

MSc in Advanced Computer Science

Systems Engineering: Assessment

The aims of this coursework is to illustrate to you the inherent complexity of socio-technical systems and to give you practical experience in exploring some of the issues in the specification and design of such systems. In this case, you will not be expected to design the e-election system – rather, you will investigate key issues that should influence the system design and generate requirements that ensure that a workable system will be deployed.

Each student must submit a portfolio of work based on the proposed e-election system. You should assume that there are 4 principal socio-technical sub-systems that are part of this system:

1. The voter registration subsystem
2. The e-voting subsystem
3. The vote tallying and reporting subsystem
4. The election auditing subsystem

During the class, you will work in groups to discuss and design e-election system but the portfolio that you submit, must be based on your own interpretation of the work of the group.

The portfolio must include the following documents:

1. A brief review of e-voting technologies discussing the advantages and disadvantages of each approach. Extensive material is available and a web page with possible links is available at:
<http://www.comp.lancs.ac.uk/computing/resources/IanS/MScSysEng-2004/E-voting/LinksAndResources.html>
2. A discussion of socio-technical issues and problems surrounding e-election systems based around the topics of:
 - a. Accessibility – i.e. making sure all those (including those with disabilities) who are legally permitted to vote have the opportunity to do so.
 - b. Trust – i.e. convincing users of the system that it is trustworthy.
 - c. Fraud – ensuring that the system is not subject to fraud or vote buying.
3. For each of the subsystems identified above, identify and discuss security threats faced by that subsystem. For the purposes of this exercise, you should ignore threats to the physical security of the system (e.g. bombs at polling stations, stolen voting machines, etc.)
4. For each of the principal subsystems identified above, a set of plausible requirements that will ensure the accurate and secure operation of the subsystems and the overall system. These requirements are NOT just

requirements for the technical (hardware and software) components of the system but also for the human and organisational processes that are part of the overall system.

You may wish to use the concern/sub-concern/question approach in identifying issues and defining requirements but you do not need to do so.

This approach to assessment demonstrates that the planned learning outcomes of the course have been achieved in the following ways:

1. An understanding of the characteristics of systems engineering and the key challenges that are likely to be faced in a systems engineering project. (1, 2)
2. An ability to assess the scope of a systems engineering problem, identify the stakeholders and other factors that shape the system requirements. (3, 4)
3. An understanding of the nature and significance of emergent system properties, especially those properties relating to system dependability, and the ability to define required system properties as requirements. (2, 3, 4)

Page limits and assessment

A skill that is important to develop is writing a document according to some limits. This forces you to be selective about what is included and to make choices about the most important material. Therefore, I have imposed strict page limits as set out below on each of the documents in your portfolio.

By strict page limits I mean that, if the page limit is N pages, then I stop reading after N pages and mark accordingly. For example, if the limit is 2 pages and you write 3 pages, then the material on the 3rd page will be ignored. **You have been warned.**

Notice that I specify page limits. You do not have to write this much and you can achieve full marks with a shorter document if it covers all the key issues.

1. A brief review of e-voting technologies. (2 pages, 10 marks)
2. A discussion of socio-technical issues and problems surrounding e-election systems based around the topics of accessibility, trust and fraud. (6 pages, 30 marks)
3. A threat assessment for each of the principal sub-systems (4 pages, 20 marks)
4. A statement of requirements for each of the principal subsystems (8 pages, 40 marks)

Notice that, in documents (3) and (4), there is an overall page limit. You should not assume that this necessarily means 2 pages per sub-system.