Seminars

Ingenjörsprocessen för programvaruutveckling – samhällsaspekter

Software Engineering – Soft Issues

ETSA05

Dept. Computer Science

Faculty of Engineering

Lund University

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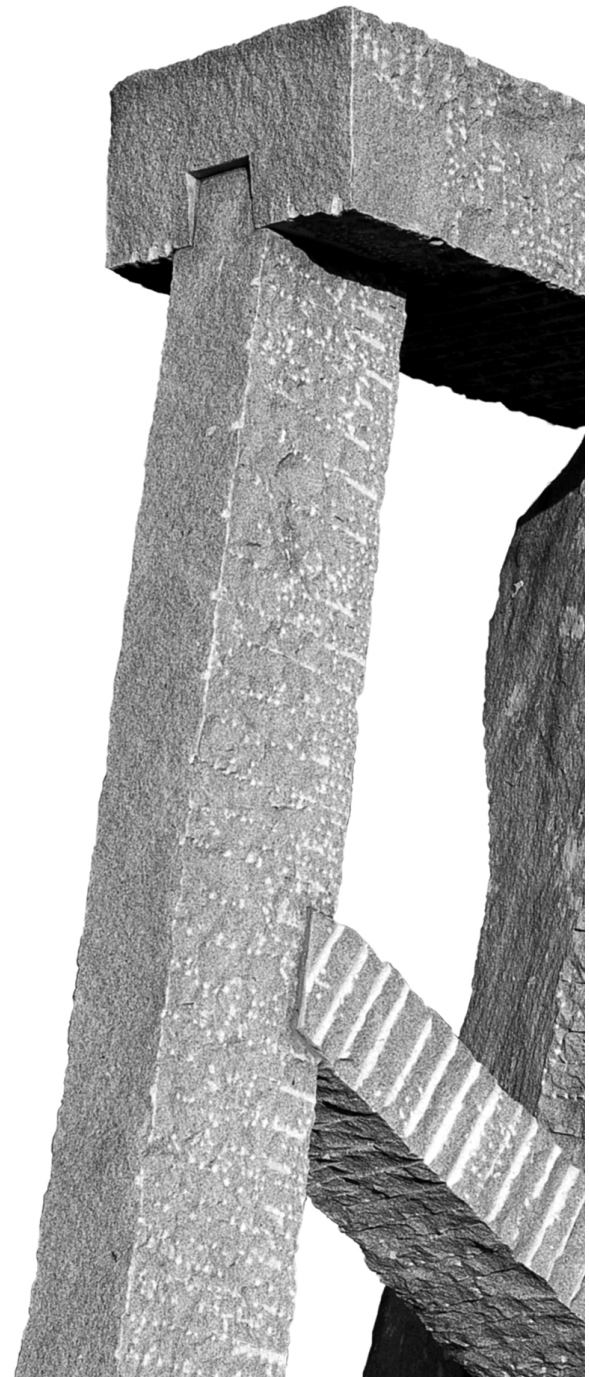
Group Essay

Extent	Purpose	Preparation
The entire course – technology, ethics, law and economy	Synthesise and examine the course content	Attend the lectures and participate in the tutorials

Task Description

In groups of three to four students, each group will be examined in this course through a group essay. All students are equally responsible for the content and have responsibilities to contribute to the essay. *Copying* existing material is *prohibited*. *Citation* of different sources is promoted, but must be clearly stated.

The essay's subject should be a technical system with information and communications technology. Examples of such systems are:
- Case record management system in health care (journalhanteringssystem)
- Electronic voting systems
- Banking systems
- Radio therapy equipment for cancer treatment
- Traffic surveillance for taxation (trängselskattesystemet) in Stockholm
- Saab's airborne radar system
- Volvo's automatic breaking system (City Safety)
- Volkswagen's diesel engine control system
- The tax authority's web portal for income-tax declaration (Skatteverkets deklarationshemsida)
- Surveillance camera systems, e.g. from AXIS
- Monitoring systems for elderly (senile) and handicapped
- Internet monitoring system to protect children's internet use
- Google's gmail service
- LADOK student administration system
- ICA-card customer log systems and its direct advertising features (ICA-kortet)
- The Swedish Police authorities' reporting system – PUST.

