

ICT PROJECT MANAGEMENT SYSTEM(IPMS)

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DECLARATION

I KYATUHIRE SHILAH do hereby declare that the work in this report book is purely out of my effort with consistent support from my supervisors, mentors, and parents. It has never been submitted to any university for any Degree or Diploma award requirements.

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APPROVAL

This is to clarify that Kyatuhire Shilah did this report and has been under my voluntary support and supervision. I am glad that it is now ready to be submitted to the Department of Computing and Information Technology with my approval as one of the prerequisite requirements for the award of Bachelor of Science in Information Technology

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SIGNATURE

A handwritten signature in blue ink, appearing to read "Dr. Eilu Emmanuel", written over a dotted line. The signature is stylized and includes a large flourish at the end.

DATE 01/10/2024

DEDICATION

I dedicate this report to my entire family who have supported me morally, physically, spiritually, and financially. This has helped me to move on academically. Thank you for loving, caring, and offering me a wonderful education. I also dedicate this report to my mentors, and academic and National Innovation ICT hub team for the guidance rendered to me during my project development.

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I acknowledge God's mercy, grace, guidance, protection, and love for making my final year project development successful. The success of this report is greatly credited to my mentors Mr. Osbert Osamai and Mr. Kotaki Robert, the agency supervisor Miss Sandra Abwin, and the academic supervisor Mr. Eilu Emmanuel. I also need to acknowledge my parents, relatives, and friends for the endless support they have rendered to me.

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ABSTRACT

This report is all about an internship exercise carried out at National ICT Innovation Hub that lasted for the period of 10 weeks as summarized below.

Chapter one talks about introduction about the agency, background, general set up, ownership and management, objectives of the organization, organization structure, activities the organization does and the clients of the agency. Chapter two also talks about introduction, specific objectives and activities undertaken during the field attachment. It further talks about the relationships between the field activities and the theories learnt in lecture rooms. Chapter three introduces us to lessons learnt, skills attained by the intern, experience gained, how the field work impacted on the intern’s professional development. Chapter four exposes the challenges that we encountered during the field training by the internee, challenges National ICT Innovation Hub and their respective resolutions. Chapter five talks about recommendations and conclusions, however it should be noted that the recommendations are not only to the agency but also to the university at large.

LIST OF ABBREVIATIONS

ICT Information and Computer Technology

IT Information Technology

Chapter One

TOPIC: ICT PROJECT MANAGEMENT SYSTEM(IPMS)

1.0 Introduction

Chapter One of this project presents the study's background information, highlighting the study's problem statement, objectives, scope, and significance.

1.1 Background to the Study

Currently, the ICT National Innovation Hub is in a situation where it lacks an effective project management system that manages the innovators' performance and progress at all stages of innovation. In an ICT hub, the absence of a robust project management system can lead to significant delays, resource wastage, and customer dissatisfaction.

Therefore, there is a need for a project management system. Implementing a project management system in an ICT hub is essential for enhancing coordination, collaboration, and resource management, ensuring projects run smoothly and efficiently. It facilitates real-time communication and centralized information sharing, optimizing resource allocation, and improving time and budget management. The system aids in identifying and mitigating risks, maintaining quality control, and enabling data-driven decision-making through detailed analytics. Additionally, it ensures client and stakeholder satisfaction by providing transparency and regular updates. Scalable and flexible, the system supports the growth of the ICT hub while maintaining compliance and thorough documentation, making it indispensable for achieving strategic goals and delivering high-quality results.

1.2 The Problem Statement

ICT National Innovation Hub faces challenges in effectively managing its innovation initiatives including the need for centralized tracking, efficient resource allocation, fostering collaboration, prioritizing projects, measuring performance, engaging employees, and promoting innovation culture, these hinder the successful development and implementation of innovative ideas, impacting organizational growth and competitiveness.

Analysis indicates that approximately 40% of projects exceed their allocated budgets, with an average overrun of 25%. Moreover, nearly 30% of projects fail to meet their scheduled completion dates, leading to client dissatisfaction and potential revenue loss. These delays not only impact the organization's and innovators' reputations but also strain client relationships and hinder the ability to secure future projects.

Additionally, the lack of a centralized system makes it challenging to allocate resources effectively, leading to underutilization of talent and equipment. This impacts project efficiency and affects morale and job satisfaction. Therefore, there is a need for an effective ICT innovator project Management system to address these challenge

1.3 Main Objective

The main objective is to develop an ICT Project Management System that will enable the innovators to apply for space, update the stakeholders on the projects' progress, and enable communication. The system will also enable the stakeholders to allocate resources and track the progress of the ongoing projects.

1.3.1 Specific objectives

- To study the current system used to manage the ICT innovation projects at the National ICT Innovation Hub to identify the system requirements.
- To design a Project Management System for the National ICT Innovation Hub using the identified requirements.
- To implement the designed Project Management System using different programming languages for example MySQL, JavaScript, and Django Framework.
- To test and validate the Project Management System to identify any errors and to check if it meets the user requirements.

1.4 Scope

The system designed and developed will be used by the National ICT Innovation Hub by the innovators, IT department, and the Project management department for effective resource allocation depending on the stage of innovation and tracking the progress of the ongoing projects at the ICT Hub. The system will interact with the innovators, Hub Stakeholders, and the project management team

1.5 Significance

The department of project management uses physical pitches to assess the progress of the innovators and after the innovators pitch their projects the project management team later makes decisions.

The Innovator Project management system will offer the following advantages:

- The system will enable the innovators to make applications for the space at the ICT Hub depending on their stage of innovation and can track the progress of their applications.
- The innovators will have time-to-time communication with the stakeholders in case of any complaints and inquiries.
- The project management team will be able to assess the progress of the ongoing projects once updated and give feedback to the innovators as soon as possible

Chapter Two

Literature Review

2.0 Introduction

Chapter One provided an overview of the study, outlining the objectives, scope, and significance. This chapter reviews the literature on ICT Innovator Project Management Systems within the National ICT Innovation Hub. It defines an ICT Project Management System, types of Information management systems, and how they work.

2.1 ICT Project Management System

An ICT Project Management System is a specialized information system designed to manage and track the progress of innovative projects within an ICT hub. ICT projects are initiatives aimed at leveraging technology to solve specific problems, achieve goals, or improve processes within an organization or society at large.

According to Taylor (2020), these systems facilitate the coordination of project activities, resource allocation, and timelines. They support detailed project reporting, strategic decision-making, and compliance with regulatory requirements, thereby fostering a conducive environment for innovation and efficient project execution.

2.2 Types of project management systems

2.2.1 Waterfall Project Management

The Waterfall model is a traditional project management methodology characterized by its linear and sequential approach. Each phase of the project must be completed before moving on to the next, making it suitable for projects with well-defined requirements and stable conditions.

Royce (1970), who introduced the model, emphasized its structured nature, which provides clear milestones and deliverables. However, the rigidity of this method can be a drawback in dynamic environments where changes are frequent. Despite its limitations, the Waterfall model remains widely used in industries such as construction and manufacturing, where detailed planning and a clear sequence of tasks are crucial for success.

2.2.2 Agile Project Management

Agile project management is an iterative approach that emphasizes flexibility, customer collaboration, and responsiveness to change. According to Highsmith (2010), Agile prioritizes customer satisfaction through the early and continuous delivery of valuable software, making it ideal for projects with dynamic requirements.

Beck (2001) outlines the core values and principles of this methodology, focusing on individuals and interactions, working software, customer collaboration, and responding to change over following a plan. While Agile offers significant benefits in terms of adaptability and client engagement, it requires a high level of team collaboration and commitment to continuous improvement, which can be challenging to maintain.

2.2.3 Scrum Project Management

Scrum is a specific framework within the Agile methodology, designed to facilitate team collaboration and iterative progress. Schwaber (2016) formalized Scrum, highlighting its structure of roles, events, and

artifacts that promote transparency, inspection, and adaptation. Scrum divides work into short, iterative cycles called sprints, typically lasting two to four weeks, allowing teams to deliver increments of the product regularly and gather feedback. This framework's emphasis on teamwork and continuous improvement makes it particularly effective for complex projects with evolving requirements. However, the success of Scrum relies heavily on the team's ability to work cohesively and adhere to the defined roles and processes.

2.2.4 Kanban Project Management

Kanban is an Agile methodology that focuses on visualizing the workflow to improve efficiency and limit work in progress (WIP). Anderson (2010) popularized Kanban for knowledge work, emphasizing its ability to enhance visibility and manage flow through a visual board with columns representing different stages of the process. By limiting WIP, teams can prevent bottlenecks and improve delivery speed. Kanban's continuous delivery model allows for frequent updates and adjustments, making it ideal for environments where priorities change rapidly.

2.2.5 Lean Project Management

Jones (2003) describes Lean thinking as creating more value for customers with fewer resources, focusing on value stream mapping and continuous improvement.

According to Ohno (1988), Lean project management aims to maximize value by eliminating waste and optimizing processes, rooted in the principles of Lean manufacturing developed by Toyota. Lean's emphasis on efficiency and waste reduction makes it highly effective in industries such as manufacturing, logistics, and healthcare.

2.2.6 Six Sigma Project Management

According to Harry (2000), Six Sigma is a data-driven methodology aimed at improving quality by identifying and removing defects and variations in processes. Developed by Motorola in the 1980s, Six Sigma employs a set of quality management methods, including the DMAIC (Define, Measure, Analyze, Improve, Control) process.

George (2002) defines Six Sigma as focusing on reducing process variation and enhancing process control, making it particularly useful in manufacturing and engineering.

2.2.7 Critical Path Method (CPM)

The Critical Path Method (CPM) is a project management technique used to map out key tasks necessary to complete a project, identifying critical and non-critical tasks to avoid delays.

Developed by DuPont in the 1950s, CPM helps project managers determine the longest path of dependent activities and calculate the earliest and latest start and finish times for each task (Kelley & Walker, 1959). According to Mantel (2012), CPM optimizes scheduling and resource allocation, making it ideal for construction and engineering projects.

2.2.8 Hybrid Project Management

Hybrid project management combines elements from various methodologies, such as Waterfall and Agile, to create a customized approach suited to specific project needs. Wysocki (2011) highlights the increasing popularity of hybrid models due to their flexibility, allowing project managers to tailor their methods to the unique requirements of each project. This approach benefits from the structured planning of Waterfall and the adaptability of Agile, making it suitable for projects with diverse and changing requirements.

2.3 Related systems.

2.3.1 Trello

According to Cohen (2016), Trello is a user-friendly project management tool that uses boards, lists, and cards to help teams organize tasks. It is based on the Kanban methodology and is known for its simplicity and visual appeal.

2.3.1.1 Technologies used by Trello

According to Jordan (2018), Trello leverages a robust and sophisticated technology stack to provide its versatile and user-friendly service. The front end is built with modern web technologies like HTML5, CSS3, and JavaScript, using frameworks such as React for a dynamic and responsive user interface. The back end is powered by Node.js, which allows for efficient handling of multiple connections due to its non-blocking, event-driven architecture (Osmani, 2018). Trello uses MongoDB for its primary database, offering flexibility and scalability, and Redis for real-time data caching and session management (Carlson, 2013). Real-time collaboration is facilitated by Web Sockets, enabling instant updates across all devices (Lubbers, 2010).

2.3.1.2 How Trello works

According to Cohn (2016), Trello is a project management tool that uses a visual system of boards, lists, and cards to organize tasks and projects. It is based on the Kanban methodology, which helps teams visualize their workflow and manage tasks efficiently. Here's a breakdown of how Trello works:

- Boards

A Trello board represents a project or a specific area of work. Boards can be created for different projects, teams, or individual workflows. Each board contains lists and cards, which are the primary elements used to manage tasks.

- Lists

Lists represent stages of a project or different categories of tasks. Common list names include "To Do," "In Progress," and "Done," but users can customize lists to fit their specific workflow.

Lists are organized in columns within a board, and tasks move across these lists as they progress.

- Cards

Cards are the individual tasks or items within a list. Each card represents a single task, idea, or piece of work. Users can click on cards to add more details, such as descriptions, due dates, attachments, checklists, comments, and labels. Cards can be moved from one list to another to indicate progress.

- Card Details and Customization

a) Description: Provides an overview or detailed information about the task.

b) Labels: Color-coded labels to categorize and prioritize tasks.

c) Members: Team members can be assigned cards, indicating who is responsible for the task.

d) Checklists: Sub-tasks or steps within a task can be listed and checked off as completed.

e) Due Dates: Deadlines can be set for tasks to ensure timely completion.

f) Attachments: Files and documents can be attached to cards for easy reference.

g) Comments: Team members can discuss tasks and provide updates through comments

- **Collaboration and Communication**

Trello facilitates team collaboration by allowing multiple users to work on the same board simultaneously. Members can be invited to boards and assigned specific roles and permissions. Notifications keep team members informed about updates and changes to tasks.

- **Power-ups and Integrations**

Trello offers "Power-Ups," which are integrations with other applications and services. Power-Ups extend Trello's functionality, allowing users to integrate with tools like Google Drive, Slack, Jira, and more. These integrations help streamline workflows and centralize project management activities.

- **Automation with Butler**

Trello includes an automation tool called Butler, which allows users to automate repetitive tasks. Butler can create rules, buttons, and scheduled commands to move cards, assign members, add labels, and more.

- **Mobile and Web Accessibility**

Trello is accessible via web browsers and mobile applications (iOS and Android), enabling users to manage projects from anywhere.

2.3.1.3 Strengths of Trello

According to Cho (2017), the strengths of Trello are:

- **Intuitive Interface:** Trello's drag-and-drop interface is easy to use and visually appealing.
- **Flexibility:** Highly customizable to fit various workflows and project types.
- **Collaboration:** Facilitates team communication and collaboration effectively. **Integration:** Supports numerous integrations with other tools and applications.
- **Mobile Accessibility:** Available on multiple platforms, allowing for remote project management.
- **Trello is scalable and can be used for a wide range of projects, from simple to complex. Whether used by small teams or large organizations**
- **Enhanced Visibility and Transparency:** Trello's visual nature enhances project visibility and transparency. Team members can easily see the status of tasks and projects, which helps in identifying bottlenecks and ensuring that projects stay on track
- **Trello provides an API that enables developers to create custom integrations and automate workflows.**
- **Trello's Power-Ups extend the platform's functionality by integrating with other tools and services. Users can add Power-Ups for calendar views, time tracking, reporting, and more, enhancing Trello's capabilities and making it a versatile project management tool**

2.3.1.4 Weaknesses of Trello

According to Scott (2018), The weaknesses of Trello are.

