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AG Software Engineering: Dependability

Software Quality Assurance (WS 10/11)

Problem Set 1
Due Wednesday, November 10th, 2010

Problem 1: Software Intensive Systems

Please define the general term "system" according to Birolini and explicitly name the parts a system can encompass. Explain your answer in the view of aviation.
What is the difference to a "technical system"?
For the analysis of a technical (embedded) system it is crucial to extract it from its environment. How can this be achieved? Please sketch your ideas.
Please list important non-functional requirements for embedded systems.

Problem 2: Reliability vs. Availability

Please explain the difference between "reliability" and "availability".

Problem 3: Safety vs. Security

Please explain the terms "safety" and "security". What is meant by "technical safety"? Please give examples for the safety of a failure-free system and the technical safety of a failure afflicted system.

Problem 4: Failure, Fault

What is meant by the terms "failure" and "fault"? Please illustrate your answer by means of the "Ariane 5" disaster (see lecture).

Problem 5: Hardware Failures vs. Software Failures

Please explain the differences between hardware failures and software failures.

Problem 6: Correctness and Robustness

Please give your opinion on the following statements:

	true	false
Correctness has a binary character	☐	☐
Even if there are no defects, the program might not have to be correct	☐	☐
An artifact is not consistent to its specification, if it is not correct	☐	☐

Robustness has a binary character	☐	☐
A correct system can have low robustness	☐	☐
Robustness is a property only of the implementation	☐	☐

Problem 7: Quality Model

Within ISO 9126, the following six quality characteristics and sub-characteristics are defined. Please give short definitions.

Quality characteristic	Sub-characteristics
Functionality	Suitability
	Accuracy
	Interoperability
	Compliance
	Security
Reliability	Maturity
	Recoverability
	Fault Tolerance
Usability	Learnability
	Understandability
	Operability
Efficiency	Time Behavior
	Resource Behavior
Maintainability	Stability
	Analyzability
	Changeability
	Testability
Portability	Installability
	Replaceability
	Adaptability

Quality characteristics might influence each other. Think about the following dependencies and figure out, whether the influences are positive or negative:

Safety – Availability
Safety – Reliability
Availability – Reliability
Efficiency – Safety/Reliability