous solutions to the problem are inadequate. Occasionally an author will fail to state either point, making your job much more difficult.
3. What is the proposed solution? This is also called the hypothesis or idea. There should also be an argument about why the solution solves the problem better than previous solutions. There should also be a discussion about how the solution is achieved (designed and implemented) or is at least achievable.
4. What is the evaluation of the proposed solution? An idea alone is usually not adequate for publication of a research paper. What argument and/or experiment is made to make a case for the value of the ideas? What benefits or problems are identified? Are they convincing?
5. What are the contributions? The contributions in a paper may be many and varied. Ideas, software, experimental techniques, and area survey are a few key possibilities.
6. What are future directions for this research? Not only what future directions do the authors identify, but what ideas did you come up with while reading the paper?
Deliverable 1 will be returned to you after the mid-semester study period with feedback to help you improve your final essay.

**Deliverable 2 (15%)**

Write a 1200 word essay comparing and contrasting your three papers. Your essay must address the following questions:

*Context:* Why were the papers written? What was the similar problem that the system/method/theory conveyed in the papers was designed to address?

*Compare and Contrast:* Outline the solution proposed in each paper and how it was evaluated. What were the new ideas, or hypotheses, that differentiated the three papers?

*Conclusions:* What did they achieve? What were the limitations? Which of the papers do you believe has the best solution, and why?

These questions can often be addressed by using a simple example to illustrate the points. This is an exercise in abstraction. You need to choose a level of abstraction appropriate for conveying the story of the papers within the 1200 word maximum limit. Students sometimes find this a difficult skill to master, but it is well worth practising, as you will be required to do this often in almost any IT-related career you choose.

Make sure you use sections and sub-headings in your essay to help the reader follow the structure your essay.

**Sources**

It is worth exploring the relevant literature before making a final decision on your essay topic. A good strategy is to approach the task a little bottom-up as well as top-down. Don't be too stubborn on topic before investigating the literature - find two or three good papers that form a logical sequence and tell a story that is easy to present in a logical fashion as described above, and cultivate an interest in that topic!

Published information about Software Engineering can be found in textbooks, web pages, professional magazine articles (e.g., IEEE Software and Communications of the ACM) and in the fully refereed scientific literature. The first three categories are very useful for finding out about a new area, but they do not usually present new, rigorously tested, research results. Thus, for your SRPM assignment you are required to focus on papers from the last (refereed research) category.

Papers must be published in recognised refereed conferences and journals. This includes, for example, papers found on IEEE explore and the ACM portal. The reference lists at the end of textbook chapters are also a good source for suitable papers. If you are not sure whether a paper you have found is from “recognised peer-reviewed journals or conference proceedings” please see the course co-ordinator for clarification.
The leading publications (conferences and journals) for software engineering research include:

**ACM Transactions on Software Engineering and Methodology**

**Requirements Engineering** (Springer-Verlag)

**IEEE Transactions on Software Engineering**

**Journal of Systems and Software** (Elsevier)

**International Conference on Software Engineering**

**International Conference on Evaluation and Assessment in Software Engineering**

**International Symposium on Empirical Software Engineering and Measurement**

**ACM Conference on the Foundations of Software Engineering**

**International Conference on Software Process**

**International Conference on Software Maintenance**

**International Symposium on Software Reliability Engineering**

**International Symposium on Software Testing and Analysis**

**IEEE Requirements Engineering**

**Empirical Software Engineering**

**Software Practice and Experience**

**IEE Proceedings. Software Engineering**

**Proceedings of the IEEE International Symposium on Requirements Engineering**

These are some of the major repositories for software engineering research and most of the topics and authors covered in the lectures will make an appearance. Many other journals and conference proceedings are also in the library and available in online repositories.

Another excellent source of papers is the library's searchable electronic indices, such as IEEE Xplore and ACM portal: Try ieexplore [http://www.ieeeexplore.ieee.org/](http://www.ieeeexplore.ieee.org/) and the ACM digital library and guide to computing literature [http://portal.acm.org/](http://portal.acm.org/). Many of the journals and conferences in these indices are subscribed to by the University, and you can download the papers from a browser operating from the UWA domain (or through a UWA proxy). Google scholar [http://scholar.google.com/](http://scholar.google.com/) is particularly useful for finding groups of related papers.

**Citations and References**

It is essential to support your research (assignment, report or thesis) with reference to your source material, whether from written sources, diagrams, maps or recorded material. The reader must be able to confirm that an author has been correctly quoted and must be given sufficient information to identify and retrieve the references. You need to acknowledge the information you have found in the body of your work as well as providing a list of it at the end. This can take 2 forms:

- a list of the sources you have directly quoted in number order - a **reference list** or endnotes or
- an alphabetical list by author of all the material you consulted regardless of whether you used that material directly - a **bibliography**

For this assignment you should provide a **bibliography** of your sources.

Read the guide to Citation and Reference in CITS7200 Scientific Communication, and follow the style guidelines for this essay assignment:


**Highly Recommended Reading**


Available from


[30 July 2010]

*Lecture2, A Guide to Writing in English*, Lecture Notes of CITS7200 Scientific Communication at The University of Western Australia. Available from:


[30 July 2010]

*Lecture5, Citation and Reference*, Lecture Notes of CITS7200 Scientific Communication at The University of Western Australia. Available from:


[30 July 2010]