**HW 2 – CS 4321, Fall 2015**

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**Questions – Lesson 2: Life Cycle Models (32 minutes)**

1. What types of projects are amenable to an agile approach according to Professor Barry Bohem?

* Small projects are usually appropriate for an agile approach.

1. Does Professor Barry Bohem think that you can use different software processes on different parts of a project?

* Yes. You can use multiple lifecycle models within a single project.

1. List and briefly describe the five steps in requirements engineering?

* 1. **Elicitation**: Collection of requirements from stake holders and other sources and can be done in different ways.
* 2**. Requirement analysis**: Involves the study and deeper understanding of collective requirements.
* 3. **Specification of requirements**: The collective requirements are suitably represented, organized, and saved, so that they can be shared.
* 4. **Validation**: Make sure that they are complete, consistent, not redundant, etc.
* 5. **Management**: Accounts for changes to requirements during the lifetime of the project.

1. What is software design?  
   - The phase where software requirements are analyzed in order to produce the description of the internal structure and organization of the system.
2. List and briefly describe the four fundamental principles of implementation.

* 1. **Reduction of complexity**: Aims to build software easier to understand and use
* 2. **Anticipation of diversity**: Takes into account that software construction might change in various ways over time.
* 3. **Structuring for validation**: build software that is easily testable
* 4**. Use of internal or external standards**: Examples: Internal could be coding names etc., External could be such as hospital standards, etc.

1. Define validation. Define verification.

* Validation: Answers the question, did we build the right system?
* Verification: Did we build the system right?

1. List and explain three reasons why software maintenance is a phase in the software process.

* 1. The environment may change causing the software to need to be compatible with the system.
* 2. There may be feature requests from the user realizing that they need a new feature or something in the application.
* 3. Bug reports, being the most common, will be sent back to us so that way we can ensure that it is maintained to avoid a loss of performance or productivity.

1. List and explain three types of software maintenance projects.

* 1. **Corrective maintenance**: Eliminate problems with the code.
* 2. **Perfective maintenance**: Accommodates the feature request, and even to just improve the software.
* 3. **Adaptive maintenance**: To take care of the environment changes.

1. List one reason why maintenance is expensive.

* Regression testing can be expensive because every time you modify your application, you have to do it to make sure that it works as expected.

1. What is regression testing?

* The activity of retesting software after it has been modified to make sure that the changes you perform to the software work as expected, and your changes did not introduce any unforeseen effect.

1. What is a software process (or lifecycle) model?

* A prescriptive model of what will happen from the very beginning, to the very end of the software development process.

1. List three criteria for using the Waterfall model.

* 1. Well for software products which there is a stable product definition.
* 2. The domain is well known.
* 3. Technologies involved are well understood.

1. What is an advantage of the waterfall model?

* It helps find errors early.

1. Why is the Waterfall model less than ideal for most real world projects?

* It is not flexible because it is difficult to fully specify requirements at the beginning of a project.

1. What are the four main phases of the spiral model?

* 1. Determine Objectives, 2. Identify and resolve risks, 3. Development and tests, 4. Plan the next iteration.

1. List four advantages of the spiral model.

* 1. The risk analysis reduces the chances of the project to fail.
* 2. Functionality can be added at a later phase because of the iterative nature of the process.
* 3. Software is produced early in the software lifecycle.
* 4. We can get early feedback from the user and how it is working out.

1. List two disadvantages of the spiral model.

* 1. Risk analysis requires a highly specific expertise.
* 2. The whole success is highly dependent on risk analysis. Also more complex than the other models.

1. Describe how evolutionary prototyping works.

* Works in four main phases: Start from an initial concept, design and implement initial prototype, refine prototype until acceptable, complete and release prototype. This means the system is continually refined and rebuilt.
* How is risk minimized by using evolutionary prototyping?
* The feedback is immediate thus causing the risk to be minimized.

1. List two disadvantages to evolutionary prototyping.

* It is difficult to plan in advance how long it is going to take.
* Easily can become an excuse to do a cut and fix kind of approach.

1. What is *throwaway prototyping*?

* When the prototype is just used to gather requirements, but is thrown away at the end of the requirements gathering instead of being evolved.

1. In TDD, why is the refactoring step important?

* Because you are modifying the code to make it more maintainable, readable, etc. This will help the overall design of the code.

1. List five considerations when choosing a software process model?

* 1. What level of understanding do we have of the requirements?
* 2. The expected lifetime of the project.
* 3. Level of risk involved?
* 4. Schedule constraints.
* 5. Expected interaction with management/customer.