IT314 – Software Engineering

Lab 1

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Lab Group: 5

a) A simple data processing project.

- Features: Basic data processing, data transformation, and storage.
- Non-functional aspects: Performance, efficiency, and accuracy.
- Domain: Data processing.

Suggested Process Model: Waterfall Model

Reason: The Waterfall model is suitable for simple and well-defined projects with clear and stable requirements. Since a simple data processing project is unlikely to undergo significant changes in requirements, this model can be used effectively.

b) A data entry system for office staff who have never used computers before. The user interface and user-friendliness are extremely important.

- Features: Data entry, data editing and correction, searching, and user-friendly interface.
- Non-functional aspects: Usability, user experience, learnability.
- Domain: Data entry, office automation.

Suggested Process Model: Prototyping Model or Agile Model

Reason: Both Prototyping and Agile models prioritize user involvement and feedback. Given the significance of user interface and user-friendliness, these models facilitate frequent iterations and user testing to ensure the system meets the needs of office staff who are new to computers. If a working product is required at the end of each iteration, the Agile model may be preferred but the Prototyping model is more apt here since new computer users may get find it hard to keep learning new features being added after each iteration in the Agile model.

c) A spreadsheet system that has some basic features and many other desirable features that use these basic features.

- Features: Cells and grid, Data entry, Formulas, Sorting and Filtering, Graphs, and AutoFill.
- Non-functional aspects: Performance, scalability, usability.
- Domain: Spreadsheet application.

Suggested Process Model: Incremental Model

Reason: The Incremental model allows for the development of basic features first and then iteratively adds more desirable features. It's suitable for projects with a clear core set of functionalities and evolving requirements, as seen in the spreadsheet system case.

d) A web-based system for a new business where requirements are changing fast, and an in-house development team is available for all aspects of the project.

- Features: Web-based system, rapidly changing requirements.
- Non-functional aspects: Scalability, flexibility, adaptability.
- Domain: Web-based application for a new business.

Suggested Process Model: Spiral + Incremental Model

Reason: Since this a web-based for a new business, “Time to market” is important. The requirements are unclear and evolving and so new features may be added based on feedback and reaction of the customers. These capabilities are achievable through a Spiral model with many iterations to minimize the risk for a new business.

e) A Web-site for an online store with a long list of desired features that require frequent new releases.

- Features: Extensive online store features, frequent updates.
- Non-functional aspects: Performance, security, reliability.
- Domain: E-commerce.

Suggested Process Model: Prototyping and Incremental Model

Reason: For an e-commerce website, a good UI is very important and based on the feedback of the users, it may need to undergo changes. New features may be required in quick succession so characteristics of a Prototyping model are needed with an Incremental approach.

f) A system to control anti-lock braking in a car.

- Features: Anti-lock braking system functionalities, safety-critical aspects.
- Non-functional aspects: Safety, reliability, real-time responsiveness.
- Domain: Automotive control systems.

Suggested Process Model: Waterfall + Incremental Model

Reason: The waterfall model fixes the requirements early on after careful analysis. This will help in this scenario as detailed designing of the braking system should be done according to the safety standards before any implementation or production is

started. The Incremental model with adherence to relevant safety standards can also be suitable, as it allows for iterative development with safety considerations.

g) A virtual reality system to support software maintenance.

- Features: Virtual reality-based software maintenance tools, user interface for maintenance tasks.
- Non-functional aspects: Usability, efficiency, interactivity.
- Domain: Software maintenance.

Suggested Process Model: Agile Model

Reason: Agile models enable iterative development and user feedback, making them well-suited for projects that require frequent updates and improvements, such as a virtual reality system for software maintenance.

h) A university accounting system that replaces an existing system.

- Features: Accounting functionalities, data migration from the existing system.
- Non-functional aspects: Data integrity, scalability, integration with other university systems.
- Domain: Accounting and finance for universities.

Suggested Process Model: Incremental Model or Spiral Model

Reason: Both the Incremental and Spiral models can accommodate system replacement projects with existing functionalities. They allow for incremental improvements and feedback while considering data migration and integration with other systems.

i) An interactive system that allows railway passengers to find train times from terminals installed in stations.

- Features: Interactive interface, real-time train schedule, location-based services.
- Non-functional aspects: Performance, accuracy, real-time responsiveness.
- Domain: Railway passenger services.

Suggested Process Model: Iterative and Incremental Model

Reason: The iterative and incremental approach allows for regular updates to improve the interactive system based on user feedback and real-world usage. This ensures that the system evolves to meet the passengers' needs effectively.

j) Company has asked you to develop software for a missile guidance system that can identify a target accurately.

- Features: Missile guidance, target identification, precision.
- Non-functional aspects: Accuracy, reliability, safety.
- Domain: Defense and military.

Suggested Process Model: Waterfall + Incremental Model

Reason: A missile guidance system is a critical project with focus on safety, accuracy and strict deadlines and protocols. Adherence to safety standards is crucial to meet the stringent requirements of such a project. For the strict requirements, a waterfall model is the most appropriate and the incremental approach helps in testing and improvement.

k) When emergency changes have to be made to systems, the system software may have to be modified before changes to the requirements have been approved.

- Features: Emergency changes, quick modifications, maintenance.
- Non-functional aspects: Responsiveness, adaptability.
- Domain: System maintenance and updates.

Suggested Process Model: Agile Model

Reason: Agile models are well-suited for managing emergency changes and fast modifications. They enable rapid development, deployment, and adaptability, making them suitable for scenarios with quickly changing requirements.

l) Software for an ECG machine.

- Features: ECG measurement and analysis, real-time data processing.
- Non-functional aspects: Reliability, real-time responsiveness, accuracy.
- Domain: Medical devices, healthcare.

Suggested Process Model: Waterfall + Incremental Model

Reason: ECG machines are an important diagnosing tool so safety is a must and there must be no flaws in measurements. The design and analysis part of the process must be stressed upon. The incremental nature of the model will help in improving the accuracy of the ECG machines if new technological advancements are made during the process of development.

m) A small-scale, well-understood project with no changes in requirements once decided.

- Features: Clearly defined functionalities, stable requirements.
- Non-functional aspects: Efficiency, performance.
- Domain: Small-scale projects with well-defined scope.

Suggested Process Model: Waterfall Model

Reason: For small-scale projects with stable and well-understood requirements, the Waterfall Model can be suitable for its sequential and systematic approach.