**CAPSTONE PROJECT 1- ONLINE AGRICULTURAL PRODUCTS STORE**

Mr. Henry, after being successful as a businessman and has become one of the wealthiest persons in the city. Now, Mr. Henry wants to help others to fulfil their dreams. One day, Mr. Henry went to meet his childhood friends Peter, Kevin and Ben. They live in a remote village and do farming. Mr. Henry asked his friends if they are facing any difficulties in their day-to-day work.

Peter told Mr. Henry that he is facing difficulties in procuring fertilizers which are very important for farm. Kevin said that he is also facing the same problem in-case of buying seeds for farming certain crops. Ben raised his concern on lack of pesticides which could help in greatly reducing pests in crops.

After listening to all his friends’ problems, Mr. Henry thought that this is a crucial problem faced not only by his friends but also by so many other farmers. So, Mr. Henry decided to make an online agriculture product store to facilitate remote area farmers to buy agriculture products. Through this Online Web / mobile Application, Farmers and Companies (Fertilizers, seeds and pesticides manufacturing Companies) can communicate directly with each other.

The main purpose to build this online store is to facilitate farmers to buy seeds, pesticides, and fertilizers from anywhere through internet connectivity. Since new users are involved, Application should be user friendly.

This new application should be able to accept the product (fertilizers, seeds, pesticides) details from the manufacturers and should be able to display them to the Farmers. Farmers will browse through these products and select the products what they need and request to buy them and deliver them to farmers location.

Mr. Henry has given this project through his Company SOONY. In SOONY Company, Mr Pandu is Financial Head and Mr Dooku is Project Coordinator. Mr. Henry, Mr Pandu, and Mr Dooku formed one Committee and gave this project to APT IT SOLUTIONS company for Budget 2 Crores INR and 19 months Duration under CSR initiative. Peter, Kevin and Ben are helping the Committee and can be considered as Stakeholders share requirements for the Project.

Mr Karthik is the Delivery Head in APT IT SOLUTIONS company and he reached out to Mr Henry through his connects and bagged this project. APT IT SOLUTIONS company have Talent pool available for this Project. Mr Vandanam is project Manager, Ms. Juhi is Senior Java Developer, Mr. Teyson, Ms Lucie, Mr Tucker, Mr Bravo are Java Developers. Network Admin is Mr Mike and DB Admin is John. Mr Jason and Ms Alekya are the Tester. And you joined this team as a BA.

**Question 1:** BPM- Identify business process model for Online Agricultural Store – (Goals, Inputs, Resources, Output, Activities, Value created to the end customer) **5 marks**

**Answer:** Business Process Model for Online Agricultural Products Store

1. GOALS:
* Bridge the gap between farmers and manufacturing companies by creating a user- friendly digital platform.
* Facilitate remote farmers in procuring agricultural products like fertilizers, seeds, and pesticides online.
* Improve farming efficiency and reduce challenges such as pest control and crop productivity.
1. INPUTS:
* Farmers requirements for these products.
* Information on agricultural products like fertilizers, seeds, pesticides from the manufacturer.
* Budget allocated by SOONY Company under the CSR initiative.
* Technical expertise provided by APT IT SOLUTIONS.
* Feedback from stakeholders including Kevin, Peter and Ben.
1. RESOURCES:
* Technical team: JAVA developers (Ms. Juhi, Mr. Teyson, Ms. Lucie, Mr. Tucker, Mr. Bravo), Network Admin (Mr. Mike), Database Admin (Mr. John) and Testers (Mr. Jason, Ms. Alekya).
* Project Management: Mr. Vandanam as Project Manager and Mr. Dooku as Project Coordinator.
* Stakeholders: Farmers and agricultural product manufacturers.
* Technology: Online web/mobile application platform.
1. OUTPUT:
* A web/online application that allows farmers to:
* Browse products (fertilizers, seeds, pesticides)
* Place orders based on their requirements.
* Receive product delivery details on the application and delivery at their location.
* Reduced farming inefficiencies and increased productivity.
* A web/online application that allows manufacturers to:
* List products that are available (fertilizers, seeds, pesticides)
* Receive orders from the farmers based on their requirement.
* Mark “sold out” for the products that are not in stock.
* Send orders as per requirement to the farmers.
1. ACTIVITIES:
* Requirement gathering from stakeholders (farmers, manufacturers, committee members).
* Application development and testing by the technical team.
* Integration of product catalogs and payment/delivery systems.
* Training and support for farmers and manufacturers to use the platform.
* Launch and deployment of the platform for farmers and manufacturers accessibility.
1. Value created for End Customer:
* Easy access to quality agricultural products without travelling to cities or far.
* Reduced time and effort in procuring essential farming inputs.
* Improved farming outputs due to timely availability of required resources.
* Strengthened communication between farmers and manufacturers.

