SMS: A COMPREHENSIVE ENCHANCEMENT AND STRATEGIC APPROACH IMPLEMENTING QR CODE TO OPTIMIZE HEALTHCARE

SERVICES FOR CLINIC MANAGEMENT

SYSTEM AT BESTLINK COLLEGE

OF THE PHILPPINES

A Capstone

Presented to the Faculty of

The College of Computer Studies

Bestlink College of the Philippines

In Partial Fulfilment

Of the Requirements for the Degree of

Bachelor of Science in Information Technology

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October 2024

**DECLARATION**

We, the undersigned researchers, confirm that the project study presented herein does not incorporate, without proper acknowledgment, any material previously submitted for a diploma in any university, to the best of our knowledge and belief. We assert that it does not contain any material previously published or written by another person or ourselves unless due reference is made in the text. Furthermore, we hereby grant permission for the project study, if accepted, to be made available for photocopying and interlibrary loan, and for the title and summary to be accessible to external organizations.

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**APPROVAL SHEET**

The capstone, entitled **“SMS1: A Comprehensive Enhancement and Strategic Approach Implementing QR Code to Optimize Healthcare Services for the Clinic Management System at Bestlink College of the Philippines,”** was meticulously prepared and submitted by Angelo B. Abargos, Joseph Oliver P. Banac, Lister John L. Evangelista, Ariel A. Forcado, and Andiella Mhae B. Gabad. The presentation was made to the faculty of the College of Computer Studies as part of the requirements for the degree of Bachelor of Science in Information Technology. After thorough examination, it is recommended for acceptance and approval for the Pre-Oral Defense.

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**CERTIFICATE OF AUTHENTICITY**

This certificate attests to the research work presented to the faculty of the College of Computer Science in the Capstone Project entitled **“SMS1: A Comprehensive Enhancement and Strategic Approach Implementing QR Code to Optimize Healthcare Services for the Clinic Management System at Bestlink College of the Philippines.”** The project has been submitted in partial fulfillment for the degree of Bachelor of Science in Information Technology at the Bestlink College of the Philippines. The work represents the original and scholarly efforts carried out by the individual mentioned herein. It is confirmed that this Capstone Project does not incorporate verbatim words or concepts from published sources or works used as a basis for an academic degree from any other institution of higher education, except where duly acknowledged and referenced.

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**DEDICATION**

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**ABSTRACT**

Title SMS1: A Comprehensive Enhancement and Strategic Approach

Implementing QR Code to Optimize Healthcare Services for the Clinic Management System at Bestlink College of the Philippines

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**Chapter 1**

**Introduction**

In the current time, people can’t imagine their lives without technology. The technology sector has changed and developed many products. A computer is an example of technology that helps people in many ways. People use computers to finish office work, for business, and for entertainment. Computers help us make manual processes easier and more efficient.

Most of us already take an active interest in how our environment is changing. As we continue our research, we ask the Head Physician*, Dr. Jane Ann F. Fernandez MD*, who provided valuable insights into how modern technology is influencing healthcare delivery.Our research focuses on how staff members at *BESTLINK COLLEGE OF THE PHILIPPINES CLINIC* can provide individuals with effective care in a reasonable amount of time.

A key feature of our system is the integration of QR codes. Nurses and Dr. Jane Ann F. Fernandez can obtain their details instantly by scanning a QR code, which minimizes errors and eliminates the need for humans to provide information. This feature guarantees that the appropriate data is constantly available to the clinic personnel, helping them manage patient information more effectively. By using QR codes, the process is made simple and easy.

**Background of the Capstone Project**

In today's rapidly evolving healthcare landscape, the demand for accurate and timely information has never been more critical. We developed this system to make the BCP-CLINIC acquire the right information and make their reports easily, to consume time works, and easily deliver monthly reports and records. The BCP Clinic plays a crucial role in safeguarding the health and well-being of students, faculty, and staff. However, the traditional methods of record-keeping and report generation often lead to inefficiencies, inaccuracies, and delays in decision-making.

To address these challenges, we have developed an advanced clinic management system that integrates QR code technology. This system is designed to streamline the workflow within the BCP Clinic by enabling quick and easy access to patient records and other essential information. By simply scanning a QR code, clinic staff can instantly retrieve accurate data, reducing the time spent on administrative tasks and minimizing the risk of errors.

In addition, the use of QR codes enhances the security of patient information by limiting access to authorized personnel only. This ensures that sensitive health data is protected while still being easily accessible to those who need it. This method can also help health services researchers evaluate health outcomes for people and populations, as well as effectively examine care access and quality.

The purpose of this project is to greatly increase the effectiveness and efficiency of healthcare service delivery at BCP by using modern technology, including QR codes, in clinic operations. As a result, the clinic is more flexible and capable of meeting the demands of the local community, which enhances the quality of life and the efficiency of the school environment.

**Context and Scope**

**Context:**

The Bestlink College of the Philippines (BCP) Clinic serves as a vital health service provider within the institution, catering to the needs of students, faculty, and staff. The clinic is faced with issues in maintaining patient records, providing timely reports, and guaranteeing the authenticity of health-related data as the demand for effective healthcare services continues increasing. These challenges are compounded by the need for reliable, secure, and easily accessible technology that can support clinic operations while securing private patient information.

In response to these challenges, the capstone project focuses on the development and implementation of an advanced clinic management system that integrates QR code technology. The system is intended to improve data administration, streamline clinic operations, and improve the quality of BCP's medical services overall.