- **Simplicity:** While its simplicity is an advantage, it can also be a limitation for complex project management needs.
- **Limited Advanced Features:** Lacks some advanced features like in-depth reporting, Gantt charts, and resource management.
- **Scaling:** This may become less efficient for very large projects with numerous tasks and dependencies.

2.3.1.5 Conclusion on Trello

Trello is a versatile and user-friendly project management tool that offers robust functionalities for visual task management, collaboration, and automation. Its flexibility and customization options make it suitable for a wide range of applications, from personal task lists to team-based project tracking. However, its simplicity may not meet the needs of more complex projects requiring advanced management features.

Overall, Trello's strengths in visual organization, communication, and accessibility make it a valuable tool for enhancing productivity and project management.

2.3.2 Project Management Information System (PMIS) in Government Projects

According to the Ministry of ICT and National Guidance (2019), The Project Management Information System (PMIS) is extensively used in Ugandan government projects to enhance the planning, execution, and monitoring of development initiatives. PMIS integrates various project management functions such as scheduling, resource allocation, and progress tracking

2.3.2.1 Technologies Used by PMIS

According to Leon (2014), Project Management Information Systems (PMIS) in government projects employ a suite of advanced technologies to enhance planning, execution, monitoring, and evaluation. Enterprise Resource Planning systems, such as SAP and Oracle, integrate various functions into a unified platform, providing real-time data and analytics for informed decision-making. Geographic Information Systems (GIS) are essential for projects involving spatial data, enabling visualization and analysis of geographic information (Tomlinson, 2011). Building Information Modeling (BIM) enhances construction project efficiency through 3D visualization and coordination (Azhar, 2011). Cloud computing offers scalable and flexible solutions for data storage and collaboration, exemplified by platforms like Microsoft Project Online (Armbrust, 2010). The Internet of Things (IoT) integrates real-time data collection for infrastructure and public services, enhancing situational awareness (Gubbi, 2013).

2.3.2.2 How PMIS works

- **Data Integration and Real-Time Monitoring:** A core aspect of PMIS is the integration of data from various sources to provide a unified view of the project status. Real-time monitoring and reporting capabilities allow project managers to track progress, identify issues early, and make informed decisions (Heagney, 2016).
- **Collaboration and Communication:** Effective communication and collaboration are essential for project success, and PMIS facilitates these through various tools and features. Document management systems allow team members to store, share, and collaborate on project documents, ensuring that everyone has access to the latest information (Project Management Institute, 2017).
- **Automation and Workflow Management:** PMIS often includes automation features that streamline project workflows and reduce manual effort. These systems can automate routine tasks such as sending notifications, generating reports, and updating project schedules based on predefined rules (Steyn, 2017).
- **Integration with Other Systems:** PMIS is often integrated with other enterprise systems, such as Enterprise Resource Planning (ERP), Customer Relationship Management (CRM), and Human Resource Management Systems (HRMS) (Levine, 2002). This integration allows for seamless data exchange and ensures that project-related information is consistent across the organization. For example, integrating PMIS with ERP systems enables accurate tracking of project costs and resource utilization, while CRM integration helps in managing client interactions and feedback.
- **Security and Data Management**
- According to the Project Management Institute (2017), Data management capabilities ensure that project data is organized, stored, and backed up systematically. Advanced PMIS includes data

analytics tools that help in analyzing historical data to identify trends, inform future projects, and support decision-making.

2.3.2.3 Strength of PMIS

The adoption of PMIS brings several benefits to organizations and project teams. PMIS provides real-time visibility into project progress and performance metrics, allowing stakeholders to make informed decisions and mitigate risks promptly (Heagney, 2016). Improved communication and collaboration among team members and stakeholders are facilitated through centralized document management, communication tools, and project reporting features (Levine, 2002). Integration with other enterprise systems, such as ERP and CRM, enhances data consistency and operational efficiency across the organization (Nicholas, 2017). Moreover, PMIS supports compliance with regulatory requirements and industry standards, ensuring adherence to project governance and quality assurance practices (Project Management Institute, 2017).

2.3.2.4 Weaknesses of PMIS

PMIS implementation poses challenges for organizations. Common challenges include high initial costs of implementation and customization, especially for large-scale projects (Kerzner, 2017). Resistance to change among stakeholders and users, coupled with the need for extensive training and support, can hinder adoption and utilization (Levine, 2002). Integration complexities with existing systems and interoperability issues may also arise, requiring careful planning and coordination (Steyn, 2017). Furthermore, maintaining data security and privacy amidst increasing cyber threats remains a critical concern for organizations deploying PMIS (Project Management Institute, 2017).

2.3.2.5 Conclusion on PMIS

Project Management Information Systems (PMIS) play a pivotal role in ensuring the successful delivery of projects by providing a comprehensive set of tools and functionalities for planning, execution, monitoring, and control. These systems integrate data from various sources, facilitate real-time monitoring, and enhance communication and collaboration among project stakeholders. Automation features streamline workflows, while integration with other enterprise systems ensures consistency and efficiency.

2.3.3 Jira

According to Wesson (2011), Jira was developed by Atlassian and is a project management tool primarily designed for Agile software development. It uses Scrum and Kanban boards to visualize workflows and manage tasks. Jira supports sprint planning, bug tracking, and backlog prioritization, making it ideal for software development teams. The system works by allowing teams to create issues (tasks) and track their progress through customizable workflows.

2.3.3.1 Technologies used by Jira

According to Atlassian (2021a), The technologies used by Jira are:

Jira's front end is primarily built using modern web technologies to ensure responsiveness and usability. It utilizes HTML5 for structure, CSS3 for styling, and JavaScript, often with frameworks like React or Angular, for dynamic rendering and interactivity. On the server side, Jira is powered by Java, a robust and scalable programming language.

Database Management

Jira uses relational databases, such as PostgreSQL, MySQL, or Oracle, to store project data, configuration settings, and user information.

Integration and Extensibility

One of Jira's key strengths is its extensibility through plugins and integrations. It offers a robust API that allows developers to extend its functionality and integrate with other tools and systems.

Cloud and Infrastructure

Jira is available both as a cloud-based solution (Jira Cloud) and as a self-hosted option (Jira Server/Data Center). Jira Cloud leverages Amazon Web Services (AWS) and other cloud infrastructure providers to deliver scalability, reliability, and global accessibility.

Security Measures

Atlassian implements industry-standard security practices, including encryption of data in transit and at rest, role-based access controls, and regular security audits and updates. Compliance certifications such as SOC 2 and ISO 27001 further validate Jira's commitment to data security and privacy.

2.3.3.2 How Jira works

According to Atlassian (2021a), The functionalities of Jira are:

- Central to Jira's functionality is its ability to create and track issues, categorize them into customizable workflows, and assign tasks to team members

- Issue Tracking and Management

At the core of Jira is its robust issue-tracking capabilities. Users can create different types of issues such as bugs, tasks, user stories, and epics, and assign them to specific project teams or individuals.

- Customization and Configuration

Jira offers extensive customization options to adapt to diverse project management requirements

- Collaboration and Communication

Effective collaboration is facilitated through Jira's integration with communication tools such as Confluence, Slack, and Microsoft Teams.

- Reporting and Analytics

Jira offers robust reporting and analytics capabilities to track project performance and monitor team productivity. Built-in reports such as burndown charts, velocity charts, and sprint reports provide insights into project progress, sprint efficiency, and team workload.

- Integration and Extensibility

Jira's API and extensive marketplace of plugins and integrations enable seamless connectivity with third-party tools and systems.

2.3.3.3 Strengths of Jira

According to Atlassian (2021a), The Strengths of Jira are:

- Flexibility and Customization: One of Jira's key strengths lies in its flexibility and extensive customization options.
- Powerful Issue Tracking and Management: Jira excels in issue tracking and management, providing robust capabilities for creating, assigning, prioritizing, and tracking issues throughout their lifecycle.

- **Integration Ecosystem:** Jira integrates seamlessly with a wide range of development and collaboration tools, including Confluence, Bitbucket, GitHub, Jenkins, Slack, and Microsoft Teams.
- **Reporting and Analytics:** Jira offers comprehensive reporting and analytics features that provide insights into project performance, team productivity, and progress. Built-in reports such as burndown charts, velocity charts, sprint reports, and custom dashboards enable stakeholders to monitor key metrics, identify trends, and make data-driven decisions.

2.3.3.4 Weaknesses of Jira

According to Zhang (2013), the weaknesses of Jira are:

- **Complexity and Learning Curve:** Despite its flexibility, Jira can be complex to configure and use, particularly for new users or teams unfamiliar with Agile methodologies.
- **Performance Issues with Large Datasets**
- **Cost of Ownership:** While Jira offers various pricing plans, including cloud-based and self-hosted options, the total cost of ownership can be substantial.
- **Integration Challenges**
- **Dependency on Third-Party Plugins**

2.3.3.5 Conclusion on Jira

Jira, as a versatile Agile project management tool, excels in issue tracking, customization, and integration with development and collaboration tools. Its strengths include flexibility, Agile support, powerful issue management, and extensive reporting capabilities. However, challenges such as complexity, scalability concerns with large datasets, integration issues, and cost implications highlight areas for consideration and improvement.

2.3.4. Asana

According to Meyer (2015), Asana is a versatile project management tool that supports various project management methodologies, including Agile and Waterfall. It features task lists, timelines, and calendars to help teams plan and track their work. Asana is used by various organizations which include Uber, Pinterest, NASA, Spotify, and many others.

2.3.4.1 Technologies Used by Asana

According to Asana (2021), Asana employs a range of advanced technologies to provide a robust and efficient project management platform. The front end of Asana is built using React, a popular JavaScript library, which allows for a dynamic, responsive, and highly interactive user interface. It utilizes HTML5 for the semantic structure of web pages and CSS3 for styling and layout. The back end is primarily constructed with Scala running on the Java Virtual Machine (JVM) and uses MySQL as its primary relational database management system. Asana employs Web Sockets to enable instant updates and notifications across the platform. It also leverages cloud infrastructure and Apache Kafka for real-time data streaming and analytics. For security, Asana employs SSL/TLS to encrypt data transmitted between users and its servers, and it supports OAuth and SAML protocols for secure authentication.

2.3.4.2 How Asana Works

According to Asana (2021), The functionalities of Asana are:

- **Task Management:** At the heart of Asana is its task management system, which allows users to create tasks, assign them to team members, set due dates, and add descriptions and subtasks.

- **Projects and Workspaces:** Asana organizes work into projects and workspaces. Projects can be viewed in different formats, including lists, boards, calendars, and timelines. This flexibility helps teams visualize their work most effectively.
- **Collaboration Features:** Asana supports real-time collaboration through features such as task comments, mentions, and file attachments. Team members can communicate directly within tasks, ensuring that all relevant information is centralized and easily accessible.
- **Workflow Automation:** Asana includes automation features that streamline repetitive tasks and processes. Users can create custom rules to automate actions like task assignments, due date changes, and notifications, enhancing productivity and consistency.
- **Asana offers robust reporting tools** that allow users to track project progress, workload distribution, and team performance. Customizable dashboards and advanced search capabilities help users generate insights and make data-driven decisions.
- **Asana's user interface is user-friendly**, with a focus on reducing the cognitive load for users. The interface is clean and uncluttered, featuring drag-and-drop functionality, easy navigation, and quick access to frequently used features.
- **Asana leverages Web Sockets and real-time communication protocols** to ensure that updates are instantly reflected across all users' devices.
- **Integration Capabilities:** Asana integrates with a wide range of third-party applications, including Slack, Microsoft Teams, Google Drive, and GitHub.
- **Asana provides mobile applications for iOS and Android**, enabling users to manage tasks and collaborate on the go.
- **Asana offers extensive customization options**, allowing users to tailor the tool to their specific needs. Users can create custom fields, templates, and workflow rules to match their unique processes and preferences.
- **Asana provides comprehensive onboarding resources**, including tutorials, webinars, and a detailed help center. These resources help new users quickly become proficient with the tool, reducing the learning curve and enhancing user adoption.
- **Asana is designed to promote transparency and collaboration.** Teams can easily share project plans, track progress, and identify bottlenecks through shared dashboards and project views. This visibility helps keep everyone aligned and accountable.

2.3.4.3 Strengths of Asana

According to Asana (2021), the strengths of Asana are:

- **One of Asana's significant strengths is its ability to adapt to various workflows.** Users can create custom workflows that match their specific project management methodologies, whether they follow Agile, Waterfall, or hybrid models.
- **Multiple Project Views:** Asana offers multiple project views, including list, board, calendar, and timeline. This flexibility allows users to visualize their projects in the format that best suits their working style and needs.
- **Asana has a User-Friendly Interface** making it easy for new users to get started quickly

- The availability of mobile apps for iOS and Android extends Asana's usability, allowing users to manage tasks and collaborate on the go.
- **Real-Time Collaboration:** Asana facilitates real-time collaboration, ensuring that all team members are always on the same page.
- Asana promotes team transparency and accountability by providing visibility into who is responsible for what and by when. Shared project views and dashboards help teams stay aligned on project goals and timelines, fostering a culture of accountability.
- Asana integrates seamlessly with a wide range of third-party applications, including Slack, Microsoft Teams, Google Drive, and GitHub.
- Asana's automation features help streamline repetitive tasks and processes thereby improving efficiency and reducing the manual workload.
- Asana offers robust reporting tools that provide insights into project progress, team performance, and workload distribution.

2.3.4.4 Weaknesses of Asana

- According to Hughes (2019), while Asana is praised for its user-friendly interface, new users may still face a steep learning curve, especially when trying to utilize its advanced features fully. This complexity can lead to slower adoption rates within teams and may require additional training resources.
- According to Brown (2020), Asana lacks some of the advanced functionalities found in dedicated project management tools like Microsoft Project. Users seeking detailed dependency tracking, critical path analysis, or more sophisticated project forecasting may find Asana's offerings limited.
- According to Jones (2021), Asana's resource management capabilities are not as comprehensive as those offered by other project management tools. While it provides basic workload management features, it lacks detailed resource allocation, time tracking, and capacity planning.
- **Scalability Issues:** According to Smith (2021), Asana may experience performance issues when handling very large projects or a high volume of tasks. Users have reported slower load times and reduced responsiveness in such scenarios.

