American International University-Bangladesh (AIUB)

Department of Computer Science

Faculty of Science & Technology (FST)

Food Savvy: A Digital Solution for Efficient Food Waste Management

A Software Engineering Project Submitted
By

Semester: Spring_23_24		**Section: I**	**Group Number: 2**	
SN	Student Name	Student ID	Contribution (CO3)	Individual Marks
1	DIP ACHORJEE SHOKAL	22-46788-1	35	
2	SHUVO SARKER JOY	22-47148-1	30	
3	SIRAJUS SALEKEEN	21-45262-2	20	
4	PALASH SEN	20-42969-1	15	

The project will be Evaluated for the following Course Outcomes

CO3: *Select* appropriate software engineering models, project management roles and their associated skills for the complex software engineering project and evaluate the sustainability of developed software, taking into consideration the societal and environmental aspects	Total Marks	
Appropriate Process Model Selection and Argumentation with Evidence	[5 Marks]	
Evidence of Argumentation regarding process model selection	[5Marks]	

Analysis the impact of societal, health, safety, legal and cultural issues	[5Marks]	
Submission, Defense, Completeness, Spelling, grammar and Organization of the Project report	[5Marks]	

Description of Student's Contribution in the Project work

Student Name: DIP ACHORJEE SHOKAL
Student ID: 21-44989-2
Contribution in Percentage (35%)
Contribution in the Project:
Appropriate Process Model Selection and Argumentation with Evidence.
Project role identification and responsibilities.
Formatting of the document.
Literature review.

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Signature of the Student

Student Name: SHUVO SARKER JOY
Student ID: 22-47148-1
Contribution in Percentage (30%)
Contribution in the Project:
Evidence of Argumentation.
Analysis the impact.
Formatting of the document.
Literature review.

_____
Signature of the Student

Student Name: MD. SIRAJUS SALEKEEN
Student ID: 21-45262-2
Contribution in Percentage (20%)
Contribution in the Project:
Contributed to the introduction section.
Contributed to referencing and formatting of the document.
Literature review.

_____
Signature of the Student

Student Name: PALASH SEN
Student ID: 20-42969-1
Contribution in Percentage (15%)
Contribution in the Project:
Contributed to referencing and formatting of the document.
Literature review.

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Signature of the Student

Rubric for Project Assessment (CO3)

Criteria	Marks distribution (Max 3X5= 15)				Acquired Marks
	Inadequate (1-2)	**Satisfactory (3)**	**Good (4)**	**Excellent (5)**	
Selection of Software Engineering Models	Does not articulate a position or argument of choosing appropriate model. Does not present any evidence to support the arguments for the choice of the model	Articulates a position or argument for choosing models that is unfocused or ambiguous. Presents incomplete/vague evidence to support argument for model choice	Articulates a position or argument of choosing models that is limited in scope. Does not present enough evidence to support the argument for the choice of the model	Clearly articulates a position or argument for the choosing software engineering models. Presents sufficient amount of evidence to support argument for the model selection	

Role identification and Responsibility Allocation	The project has poor project management plans for identifying roles and assigning the responsibilities	Identify few roles in the project management where some of the roles are left alone with any project responsibilities	Identify most of the roles in the project management and assign their responsibilities	Well planned project with proper role identification and responsibility allocation in the project management activities	
Impact identification	Student vaguely discuss the impact of societal, health, safety, legal, cultural, or environmental issues in their project	Student provided with partial relevance to the impact of societal, health, safety, legal, cultural, or environmental issues in their project	Student fairly provided the analysis to the impact of societal, health, safety, legal, cultural, or environmental issues in their project	Student comprehensively provided the analysis to the impact of societal, health, safety, legal, cultural, or environmental issues in their project	
Formatting and Submission	Project report is not complete and Several errors in spelling and grammar. Present a Confusing organization of concepts, supporting arguments, and real-life example. Sentences rambling, and details are repeated.	Some errors in spelling and grammar. Some problems of organizing the answer in a logical order of defining, elaborating, and providing real-life examples.	Few errors in spelling and grammar. Presents most of the details in a logical flow of organization in definition, details, and example.	Project report is complete and No errors in spelling and grammar. Consistently presents a logical and effective organization of definition, details, and real-life example of the topic.	
				Acquired marks:	
				CO Pass / Fail:	

