Assignment 3 on 15th October 2025

Instructions

1. The assignment contains three sections: A, B and C. Answer all questions in all sections.
2. You are required to keep the previous groups you made for the previous assignment.
3. Also, only a group leader is required to submit to represent a group
4. Deadline is indicated in google e-learning where you will submit it. Any similarities, no matter how small, will be treated as collusion and penalized accordingly. Your work must be your own.
5. You should use the presentations provided and any relevant online material to aid your understanding as you prepare to answer the questions.
6. You may make (reasonable) use of ideas from third-party sources, provided these are cited as References within your answers and included in the Reference list at the end. Do not copy or closely paraphrase text. If any text is reproduced verbatim (i.e. if you quote a source – even the lecture slides), then this must be placed inside quotation marks "__". Make sure you follow these rules, otherwise your use of third-party sources and ideas may well be considered as plagiarism. Standard University policies apply to this and you can check them online for more guidance.
7. You are not required to provide/include any code. This is not a programming assignment.
8. See also the instructions above entitled 'Submission method & guidelines', and below.
9. The marking criteria for each question is provided in each question below.

Important:

1. Avoid plagiarism.
2. Word-limit depends on individual.
3. Include source (Reference)
4. Deadline (indicated in the submission platform)

Section A

Subsection 1

You have been hired as a software analyst by Nyabihu solution ltd, an educational technology startup, to develop a new Learning Management System (LMS) that will be used by schools to manage courses, students, and teachers. The system is expected to be web-based and mobile-accessible, with features including course enrollment, grade tracking, assignment submission, and communication between teachers and students. Nyabihu solution ltd has provided the following initial information:

- Students and teachers need to access the system via web browsers and mobile devices.
- Teachers must be able to create courses, upload assignments, and record grades.

- Students should be able to register for courses, submit assignments, and check their grades.
- The system must handle up to 10,000 simultaneous users without performance degradation.
- Security is critical: only authorized users should access sensitive student data.
- The interface should be intuitive and responsive on different devices.
- The company plans to integrate the LMS with an existing payment gateway for course fees.

Based on this scenario, answer the following questions:

Questions1

a. Identify at least five functional requirements for the LMS and justify why each is considered functional.
b. Identify at least five non-functional requirements and explain how each contributes to the system's quality attributes.

Questions2

a. Define user requirements in the context of this LMS.
b. Describe at least three user requirements for students and three for teachers, ensuring they reflect the actual needs of the system users.

Questions3

a. Define system requirements and explain the difference between system and user requirements.
b. Translate two of the user requirements from question 2 into precise system requirements.

Questions4

a. Explain the purpose of interface specifications in software development.
b. Describe the key interface specifications for:
    i. Student dashboard
    ii. Teacher course management page
    iii. Mobile app login interface

Questions5

a) Define the purpose of an SRS and explain why it is crucial for this LMS project.
b) Outline the major sections that should be included in the SRS for EduLearn LMS.
c) Suggest two ways in which the SRS can improve communication between developers, testers, and stakeholders.

Questions6

a) Based on the scenario, propose a requirement prioritization strategy and justify your choices.
b) Identify one requirement that could be challenging to implement and explain why.

Questions7

The system must handle 10,000 simultaneous users without performance degradation.

a) Discuss at least two techniques that could be applied to ensure this non-functional requirement is met.
b) How would you test this requirement during the software development lifecycle?

Subsection 2

Goshen Microfinance ltd plans to launch a mobile banking app that allows customers to transfer money, view statements, pay bills, and manage their accounts. The app must support Android and iOS, respond within 2 seconds for transactions, and handle 10,000 concurrent users. Security is paramount to prevent fraud and unauthorized access.

a. Draft both user requirements system requirements by identifying functional requirements and non-functional requirements for this application.
b. Select an appropriate software process model for this project and justify your choice.
c. Draft a sample interface specification for the funds transfer module. Explain how these requirements will be documented in the SRD.

Section B

Subsection 1

Neteka Tech is a mid-sized software company recently contracted by a national university to develop a University Information Management System (UIMS). The system will manage student registration, course allocation, grading, staff management, and financial transactions. The client emphasized the need for reliability, data security, and ease of use. The development team includes project managers, software engineers, requirement analysts, and testers.

The company intends to adopt a hybrid Agile-Waterfall model to balance flexibility and documentation. The client requested that the first prototype be delivered within four months, and the complete deployment should be ready within nine months.

However, several challenges emerged:

- The requirements from different departments were inconsistent.
- The finance team wanted online payment integration, while the academic team demanded complex grading logic.
- Midway through development, the client requested integration with a new government education database.
- Some stakeholders had limited technical knowledge, complicating the elicitation process.

Question 1

Based on the scenario, explain why TechNova Solutions chose a hybrid Agile-Waterfall model instead of a purely traditional or purely Agile model. Discuss how this decision affects project control, customer satisfaction, and adaptability to changes.

Question 2

Identify and describe five key stages of the Software Development Life Cycle (SDLC) that are most relevant for this project. Explain how each stage contributes to successful system delivery.

Question 3

During the requirements phase, conflicting requirements emerged between the finance and academic departments.

a) Propose a requirements conflict resolution strategy suitable for this case.
b) Discuss the role of the requirement analyst in managing such conflicts.

Question 4

The client requested integration with a new government education database after development had started.

Explain how management change should be implemented to handle this new requirement without compromising the project schedule and budget.

Question 5

Suppose TechNova conducted a feasibility study before starting the project.