2.3.4.5 Conclusion on Asana

Asana is a versatile and effective project management tool that, when used thoughtfully, can significantly enhance team productivity and project outcomes. Its ongoing development and commitment to improving user experience ensure that it will continue to be a relevant and powerful tool in the project management landscape.

2.3.5 Wrike

Based on Wrike (2020), Wrike is a comprehensive project management tool that combines project planning, collaboration, and reporting. It supports various methodologies, including Agile, Waterfall, and hybrid approaches. Wrike works by enabling users to create tasks, assign responsibilities, set deadlines, and track progress through Gantt charts and dashboards. Its strengths include robust reporting, time tracking, and seamless integration with other tools. However, the complexity and range of features can be overwhelming for new users, and its pricing may be prohibitive for smaller teams (Kerzner, 2017).

2.3.5.1 Technologies used by Wrike

Wrike employs a range of advanced technologies. The front end of Wrike is built using AngularJS, a robust JavaScript framework that enables the creation of dynamic, responsive user interfaces, providing real-time updates and interactions. On the back end, Wrike uses Node.js for its server-side operations. For data storage and management, Wrike utilizes PostgreSQL, a powerful relational database system known for its reliability. Additionally, Wrike integrates with Amazon Web Services (AWS) to ensure robust cloud infrastructure, offering scalability, security, and high availability for its users. Wrike also uses Web Sockets, ensuring instant updates and communication between team members.

2.3.5.2 How Wrike Works

According to Wrike (2021), the functionalities of Wrike are:

- **Task and Project Management:** Users can create tasks, assign them to team members, set due dates, and prioritize them according to urgency and importance. Tasks can be grouped into projects and folders, allowing for organized and hierarchical management of work. Each task can include subtasks, descriptions, attachments, and comments, providing comprehensive details and context.
- **Wrike allows users to create custom workflows tailored to their specific needs.** Custom statuses can be defined for different stages of a project, enabling teams to track progress and identify bottlenecks effectively.
- **Gantt Charts and Timeline Views:** Wrike offers robust timeline and Gantt chart views, which help in visualizing project schedules and task dependencies.
- **Dashboards and Reporting:** Wrike provides customizable dashboards and reporting tools that offer insights into project performance, team productivity, and workload distribution.
- **Wrike's user interface is designed to be intuitive and user-friendly.** The platform employs a clean and organized layout, making it easy for users to navigate and find the features they need. The use of drag-and-drop functionality and quick access to frequently used tools enhances the overall user experience.
- **Mobile Accessibility:** Wrike offers mobile apps for iOS and Android, allowing users to manage their tasks and collaborate on the go. The mobile apps provide nearly the same functionality as the desktop version, ensuring seamless work continuity across devices.
- **Real-Time Collaboration:** Wrike supports real-time collaboration, ensuring that team members are always working with the most up-to-date information. Features like live editing, task comments, and facilitates instant communication and collaboration within the platform.
- **File Sharing and Document Management:** Wrike integrates with various file storage services like Google Drive, Dropbox, and OneDrive, enabling easy file sharing and document management. Users can attach files to tasks and projects, ensuring that all relevant documents are accessible in one place.

- Wrike integrates with a wide range of third-party applications, including Slack, Salesforce, Microsoft Teams, and more. These integrations allow users to connect Wrike with other essential tools, creating a cohesive workflow and enhancing productivity.
- Automation and Workflows: Wrike includes automation features that help streamline repetitive tasks and processes.
- Wrike implements robust security measures to protect user data. This includes data encryption, regular security audits, and compliance with industry standards such as GDPR and ISO/IEC 27001.

2.3.5.3 Strengths of Wrike

- Comprehensive Task and Project Management: Wrike offers multiple project views, including list, board (Kanban), Gantt chart, and calendar views. This flexibility allows users to visualize their projects in the most effective format for their workflow, enhancing both individual and team productivity.
- Custom Workflows and Automation: Users can define custom statuses and set up automation rules to streamline processes, reduce manual work, and ensure consistency in project management.
- Wrike supports live editing and real-time updates, ensuring that all team members are working with the latest information. This feature is crucial for maintaining team alignment and facilitating immediate collaboration on tasks and projects.
- Wrike includes built-in communication tools such as task comments and document attachments. These tools centralize project-related communication, reducing the need for external messaging apps and improving information flow within the team.
- Wrike's user interface is user-friendly Interface which helps users quickly become proficient with the platform.
- Mobile Accessibility: Wrike's mobile applications for iOS and Android extend its usability by allowing users to manage tasks and collaborate from anywhere.
- Wrike integrates with a wide array of third-party applications, including Slack, Microsoft Teams, Google Drive, and Salesforce. These integrations allow users to connect Wrike with their existing tools, creating a more cohesive and efficient workflow.
- Reporting and Analytics. Wrike offers robust reporting and analytics features, including customizable dashboards and detailed reports. Users can track key performance metrics, monitor project progress, and generate insights to inform decision-making.
- Workload Management: The platform provides visual tools to monitor team members' workloads and ensure even distribution of tasks, promoting a healthier work environment.
- Robust Security Measures: These measures ensure that user data is protected, and privacy is maintained

2.3.5.4 Weakness of Wrike

- According to Smith (2020), New users often find the platform overwhelming due to its extensive feature set and complex interface.
- High Cost for Premium Features: Wrike's pricing model can be a limitation, especially for small businesses or startups with limited budgets.

- **Limited Customization Options:** Although Wrike allows for some degree of customization, it may not be sufficient for organizations with highly specific needs.
- **Slow Performance with Large Projects:** According to White (2021) Wrike can experience performance issues when handling very large projects or a high volume of tasks. Users have reported slower load times and reduced responsiveness in such scenarios, which can be detrimental to productivity and user satisfaction.
- **Scalability Challenges:** According to Davis (2020), Wrike is designed to support teams of various sizes, and scalability can become a problem for very large organizations. As the number of projects and tasks increases, the platform may struggle to maintain optimal performance, leading to potential workflow bottlenecks.

2.3.5.5 Conclusion on Wrike

Wrike's comprehensive feature set and real-time collaboration capabilities make it a powerful tool for enhancing project management and team productivity. By addressing its weaknesses through training, strategic planning, and possibly integrating complementary tools, organizations can leverage Wrike's strengths to achieve better project outcomes. Understanding both the advantages and drawbacks of Wrike is crucial for teams to make informed decisions about its suitability for their specific needs and to maximize the platform's potential benefits.

2.3.6 Smartsheet

According to Smartsheet (2020), Smartsheet is a project management and collaboration tool that combines the ease of use of spreadsheets with advanced project management features. It supports a variety of methodologies, including Agile and Waterfall. Smartsheet works by allowing users to create sheets to manage tasks, set deadlines, and collaborate in real time.

2.3.6.1 Technologies used by Smartsheet

Based on Slack (2021), Smartsheet leverages a range of advanced technologies to provide a robust and user-friendly platform. Built primarily on a web-based architecture, Smartsheet uses JavaScript and HTML5 for its front-end development. On the back end, it utilizes Java and MySQL. Smartsheet also integrates with numerous third-party applications through APIs, supporting seamless connectivity with tools like Microsoft Office 365, Google Workspace, and Slack. Additionally, Real-time collaboration is facilitated through Web Sockets, enabling instant updates and communication between users.

2.3.6.2 How Smartsheet Works

- **Task and Project Management:** At its core, Smartsheet operates similarly to a traditional spreadsheet, but with enhanced project management capabilities. Users can create and manage tasks, assign them to team members, set due dates, and track progress through various project views such as grid, Gantt chart, card (Kanban), and calendar views (Smith, 2020).
- According to Jones (2019), Smartsheet supports the automation of repetitive tasks through its workflow automation feature. Users can set up automated actions triggered by specific events, such as task assignments, status changes, and notifications. This helps streamline processes, reduce manual work, and ensure consistency across projects.
- Smartsheet's user interface is designed to resemble a traditional spreadsheet, making it accessible and familiar to users. This design choice lowers the learning curve and allows users to leverage existing spreadsheet skills while benefiting from additional project management features (Brown, 2019).
- Based on Miller (2021), Smartsheet provides extensive customization options, allowing users to tailor sheets to their specific needs. Users can create custom fields, forms, and templates, ensuring that the platform can adapt to diverse workflows and requirements.

- Collaboration Tools: Smartsheet supports real-time collaboration, enabling multiple users to edit and update sheets simultaneously. This feature ensures that all team members have access to the most up-to-date information and can collaborate effectively without delays (Davis, 2020).
- Smartsheet offers an API that enables custom integrations and automation. This flexibility allows organizations to tailor the platform to their specific needs and integrate it with other systems and applications (Jones, 2021).
- Smartsheet's resource management features help teams allocate and manage resources effectively. The platform provides visual tools to monitor workload distribution, ensuring that tasks are balanced, and team members are not overburdened (Smith, 2021).

2.3.6.3 Strength of Smartsheet

- According to Brown (2020), One of Smartsheet's primary strengths is its familiar spreadsheet-like interface, which makes it accessible to users who are comfortable with traditional spreadsheets such as Excel.
- Smartsheet allows users to view their projects in various formats, including grid, Gantt chart, card (Kanban), and calendar views. This flexibility enables users to choose the view that best suits their workflow and project management style (Jones, 2021).
- Smartsheet supports real-time collaboration, enabling multiple users to work on the same sheet simultaneously. This feature ensures that team members always have access to the most up-to-date information, enhancing coordination and reducing miscommunication (Davis, 2020).
- Smartsheet integrates seamlessly with a wide range of third-party applications, including Microsoft Office 365, Google Workspace, Slack, and Jira which allows users to connect Smartsheet with their existing tools, creating a unified and efficient workflow (Smith, 2020).
- Smartsheet's automation capabilities are a significant strength. Users can set up automated workflows to handle repetitive tasks, trigger alerts, and update statuses based on predefined rules (Miller, 2021).
- Smartsheet offers robust reporting and analytics tools, including customizable dashboards and detailed reports.
- Smartsheet provides comprehensive resource management tools that help teams allocate resources effectively and balance workloads. Visual tools such as resource views and allocation reports enable project managers to ensure that tasks are evenly distributed and that team members are not overburdened (White, 2020).
- Smartsheet's interface is designed to be intuitive and user-friendly, making it easy for users to navigate and utilize its features effectively.
- Mobile Accessibility: Smartsheet offers mobile applications for both iOS and Android, allowing users to manage tasks and collaborate on the go (Brown, 2020).
- Smartsheet implements stringent security protocols, including data encryption, regular security audits, and compliance with industry standards such as GDPR and ISO/IEC 27001. These measures ensure that user data is protected, and privacy is maintained (Wrike, 2021).

2.3.6.4 Weaknesses of Smartsheet

- Complexity in the use of advanced features and requirements makes it for the new users.
- High cost and Pricing Structure makes it hard for small businesses or startups with limited budgets. This makes it less accessible for smaller organizations or those with tight financial constraints (Smith, 2019).
- Integration Limitations: Compatibility issues and the need for additional configuration can hinder the smooth operation of workflows, making it difficult to create a fully integrated project management ecosystem (Brown, 2019).
- Limited Customization Options: There are limitations in how extensively users can tailor the platform to their specific needs. Advanced customization often requires technical expertise or third-party tools, which can be a disadvantage for teams that require highly specialized workflows or features (Davis, 2020).
- Performance issues with Large Data Sets: Smartsheet can experience performance issues when handling large data sets or complex projects with many dependencies. Users have reported slower load times and reduced responsiveness (Hughes, 2021).
- Limited Mobile Features: While Smartsheet provides mobile applications for iOS and Android, the mobile version does not offer the full functionality available on the desktop. This limitation can hinder productivity for users who rely on mobile devices to manage their tasks and projects on the go (White, 2020).

2.3.6.5 Conclusion on Smartsheet

While Smartsheet offers a comprehensive suite of features that can significantly benefit project management processes, organizations must carefully weigh these advantages against the potential drawbacks. For teams seeking a powerful and flexible tool, Smartsheet can be highly effective, provided they are prepared to invest the necessary time and resources to address its limitations. By doing so, they can leverage Smartsheet's capabilities to enhance their project management practices and achieve better project outcomes.

2.3.4 General conclusion

ICT project management systems play a pivotal role in modern organizations by providing robust frameworks for planning, executing, monitoring, and controlling projects. These systems leverage advanced technologies such as cloud computing, AI, and integration capabilities to enhance collaboration, streamline workflows, and improve decision-making processes.

2.4 Comparison of related systems

Systems	strengths	weaknesses	Technology
Trello	<ul style="list-style-type: none"> • User friendly • Flexibility • Facilitates team communication and collaboration • Supports numerous integrations with other tools and applications. • Mobile Accessibility • Trello is scalable and can be used for a wide range of projects • Enhanced Visibility and Transparency • Trello enables custom integrations and automate workflows. • Users can add Power-Ups for calendar views, time tracking, reporting. 	<ul style="list-style-type: none"> • Limited Advanced Features for reporting. • less efficient for very large projects with numerous tasks and dependencies. 	<ul style="list-style-type: none"> • web technologies like HTML5, CSS3, and JavaScript. • frameworks such as React for a dynamic and responsive user interface • MongoDB for its primary database
PMIS	<ul style="list-style-type: none"> • PMIS provides real-time visibility into project progress. • Improved communication and collaboration among team members and stakeholders. • Enhanced data consistency 	<ul style="list-style-type: none"> • High initial costs of implementation. • Resistance to change among stakeholders and users. • Integration complexities 	<ul style="list-style-type: none"> • SAP and Oracle • Building Information Modeling (BIM) • Cloud computing. • The Internet of Things

	<ul style="list-style-type: none"> • PMIS supports compliance with regulatory requirements and industry standards. 	<ul style="list-style-type: none"> • cyber threats remain a critical concern for organizations deploying PMIS 	
Jira	<ul style="list-style-type: none"> • Flexibility and extensive customization options • Powerful Issue Tracking and Management • Jira integrates seamlessly with a wide range of development and collaboration tools • Jira offers comprehensive reporting and analytics features. 	<ul style="list-style-type: none"> • Complexity and Learning Curve. • Performance Issues with Large Datasets • High cost of Ownership. • Integration Challenges • Dependency on Third-Party Plugins 	<ul style="list-style-type: none"> • Modern web- based technologies e.g. HTML5, CSS3 • JavaScript frameworks like React or Angular, for dynamic rendering and interactivity • PostgreSQL, MySQL, or Oracle. • Compliance certifications such as SOC 2 and ISO 27001.