Appropriate software development process model for “FoodSavvy: A Digital Solution for Efficient Food Waste Management” project

Process Model:

***Analysis regarding the nature and environment of the software that we are going to develop and selecting the most suitable method (Incremental Development Method) to develop the software:

For this Food Waste Management project, the Incremental Model is chosen as the most suitable software development process model. The Incremental Model is selected due to its iterative and incremental nature, which aligns well with the evolving requirements and complexity of the project. This model allows for flexibility, adaptability, and early delivery of key functionalities, ensuring timely feedback and continuous improvement throughout the development process. In the Incremental Model, the development is divided into multiple increments or phases, each delivering a small set of features or functionalities. This allows for faster development cycles and frequent releases, enabling stakeholders to provide feedback early on and make necessary adjustments.

In this project, the Incremental Model can be applied as follows:

Initially, we can focus on developing the core functionalities such as user registration, login, and inventory management. This first increment would provide a basic working system that allows users to create accounts, log in, and manage their food inventory. Feedback from users and stakeholders can then be gathered to assess the effectiveness of these features and make any necessary improvements or modifications.

The next increment could include the addition of features such as personalized notifications, shopping list generation, and basic analytics. This increment would enhance the user experience by providing tailored notifications, generating optimized shopping lists, and offering insights into food consumption habits.

Subsequent increments can introduce functionalities like food donation and sharing, integration with external systems (e.g. smart kitchen appliances or grocery delivery services), and user feedback and ratings. Each increment builds upon the previous ones, gradually expanding the application's capabilities and addressing specific user needs.

By following the Incremental Model, we can ensure a more efficient development process, reduce risks associated with changing requirements, and deliver value to users early on. This approach allows for continuous feedback and adaptation, enabling us to incorporate user suggestions, improve the application's functionality, and ensure a high-quality end-product that meets the evolving needs of food waste management.