List and briefly discuss the four main types of feasibility analyses they should perform and how the findings could influence project approval.

Question 6

During elicitation, some stakeholders lacked technical knowledge and struggled to express their requirements clearly.

a) Identify three effective elicitation techniques that can be used in this situation.
b) Discuss the advantages and limitations of each technique.

Question 7

Prepare a Software Requirement Specification (SRS) outline for one functional area of the system (e.g., student registration). Include at least five sections and explain the purpose of each.

Question 8

As a system engineer, you are responsible for ensuring requirement quality. Discuss five characteristics of well-defined software requirements and how poor-quality requirements can affect the development process.

Question 9

The project manager wants to evaluate team performance and development progress.

a) Suggest three key performance indicators (KPIs) that could be used for monitoring software process effectiveness.
b) Explain how each KPI supports continuous improvement.

Question 10

After deployment, the university requested a post-implementation review.

Explain what a post-implementation review involves, its main objectives, and how its results can guide future software process improvements for TechNova Solutions.

Subsection 2

La Croix Du Sud (Kwa NYIRINKWAYA) as a private hospital requires a real-time patient monitoring system to track vitals and alert medical staff during emergencies. The software must be highly reliable, fault-tolerant, and integrate with existing hospital systems.

a. Considering the criticality and reliability requirements, which software process model is most suitable? Explain why.

b. Define how verification and validation will be applied differently for this system compared to a regular commercial application.
c. The hospital has requested a feature that was not in the initial requirement. Explain how incremental or iterative models would handle this change.

Section C

Question 1

A university's IT department has initiated a project to develop a mobile application that allows students to register for courses, check class schedules, and view exam timetables. The project team has decided to adopt the Agile Scrum framework to deliver the product incrementally.

The Scrum team consists of:

- Product Owner: The Head of IT Services.
- Scrum Master: A senior software engineer with Scrum certification.
- Development Team: Six developers and one tester.

The Product Owner has defined the following user stories:

1. As a student, I want to log in using my university credentials.
2. As a student, I want to add or drop courses within the registration period.
3. As a student, I want to receive notifications when registration deadlines are approaching.
4. As an administrator, I want to generate a report of registered students per course.

During the Sprint Planning Meeting, the team estimates that the total project may require five sprints, each lasting two weeks. However, during the second sprint, two developers fall sick, causing delays.

Questions2

a) Explain how the Scrum Master can handle the reduction in team capacity during Sprint 2 while ensuring progress is maintained.
b) Identify the Scrum events that will help the team reflect and improve their performance after Sprint 2. Explain their purpose.
c) The Product Owner insists on adding a new user story during an ongoing sprint. Describe the correct Scrum response to this situation and justify your reasoning.
d) Suggest two Agile principles that are reflected in this project scenario and explain how they are applied.

Questions3

An e-commerce company, ShopSmart, is experiencing frequent delays in feature delivery and poor communication among its development team. To improve customer satisfaction, management decides to shift from a Waterfall model to an Agile Scrum approach.

The company has now formed cross-functional Scrum teams, each responsible for delivering specific product features such as payment systems, recommendation algorithms, and order tracking.

During the first few sprints, the teams struggle with unclear requirements, unfinished tasks, and conflicts over sprint priorities. The Product Owner also finds it challenging to maintain a properly refined product backlog.

a) Identify and discuss three main challenges ShopSmart is facing in adopting Agile Scrum, and propose one practical solution for each.

b) Explain the importance of the Product Backlog Refinement session and describe how it can help the team avoid issues of unclear requirements. *(3*

c) The development team often fails to complete all committed stories by the end of each sprint. What steps can the Scrum Master take to improve sprint predictability?

d) Suggest how Daily Scrum meetings could enhance collaboration and accountability in this team.

Question 4

The AUCA plans to develop an online registration system for its students. The system must allow students to register for courses, pay fees online, and track their academic progress. Faculty members should be able to update course information, approve registrations, and generate reports. The administration requires a dashboard to monitor registration statistics and fee collection.

a. Identify functional and non-functional requirements for the system. Justify your classification.
b. Develop a use case diagram for the main actors in the system.
c. Explain which software process model would be most suitable for this project and why.
d. Draft a sample interface specification for the course registration page.
e. Outline the main components of the software requirements document (SRD) for this project.

Question 5

A software engineering team is developing a banking loan management system using the Agile Scrum framework. After three sprints, the Product Owner notices that although progress is being made, there are still misalignments between what the client expects and what the team delivers.

At the end of the third sprint, a Sprint Review is conducted where stakeholders provide feedback on new features. The following issues are raised:

- Some features do not meet the acceptance criteria.
- The development team is not testing features thoroughly.
- Communication gaps exist between developers and testers.

The Scrum Master plans a Sprint Retrospective to address these problems.

a) Explain the difference between a Sprint Review and a Sprint Retrospective in this context.
b) Propose three key discussion points that should be addressed during the Sprint Retrospective meeting to improve future sprints.
c) Describe how continuous feedback during sprints could help align the delivered features with client expectations.

Question 6

Nyereka Tech as one of startup operating in Rwanda is creating embedded software for smart thermostats that communicate with a mobile app. The software must be energy-efficient, secure, and compatible with multiple Internet of Things (IoT) devices.

a. Identify the challenges in using a traditional software process model versus an iterative or agile model for embedded systems.
b. Suggest a hybrid software process model and justify your selection.
c. Describe how requirements elicitation would work when both hardware and software constraints exist.

All the best