Asana	<ul style="list-style-type: none"> • Ability to adapt to various workflows • Multiple Project Views, including list, board, calendar, and timeline. • Asana has a User-Friendly Interface making it easy for new users. • The availability of mobile. • Real-Time Collaboration • Asana promotes team transparency and accountability • Asana integrates seamlessly with a wide range of third-party applications • Asana’s automation features help streamline repetitive tasks and processes. • Asana offers robust reporting tools 	<ul style="list-style-type: none"> • Complexity due to the steep learning curve. • Asana lacks some of the advanced functionalities for more sophisticated projects. • It lacks detailed resource allocation, time tracking, and capacity planning. • slower load times and reduced responsiveness in such scenarios. 	<ul style="list-style-type: none"> • JavaScript • HTML5 for the semantic structure of web pages and • CSS3 for styling and layout. • Java Virtual Machine (JVM) and MySQL a • Asana employs SSL/TLS to encrypt data transmitted between users and its servers
Wrike	<ul style="list-style-type: none"> • Comprehensive Task and Project Management • Custom Workflows and Automation • Wrike supports live editing and real-time updates • Wrike includes built-in communication tools such as task comments and document attachments. • Wrike’s user interface is user-friendly • Mobile Accessibility • Wrike integrates with a wide array of third-party applications, • Wrike offers robust reporting and analytics features • Workload Management • Robust Security Measures 	<ul style="list-style-type: none"> • Extensive feature set and complex interface • High Cost for Premium Features • Limited Customization Options of tasks. • Users have reported slower load times for big projects. • Scalability Challenges 	<ul style="list-style-type: none"> • AngularJS, a robust JavaScript • Node.js for its server-side operations. • PostgreSQL • Web Sockets

Smartsheet	<ul style="list-style-type: none"> • Accessible to users who are comfortable with traditional spreadsheets such as Excel. • Smartsheet’s flexibility enables users to choose the view that best suits their workflow and project management • Smartsheet supports real-time collaboration, enabling multiple users to work on the same sheet simultaneously. • Smartsheet integrates seamlessly with a wide range of third-party applications. • Smartsheet's automation capabilities are a significant strength. • Smartsheet offers robust reporting and analytics tools • Smartsheet provides comprehensive resource management • Smartsheet's interface is user-friendly, • Mobile Accessibility • Smartsheet implements stringent security protocols 	<ul style="list-style-type: none"> • Complexity in the use of advanced features. • High cost and Pricing Structure. • Integration Limitations • Limited Customization Options. • Performance issues with Large Data Sets • Limited Mobile Features. 	<ul style="list-style-type: none"> • JavaScript andHTML5 • MySQL. • APIs • Web Sockets
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Chapter Three

Research Methodology

Topic: ICT PROJECT MANAGEMENT SYSTEM

3.0 Introduction

The methodology emphasizes the research frameworks, data collection methods, analytical techniques, and tools to be employed in the design and implementation of the system. It aligns with the specific objectives of the proposed ICT Project Management System.

3.1 System Study and Analysis

Different techniques were used to determine the system and user requirements to achieve the main objective of developing the ICT Project Management System. This helped to determine what the proposed system was expected to do and how it would function based on the system's requirements

3.2 Data collection techniques

3.2.1 Observation

As a researcher, visited the ICT Hub and physically observed the whole process of how the ICT projects are managed from the point of entry of the innovators to when the projects are successful and implemented, and noted down my observations from the field.

3.2.2 Interviews

An interview is a qualitative data collection technique used to gather detailed information through direct interaction between the interviewer and the interviewee. As a researcher, I conducted interviews using both closed and open-ended questions with different stakeholders and innovators at the ICT Hub to identify the functional and non-functional requirements for the proposed ICT Project Management System to satisfy user needs. Asked the stakeholders and innovators about the functionality of the existing system to identify the problems, strengths, and process flow of the existing system.

3.2.3 Document analysis

Read and studied the existing process documents of the existing system to understand more of how it functions and attain the necessary information required to help in determining the system requirements of the proposed system to be developed.

3.2.4 Questionnaires

As a researcher, designed questions were given out to the Hub stakeholders and ICT innovators where I received feedback and revised it to gather the relevant information about the existing system, and determined the challenges of the system to be solved in the proposed ICT Project Management System to be developed.

3.3 Data Analysis Methods

3.3.1

As a researcher, used analysis application software such as Microsoft Word and Microsoft Excel spreadsheets to record data from the observations and interviews like taking note of the process the innovators go through to update the stakeholders about the project's progress and how the stakeholders grade their project progress.

3.3.2. Thematic Analysis

Thematic analysis was used to analyze qualitative data from interviews. This method involved identifying, analyzing, and reporting patterns within the data. It helped in understanding stakeholders' key concerns and requirements, which informed the system design.

3.4 System Analysis

System analysis was conducted to understand the current state of project management practices and identify areas for improvement. This involved:

3.4.1. Requirements Analysis

Requirements analysis was performed to gather detailed information about the needs of the users. This included identifying functional and non-functional requirements, which were then documented and prioritized based on their importance and feasibility.

3.4.2. Workflow Analysis

Current project management workflows were analyzed to identify inefficiencies and bottlenecks. This involved mapping out existing processes and identifying areas where automation and optimization could improve productivity and accuracy.

3.4.3. Gap Analysis

A gap analysis was conducted to compare the current capabilities of existing project management systems with the desired capabilities of the proposed IPMS. This analysis highlighted the shortcomings of current systems and provided insights into the features and functionalities needed to address these gaps.

3.5 System Design and Implementation

3.5.1 Requirements Gathering

Based on the data collected from interviews, observation, and document analysis, detailed system requirements were gathered. These requirements were categorized into functional and non-functional requirements, ensuring a comprehensive understanding of the system needs.

3.5.1.1 Functional Requirements

Functional requirements describe the specific behaviors or functions of the system. They define what the system should do and are derived directly from the needs and objectives identified during the requirements analysis phase. Key functional requirements for the ICT Project Management System include:

- **User Management:** The system should support user registration, authentication, and authorization. Different user roles should have appropriate access rights.
- **Project Planning:** The system should enable users to create, update, and manage project plans, including setting timelines, milestones, and deliverables.
- **Task Management:** Users should be able to create, assign, track, and update tasks. This includes setting priorities, deadlines, and dependencies between tasks.
- **Resource Management:** The system should facilitate the allocation and management of resources to various tasks and projects.
- **Communication Tools:** Integrated communication tools such as messaging, discussion forums, and email notifications to facilitate collaboration among team members.
- **Document Management:** Users should be able to upload, store, and manage project-related documents within the system.

3.5.5.1 Non-Functional Requirements

Non-functional requirements define the system's quality attributes, performance criteria, and operational constraints. They ensure the system's reliability, usability, and efficiency. Key non-functional requirements for the ICT Project Management System include:

- **Scalability:** The system should be able to handle an increasing number of users, projects, and tasks without performance degradation.
- **Performance:** The system should provide fast response times and handle high volumes of data and transactions efficiently.
- **Security:** The system must ensure data confidentiality, integrity, and availability. This includes implementing robust access controls, data encryption, and secure communication protocols.
- **Usability:** The system should have an intuitive and user-friendly interface to ensure ease of use for all user types. This includes clear navigation, helpful tooltips, and responsive design.
- **Reliability:** The system should operate reliably with minimal downtime. This includes implementing backup and recovery mechanisms to prevent data loss.
- **Maintainability:** The system should be designed for easy maintenance and updates. This includes modular architecture and thorough documentation.
- **Compliance:** The system should comply with relevant industry standards and regulations, such as data protection laws and project management best practices.

3.5.2. System Architecture

The system architecture was designed to meet the specified requirements. The architecture included the overall structure of the system, the components, and their interactions. The design aimed to ensure automation, scalability, reliability, and ease of maintenance.

3.5.3. Development Tools

Various development tools and technologies were used to implement the system. These included:

- **Programming Languages:** JavaScript, Python, HTML, and PHP for front-end and back-end development.
- **Frameworks:** Django for developing responsive and robust applications.
- **Database Management:** MySQL for managing the system's data.
- **VPN and firewalls** to protect the system from cyber threats.

3.5.4. Testing

The system underwent rigorous testing to ensure it met all requirements and functioned correctly. This included unit testing, integration testing, system testing, and user acceptance testing. Feedback from stakeholders was incorporated to refine and improve the system.

3.5.5. Validation

Validation was an assessment of the ICT Project management system which ensured that the system meets the intended purpose and needs of system users. Validation was done to check whether the System meets the identified user, functional, and non-functional requirements.

Validation was done by providing the system to end user representatives who tried out the system to verify that it meets the intended user requirements

3.6 Conclusion

The methodology employed in this project ensured a systematic approach to designing and implementing the ICT Project Management System. By combining qualitative and quantitative research methods, detailed and accurate data were gathered to inform the system design. The use of appropriate data collection and analysis techniques, along with rigorous testing, ensured the development of a reliable and effective system that meets the needs of its users. The inclusion of a thorough system analysis provided a clear understanding of the current project management landscape, guiding the development of a system that addresses existing gaps and improves overall project management efficiency.

Chapter Four

4.0 System Study, Analysis, and Design

This chapter concerns the study of the existing system, analysis of the requirements for the system, process and data modeling.

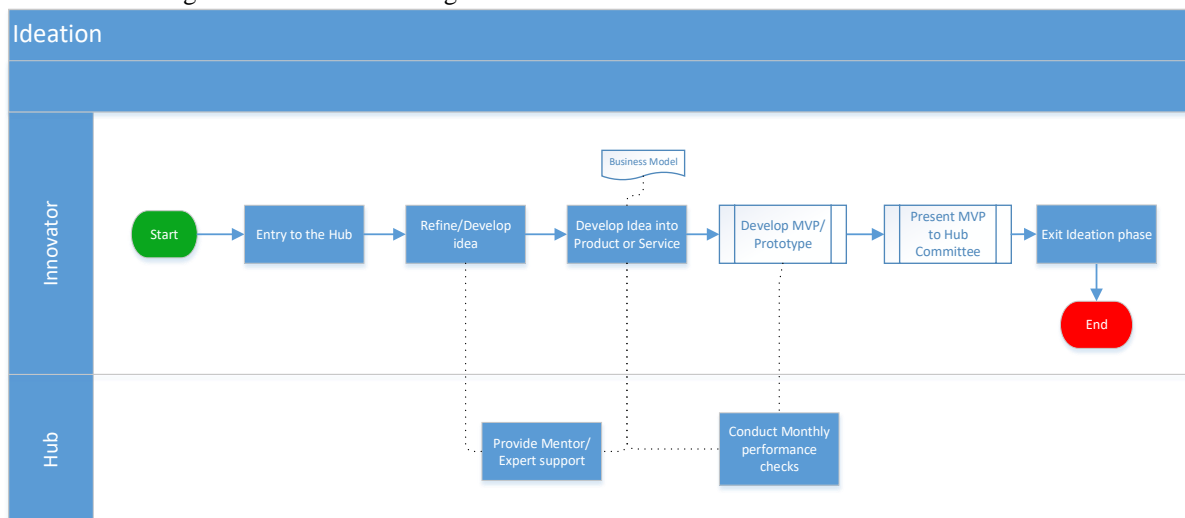
4.1 The study of the Existing System

From the data gathered about the existing project management system through interviews, observation and review of existing documents (documentation review). As a researcher, found out the system only allows the innovators to apply for space and once considered pitches are made physically and the performance is awarded during and after the pitches on the performance of the projects. Thus, this has brought about delays hence the need for an ICT Project Management System.