 **Question 2:** SWOT- Mr Karthik is doing SWOT analysis before he accepts this project. What aspects he should consider as Strengths, as Weaknesses, as Opportunity and as Threats. **5 marks**

**Answer:** SWOT analysis provides a roadmap to mitigate risks, leverage strengths and capitalize on opportunities to ensure project’s success.

1. STRENGTHS:
* **Expert team:** APT IT solutions have a highly skill talent pool including experienced Java developers, Network Admins and Testers.
* **Clear Goals and Budget:** The project has a defined budget and clear objective which ensures proper resource allocation.
* **Support form stakeholders:** Stakeholders like Peter, Ben and Kevin provide valuable insights, enhancing the platform’s relevance to farmer’s needs.
* **Corporate Social Responsibility (CSR) Initiative**: The project aligns with SOONY Company’s CSR goals, ensuring strong organizational backing.
1. WEAKNESSES:
* **Complexity of Farmer’s Needs:** Farmers in remote areas might have limited technical knowledge, requiring extensive training and a highly user-friendly application.
* **Dependence on Manufacturers:** The platform’s success relies on the participation of product manufacturers and their willingness to supply timely information.
* **Technical challenges:** Developing and maintaining a robust online application for rural areas may face issues like poor internet connectivity and integration problems.
1. OPPORTUNITIES:
* **Market Expansion:** The project can pioneer online agricultural platforms in rural areas, opening doors for similar initiatives in other regions.
* **Empowering Farmers:** By solving critical problems in agriculture, the platform can significantly enhance farmer’s livelihoods.
* **Scalability:** After success in the pilot region, the platform can expand to include other products and services, such as farm equipment or advisory services.
* **Government Support:** Ther could be potential collaboration with government initiatives aimed at rural development and digital transformation.
1. THREATS:
* **Adoption Resistance:** Farmers may resist adopting new technology due to unfamiliarity or skepticism.
* **Operational Challenges:** Ensuring timely delivery of products to remote locations may pose logistical difficulties.
* **Competition:** Emerging competitors or existing platforms offering similar services could impact the adoption rate.
* **Economic Fluctuations:** Market uncertainties like inflation or pricing instability in agricultural products might affect project outcomes.

**Question 3:** Feasibility Study- Mr Karthik is trying to do feasibility study on doing this project in Technology (Java). Please help him with points (HW SW Trained Resources Budget Time frame) to consider in feasibility Study. **5 marks**

**Answer:** Key points to consider for feasibility study for the online agricultural product store:

1. Hardware (HW) Requirements:
* Server Infrastructure: A reliable and scalable server to host the application and manage user traffic.
* Storage: Cloud-based or physical storage to store product details, farmer data, and transaction records.
* Networking Equipment: Devices for stable and secure internet connectivity, especially to ensure platform reliability for remote access.
* User Devices: Farmers and manufacturers will need smartphones, tablets, or PCs with internet connectivity.
1. Software (SW) Requirements:
* Programming Languages: Primarily Java for backend development.
* Frameworks and Tools: Spring Boot for developing the application, Hibernate for database handling.
* Database Management: SQL or NoSQL databases for storing data securely and efficiently.
* Web and Mobile Frameworks: React or Angular for the web interface; Android/iOS development tools for mobile app creation.
* Security Software: Tools for encryption, authentication, and data privacy compliance.
1. Trained Resources:
* Java Developers: Proficient in backend development using Java and frameworks like Spring Boot.
* UI/UX Designers: To create a user-friendly interface that caters to farmers with minimal technical knowledge.
* Network Administrators: To ensure smooth operation of servers and networks.
* Testers: For testing functionality, usability, and security.
* Support Team: To assist farmers and manufacturers with onboarding and troubleshooting.
1. Budget:
* Allocated Budget: 2 Crores INR (as mentioned in the document).
* Allocation:
1. Development and Testing: ~60% of the budget for hiring and technology costs.
2. Hardware and Hosting: ~25% for servers, cloud services, and networking equipment.
3. Training and Support: ~10% for educating farmers and stakeholders.
4. Contingency: ~5% for unforeseen expenses.
5. Time Frame:
* Project duration: 19 months
* Phases:
1. Requirement Gathering and Planning: 2 months.
2. Design and Development: 9 months.
3. Testing and Quality Assurance: 3 months.
4. Deployment and Training: 3 months.
5. Post-deployment Support and Maintenance: 2 months.
6. Feasibility Assessment:
* Technical Feasibility: With trained resources and a robust Java-based technology stack, the development is feasible.
* Operational Feasibility: Involves addressing farmers’ technical limitations through training and support.
* Economic Feasibility: The allocated budget appears sufficient for development, training, and implementation.
* Schedule Feasibility: The proposed 19-month timeline is adequate if managed efficiently.