You may alternatively choose a relevant system from the course in requirements engineering http://cs.lth.se/english/course/ets170/project/.

At the first seminar, you compose groups and choose system. You may choose another system, but it must be approved by the seminar responsible first. The task is to analyse aspects of the system of your choice (Note: the task is **not** to compare two systems, it is about analysing one system of your choice):
- Which quality characteristics are particularly important for this system? Prioritize among the relevant ones.
- Which aspects of availability for the elderly, disabled, and individuals with special needs are current interests?[1]
- Which ethical questions must be answered for the system?

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[1] If your system is not applicable for people with disabilities, analyze the system with respect to accessibility with respect to general human-computer interaction.

- Which legal aspects are relevant for the system?
- What are the financial driving forces in favour of and against the system? Who wants to invest? Who can make a profit? What is the cost for the individual? What is the cost for society?

These topics are covered by the seminars, and you will work on the analysis during the seminars.

Subtask 1: Case selection

At the first seminar, compose working groups of 3-4 students, and choose your own system to analyse.

Subtask 2: Outline and literature

In the third week of the course, the essay's outline and a list of *peer-reviewed literature* shall be submitted that you will use in your essay. The basic outline of the essay should look like the following:

Title	
1. Introduction	6. Legal aspects
2. Description of the system	7. Business aspects
3. Quality characteristics	8. Summary
4. Availability for disabled	9. Contribution statement
5. Ethical aspects	10. References

Content should be added under each heading. The essay should consist of a minimum of two A4 pages using the IEEE two-column template, accessible in MS Word and latex format from the course web. If you want to change or adjust the outline, you must do so now.

Subtask 3: A complete essay for peer review

The complete essay should consist of 5-7 A4-pages plus references, using the IEEE two-column template and be written in understandable English with cohesive flow.

Subtask 4: A complete essay

The same as above, updated based on peer review comments.

Subtask 5: Oral presentation

The essay should be presented orally at the last seminar. The presentation, including questions must not exceed 10 minutes. All group members must participate in the preparation, and be prepared to present, but we choose one presenter at random.

Seminar 1: Software quality characteristics and accessibility

Scope	Purpose	Preparation
Non-functional or quality characteristics of software. Accessibility for information technology.	Raising awareness of the multitude of quality characteristics. Raising awareness of how information technology may help or hinder people with disabilities.	Read: Basu, "Assuring Software Quality with ISO9126" Jung et al "Measuring…" 2004 Check: http://www.sqa.net/iso9126.html http://www.who.int/classifications/icf/en/index.html www.tiresias.org

Entry questions (individual, before seminar)

1. What is ISO 9126, according to Basu? _____

_____

_____

2. Which of the quality characteristics in ISO9126 do you think are mostly relevant to the software developer, and which are mostly relevant to the user?

Developer:_____

_____

User: _____

_____

3. Jung et al studied user's perception of a product's quality by users and developers.

a) How many of each did respond?_____

b) How did the dimensions of the survey responses relate to the characteristics?

_____

_____

_____

_____

Task 1: Software characteristics and types

Rank for each product example, the order of importance of the characteristics. Add your own group essay product/system example. For the most important characteristic, choose metrics from the table on the next page, and define target levels for these metrics.

Product example	Functionality	Reliability	Usability	Efficiency	Maintainability	Portability	Metrics for the most important characteristic and target levels.
Cellphone *communication* software							
Cellphone *application* software							
MS Office							
LADOK							
Control software for nuclear power plants							
Group essay product/system:							

Each quality characteristic can be divided into measurable sub-characteristics. The following table gives a list of sub-characteristics and examples of metrics.