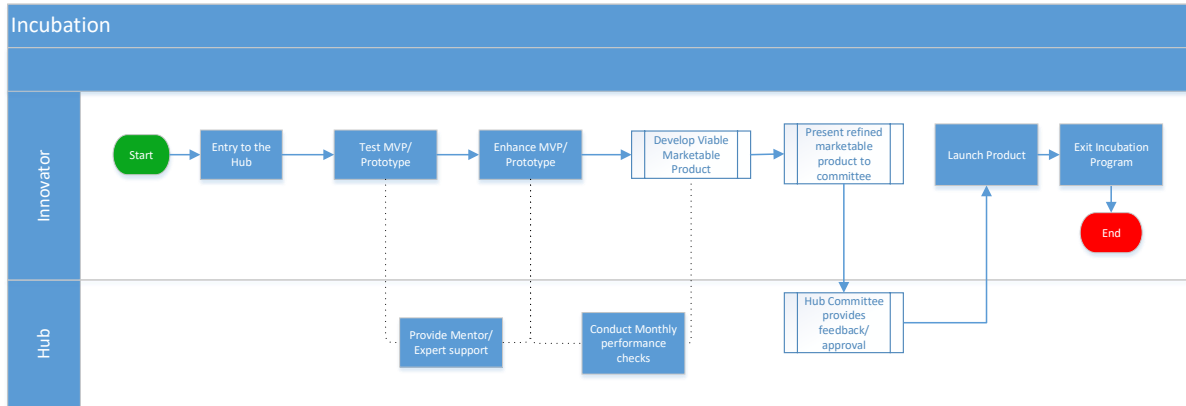
Further analysis of the existing ICT Project Management System yielded flow charts that show the project management processes right from space application by the innovators to fully being Hub members of the National ICT Innovation Hub and tracking of their projects while in the Hub until the exit from the hub(see figures in 4.1)

4.1 Workflow for the ICT project Management Processes

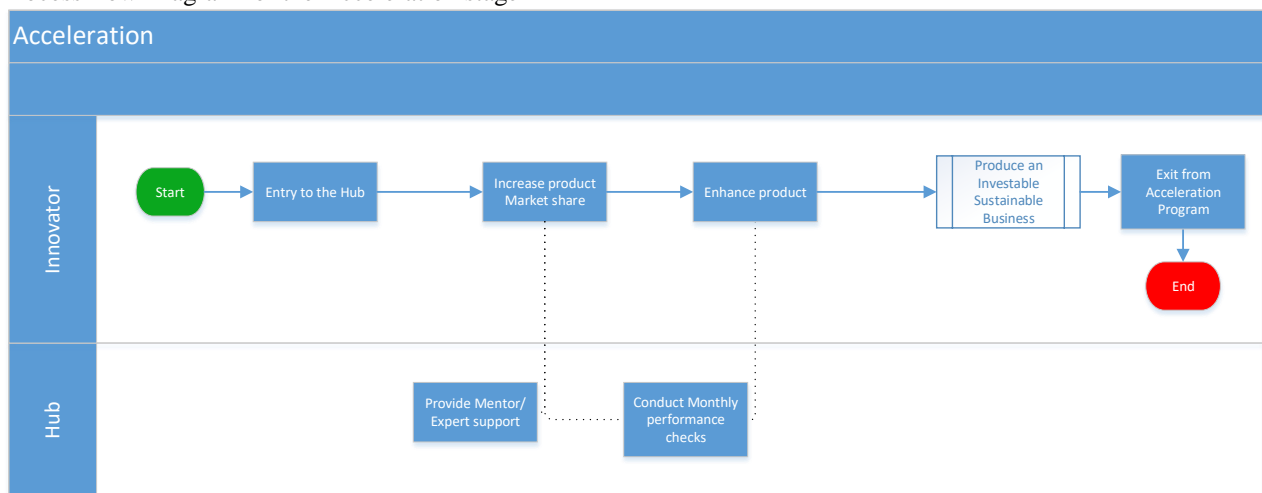
Process flow Diagram for the ideation stage



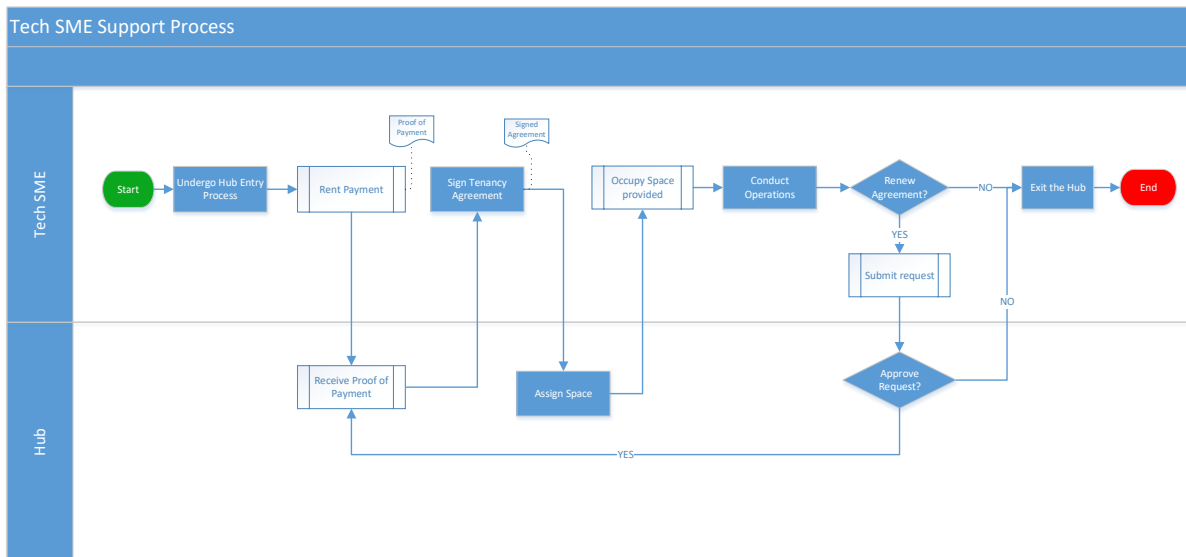
Process flow Diagram for the incubation stage



Process flow Diagram for the Acceleration stage



Process flow Diagram for the Tech SME Support stage



4.1.2 Strength of the Existing System

- I. Innovators can apply for space by filling out the application forms at every innovation stage.
- II. The existing system has a noticeboard that shows the upcoming events and programs at the Hub
- III. It enables one to book space in case of any event

4.1.3 Weakness of Existing System

- I. The existing system lacks instant verification once the applicant signs-up there is congestion since there are no access controls
- II. Innovators are unable to track their applications
- III. The system does not enable real-time communication

4.2 Data analysis results

Different data collection techniques were used by the researcher to collect data that was analyzed to obtain accurate information and generate reports. The researcher was able to find out the different challenges that are associated with the current ICT project management system.

The major challenge faced with the current system is that it does not involve the project tracking features and delays the decision-making and processes since the stakeholders must do the physical pitching before making some decisions. An example of an analysis of the challenges associated with the current system is shown in Table 4.2.1.

4.2.1 The tabular representation of the challenges associated with the existing ICT Project management system

Table 1: Challenges associated with the current system.

Challenges	Number of respondents out of 5	Percentage of respondents
Poor integration with other tools	4	80
Limited functionality	4	80
Performance issues	3	60

4.2.2 The Graphical Representation of the Challenges faced by the existing ICT Project management system.

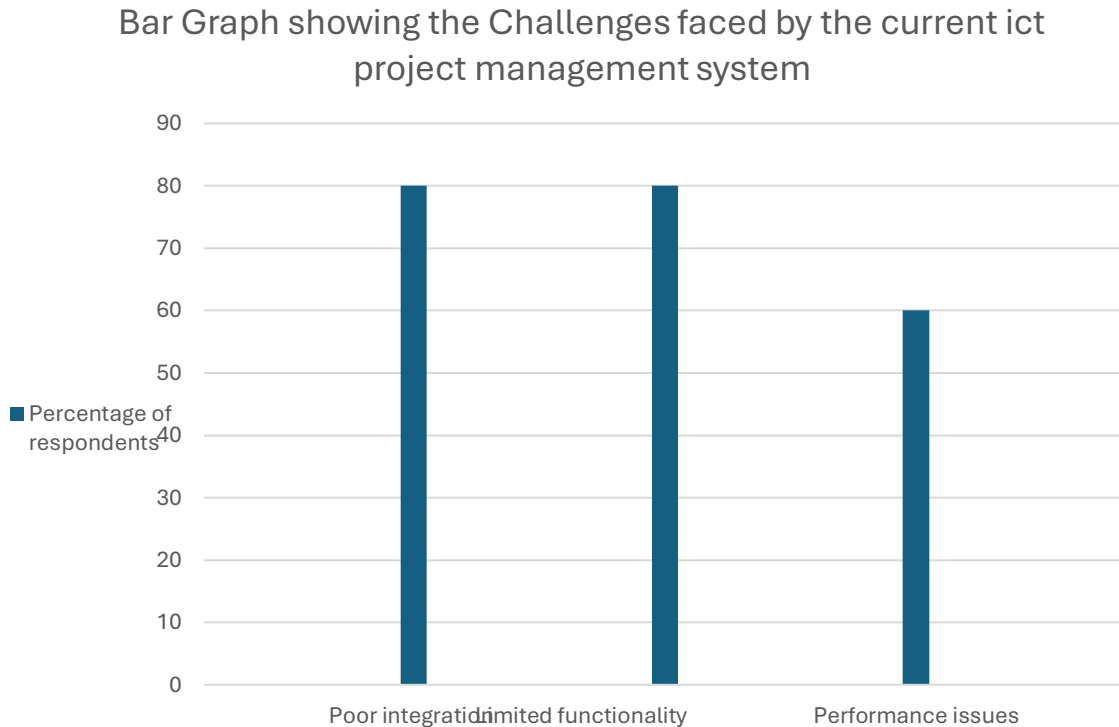


Figure 4. 1: A graphical presentation of the challenges faced by the existing ICT project management system.

4.2.1 Non-functional Requirements

The following are the user services the system is expected to provide and the constraints under which it must operate.

- I. The system should have a user-friendly interface with intuitive navigation.
- II. The system should be capable of handling growing numbers of users and projects
- III. The system should have fast response times and minimal downtime
- IV. The system should enable authentication users.

4.2.2 Functional requirements

The functional requirements define the specific features and functions the system should provide to meet the needs of its users, and these include the following:

- I. Task Management: Ability to create, assign, prioritize, and track tasks across multiple projects.
- II. Milestone Tracking: Set and monitor milestones to ensure project progress aligns with timelines.
- III. Resource Allocation: Assign and manage resources across projects.
- IV. Team Collaboration Tools: Facilitate communication between team members via chat, forums, or message boards.
- V. File Sharing: Securely upload, share, and manage project-related documents and files.
- VI. Progress Reports: Generate regular reports on project status, task completion, resource usage, and timelines.
- VII. Performance Analytics: Analyze team performance, project efficiency, and bottlenecks.
- VIII. User Authentication: Secure login with options for single sign-on and multi-factor authentication.
- IX. User Management: Manage user profiles, assign roles, and set permissions for accessing different system modules.
- X. Document Management: Centralized repository for storing, categorizing, and retrieving project documents.

XI. Responsive Design: Ensure the system interface is accessible and functional on mobile devices and tablets.

4.2.3 System Requirement

System requirements specify the hardware and software specifications necessary for a system or application to function effectively. These requirements ensure that the system runs smoothly, meets performance expectations, and provides a good user experience.

4.2.3.1 Hardware Requirements

Table 2: Hardware requirements

Hardware component	System Requirements	Justification
Processor	Intel Core i5 or above	A Core i5 or higher provides the necessary processing power to efficiently manage multiple tasks, project data, and user interactions typical in an ICT project management system.
Processor Speed	2.5 GHz or above	This clock speed ensures smooth operation of the system, handling concurrent processes and complex project management functionalities without lag.
Memory (RAM)	8 GB or above	Sufficient RAM is crucial for handling multiple projects, tasks, and data simultaneously, providing a responsive and efficient user experience.
Disk Space	250 GB or above	Adequate storage is required to accommodate the system software, project data, documents, and backups, ensuring the system can scale with project demands.
Graphics	Integrated or Dedicated GPU	A basic integrated GPU is sufficient for standard operations, but a dedicated GPU may be recommended if the system handles large datasets, advanced reporting, or graphical visualization.
Network	10/100/1000 Mbps Ethernet	High-speed network connectivity is necessary for real-time collaboration, data syncing, and accessing cloud-based features.

4.2.4.2 Software Requirements

Table 3: Software requirements

Software Component	System Requirement	Justification
Operating System for the Server	Windows Server 2015 or above	Windows Server 2015 provides robust security, improved performance, and advanced features like containerization and Hyper-V for managing complex ICT environments.
Operating System for the Client PC	Windows 10 or above	Windows 10 offers better security, stability, and compatibility with modern software applications, making it suitable for business desktops and laptops.
Web Server	Apache Web Server Version 2.4 or Nginx	Apache 2.4 and Nginx are widely used, highly configurable web servers known for their performance, security, and compatibility with modern web applications.
Web Browser	Latest versions of Chrome, Firefox, or Edge	These browsers are compatible with modern web standards, provide better security, and ensure optimal performance when accessing web-based project management tools.
Database Management System	MySQL Server Version 8.0 or PostgreSQL	MySQL 8.0 and PostgreSQL are both powerful, open-source RDBMSs that provide robust features for managing complex project data, ensuring data integrity and multi-user access.

4.3 System Design

In the system design phase, process modeling involved the use of Data Flow Diagrams (DFD), and Data modeling involved the use of Entity Relationship Diagrams (ERD).

4.3.1 Architectural Design for the System

The architectural design illustrates how the ICT Project Management System (ICTPMS) is composed of various subsystems, including Project Data Collection, Data Processing, Data Storage, and Data Display. The figure below presents an architectural diagram of the ICT Project Management System.

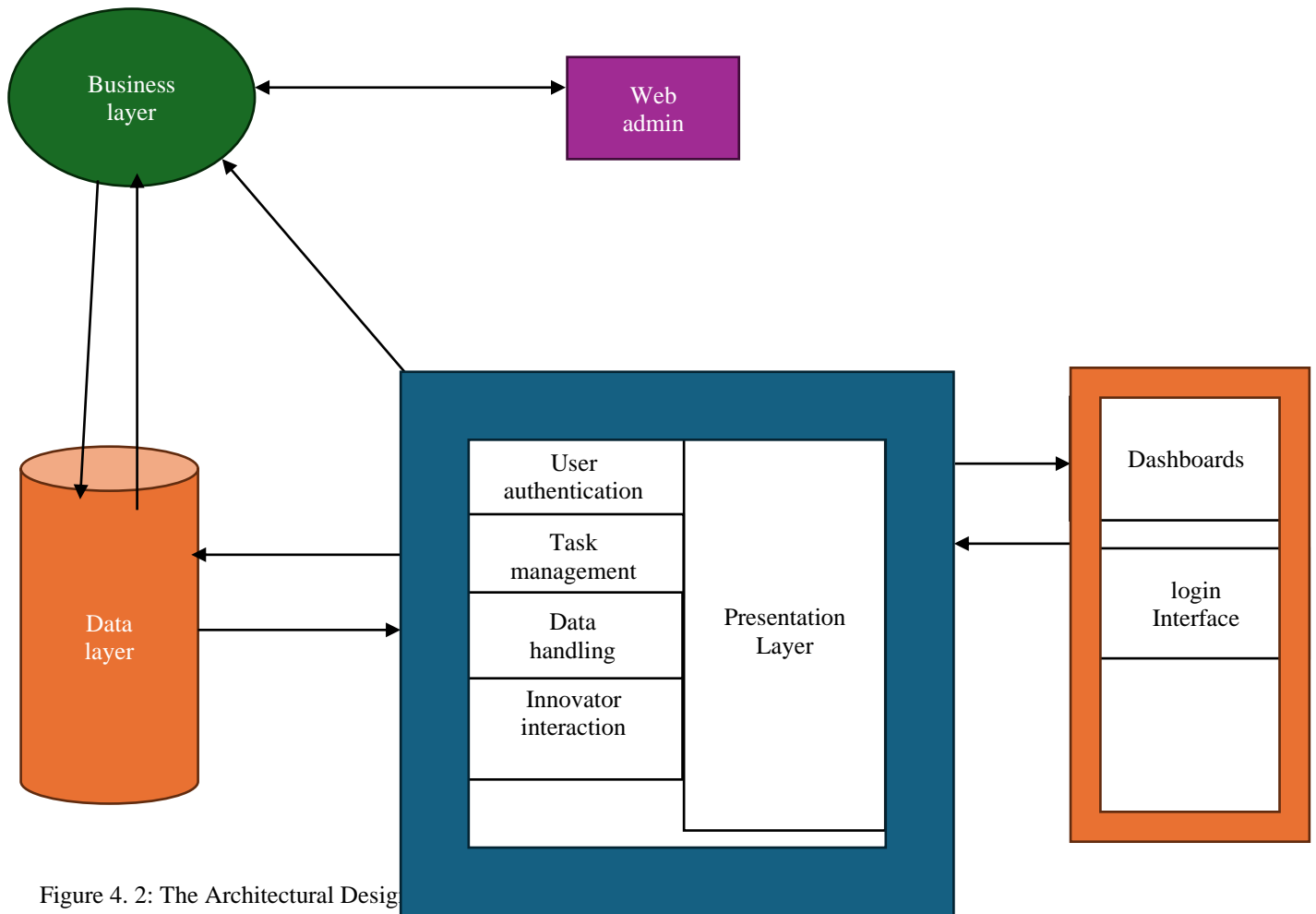


Figure 4. 2: The Architectural Design

4.3.3 Data Flow Diagrams (DFD).

4.3.3.1 The Context Level DFD

users sign up and log into the project management system and when the user is authenticated, the Innovator applies once the innovator is accepted, and tasks are assigned he can update the progress for the project managers to track the performance. The administrator also logs into the system and when authenticated can assign tasks to team members