**Question 4:** GAP Analysis: Mr Karthik must submit Gap Analysis to Mr Henry to convince to initiate this project. What points (compare AS-IS existing process with TO-BE future Process) to showcase in the GAP Analysis. **5 marks**

**Answer:** Key points to showcase in the GAP Analysis are:

1. Current State (AS-IS Process):
* Farmers face issues procuring fertilizers, seeds, and pesticides due to lack of direct access to manufacturers.
* Products are either unavailable in remote areas or are delayed due to intermediaries.
* Difficulty in ensuring timely delivery to farmers’ locations.
* Lack of a central system for communication between farmers and companies.
1. Desired Future State (TO-BE Process):
* Implementation of an online platform (web/mobile application) where:
1. Farmers can directly buy agricultural products from companies.
2. Manufacturers can list their products and provide details.
3. Products can be delivered efficiently to farmers’ locations.
* Seamless communication between farmers and companies.
* Enhanced supply chain efficiency with real-time tracking and inventory updates.
1. Identified Gaps:
* Technology Gap: Absence of an online platform connecting farmers and companies.
* Awareness Gap: Farmers are unaware of available solutions and products.
* Logistical Gap: Inefficient distribution mechanisms for remote areas.
* Stakeholder Communication Gap: Lack of a direct link between farmers and companies.
1. Proposed Solution:
* Development of a user-friendly web/mobile application.
* Features:
1. Product listing and search functionality.
2. Secure payment gateway.
3. Order tracking and delivery scheduling.
4. Multilingual support for ease of use by farmers.
* Integration with logistics partners for timely delivery.
1. Benefits:
* Improved access to essential agricultural products for farmers.
* Cost savings by eliminating intermediaries.
* Increased transparency and efficiency in the supply chain.
* Better communication and collaboration among stakeholders.
1. Implementation Roadmap:
* Phase 1: Requirements gathering and stakeholder consultations.
* Phase 2: Platform design and development.
* Phase 3: Testing and quality assurance.
* Phase 4: Pilot launch in select regions.
* Phase 5: Full-scale implementation and feedback integration.
1. Budget and Timeline:
* Budget: INR 2 Crores under CSR initiative.
* Timeline: 19 months for full project delivery.

With the GAP analysis, Mr. Karthik also needs to use visual aids like flowcharts and tables to clearly illustrate the AS-IS and TO-BE processes, highlight the impact of the solution on the target users (farmers) and stakeholders and then present the report to Mr. Henry for approval and project initiation.

**Question 5:** Risk Analysis: List down different risk factors that may be involved (BA Risks And process/Project Risks) **10 marks**

**Answer:** The various risk factors that may be involved in BA are:

1. Business Analysis Risk:
* Inadequate Requirement Gathering:
* Miscommunication between stakeholders (farmers, manufacturers, and project team) may lead to incomplete or unclear requirements.
* Farmers may not be able to articulate their needs effectively due to lack of technical understanding.
* Stakeholder Conflicts:
* Differing priorities or interests between farmers, manufacturing companies, and project sponsors can cause delays in decision-making.
* Changing Requirements:
* Mid-project changes in requirements may disrupt the development timeline.
* Lack of Domain Knowledge:
* The Business Analyst or team may lack sufficient understanding of agricultural processes, leading to gaps in solution design.
1. Project Risks:
* Technical Risks:
* Challenges in developing a user-friendly application that can work in remote areas with low internet connectivity.
* Integration issues with third-party systems (e.g., logistics partners, payment gateways).
* Resource Risks:
* Unavailability of skilled resources during critical phases of the project.
* Over-reliance on key team members like developers, testers, or project leads.
* Timeline and Budget Risks:
* The project may exceed the planned budget of INR 2 Crores or the timeline of 19 months.
* Delays in approval or resource allocation can extend the schedule.
* Operational Risks:
* Logistics and delivery challenges in reaching remote areas.
* Potential disruptions in the supply chain for fertilizers, seeds, and pesticides.
* User Adoption Risks:
* Farmers may struggle with using the new platform due to lack of technical expertise.
* Resistance from traditional intermediaries who might feel threatened by the new model.
* Data Security Risks:
* Breach of sensitive data, such as farmers' personal and payment information, could harm user trust.
* Risks associated with system downtime or data loss.
* Regulatory Risks:
* Non-compliance with government regulations or CSR initiative guidelines may hinder project execution.