Characteristic	Quality Sub-characteristics		
	Name	**Explanation**	**Metrics examples**
Functionality	Suitability	Can software perform the tasks required?	*Functional specification stability (volatility)* – proportion of incorrectly implemented functions
	Accuracy	Is the result as expected?	*Computational accuracy* – number of inaccurate computations
	Interoperability	Can the system interact with another system?	*Data exchangeability* – number of times when the user fails to exchange data between target software and other software
	Security	Does the software prevent unauthorised access?	*Access controllability* – number of detected illegal operations
Reliability	Maturity	Have most of the faults in the software been eliminated over time?	*Mean time between failures* – average time interval between failures
	Fault Tolerance	Is the software capable of handling errors?	*Incorrect operation avoidance* – number of test cases of incorrect operations which were avoided
	Recoverability	Can the software resume working and restore lost data after failure?	*Mean time down* – average time the system stays unavailable when failure occurs before gradual start up
Usability	Understandability	Does the user comprehend how to use the system easily?	*Completeness of description* – proportion of functions that are understood after reading the product description
	Learnability	Can the user learn to use the system easily?	*Ease of function learning* – mean time taken to learn to use function correctly
	Operability	Can the user use the system without much effort?	*Error correction* – mean time taken to correct error on tasks
	Attractiveness	Does the interface look good?	*Interface appearance customisability* – proportion of interface elements that can be customised in appearance to user's satisfaction
Efficiency	Time Behaviour	How quickly does the system respond?	*Response time* – the time it takes to complete the operations
	Resource Utilisation	Does the system utilise resources efficiently?	*Maximum memory utilisation* – absolute limit on memory required in fulfilling a function
Maintainability	Analysability	Can faults be easily diagnosed?	*Failure analysis capability* – proportion of failures of which causes are not found as compared to total number of failures
	Changeability	Can the software be easily modified?	*Change cycle efficiency* – average time taken from the initial user's request to the resolution of problem
	Stability	Can the software continue functioning if changes are made?	*Change success ratio* – number of failures which user encounters after software was changed
	Testability	Can the software be tested easily?	*Availability of built-in test function* – proportion of test cases in which maintainer can use suitably built-in test function
Portability	Adaptability	Can the software be moved to other environments?	*Porting user friendliness* – sum of user operating time spent to complete installation or change setup
	Installability	Can the software be installed easily?	*Ease of installation* – proportion of cases in which user succeeded the install operation
	Co-existence	Can the software operate well together with other software?	*Available co-existence* – number of constraints or unexpected failures during operating concurrently with other software
	Replaceability	Can the software easily replace other software?	*Continuous use of data* – proportion of data that can be continuously used after replacing software

Task 2: Disabilities

Information and Communication Technology (ICT) may help people with disabilities of different kind. The following table lists various types of ICT products that have been specifically designed for people with disabilities. These products are known as assistive technologies (more information can be found at *www.tiresias.org*).

Assistive ICT Products	
Product	**Description**
Braille displays	Braille displays create a tactile translation of information on a computer screen. Some displays have a reusable, refreshable surface.
Screen magnifier	Software that will magnify a part of the screen and display it in an enlarged version elsewhere.
Screen readers	Software that reads the contents of a computer screen, converting the text to speech.
Speech/voice recognition software	Software that allows users to give commands and enter data using their voices, rather than a keyboard or mouse.
Speech synthesisers	Speech synthesisers convert electronic text to speech.
Textphones	A textphone has a keyboard and a display screen. Instead of speaking into a telephone mouthpiece, the user types what they want to say using the keyboard.
Alternative input devices	These include alternative keyboards, pointing devices, joysticks, sip-and-puff systems, sticks, trackballs and wands. They allow users to control their computers through means other than a standard keyboard.
Eyetracking software	Software that follows the movement of the eyes and allows the user to navigate on-screen with only eye movements.
Word prediction software	Software that predicts the user's words based on the words recently typed and the how frequently the user types the same words.
Keyboard filters	These include typing aids such as add-on spelling checkers and word prediction utilities.