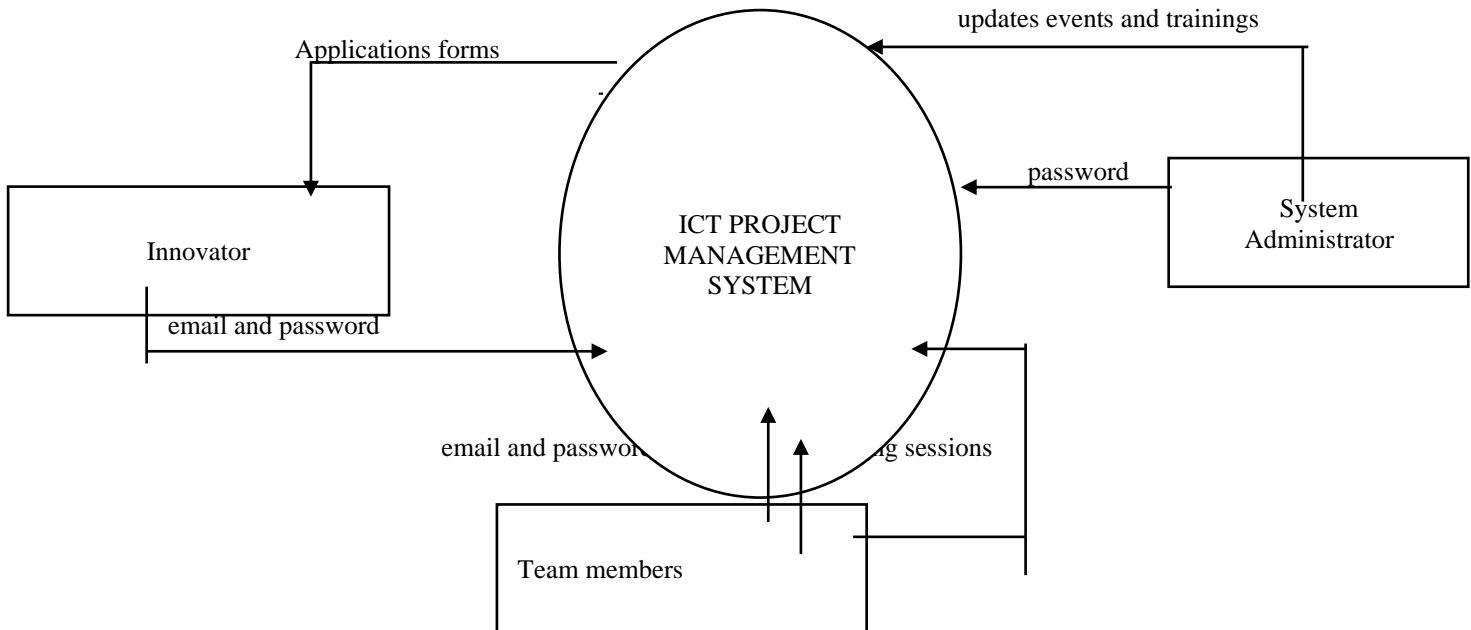
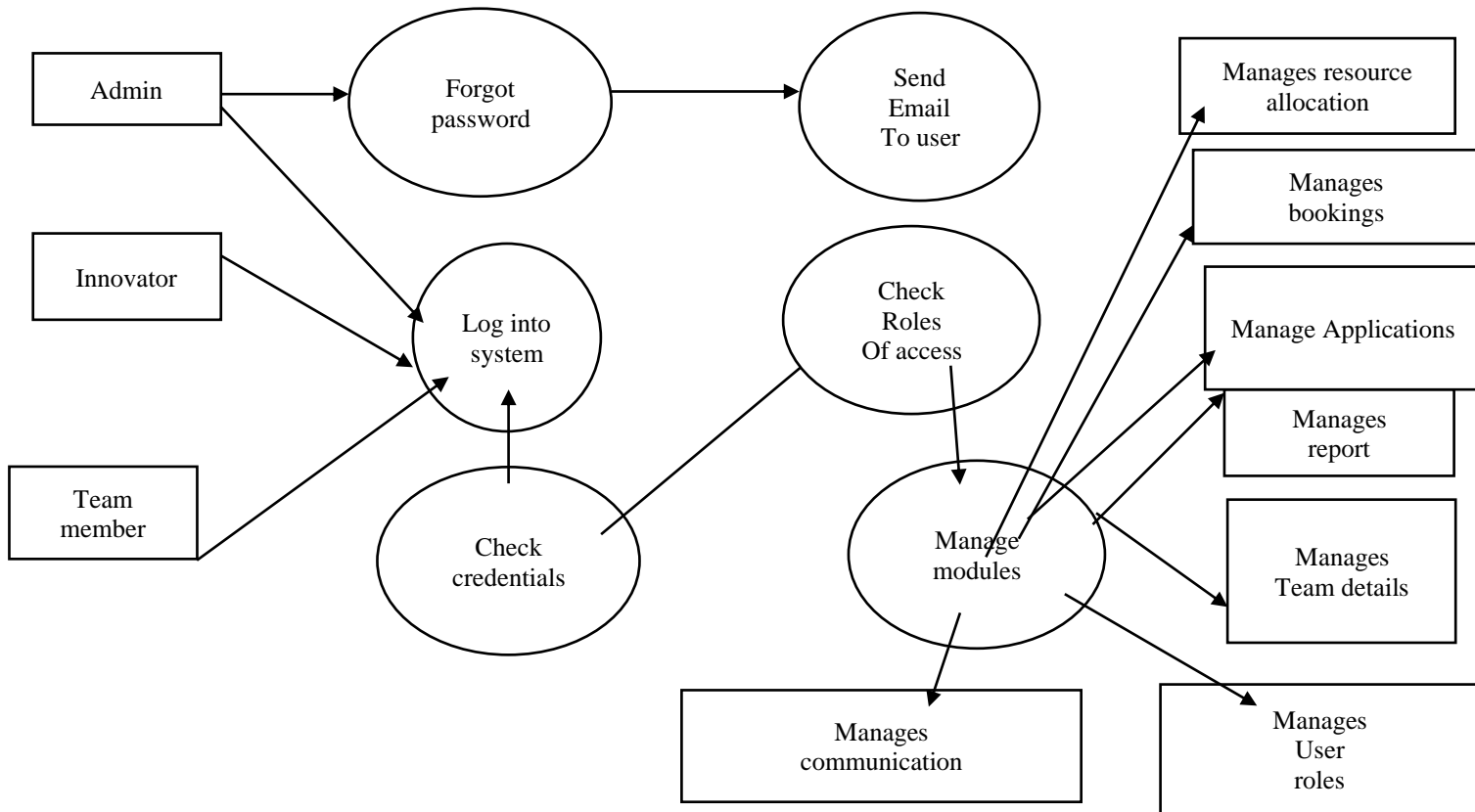


Figure 4.3 Context Level Diagram for the ICT Project Management System

4.3.3.2 The Level 1 DFD for the ICT Project Management System

The Level 1 DFD breaks down the processes in the system into more detailed components. This diagram elaborates on the interactions between users and the system, including data storage, task management, and reporting mechanisms.



Description for Processes

Table 4: Description of Processes

Process	Description
Authentication Process	Verification of emails and passwords of users
User Registration Process	Capture all user details as they signup
Innovator application Process	Captures all the innovators details

Team Monitoring Process	Keeps track of all tasks performed by team members
Tasks Monitoring Process	Keeps track of all tasks performed by users

Description of Data Stores

Table 5: Description of Data stores

Data store	Description
User Data	Stores users 'passwords, usernames and emails
Innovators' Data Store	Stores the innovators application details
Tasks Monitoring Process	Stores the details of tasks performed
Team members' Data	Stores all Hub members information

Description for External Entities

Table 6: Description of External Entities

Entity	Description
Innovators/clients	Applies using the system depending on the stage of innovation
Team members	Updates the upcoming events and training Manages the bookings for space
Administrator	Monitors and manages the system
Projects	The set goals to be achieved by the innovators
Tasks	Activities assigned to the hub team to assist the innovators in accomplishing the projects
Reports	These are the outcomes from the tracking of the project progress

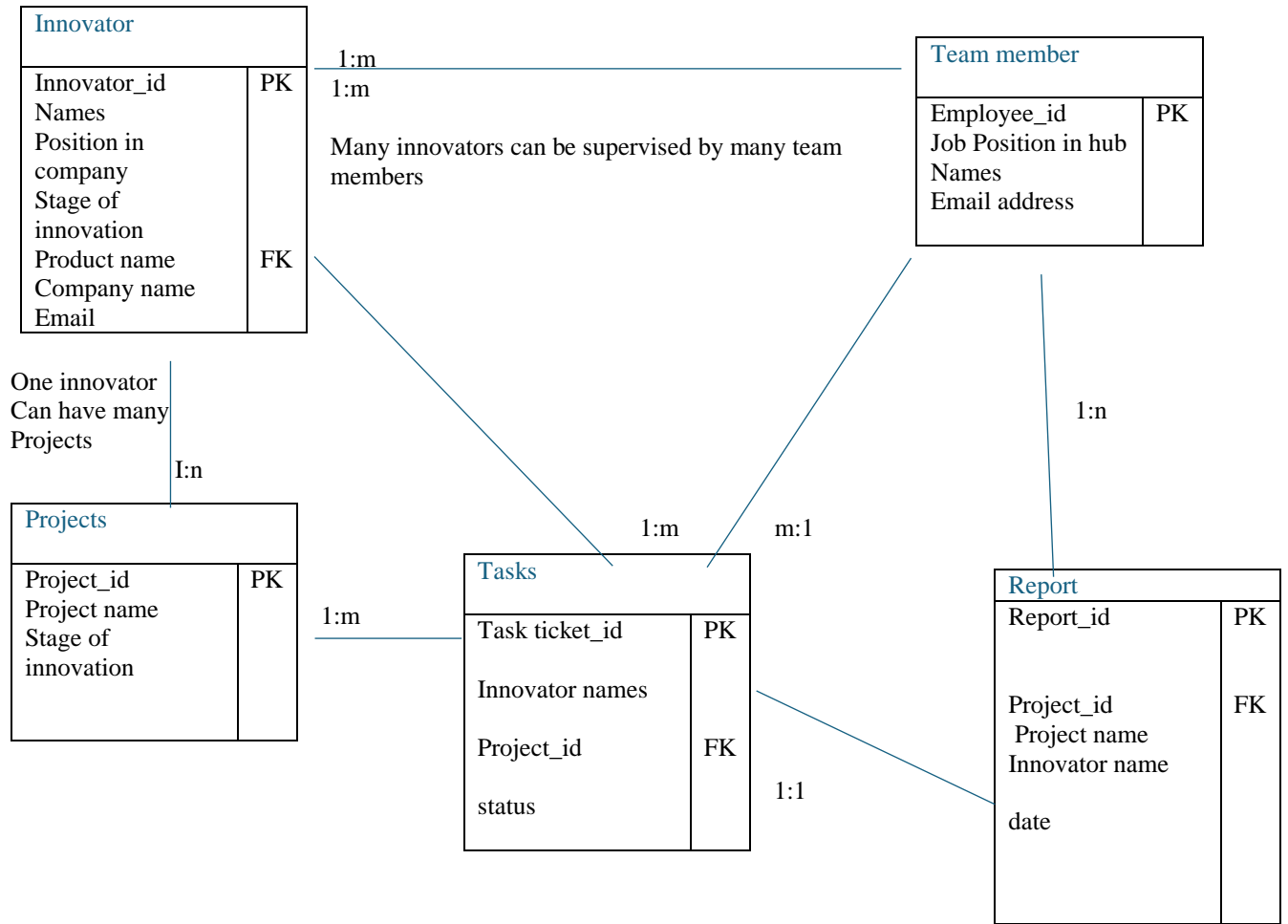
4.3.4 Identification of Entities and their Attributes

Table 7: Identification for Entities and their Attributes

Entity	Description	Attributes
Innovators/clients	Applies using the system depending on the stage of innovation updates the progress of the projects in the system	innovator_id names position in company stage of innovation Name of company Name of product/service/project Telephone E-mail requirements
Team members	Performs assigned tasks and evaluates the innovators' projects	Employee_id Job Position in hub Names Email address
Projects	The set goals to be achieved by the innovators	Project_id Project name Innovation stage

Tasks	Activities assigned to the hub team to assist the innovators in accomplishing the projects	Task ticket_id Project_id Innovator name status
Reports	These are the outcomes from the tracking of the project progress	Report_id Project_id Project_name date

4.3.5 ERD DIAGRAM



4.3.6 Mapping of ERD to Relational Schema

4.3.6.1 Innovator

Table 8: The innovator table

Field Name	Data Type	Constraint
Innovator_id	int(12)	Primary Key, Not null
names	varchar(30)	Not null
position in company	varchar(30)	Not null
stage of innovation	Varchar(25)	Not null
Name of company	varchar(30)	Not null
Name of product/service/project Telephone	varchar(30)	Foreign key
E-mail	varchar(15)	Null

4.3.7.2 Team members

Table 9: Team members table

Field Name	Data Type	Constraint
Employee_id	int(16)	Primary Key, Not null
Job Position in hub	varchar(20)	Not null
Email address	Varchar(15)	Not null
Names	varchar(20)	Not null

4.3.7.3 Projects

Table 10: The Projects table

Field Name	Data Type	Constraint
Project_id	int(16)	Primary Key, Not null
Project name	varchar(30)	Not null
Innovation stage	varchar(20)	Not null

4.3.7.4 Tasks

Table 11: Tasks table

Field Name	Data Type	Constraint
Task ticket_id	int(16)	Primary Key, Not null
Innovator name	varchar(20)	Not null
Project_id	Int(16)	Foreign Key, Not null
status	Varchar(15)	Not null

4.3.7.5 Reports

Table 12: The Reports table

Field Name	Data Type	Constraint
Report_id	int(16)	Primary Key, Not null
Project_id	int(16)	Foreign key, Not null
Project_name	varchar(20)	Not null
date	date	Not null

4.4 Conclusion

In summary, this chapter was mainly based on the study of the existing system, analysis of the requirements for the system, processes and data modeling.

