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AG Software Engineering: Dependability

Software Quality Assurance (WS14/15)

Problem Set 1

Due: in exercise, 12.11.2014

Problem 1:   Embedded Systems

a) 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.
b) What is the difference to a "technical system"?
c) 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.
d) 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	☐	☐
If there are no defects, the program is correct	☐	☐
It can always be decided, whether an artifact is correct or not	☐	☐
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	☐	☐
When analyzing a system, people are never taken into account.	☐	☐
Technical safety is defined for technical systems only.	☐	☐
A technical system cannot influence the environment and people.	☐	☐
Safety can be measured.	☐	☐

Problem 7:   Quality Model

a) Quality characteristics might influence each other. Think about the following dependencies and figure out, whether the influences are positive or negative.
   i. Safety – Availability
   ii. Safety – Reliability
   iii. Availability – Reliability
   iv. Efficiency – Safety/Reliability