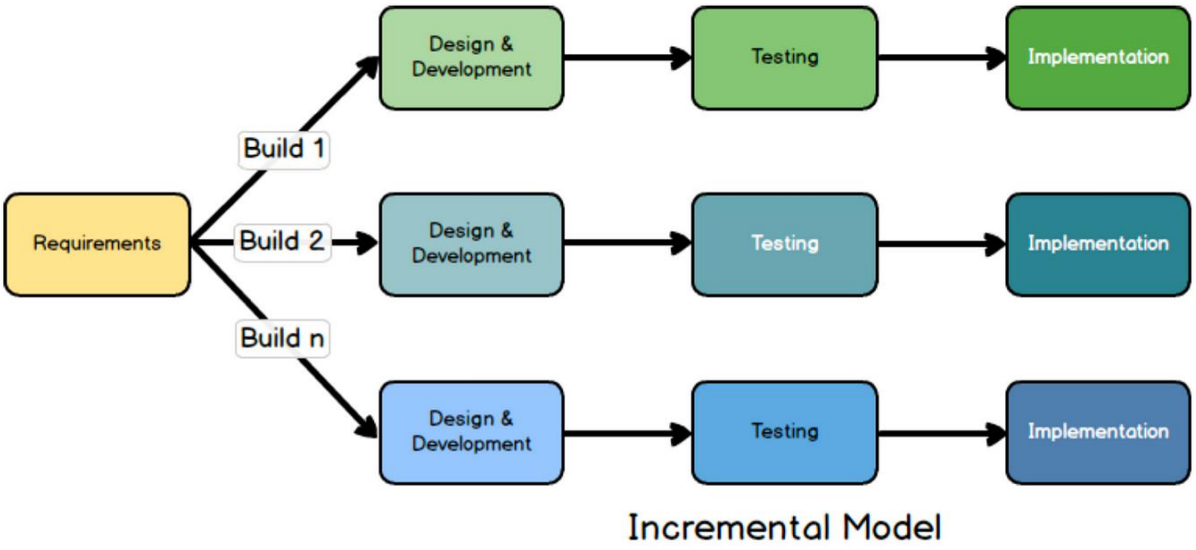

Fig: Incremental Development Model

*****Argument based on our analysis:**

1. **Iterative Development**: The development process involves repeating a series of steps for each increment. These steps typically include requirements analysis, design, implementation, testing, and deployment.
2. **Incremental Delivery**: The project is delivered incrementally, with each increment adding new features or functionality to the system. This allows stakeholders to start using and benefiting from the system early on, even as further enhancements are being developed.
3. **Feedback Loop**: Each increment is subject to review and feedback from stakeholders. This feedback informs subsequent increments, guiding the direction of development and ensuring that the final product meets user requirements.
4. **Prioritization of Features**: Features are prioritized based on their importance and value to stakeholders. Critical or high-priority features are typically implemented in earlier increments, while less essential features may be deferred to later increments.
5. **Risk Management**: Risks are mitigated through incremental development by addressing them early in the process. By delivering working increments at regular intervals, potential risks can be identified and addressed sooner, reducing the likelihood of major issues later in the project.
6. **Flexibility**: The Incremental Model offers flexibility to adapt to changing requirements or priorities. As the project progresses and stakeholders gain a better understanding of their needs, adjustments can be made to future increments to ensure that the final product aligns with evolving requirements.

Overall, the Incremental Model is well-suited for projects where requirements are subject to change, and stakeholders value early delivery of usable functionality. It allows for a more flexible and iterative approach to development, leading to better alignment with user needs and reduced project risk.

*****Sufficient amount of evidence to support the argument for our model selection in developing our proposed solution:**

1. **Iterative Development**:
    - **Evidence**: The iterative nature of the Incremental Model allows for continuous refinement and improvement of the software. Each increment undergoes iterative cycles of requirements analysis, design, implementation, testing, and deployment. This iterative approach enables the team to incorporate feedback from stakeholders and make necessary adjustments throughout the development process.
2. **Incremental Delivery**:
    - **Evidence:** Incremental delivery aligns well with the project's goal of providing early value to stakeholders. By delivering functional increments at regular intervals, users can start using and benefiting from the system sooner rather than waiting for the entire project to be completed. This incremental delivery approach ensures that stakeholders can provide feedback early on and helps in validating the direction of development.
3. **Feedback Loop**:
    - **Evidence:** The feedback loop is a critical component of the Incremental Model. Each increment is subject to review and feedback from stakeholders, including end users, project sponsors, and other relevant parties. This feedback informs subsequent increments, guiding the development process and ensuring that the final product meets user requirements and expectations. For example, user feedback on early increments can help identify usability issues or missing features that can be addressed in later iterations.
4. **Prioritization of Features**:
    - **Evidence:** Prioritizing features based on their importance and value to stakeholders is essential for project success. The Incremental Model allows for the prioritization of features, with critical or high-priority features implemented in earlier increments. By focusing on delivering the most valuable features first, the team can ensure that the system provides immediate benefits to users and stakeholders.
5. **Risk Management**:
    - **Evidence:** The Incremental Model provides effective risk management by addressing potential risks early in the development process. By delivering working increments at regular intervals, potential risks can be identified and mitigated sooner rather than later. For example, if a particular feature or requirement proves to be more challenging than anticipated, the team can adjust its approach in subsequent increments to minimize the impact on the project timeline and budget.