**Question 6:** Stakeholder Analysis (RACI matrix): Perform stakeholder analysis (RACI Matrix) to find out the key stakeholders who can take Decisions and Who are the influencers.  **8 marks**

**Answer:** The RACI matrix is a tool used to identify roles and responsibilities of stakeholders involved in a project. Here's the RACI analysis for the given scenario:

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| **Stakeholder** | **Role** | **RACI** |
| Mr. Henry | Project Sponsor | R: Provides funding and vision for the project. Approves decisions and final deliverables. |
| Mr. Pandu | Financial Head | A: Accountable for ensuring the project stays within budget |
| Mr. Dooku | Project Coordinator | R: Responsible for coordinating the project activities and reporting progress. |
| Mr. KevinMr. PeterMr. Ben | Stakeholders (Farmer’s Representative) | C: Consulted to share farmer’s requirements and validate that the solution meets their needs. |
| Mr. Karthik | Delivery Head (APT IT Solutions) | A/R: Accountable for delivery and Responsible for ensuring execution through his team. |
| Mr. Vandanam | Project Manager | R: Responsible for planning, executing and monitoring the project progress. |
| Ms. Juhi | Senior Java Developer | R: Responsible for developing critical application features. |
| Mr. Teyson,Ms. Lucie,Mr. Tucker,Mr. Bravo | Network Admin | R: Responsible for writing and testing code for the platform. |
| Mr. Mike | Network Admin | R: Ensures the system’s connectivity and performance are optimal. |
| Mr. John | Database Admin | R: Responsible for managing and securing the project database. |
| Ms. AlekyaMr. Jason | Tester | R: Tests the application for functionality, usability and bug fixes. |
| Farmers | End Users | C: Consulted to provide feedback and validate that the platform meets their expectations. |
| Government Agencies | Regulators | I: Informed about project progress to ensure compliance with regulations. |

Key Roles:

1. Decision makers:
* Mr. Henry (Sponsor): Final approval for project milestones.
* Mr. Pandu (Financial Head): Budget-related decisions.
1. Influencers:
* Peter, Kevin, Ben (Farmers' Representatives): Influence requirements and usability of the platform.
* Mr. Dooku (Project Coordinator): Ensures team alignment and influences execution.

**Question 7:** Business Case Document: Help Mr Karthik to prepare a business case document. **8 marks**

**Answer:** Business case document outline for Mr. Karthik is as follows:

1. Executive Summary:
* This business case presents a detailed proposal to develop an Online Agriculture Product Store, initiated by Mr. Henry under the CSR initiative of SOONY Company, to support farmers in remote areas. The platform aims to enable farmers to procure fertilizers, seeds, and pesticides directly from manufacturers through a user-friendly web or mobile application.
* This initiative addresses critical challenges faced by farmers, including limited access to agricultural supplies, and aligns with the goal of empowering rural communities while creating a sustainable platform for the agriculture industry.
1. Objectives:
* Provide a digital platform to bridge the gap between farmers and manufacturers.
* Enable easy access to fertilizers, seeds, and pesticides for farmers in remote locations.
* Foster direct communication and transactions between manufacturers and farmers.
* Ensure user-friendly design for ease of use by first-time users, especially farmers.
* Deliver the project within the allocated budget of INR 2 Crores and within 19 months.
1. Background and Problem Statement
* Farmers, especially those in remote areas, face challenges in accessing agricultural products like fertilizers, seeds, and pesticides. Limited transportation, lack of local availability, and high costs exacerbate their struggles, affecting productivity and income.
* Through discussions with stakeholders (Peter, Kevin, Ben), it was identified that:
* Peter: Struggles to procure fertilizers.
* Kevin: Faces issues buying seeds for specific crops.
* Ben: Suffers from the unavailability of effective pesticides.

This issue is widespread among farmers and requires a scalable and sustainable solution.

1. Proposed Solution
* Develop a user-friendly Online Agriculture Product Store to connect manufacturers with farmers directly.
* Key features:
* Product Listings: Fertilizers, seeds, and pesticides with detailed descriptions.
* Farmer Portal: Browsing, ordering, and payment system.
* Manufacturer Portal: Add and manage product listings.
* Delivery Integration: Ensure seamless logistics to farmer locations.
* Multilingual Interface: For ease of use by diverse farmer populations.
* Mobile and Web Compatibility: Broader accessibility.
1. Project Stakeholders
* Initiator: Mr. Henry (CSR lead).
* Committee Members: Mr. Henry, Mr. Pandu (Financial Head), Mr. Doku (Project Coordinator).
* Farmers/Stakeholders: Peter, Kevin, Ben.
* Delivery Team (APT IT Solutions)
* Delivery Head: Mr. Karthik.
* Project Manager: Mr. Vandanam.
* Development Team: Ms. Juhi (Senior Java Developer), Mr. Teyson, Ms. Lucy, Ms. Tucker, Mr. Bravo (Java Developers).
* Network Admin: Mr. Mike.
* Database Admin: Mr. John.
* Testing Team: Mr. Jason, Ms. Alekhya.
* Business Analyst: ME
1. Financial Overview
* Budget: INR 2 Crores.
* Funding Source: SUNY CSR initiative.
1. Project Timeline
* Duration: 19 months.
* Key Milestones:
* Month 1-3: Requirement gathering, stakeholder interviews, and project planning.
* Month 4-6: UI/UX design and system architecture.
* Month 7-12: Development of core functionalities.
* Month 13-15: Testing and quality assurance.
* Month 16-19: Deployment and user training.
1. Risks and Mitigation