Think of persons with disabilities as defined below. How can information and communication technology help people with respective disability? For each disability type, please list up to three ICT products, which are the most helpful (from above table, also you can use additional products).

Disability	Helpful ICT products
Color blindness (färgblindhet)	
Low vision (dålig syn)	
Blindness (blind)	
Hearing problems (hörselnedsättning)	
Deafness (dövhet)	
Speech dysfunction (talsvårigheter)	
Orientation dysfunction (orienteringssvårigheter)	

Mobility (rörlighet)	
Involuntary movements (skakningar)	

Task 3: Group essay

Nowadays, ICT is used in many different products – mobile phones, ATM machines, ticket machines, etc. However, these products are not always accessible to people with disabilities (e.g. touch-screens are difficult to use for blind people, voice-messages are not useful for people with hearing problems, etc.). Analyse for your group essay product and three different disability types, and fill in the following information in the table below[1]:

1. ICT improvements that could make it more accessible (easy to use) for people with selected disability;
2. Hinders, which make ICT product difficult (or even impossible) to use for people with selected disability.

Disability:
Own product:

1. Help (improve the ICT use)	2. Hinder (make it difficult to use ICT)

Disability:
Own product:

1. Help (improve the ICT use)	2. Hinder (make it difficult to use ICT)

Disability:
Own product:

1. Help (improve the ICT use)	2. Hinder (make it difficult to use ICT)

If you have time, start writing the sections on *Quality characteristics* and *Availability for disabled* in your group essay.

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[1] If your system is not applicable for people with disabilities, analyse the system with respect to accessibility with respect to general human-computer interaction.

Seminar 2: Ethics in Software Engineering

Scope	Purpose	Preparation
Ethical issues related to software engineering.	To meet different kinds of ethical issues that may be relevant for a software engineer.	Read : Rashid et al "SE ethics…" Berenbach and Broy, "Professional…" Hatton & Genuchten "When Software…" Spinelis, "Developer, Debug Thyself" Olsen, "The $100,000 Keying Error"

Entry questions (individual, before seminar)

1. Explain what is meant by the "dual use" dilemma.

   _____

   _____

 2. Rashid et al give examples of dual uses of technology, e.g. civil and military. List three other examples of dual use, which include a dilemma.

   _____

   _____

   _____

3. Describe the technical issue in "The $100,000 Keying Error".

   _____

   _____

   _____

4. What would be needed to avoid the technical issue in "The $100,000 Keying Error"?

   _____

   _____

   _____

Task 1: Debate on engineering responsibilities

Group in teams of 3-4 people. The seminar leader appoints you to one role in one of the cases below.

Case 1: "Software engineer Andersen develops technology for image analysis, files some patents and starts a company to develop a general purpose product. It does not really take off until a company in the military domain finds her technology, makes a contract with her and applies the technology to goal-searching missiles."
"Software engineer Bengtsson's company makes a tool that performs heavy calculations in the construction domain. Since the competitive edge is on the tool and not its components, they release their maths library for open source use. This component is adopted by a company developing software for long-distance missiles."

Role 1-pro: List arguments in favor of that Andersen and Bengtsson are responsible for predicting the "dual use" of the technology and tools.
Role 1-against: List arguments in favor of that Andersen and Bengtsson are NOT responsible for predicting the "dual use" of the technology and tools.

Case 2: Study the case of the "The $100,000 Keying Error".

Role 2-pro: List arguments in favor of that the bank should take the responsibility for the user's keying error.
Role 2-against: List arguments in favor of that the bank should NOT take the responsibility for the user's keying error.

Case 3: In the "Volkswagen Gate" case there are many not yet revealed aspect to discuss. One of them is whether open source software would prevent cases like the emission cheating by Volkswagen. Other's say it is not sufficient since the software is so complex anyhow, so open code is not sufficient.