Chapter Five

5.0 System Implementation, Testing, and Validation

This chapter details the implementation of the ICT Project Management System (ICTPMS), showcasing the different functionalities it offers to various users, along with sample screenshots to demonstrate the system's interface and responses. The chapter also covers the testing and validation processes used to ensure the system meets user requirements and operates as expected.

5.1 System Functions

The ICT Project Management System (ICTPMS) automates various project management processes, offering different functionalities to users based on their roles within the system. These functionalities include project initiation, task assignment, progress tracking, and report generation.

5.1.1 Functions provided to all users

The ICTPMS includes secure authentications for all users, requiring a unique username and password to access the system. Once logged in, users can navigate through their designated sections, ensuring that only authorized personnel can perform specific actions.

5.1.2 Functions Provided to Administrators

- Administrators hold the highest level of control within the ICTPMS
- User Account Management: Create, update, and delete user accounts for project managers, team members, and clients.
- System Configuration: Manage system settings, including security protocols and access permissions.
- Audit and Monitoring: Access audit trails, monitor system usage, and ensure data integrity across the platform.
- Task Assignment: Assign tasks to team members, set deadlines, and monitor task progress.

5.1.3 Functions Provided to Innovators

- Initiation into the hub: Innovators apply for space in the Hub
- View Assigned Tasks: See the tasks assigned to them, along with deadlines and priorities.
- Update Task Status: Mark tasks as completed, in progress, or pending, and provide progress updates.
- Collaboration: Communicate with other team members and the project managers to ensure alignment on project goals.
- Access Documentation: Retrieve and review project-related documents and resources to assist in task completion.

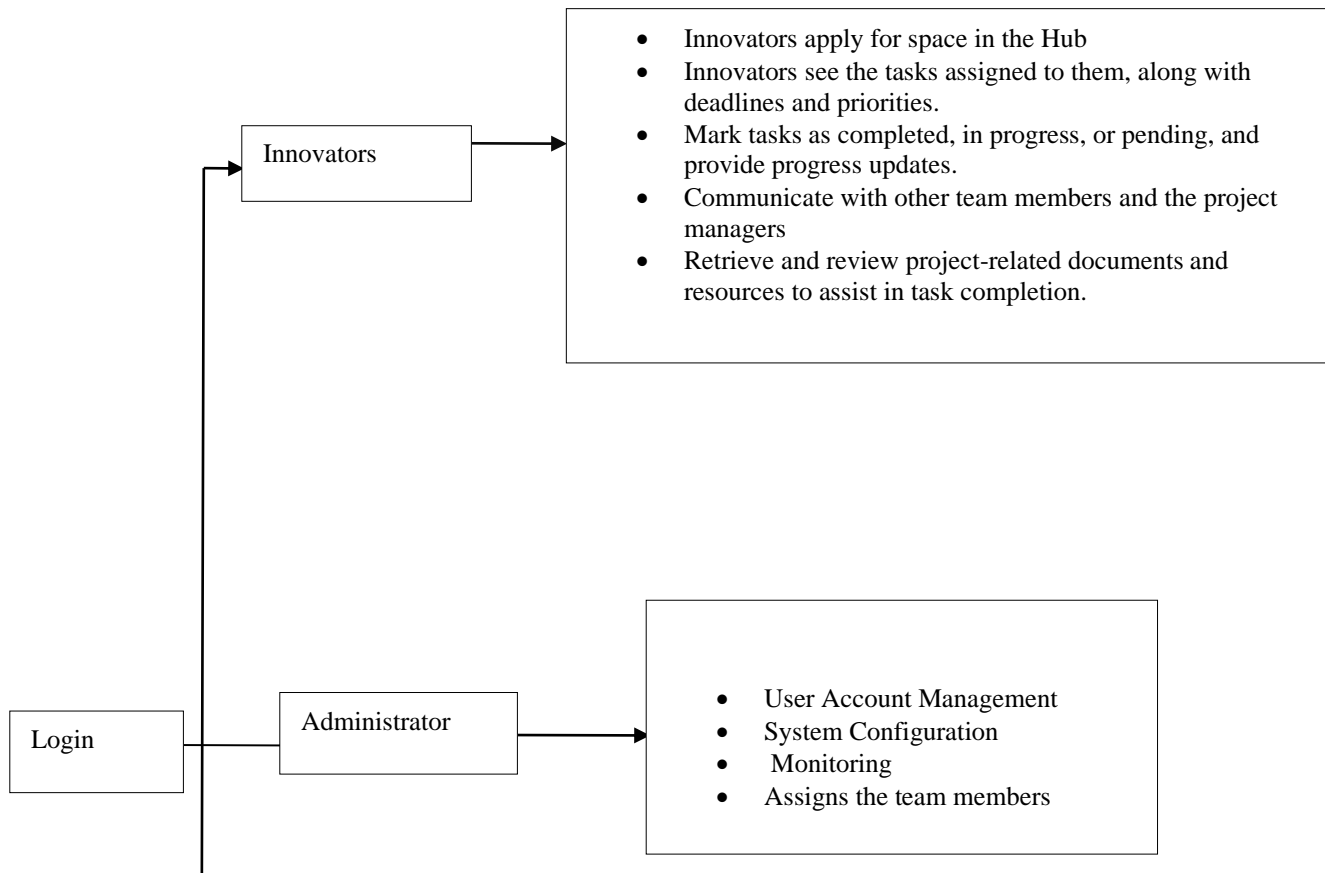
5.1.4 Functions Provided to Team members

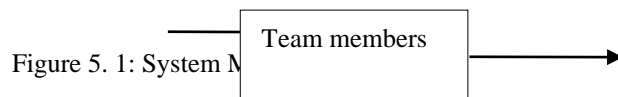
Team members have access to a range of tools for managing projects, including:

- Project Initiation: Start new projects, define project scopes, and set timelines.
- Progress Tracking: View real-time updates on project progress and innovator performance.
- Reporting: Generate and review detailed project reports, which can be shared with stakeholders.
- Communication: Collaborate with team members and innovators through integrated messaging and feedback tools.

5.2 System map

Figure 5.1: System Map showing functions provided by the system to each user





5.3 Sample Screenshots

5.3.1 System home page

The landing page consists of the 3 latest posts that are posted on the notice board. It allows all users navigate through the navigation bar and perform tasks according to their needs.

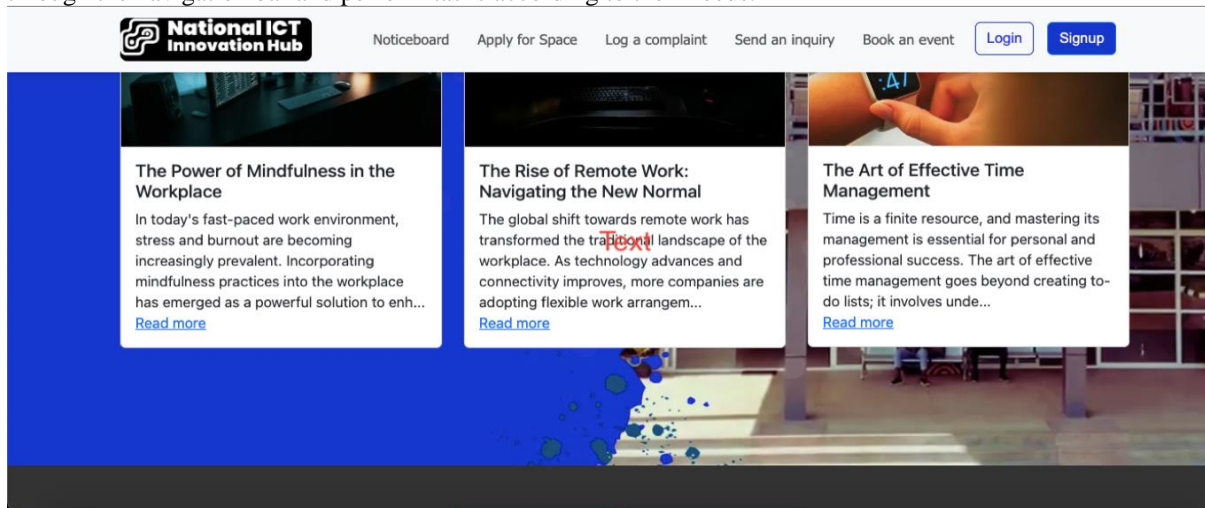


Figure 5. 2: System home page

5.3.2 Login page

At the landing page you can sign up to access the different pages i.e. Apply for space, log a complaint, and Send an Inquiry. Once an account is created for the user signing up again won't be necessary. When an incorrect password or username is entered it will display an error message

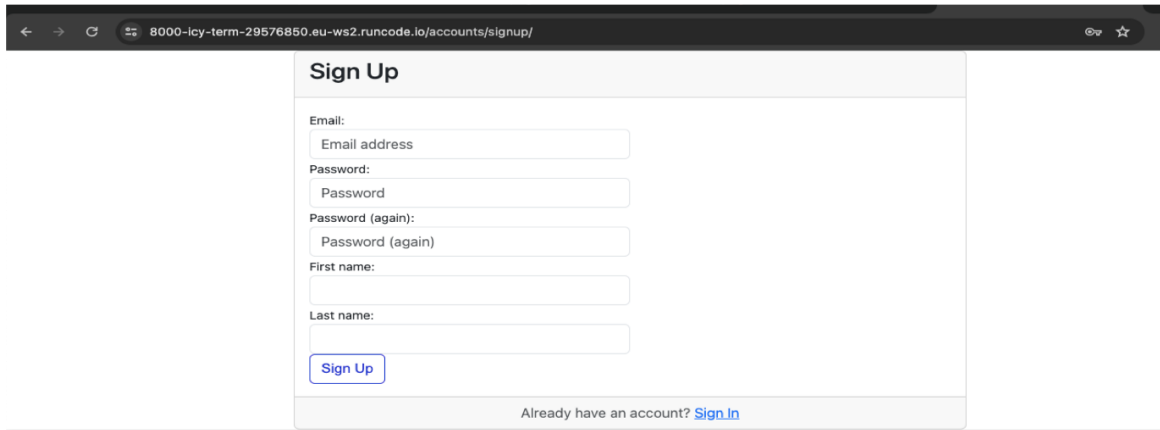


Figure 5. 3: login page

5.3.3 Innovator Dashboard

After verifying and logging in, an innovator can access the innovator dashboard. On the innovator dashboard, the innovator can send an inquiry, log a complaint, or apply for space based on the stage of innovation.