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| **Risk** | **Impact** | **Mitigation** |
| Low adoption rate by farmers | High | Conduct awareness campaigns, provide trainings. |
| Technical challenges in remote areas | Medium | Optimize for low bandwidth, provide offline modes. |
| Delays in development | Medium | Regular monitoring, Agile methodologies. |
| Budget overrun | Medium | Strict financial tracking and contingency funds. |

1. Benefits
* Direct Benefits:
* Improved access to agricultural products for farmers.
* Enhanced productivity and income for farmers.
* Indirect Benefits:
* Strengthened rural economies.
* Better communication between manufacturers and consumers.
1. Conclusion and Approval
* The Online Agriculture Product Store project addresses an essential need in the agricultural sector. It aligns with the CSR goals of SUNY Company and has the potential to make a significant social and economic impact.
* Approval is sought for the proposed project plan, timeline, and budget allocation.
* The document can be adapted and expanded based on stakeholder feedback or organizational requirements.

**Question 8:** Four SDLC Methodologies: The Committee of Mr. Henry, Mr Pandu, and Mr Dooku and Mr Karthik are having a discussion on Project Development Approach. Mr Karthik explained to Mr. Henry about SDLC. And four methodologies like Sequential Iterative Evolutionary and Agile. Please share your thoughts and clarity on Methodologies. **8 marks**

**Answer:** The overview of the four SDLC methodologies are as follows:

1. **Sequential Methodology (Waterfall Model)**
* Definition: This is a linear approach where the project development flows through predefined phases like requirements gathering, design, development, testing, deployment, and maintenance.
* Key Features:
* Each phase is completed before moving to the next.
* No overlapping or going back to a previous phase.
* Advantages:
* Well-suited for projects with clear, fixed requirements.
* Easy to manage and track progress.
* Disadvantages:
* Rigid; changes in requirements are hard to incorporate.
* Not ideal for projects with evolving needs.
* Best For:
* Simple, small projects where requirements are well understood upfront.
1. **Iterative Methodology**
* Definition: This approach builds the project in small, repeatable cycles (iterations), gradually adding more features and functionality in each cycle.
* Key Features:
* Feedback from each iteration helps refine the next one.
* Focus on incremental improvements.
* Advantages:
* Allows for flexibility and incorporates changes easily.
* Early delivery of functional components for review.
* Disadvantages:
* Requires more planning and resources to manage iterations.
* Risk of losing focus without clear objectives.
* Best For:
* Projects with a long timeline and uncertain or evolving requirements.
1. **Evolutionary Methodology**
* Definition: A hybrid of iterative and incremental approaches where the project evolves over time based on continuous feedback and incremental deliveries.
* Key Features:
* Emphasizes adaptability and incorporates feedback quickly.
* Continuous refinement of the system as requirements evolves.
* Advantages:
* High customer involvement ensures the product meets expectations.
* Reduces risk by delivering working versions frequently.
* Disadvantages:
* May lead to scope creep if changes are not managed well.
* High customer engagement required throughout.
* Best For:
* Complex projects where requirements are expected to change frequently.
1. **Agile Methodology**
* Definition: A flexible, team-oriented approach that focuses on delivering small, usable increments of the product frequently, based on customer feedback.
* Key Features:
* Divides the project into sprints (time-boxed iterations).
* Collaborative and adaptive to changing requirements.
* Advantages:
* Highly flexible and customer-centric.
* Promotes continuous improvement and faster delivery.
* Disadvantages:
* Requires active involvement of all stakeholders.
* Can be challenging for teams unfamiliar with agile practices.
* Best For:
* Dynamic projects with rapidly changing requirements or high customer interaction.

As far as my opinion, given the nature of the project, the Agile Methodology is highly recommended:

* The project involves diverse stakeholders (farmers, manufacturers, and SUNY committee members) whose requirements may evolve during development.
* User-friendliness and regular feedback are critical to success.
* Agile allows incremental deliveries, ensuring the app can be tested and refined continuously based on real-world feedback from stakeholders.

However, if the requirements are relatively stable and well-defined from the start, the Iterative or Evolutionary Methodologies could also be effective.

**Question 9:** Waterfall RUP Spiral and Scrum Models: They discussed models in SDLC like waterfall RUP Spiral and Scrum. You put forth your understanding on these models When the APT IT SOLUTIONS company got the project to make this online agriculture product store, there is a difference of opinion between a couple of SMEs and the project team regarding which methodology would be more suitable for this project. SMEs are stressing on using the V-model and the project team is leaning more onto the side of waterfall model. As a business analyst, which methodology do you think would be better for this project? **8 marks**

**Answer:** To address the differences of opinion between the SMEs and the project team, let’s first understand the SDLC models (Waterfall, RUP, Spiral, Scrum, and V-model) and evaluate their suitability for this project.