Role 3-pro: List arguments in favor of that the software in e.g. cars should be open sourced to prevent such fraud.
Role 3-against: List arguments in favor of that it is NOT sufficient to open source the code, and thereby it should not be mandatory.

When the groups have prepared their arguments, the supervisor organizes a debate between each pair of roles (pro vs against).

Task 2: The role of an engineer

Berenbach and Broy list different kinds of ethical dilemmas. Give examples of such dilemmas in a real or fictitious development project. If possible, use an example related to your product in the group essay.

Ethical dilemma	Example
Mission impossible	
Mea culpa	
Rush job	
Not my problem	
Nondiligence	
Fictionware/Vaportware	
Canceled vacation	
Sweep it under the rug	

Task 3: Group essay:

Ethical technology assessment
1. Identify potential ethical issues in your group essay product.
2. Conduct an ethical technology assessment according to the lecture on ethics. At a minimum, produce one consequence tree and one off-line analogy.
3. Discuss threats for fraud, like in the VW case, in relation to your essay product, and how that is/could be prevented.
4. If you have time, add your analyses to the *Ethical aspects* section of the group essay.

Seminar 3: Open Source Software

Scope	Purpose	Preparation
Software under open sources licenses	To provide an initial understanding and training in interpreting software licenses	Read Ruffin and Ebert, 2004. Read Henley and Kemp, 2008. Check http://www.opensource.org/licenses/gpl-3.0.html and http://www.opensource.org/licenses/bsd-license.php Read about Linux http://www.linux.org/info/ and Android http://www.android.com

Entry questions (individual, before seminar)

1. Which licenses are actually used by Linux and Android?

Linux: _____

Android: _____

2. What is meant by "Tivoisation"?

_____

_____

3. Why is "Tivoisation" outlawed by GPLv3?

_____

_____

4. Why is open source software considered improving software security?

_____

_____

Task 1: OSS principles

Discuss the principles of open source software (OSS) and respond to the following questions:

Who is paying for OSS development? _____

_____

What are the benefits and risks *contributing* to OSS development?

For an individual? _____

_____

For a company?_____

_____

What are the benefits and risks *using* OSS?

For an individual? _____

_____

For a company?_____

_____

Task 2: OSS licences

Study the GPL and BSD licenses. Discuss a company, developing say cell phones. Compare the consequences of using open source software under the GPL and BSD licenses respectively for the two cases below:

Case	GPL	BSD
Linux operating system, known for its widespread use on servers, as well as other hardware ranging from embedded devices to supercomputers. http://www.linux.org/info/		
Mobile phone built on the Android software. http://www.android.com		

Task 3: OSS and patents

How do open source and patents go together? Who is responsible for making sure there is not patented technology in the open source software they use and sell? See for example http://www.fosspatents.com/2012/10/updated-lists-of-android-patent.html

_____

_____

_____

_____

Task 4: Group essay

For group essay product, are there any open source software involved? Under which licenses? How is their business model?

_____

_____

_____

_____

_____

If you have time, add your analyses to the *Legal aspects* and *Business aspects* sections of the group essay.

Seminar 4: Patent and Copyright

Scope	Purpose	Preparation
Patent and copyright	Gain an insight into the issues involved in patent and copyright.	Read: Teska, "Software patents 101". Hunt, Bessen "The Software Patent Experiment". Samuelson, "Is Software Patentable" Try to understand the patent "Stateless shopping cart for the web".

Entry questions (individual, before seminar)

1. Which types of companies did file the most software patents according to Hunt and

Bessen?   _____

2. Samuelson mentions patent claims in *method, system* and *computer media* form in the Alice lawsuit.

Which are these claims?   _____

_____

_____

What role do they play in a patent lawsuit?   _____

_____

_____

Task 1: Protection of Intellectual Property

From the information in the lecture and preparation material, which types of software artifacts can be protected by the following models?