6. **Flexibility**:
    - **Evidence:** Flexibility is a key advantage of the Incremental Model, allowing the team to adapt to changing requirements or priorities as the project progresses. As stakeholders gain a better understanding of their needs, adjustments can be made to future increments to ensure that the final product aligns with evolving requirements. This flexibility enables the team to respond quickly to changing market conditions, user feedback, or technological advancements.

In summary, the Incremental Development Model offers several advantages that align closely with the goals and requirements of the Food Waste Management project. From iterative development cycles to incremental delivery, prioritization of features, effective risk management, and flexibility to adapt to changing requirements, the Incremental Model provides a structured yet adaptable approach to software development. By following this model, the project team can ensure a more efficient development process, reduce risks associated with changing requirements, and deliver value to users early on.

Evidence:

For this Food Waste Management project, the Incremental Model is chosen here in our project.

This approach, as evidenced by its successful implementation in our previous project, promises to significantly enhance efficiency, mitigate risks, and deliver incremental value to our stakeholders.

Previous Project Utilizing Incremental Model:
In our recent project titled "Unified Customer Experience Platform (UCEP)," we implemented the Incremental Model methodology to great success. UCEP aimed to integrate diverse customer interaction channels into a seamless platform, enhancing customer engagement and satisfaction. The decision to employ the Incremental Model stemmed from its inherent advantages in managing complex projects while accommodating evolving requirements and minimizing development risks.

Key Benefits Realized:
Iterative Development: By breaking down the project into manageable increments, we ensured continuous feedback incorporation and refinement, resulting in a solution that closely aligned with stakeholder expectations.

Risk Mitigation: The Incremental Model allowed us to identify and address potential issues early in the development cycle, minimizing the impact of unforeseen challenges and ensuring project stability.

Adaptability to Changing Requirements: In a dynamic environment where requirements often evolve, the Incremental Model provided the flexibility needed to accommodate changes without disrupting the overall project timeline or budget.

Impact:

Impact Identification Analysis for "Food Savvy: A Digital Solution for Efficient Food Waste Management"

Societal Impact:

Positive Impact: The implementation of Food Savvy can lead to reduced food waste at both consumer and commercial levels, contributing to the global effort to combat food insecurity and hunger. It promotes a culture of sustainability and responsible consumption by raising awareness about food waste issues.
Negative Impact: There may be resistance or slow adoption due to changes in behavior required by users. Additionally, if the solution is not accessible to marginalized communities or those with limited access to technology, it could exacerbate existing inequalities in food distribution.

Health Impact:

Positive Impact: Decreasing food waste can indirectly improve public health by reducing environmental pollution from decomposing food in landfills and conserving natural resources used in food production. Moreover, if surplus food is redirected to those in need, it can contribute to better nutrition and food security for vulnerable populations.
Negative Impact: If the digital solution fails to accurately track food expiration dates or improperly stores user data, it could lead to foodborne illnesses or compromise user privacy, respectively.

Safety Impact:

Positive Impact: By providing users with information on food safety guidelines and best practices for storing perishable items, Food Savvy can help prevent foodborne illnesses and improve overall food safety standards.
Negative Impact: If the digital platform malfunctions or provides incorrect information, users may inadvertently consume spoiled or unsafe food, resulting in potential health hazards and liability concerns.

Legal Impact:

Positive Impact: Compliance with food safety regulations and waste management laws can be facilitated through the use of Food Savvy's tracking and reporting features, helping businesses and individuals meet legal requirements and avoid penalties.
Negative Impact: Failure to adhere to data protection regulations or privacy laws when handling user information could result in legal repercussions, such as fines or lawsuits.

Cultural Impact:

Positive Impact: Food Savvy can promote a cultural shift towards valuing food and reducing waste, aligning with societal movements advocating for sustainability and environmental stewardship.
Negative Impact: Cultural differences in attitudes towards food waste and technology adoption may hinder the acceptance and effectiveness of the digital solution in certain communities or regions.