1. **Waterfall Model:**
* Definition: A sequential and linear approach where each phase (e.g., requirements, design, development, testing, deployment) must be completed before moving to the next.
* Advantages:
* Works well for projects with clear, fixed requirements.
* Easy to manage and understand.
* Suitable for smaller or simpler projects.
* Disadvantages:
* Inflexible to changes once a phase is completed.
* Late discovery of issues during testing phase.
1. **RUP (Rational Unified Process):**
* Definition: A framework that combines iterative and incremental approaches, emphasizing the progressive elaboration of requirements and solutions.
* Advantages:
* Focuses on risk mitigation and adaptability.
* Iterative nature allows incremental deliveries.
* Heavy documentation helps in traceability.
* Disadvantages:
* Can be complex to implement and manage.
* Resource-intensive.
1. **Spiral Model:**
* Definition: A risk-driven model that combines iterative and waterfall approaches, focusing on repeated cycles (spirals) of planning, risk analysis, and development.
* Advantages:
* Ideal for large, complex projects.
* Emphasizes risk identification and mitigation.
* Allows flexibility and evolving requirements.
* Disadvantages:
* High cost and time investment.
* Not suitable for small projects.
1. **Scrum (Agile Framework):**
* Definition: An agile framework emphasizing collaboration, adaptability, and iterative development through time-boxed sprints.
* Advantages:
* Highly flexible to changing requirements.
* Frequent delivery of functional increments.
* High stakeholder engagement and visibility.
* Disadvantages:
* Requires active stakeholder involvement.
* Needs team members experienced with Agile principles.
1. **V-Model (Verification and Validation Model):**
* Definition: A variant of the Waterfall model where every development phase is paired with a corresponding testing phase, ensuring early defect detection.
* Advantages:
* Testing starts early, reducing bugs in later stages.
* Works well for projects with clear requirements.
* Strong focus on quality.
* Disadvantages:
* Rigid and less flexible to changes.
* Testing can be resource-intensive.

Analysis of sustainability for the project:

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| **V Model** | **Waterfall Model** |
| The SMEs emphasize the V-model likely because of its strong focus on quality and early defect detection, which can help build a robust system. | The project team favors the Waterfall model, likely for its simplicity and straightforward structure. |
| This project involves new users (farmers), whose feedback might influence evolving requirements, making the V-model less adaptable. | The rigid sequential nature of Waterfall doesn’t align well with the evolving needs of farmers and manufacturers, who may require iterative feedback and changes. |

So, according to me, V-model should be used.

**Question 10:** Waterfall Vs V-Model: Write down the differences between waterfall model and V model. **5 marks**

**Answer:** The key differences between the Waterfall Model and the V-Model are as follows:

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| **Waterfall Model** | **V- Model** |
| It is a linear sequential model where each phase depends on the deliverables of the previous phase. | It is an extension of the Waterfall model with a corresponding testing phase for each development phase. |
| Sequential flow: Requirements → Design → Implementation → Testing → Deployment → Maintenance. | V-shaped: Development and testing phases are planned in parallel and aligned. |
| Testing is performed after the development phase is completed. | Testing activities begin alongside the development phase, ensuring early detection of defects. |
| Feedback is obtained only after the testing phase. | Continuous feedback loop between development and testing phases. |
| Errors are detected late in the lifecycle, increasing the cost of fixing them. | Errors are detected early as testing activities run parallel to development. |
| These are suitable for small projects with well-defined and static requirements. | These are suitable for projects where high-quality standards are critical, and requirements are stable. |
| It is less flexible and changes are difficult to implement once a phase is complete. | It is more flexible than Waterfall as issues can be resolved in their corresponding phase. |
| It has higher risk of project failure if errors or changes arise later in the lifecycle. | The risk is lower since defects are addressed in earlier stages. |
| It focuses heavily on documentation for each phase. | It emphasizes on documentation, especially for testing at each stage. |
| It takes longer time to market as testing starts only after development is complete. | It has potentially faster time to market due to simultaneous testing and development activities. |

**Question 11:** Justify your choice: As a BA, state your reason for choosing one model for this project **3 marks**

**Answer:** As a Business Analyst (BA) for this project, my choice of model is the **Agile Methodology**, particularly the **Scrum Framework**, for the following reasons:

* Flexibility to Adapt to Changing Requirements: This project aims to build an online agriculture product store that is user-friendly and involves multiple stakeholders such as farmers, manufacturers, and internal committee members. Stakeholders like Peter, Kevin, and Ben may provide evolving or additional requirements during the development process. Agile’s iterative nature allows for incorporating these changes seamlessly without significant delays.
* Incremental Delivery for Faster Feedback: By delivering the application in small increments (such as a Minimum Viable Product or specific features like product listing, cart functionality, and payment integration), stakeholders can provide early feedback. This ensures the application aligns with their needs and reduces the risk of major rework later.
* Enhanced Collaboration Among Teams: The project involves multiple teams: development (Java developers), testing (Testers), database management (DB Admins), and network administration. The Scrum framework promotes cross-functional collaboration through daily standups, sprint reviews, and retrospectives, ensuring all team members are aligned.
* Stakeholder Involvement: Stakeholders such as Peter, Kevin, Ben, and the committee (Mr. Henry, Mr. Pandu, and Mr. Doku) are crucial to the project. Agile emphasizes continuous stakeholder involvement through sprint planning and reviews, ensuring their feedback and expectations are actively incorporated.
* Risk Mitigation: Agile’s iterative cycles (sprints) help in identifying and addressing issues early, reducing risks. For example, any difficulties in integrating the database or user interface can be identified and resolved before they impact the entire project.
* Timely Delivery: With a defined budget and timeline, Agile ensures that essential features are delivered on time by prioritizing requirements through a product backlog. Non-essential features can be deprioritized if time constraints arise.
* Focus on User-Friendliness: The application needs to cater to a user base unfamiliar with technology (farmers). Agile enables user testing and feedback after each sprint, ensuring the design and functionality meet user expectations for ease of use.

The traditional model like the Waterfall model is rigid, requiring all requirements to be defined upfront and allowing minimal flexibility for changes during development. Given the dynamic nature of this project, with input expected from multiple stakeholders, Agile is a better fit to manage uncertainty and evolving needs effectively. By adopting the Agile Scrum methodology, we ensure that the project delivers high-quality results aligned with stakeholder expectations within the constraints of time and budget.

**Question 12:** Gantt Chart: The Committee of Mr. Henry, Mr Pandu, and Mr Dooku discussed with Mr Karthik and finalised on the V Model approach (RG, RA, Design, D1, T1, D2, T2, D3, T3, D4, T4 and UAT)

Mr Vandanam is mapped as a PM to this project. He studies this Project and Prepares a Gantt chart with V Model (RG, RA, Design, D1, T1, D2, T2, D3, T3, D4, T4 and UAT) as development process and the Resources are PM, BA, Java Developers, testers, DB Admin, NW Admin. **5 marks**

**Answer:** To prepare the Gantt chart for the given project, we'll follow the V-Model approach with the following phases and tasks:

**Phases in the V-Model:**

1. **Requirements Gathering (RG)**
2. **Requirements Analysis (RA)**
3. **Design**
4. **Development Phases**
	* **D1** (Module 1 Development)
	* **D2** (Module 2 Development)
	* **D3** (Module 3 Development)
	* **D4** (Module 4 Development)
5. **Testing Phases**
	* **T1** (Testing for Module 1)
	* **T2** (Testing for Module 2)
	* **T3** (Testing for Module 3)
	* **T4** (Testing for Module 4)
6. **User Acceptance Testing (UAT)**

**Assigned Roles:**

* **Project Manager (PM)**: Mr. Vandanam
* **Business Analyst (BA)**: You
* **Java Developers**: Ms. Juhi, Mr. Tehsan, Ms. Lucy, Ms. Tucker, Mr. Bravo
* **Testers**: Mr. Jason, Ms. Alika
* **Network Admin**: Mr. Mike
* **DB Admin**: Mr. John

**Steps for Creating a Gantt Chart:**

1. **Identify Tasks**: List all phases and tasks as mentioned above.
2. **Assign Resources**: Map resources to each task based on expertise.
3. **Set Durations**: Estimate the duration for each task. Since the project duration is 19 months, we allocate time for each phase proportionally.
4. **Define Dependencies**: Ensure tasks are sequenced logically (e.g., testing tasks depend on the completion of development tasks).
5. **Create Timeline**: Distribute tasks over the 19-month timeline.



