

Critical Systems Engineering 2000

Week: 2

Course topic: Dependability

Objective: To introduce the attributes of a critical system that lead to its dependability i.e. the extent to which a system is trusted by its users. Attributes covered are reliability, availability, safety and security.

Essential reading: “Software Engineering”, 5th edition. Chapter 2
“Software Engineering”, 5th edition. Chapter 20, section 21.1.

Background reading: Systems Engineering: Coping with Complexity. Chapter 1
Stevens, Brook, Jackson and Arnold

Web resources: <http://info.comp.lancs.ac.uk/year3/notes/options/365/index.htm>

Self-test:

1. What is a socio-technical system?
2. Give 3 examples of socio-technical systems
3. What are emergent properties?
4. Explain why emergent properties are often system-wide properties
5. What are possible roles for software in socio-technical systems?
6. What are the stages in the systems engineering life cycle?
7. Explain why systems problems often have to be solved in software
8. What is a critical system?
9. What are the major classes of critical system?
10. Give 2 examples of systems from each of these classes?
11. Why is the failure of a critical system often very expensive?
12. What are critical emergent properties?
13. Why should more rigorous development techniques be used for critical systems development?
14. Why is a personal insulin pump a critical system?
15. What do you think is the most important dependability attribute in the following critical systems?
 - A database of patients receiving treatment for cancer
 - A railway signalling system
 - A system that controls the traffic signals in a major town
 - An Internet router
 - A mortgage assessment system in a bank
 - A door lock control system in a nuclear waste reprocessing plant