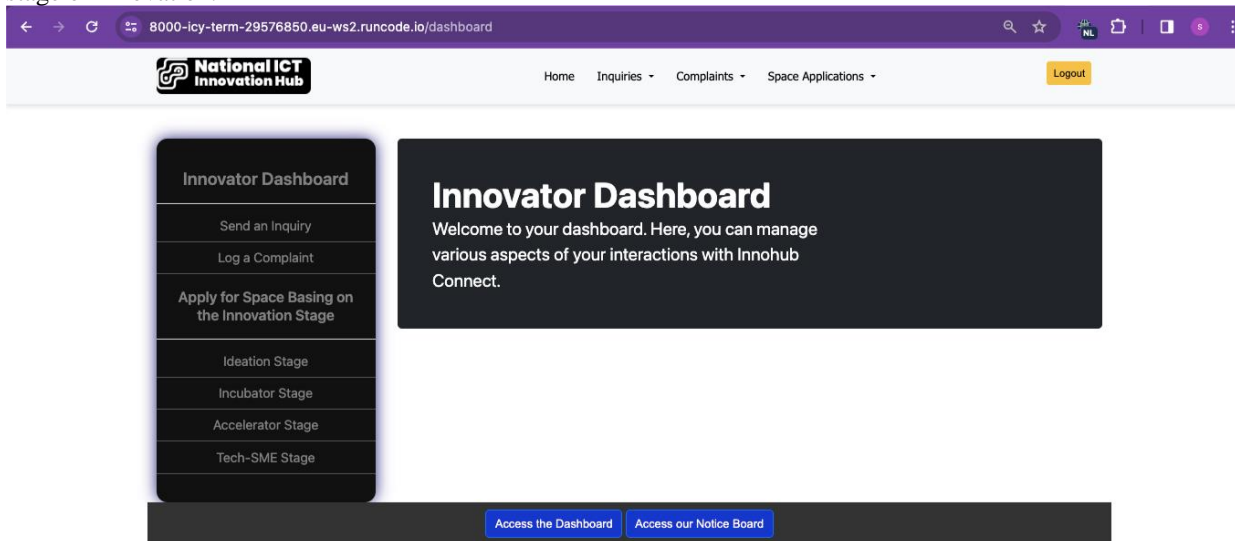


Figure 5. 4: Innovator dashboard

5.3.4 Administrator Page

Once the Administrator views the Complaint, he assigns an officer / Hub team member to handle the case and once the hub member handles she can mark it as resolved and provide the re-solution or even email the innovator if necessary

For apply for space

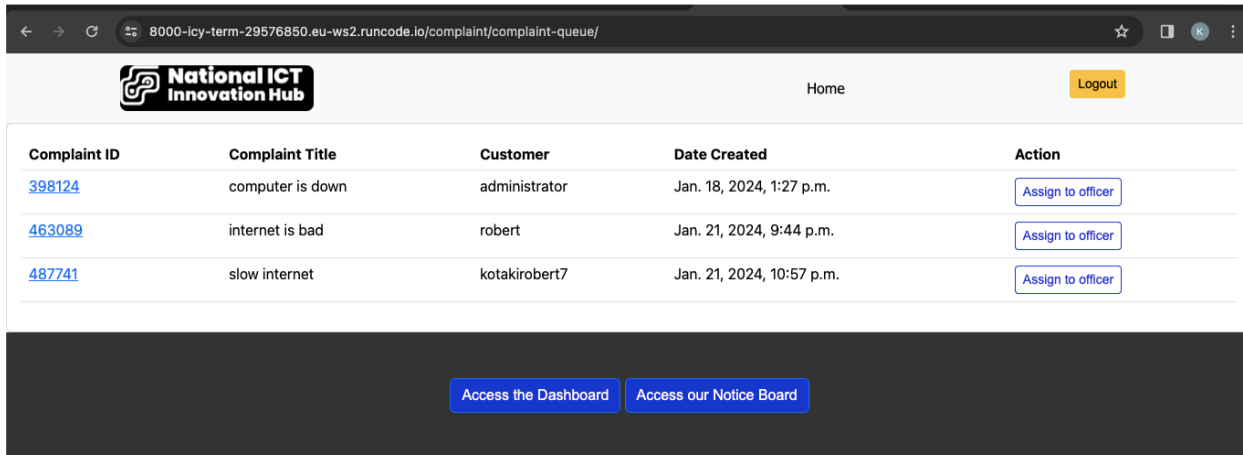


Figure 5. 5: Administrator page

5.3.5 Team member dashboard

The team member can view the assigned tasks and able to respond to the available tickets

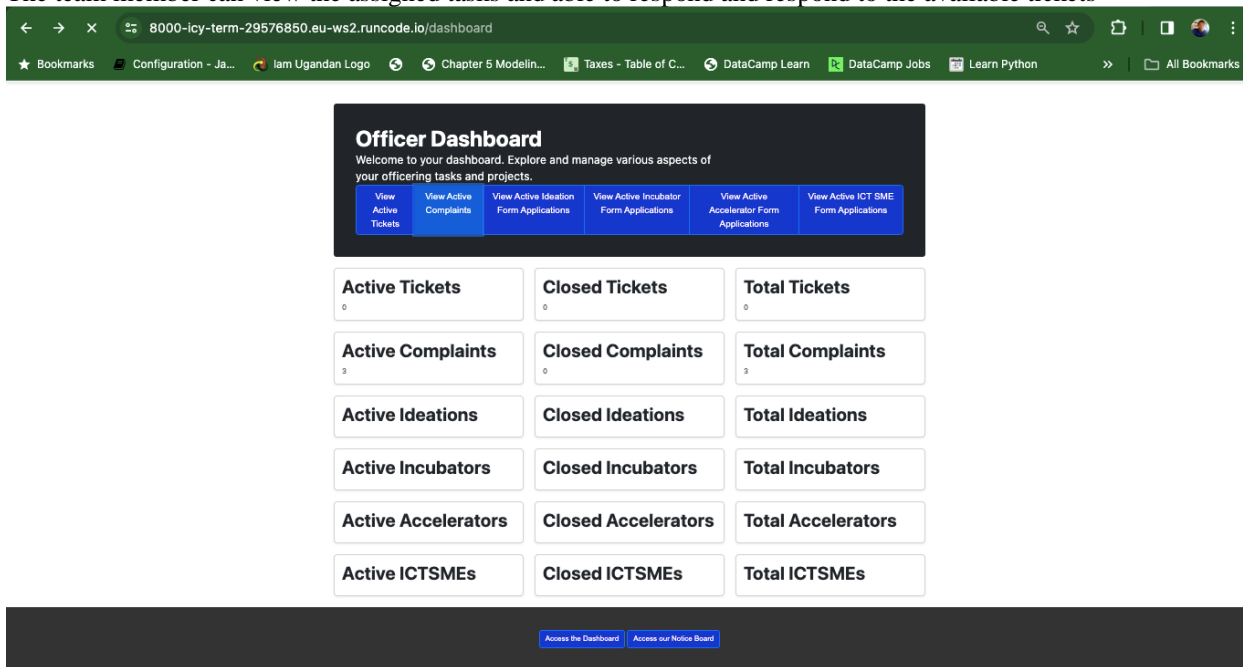


Figure 5. 6: Team member dashboard

5.3.6 .Project tracking feature

Once the Innovator initiates the project development he or she keeps updating the progress card move the tasks to the next phases until all are completed. And the hub team members can track and comment on the progress.

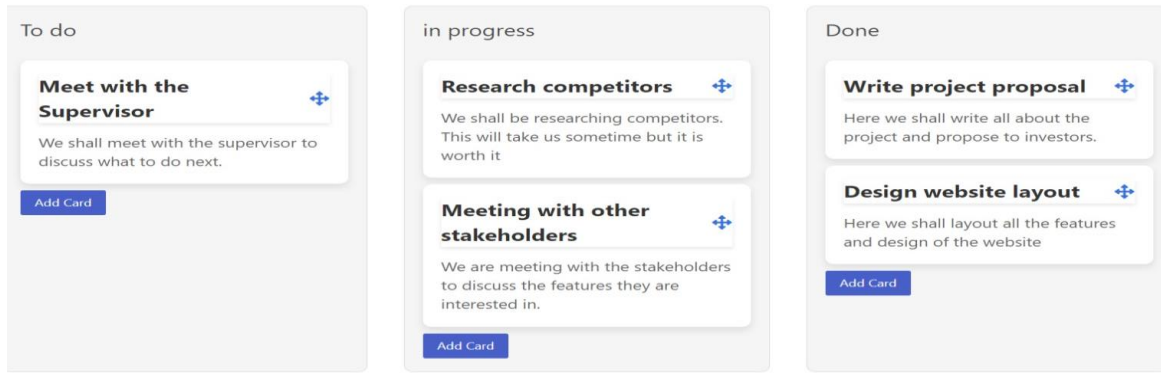


Figure 5. 7:Project tracking feature.

5.4 System Testing and Validation Results

The ICTPMS underwent rigorous testing and validation to ensure it meets the defined user needs and performs as expected. The testing focused on identifying and correcting errors, while validation ensured the system aligned with user requirements.

5.4.1 System Testing Results

The ICTPMS was subjected to comprehensive testing to identify any bugs or issues. Users interacted with the system to simulate real-world scenarios, and any faults discovered were promptly addressed. The system was tested multiple times to ensure it met the expected performance standards.

During testing, the system's ability to handle valid and invalid data was also evaluated. Error messages were triggered correctly for invalid inputs, ensuring that the system could handle unexpected user actions without compromising its functionality.

5.4.2 Validation Results

To validate the ICTPMS, the system was presented to a group of users who provided feedback on its performance and usability. The validation process included checking the accuracy of input and output data, ensuring the system's database handled transactions correctly, and verifying the system met the standards of similar project management systems.

The users expressed satisfaction with the system's performance, noting its ease of use, responsiveness, and alignment with their project management needs.

Table 13: System Validation.

Feature	Number of users out of 4	Percentage of users (%)
Functionality	3	75
User-friendliness	8	100
Improves project management processes	3	75
Solves delays and enhances efficiency in project tasks	3	75

5.5 Conclusion

In summary, this chapter detailed the functionalities of the ICT Project Management System, including the different user roles and their respective access rights. It also provided visual examples of the system through screenshots and described the rigorous testing and validation processes that were conducted. The results indicate that the system functions as intended, meeting user requirements and providing a reliable platform for managing ICT projects.

Chapter Six

6.0 Summary, Recommendations and Conclusion

6.1 Summary

The ICT Project Management System (ICTPMS) has successfully achieved all its objectives. It has been developed to replace the manual project management processes previously used in the hub. With this system, project managers can now efficiently initiate and oversee projects online, monitor progress, allocate tasks to team members, and produce comprehensive project reports. Team members can update the status of their tasks and provide feedback, while clients can easily track project progress and contribute their insights.

To ensure security, each user is provided with a unique username and password, which are required for accessing the system through a secure interface. The system administrator holds the highest level of access, with the ability to manage user accounts and configure system settings.

6.2 Recommendations

Further exploration in this area is advisable to identify and mitigate any limitations of the ICT Project Management System, given the continuous evolution of project management practices and technological advancements. The system should be tailored to meet the diverse requirements of different organizations, as each may have distinct project management workflows and needs.

6.3 Future work

The system should be extended to:

- Have an application developed to ease accessibility

6.4 Conclusion

The ICT Project Management System has successfully achieved its objectives. The major strength of this system is its ability to facilitate seamless online interactions between project managers, team members, and innovators. The system supports project initiation, task management, progress tracking, and report generation, making project management more efficient and transparent.

6.5 References

- I. The National ICT Innovation Hub,(2023).Processes and Procedure Document
- II. Heagney, J. (2016). Fundamentals of Project Management. New York: AMACOM.
- III. Kerzner, H. (2019). Project Management: A Systems Approach to Planning, Scheduling, and Controlling. Hoboken: Wiley.
- IV. Project Management Institute. (2017). A Guide to the Project Management Body of Knowledge (PMBOK Guide). Newtown Square: PMI.
- V. Brown, M. (2019). The Role of Integration in Project Management Tools: A Study on Trello. Project Management Insights, 31(4), 67-78.
- VI. Brown, M. (2019). Challenges in Integrating Project Management Tools: A Case Study of Smartsheet. Journal of Systems Integration, 31(4), 56-67.
- VII. Hughes, T. (2021). Performance Issues in Project Management Software: An Evaluation of Smartsheet. Information Systems Review, 34(2), 78-91.
- VIII. Jones, A. (2020). The Learning Curve of Project Management Tools: A Study on Smartsheet. Management Today, 40(3), 29-41.
- IX. Smith, J. (2019). Cost-Benefit Analysis of Project Management Software: Smartsheet in Focus. Business Technology Journal, 28(1), 90-102.
- X. Thomas, L. (2021). Evaluating Reporting Capabilities in Project Management Software. Business Analytics Review, 26(5), 54-68.

6.6 Appendices

6.6.1 Appendix I: Interview sample questions

- I. What is your opinion about ICT project management systems in your organization?
- II. Do you have an efficient project management system in your organization?

- III. What are the expected roles of project management systems in your organization?
- IV. What are some of the difficulties you are facing with your current system?
- V. Is your system user-friendly?
- VI. What solutions do you think can work best in enhancing your current system?
- VII. Does your system support data and information backups?
- VIII. What are your expectations from the new system?
- IX. How do you rate the system performance?

6.6.2 Appendix II: Questionnaires.

ICT PROJECT MANAGEMENT SYSTEM STUDY QUESTIONNAIRE

CASE STUDY: NATIONAL ICT INNOVATION HUB

Section 1: General Information

- 1. Name:
- 2. Job Title:
- 3. Department:
- 4. Experience with Project Management System:
 - None
 - Beginner
 - Intermediate
 - Advanced
- 5. Current Project Management Tool(s) Used at the National ICT INNOVATION HUB

Section 2: Current System Usage

- 6. How often do you use the current project management system?
 - Daily
 - Weekly
 - Monthly
 - Rarely
- 7. What are the primary tasks you perform using the current system?
 - Task Assignment
 - Project Tracking
 - Time Management
 - Resource Allocation
 - Communication and Collaboration
 - Reporting and Analytics
 - Others (please specify):
- 8. What features of the current system do you find most useful?
- 9. What features of the current system do you find least useful or problematic
- 10. What challenges do you face with the current system?
 - Lack of user-friendliness
 - Limited functionality
 - Poor integration with other tools
 - Performance issues
 - Others (please specify):

Section 3: Requirements and Expectations

- 11. What additional features would you like to see in the new project management system?

- Advanced Reporting
 - Enhanced Collaboration Tools
 - Better Integration with Other Software
 - Mobile Accessibility
 - Customizable Workflows
 - Automated Notifications and Reminders
 - Task Dependency Management
 - Others (please specify):
12. How important are the following features for the new system?
- Task Management: Not Important | Somewhat Important | Very Important
 - Time Tracking: Not Important | Somewhat Important | Very Important
 - Resource Management: Not Important | Somewhat Important | Very Important
 - Collaboration Tools: Not Important | Somewhat Important | Very Important
 - Reporting and Analytics: Not Important | Somewhat Important | Very Important
 - Integration with Other Tools: Not Important | Somewhat Important | Very Important
 - Mobile Access: Not Important | Somewhat Important | Very Important

Section 4: User Experience and Feedback

15. Rate your satisfaction with the current project management system:

- Very Unsatisfied | Unsatisfied | Neutral | Satisfied | Very Satisfied

16. What specific improvements would enhance your user experience

17. How can the new system better support your role and responsibilities?

18. Are there any specific pain points you want the new system to address?

19. Do you have any additional feedback or suggestions?

6.6.3 Appendix III: Pseudo-code

Pseudo code for innovator

Start

Innovator signs in with username and password was account is created

If the username or Password is invalid return an error Message

Else

Innovator applies for space if new at the Hub

If the application is denied after submission of documents the innovator is informed about the denial.

Else

The innovator is allocated a supervisor

Resource allocation resources

progress tracking till completion of the project.

Pseudo code for project manager

Start

Project manager enters the username and password

If the username or password is invalid, return an error message

Else

Return project management dashboard

The project manager selects a project to manage

If the project is valid, return the project details
Else

Return error message
Project manager assigns tasks or updates project details
Save changes and return a confirmation message