**Question 13:** Fixed Bid Vs Billing: Explain the difference between Fixed Bid and Billing projects **5 marks**

**Answer:** Difference Between Fixed Bid and Billing Projects:

* Fixed Bid Projects:
* **Definition:** A fixed bid project is where the client and service provider agree on a fixed price for the entire project before starting the work.
* **Scope:** The scope, deliverables, and timeline are clearly defined and agreed upon at the beginning.
* **Cost:** The total project cost is predetermined and does not vary, irrespective of the time and resources required.
* **Risk:** The vendor or service provider bears the financial risk. If the project requires more effort or time than estimated, the service provider absorbs the additional cost.
* **Flexibility:** Limited flexibility. Any change in scope after the contract is signed usually requires a change request and additional costs.
* **Example:** Mr. Henry’s online agriculture product store project given to APT IT Solutions for 2 crores INR and 19 months under a CSR initiative is a fixed bid project.
* Billing Projects (Time and Material):
* **Definition:** A billing or time-and-material (T&M) project is where the client pays for the actual effort spent, based on an hourly or daily rate, along with material costs.
* **Scope:** The scope can be flexible and is often not fully defined at the start of the project. Adjustments can be made as the project progresses.
* **Cost:** The final cost depends on the amount of time and resources utilized, making it variable.
* **Risk:** The client bears the financial risk, as the final cost can exceed initial expectations if the project takes longer than anticipated.
* **Flexibility:** Highly flexible, allowing for iterative development and changes in requirements throughout the project lifecycle.
* **Example:** If the project involved iterative releases and costs were billed monthly based on the hours worked, it would be a billing project.

Key Comparison Table

|  |  |  |
| --- | --- | --- |
| **Aspect** | **Fixed Bid** | **Billing (T&M)** |
| **Cost** | Fixed and pre-agreed | Variable based on effort and materials |
| **Scope** | Clearly defined |

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| Flexible and evolving |

 |
| **Risk** | Vendor bears the risk | Client bears the risk |
| **Flexibility** | Low | High |
| **Contract Changes** |

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| --- |
|  |

Requires change requests | Allows for ongoing changes |
| **Examples** | Predefined project with fixed deliverables | Agile or iterative projects |

**Question 14:** Prepare Timesheets of a BA in various stages of SDLC:

* Design Timesheet of a BA
* Development Timesheet of a BA
* Testing Timesheet of a BA
* UAT Timesheet of a BA
* Deployment n Implementation Timesheet of a BA **20 marks**

**Answer:** Below are the detailed timesheets for a Business Analyst (BA) in various stages of the Software Development Life Cycle (SDLC). Each timesheet includes key tasks and estimated hours for a typical workweek (5 days, 40 hours total).

**Design Timesheet of a BA**

|  |  |  |
| --- | --- | --- |
| **Day** | **Tasks** | **Hours** |
| Monday | Conduct stakeholder interviews, gather requirements, and document functional specifications. | 9 |
| Tuesday | Create detailed use cases, user stories, and process workflows. | 9 |
| Wednesday | Collaborate with UI/UX designers to finalize wireframes and prototypes. | 9 |
| Thursday | Conduct requirement walkthroughs with the development team and refine documentation. | 9 |
| Friday | Finalize Business Requirement Document (BRD) and upload for approvals. | 9 |

**Development Timesheet of a BA**

|  |  |  |
| --- | --- | --- |
| **Day** | **Tasks** | **Hours** |
| Monday | Act as a liaison between the development team and stakeholders for clarifications. | 9 |
| Tuesday | Review development progress and ensure adherence to requirements. | 9 |
| Wednesday | Provide additional details or revised requirements to developers as needed. | 9 |
| Thursday | Perform initial reviews of features developed against requirements (preliminary validations). | 9 |
| Friday | Update traceability matrix to ensure all requirements are being implemented. | 9 |

**Testing Timesheet of a BA**

|  |  |  |
| --- | --- | --- |
| **Day** | **Tasks** | **Hours** |
| Monday | Review and approve test cases prepared by QA/Testers. | 9 |
| Tuesday | Conduct walkthroughs with QA/Testers to ensure understanding of requirements. | 9 |
| Wednesday | Validate test data for functional and integration testing. | 9 |
| Thursday | Perform functional testing and validate against the requirements. | 9 |
| Friday | Report defects and assist in troubleshooting with developers and QA/Testers. | 9 |

**UAT (User Acceptance Testing) Timesheet of a BA**

|  |  |  |
| --- | --- | --- |
| **Day** | **Tasks** | **Hours** |
| Monday | Prepare UAT scenarios and scripts in collaboration with end-users. | 9 |
| Tuesday | Train users on the application and explain UAT procedures. | 9 |
| Wednesday | Support end-users during UAT sessions and capture feedback. | 9 |
| Thursday | Document UAT results and coordinate fixes with the development team. | 9 |
| Friday | Conduct a final UAT sign-off session with stakeholders. | 9 |

**Deployment and Implementation Timesheet of a BA**

|  |  |  |
| --- | --- | --- |
| **Day** | **Tasks** | **Hours** |
| Monday | Assist in preparing deployment and rollback plans. | 9 |
| Tuesday | Coordinate with stakeholders to schedule deployment. | 9 |
| Wednesday |

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Support the deployment team by ensuring all configurations align with requirements. | 9 |
| Thursday | Validate deployed system functionality in the production environment (smoke testing). | 9 |
| Friday | Gather post-deployment feedback from stakeholders and users, and document lessons learned. | 9 |

These timesheets can be adjusted as per the complexity and specific needs of the project.