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### Homework #3

List and explain, what are primary purposes and benefits of formally specifying the requirements of a SW project. Which 2 types of requirements are common?

- Establishes the services the customer requires from SW.
- Establishes the constraints under which the SW must operate.
- Lists agreed-upon descriptions that ideally do not change.
- Often forms the basis of the requirements.
- Often forms the basis of a bid for a contract.

The two most common types of requirements are **user** and **system** requirements.

Why should one consider (and in fact document) non-functional requirements for a large SW project? which kind of non-functional requirements can there be?

You should consider and document non-functional requirements because they outline items such as timing constraints, development process standards, response speed, and storage requirements. While these are not functional, they must be considered to produce a competitive and effective SW.

The various types of non-functional requirements are:

- Product Requirements (Efficiency, Reliability, Portability, Usability)
- Organizational Requirements (Delivery, Implementation, Standards)
- External Requirements (Ethical, Legislative, Safety, Privacy, Interoperability)

List some feasible Requirements for a realistic SW project.

- Performance must meet a certain level.
- The SW must run on a specific system with certain criteria.
- The SW must protect user privacy.
- The SW must be developed ethically.
- The SW must be usable by a non-technical user.
- The SW must only take up a certain amount of memory during runtime.
- The SW must obey all legislative rules and regulations.

Name the typical 5 levels of the CMM.

- Initial - The SW process is 'ad hoc' or even chaotic.
- Repeatable - Basic management processes to track cost, schedule, function.
- Defined - The SW process is documented and standardized.
- Managed - The SW process is quantitatively managed.
- Optimized - Continuous process improvement.

Argue, whether or not "follow up action" is needed after a formal SW inspection?

The need for follow up action depends on the result of the first inspection. If all SW met certain requirements and followed all of the companies rules and regulations it can be safely assumed that the employee will continue to develop SW with those in mind. On the contrary, if a SWE is determined to be lax in following these same rules, it is only logical that follow up action is taken to ensure process improvement and rework validity.

Which kinds of tests are needed for any major SW project?

- Component Testing - Individually testing components independently.
- Systems Testing - Testing the functioning system as a whole.
- Acceptance Testing - Testing with the customer to verify that needs are met.

What is the typical meaning of "architecture design" in SW development? What is its result (output)?

The design of the portion of the system that entails a comprehensive framework that describes its form, structure, and components and how they all fit together. The output is a model that lists how the system is organized and communicates, a description of the software architecture if you will. This description should be reviewed and documented.

SW architecture suffers from conflicting design goals. List 3 or more. Explain the basis of such possible conflicts.

- Large Grain Components - Inclusion means improved performance but reduces the ease of maintainability.
- Redundant Data - Data that is redundant is more widely available. However, redundant data makes security difficult.
- Localized safety-related features - Inclusion means more communication between SW. Thus, degraded performance. Yet, failure to include could be harmful to the system or user.

State some typical architectural design decisions for a major SW project.

- Performance - Localized operations, large or small grain components.
- Security - Layered architecture with critical assets in inner layers.
- Safety - Localized safety in sub-systems.
- Availability - Redundant components, mechanisms for fault tolerance, overall robustness.

- Maintainability - Use of fine-grain, replaceable components, ease of modification.

Name and briefly characterize The prototypical three-part model of a SW system.

- Input - Data being read and/or other output from other SW.
- Output - Result of internal calculations and input processing.
- Process - The computation that takes place.