	Patent	Copyright (Upphovs-rätt)	Trademark (Varumärke)	Design (Mönster-skydd)	Secrecy (Företags-hemlighet)
Software functions					
Software design (structure)					
Software design (user interface)					
Software code					

What is the main idea behind the patenting system, i.e. what is it intended to protect?

_____

_____

Do you think the patenting system works as intended for software patents? Why? Why not?

_____

_____

Task 2: Patent example

- Describe the patent "Stateless shopping cart for the web" briefly (about 10 sentences and one picture).
- Use your description of the patent and make a prototype sketch of another stateless shopping cart, so it does not use the patented solution.

Task 3: Group essay

In addition to the aspects in Task 1, give examples from your own group essay product on aspects that may be protected by the different types of legislation.

Aspect	Patent	Copyright (Upphovs-rätt)	Trademark (Varu-märke)	Design (Mönster skydd)	Secrecy (Företags-hemlighet)

Search for *peer-reviewed* articles or other material on legal aspects for your group essay product.

If you have time, start writing the section on *Legal aspects* in your group essay.

Seminar 5: Essay review

Scope	Purpose	Preparation
Essay	Learn from other essays and to get feedback on your own essay	Send your essay to your peer group (assigned at a previous seminar) no later than Tuesday). Read the essay and mark comments in the document.

Task 1: Review group essay

Review it using the grading criteria as a reference and comment on your grading.

Essay title

Essay authors

Aspect	Grade	Comment
System description		
Content - quality characteristics		
Content - accessibility		
Content - economy		
Content - ethics		
Contents - law		
Form - language		
Form - academic style		
Form - references		

Hand over your review comments to the peer group. Submit the above table to etsa05@cs.lth.se. Write Sem5 and your student IDs in the e-mail header.

Task 2: Update group essay

If you have time, update your essay based on your peers' comments and make it ready for final submission.

Seminar 6: Business plan

Scope	Purpose	Preparation
The first steps from an idea towards a company - the business plan	Gain an insight into the steps of starting a company around an idea. Get training in writing and reading business plans.	Attend the guest lecture from Venture Cup Read Mullins, "What to do…" Checklist for Venture Cup "Affärsidé"

Entry questions (individual, before seminar)

1. What are the three main characteristics of Mullin's "customer-driven feasibility study"?

_____

2.What are the differences between his proposal and the Venture Cup business plan template?

_____

_____

Tasks at the seminar

1. Define or choose a product/service idea around which you will start a company.
2. Write a short business plan with the following main structure:
    • Title, team, pitch
    • Business idea
    • Market
    • Business model
    • Team composition
    The short business plan may comprise at a maximum 4 pages
3. Submit the business plan via e-mail to etsa05@cs.lth.se and etsa05.lu@analys.urkund.se. The header MUST include the name of the seminar (Sem3), and your student ID.

Group essay

Discuss business aspects of your group essay product and start writing on the *Business aspects* section.

Tasks after the seminar

4.   You will get a business plan from a fellow team via e-mail.
5.   Review the business plan *individually*. Use the checklist from Venture Cup "Affärsidé". Fill out the scheme below and submit via e-mail to etsa05@cs.lth.se and etsa05.lu@analys.urkund.se. The header MUST include the name of the seminar (Sem3), and your student ID.

Business Plan Feedback Scheme							
Area	Criteria	Grading					Comments
		No		partly		Yes	
Formality	The formal presentation gives a professional impression						
Business idea	The business idea has a clear customer focus						
	The business idea is novel regarding the product/service or the business model						
	The product/service and/or the business system is superior compared to other alternatives						
Market	Is it clear which customers are likely to buy the product/service?						
	Estimates of the market size and share are realistic						
	The market channel (distribution, customer reach out) is trustworthy						
Business model	Have you described how to earn money on your product/service?						
	The business model is well thought through and fits the product/service						
	Where will you get venture capital from?						
Team	The team behind the business is well described						
	It is well argued that this team will succeed						
Summary							