Environmental Impact:

Positive Impact: By reducing food waste, Food Savvy contributes to mitigating greenhouse gas emissions associated with food production, transportation, and decomposition in landfills, thus helping combat climate change.
Negative Impact: The production and disposal of electronic devices and infrastructure required for the digital solution may contribute to electronic waste and environmental degradation if not managed responsibly.

In conclusion, while "Food Savvy: A Digital Solution for Efficient Food Waste Management" holds great potential for positive societal, health, safety, legal, cultural, and environmental impacts, careful consideration must be given to mitigate potential negative consequences and ensure equitable access and responsible implementation.

Project Role Identification and Responsibilities:

1. **Project Manager: (DIP ACHORJEE SHOKAL)**
    - Overall coordination and management of the project.
    - Define project goals, scope, and timeline.
    - Allocate tasks and resources to team members.
    - Monitor progress and ensure adherence to deadlines.
    - Facilitate communication and collaboration within the team and with stakeholders.
    - Mitigate risks and address any issues that arise during development.
2. **Product Owner: (SIRAJUS SALEKEEN)**
    - Represent the interests of stakeholders and end users.
    - Define and prioritize features based on stakeholder requirements and user needs.
    - Create and maintain the product backlog, including user stories and acceptance criteria.
    - Provide feedback on each increment and guide the direction of development.
    - Make decisions regarding feature implementation and trade-offs between scope, schedule, and quality.
    - Validate that each increment meets the acceptance criteria and delivers value to stakeholders.
3. **Development Team: (DIP ACHORJEE SHOKAL, SIRAJUS SALEKEEN, SHUVO SARKER JOY, PALASH SEN)**

- Software Developer:
  - Write code and implement features according to the requirements defined in the product backlog.
  - Collaborate with other team members to ensure consistency and integration across increments.
  - Participate in code reviews and testing to maintain code quality and identify defects early.
- Quality Assurance (QA) Engineer:
  - Develop test plans and test cases for each increment based on acceptance criteria.
  - Execute tests to verify that each increment meets functional and non-functional requirements.
  - Report and track defects, working closely with developers to ensure timely resolution.
  - Conduct regression testing to ensure that new features do not introduce unintended side effects.
- UI/UX Designer:
  - Design user interfaces and user experiences for each increment, ensuring usability and accessibility.
  - Create wireframes, mockups, and prototypes to communicate design concepts to stakeholders.
  - Collaborate with developers to implement designs and ensure consistency with the overall product vision.
  - Gather feedback from users and stakeholders to iterate on designs and improve usability over time.

4. **Scrum Master: (DIP ACHORJEE SHOKAL, SHUVO SARKER JOY)**
   - Facilitate Scrum ceremonies, including sprint planning, daily stand-ups, sprint reviews, and retrospectives.
   - Remove impediments and obstacles that hinder the team's progress.
   - Coach team members on Scrum principles and practices, promoting continuous improvement.
   - Foster a collaborative and productive team environment, encouraging open communication and transparency.
   - Ensure that the team follows the Scrum framework and adheres to Agile principles.
   - Act as a servant-leader, supporting the team and empowering them to self-organize and make decisions.
5. **Technical Lead: (SIRAJUS SALEKEEN, PALASH SEN)**
   - Provide technical guidance and expertise to the development team.
   - Define the overall architecture and design of the software system, ensuring scalability, flexibility, and maintainability.
   - Review and approve technical decisions, including technology stack, frameworks, and development tools.
   - Mentor junior developers and help them grow their skills and knowledge.
   - Conduct code reviews and provide feedback to ensure code quality and adherence to coding standards.

- Evaluate emerging technologies and recommend their adoption where appropriate to enhance the project's capabilities.

Each member of the team plays a crucial role in ensuring the success of the Incremental Software Development Model, from defining project goals and priorities to implementing features, testing functionality, and delivering value to stakeholders through iterative development. Collaboration and communication among team members are essential to effectively manage the complexity of the project and deliver a high-quality software product that meets user needs.