**Scope:**

The scope of this project encompasses the following key areas:

* 1. **Development of a QR Code-Integrated System:**
* Design and implementation of a system that uses QR codes for easy access to patient records and other essential data.
* Integration of QR code scanning functionality to facilitate quick retrieval of information, reducing administrative burden and improving accuracy.
  1. **Efficient Data Management:**
* Creation of a centralized database that securely stores patient information, medical records, and other clinic-related data.
* Implementation of user access controls to ensure that only authorized personnel can access sensitive information.
  1. **Streamlined Reporting Process:**
* Development of features that automate the generation of monthly and annual reports, ensuring they are accurate and delivered on time.
* Provision of tools that allow clinic staff to analyze health trends and outcomes within the BCP community.
  1. **Stakeholder Engagement:**
* Collaboration with clinic staff, IT professionals, and relevant stakeholders to ensure the system meets the operational needs of the BCP Clinic.
* Consideration of feedback from users to refine and enhance the system’s functionality.

**Limitations:**

The system will be designed primarily for use within the BCP Clinic, and its implementation is limited to the specific needs and environment of the college.

The QR code system is focused on internal clinic operations and is not intended for use in external healthcare facilities.

**Anticipated Outcomes:**

The successful deployment of a clinic management system improves the efficiency of clinic operations, enhances data security, and contributes to better health outcomes within the BCP community.

A significant reduction in the time required for administrative tasks, allowing clinic staff to focus more on patient care.

**Problem Statement**

Bestlink College of the Philippines currently faces challenges in managing clinical services efficiently, leading to potential errors, delays, and suboptimal patient care. These challenges include:

* **Manual record keeping:** Paper-based records are time-consuming, prone to errors, and difficult to access.
* **Communication gaps:** Delays in communication between healthcare providers can impact patient outcomes.

**The problem statement is:**

* **Inefficient clinical management systems:** Current systems may not be fully integrated or optimized for efficient operations.
* **Manual processes:** Reliance on manual processes can lead to errors, delays, and inefficiencies.

Implementing QR code technology can address these challenges by:

* **Digitizing patient records:** QR codes can store and access patient information electronically, reducing errors and improving accessibility.

By integrating QR code technology into the clinical management system, Bestlink College of the Philippines can:

* **Improve efficiency:** can reduce errors and save time
* **Enhance patient safety:** Reduce medication errors and improve communication between healthcare providers.
* **Optimize resource allocation:** Better manage patient flow and resource utilization. (Promote data flow)

**Objective and Goal**

**Objective:**

* **Digitize patient records:** Transition from paper-based records to a digital format using QR codes.
* **Optimize clinical workflow:** improve efficiency through the use of QR code technology.

**Goals:**

* **Improve patient safety:** Reduce medication errors, improve communication, and enhance overall patient care.
* **Increase efficiency:** clinical processes, reduce administrative burdens, and save time.
* **Enhance data management:** Create a centralized, accessible database of patient information using QR codes.
* **Improve patient satisfaction:** Provide more efficient, effective, and personalized care.

**Significance and Relevance**

The integration of QR code technology into the clinic management system at Bestlink College of the Philippines (BCP) Clinic presents a significant opportunity to enhance healthcare services and streamline operations.

**Significance:**

* **Improved Efficiency:** QR codes can streamline various processes, such as Student Information, and appointment scheduling. This can reduce administrative burdens and improve overall efficiency.
* **Enhanced Patient Experience:** QR codes can provide a more convenient and accessible way for Nurses to interact with the Students For example, students can easily access their medical records.
* **Data-driven decision-making:** QR codes can capture valuable data, such as Student Information, appointment history, and treatment outcomes. This data can be used to inform evidence-based decision-making and improve the quality of care.
* **Cost Reduction:** QR code integration can help reduce operational costs and improve resource allocation.

**Relevance:**

* **Nurse’s Needs:** Many nurses are comfortable using technology and appreciate the convenience and efficiency that QR codes can offer because one can of QR code they get the full information of the student
* **Industry Trends:** Some Healthcare organizations worldwide are increasingly adopting Technology and most of them are using QR codes to improve patient care and streamline operations.
* **Institutional Goals:** The integration of QR codes aligns with Bestlink College's commitment to providing high-quality healthcare services and utilizing innovative technologies.

**Structure of the Document**

This document is organized into several sections, each focusing on a specific aspect of the capstone project. The subsequent sections will delve into the project's technical and architectural details, development process, testing, and quality assurance, as well as the results, evaluation, and lessons learned. By the end of this document, readers will gain a comprehensive understanding of our sub-system and its impact on school management system operational efficiency and effectiveness.

**CHAPTER 2**

**Related Studies and Literature Review**

**Foreign:**

**“Collection of patient-generated health data with a mobile application and transfer to hospital information system via QR codes” (2023)**

Gathering patient-generated health data (PGHD) is critical to knowing a patient's everyday condition and providing effective care. Patient data can be efficiently collected via mobile applications, and it is preferable to quickly incorporate this data into electronic medical records. Nevertheless, most hospital information systems only have a few connections to outside mobile apps.

The EMR form and patient mobile applications exchanged data through a two-way data interface that used a QR code. To convert information from the mobile app to the EMR, the program serializes PGHD into a string of QR codes using the form template, creates and displays a QR code using UTF8 alphanumeric input mode, encodes, as well as level H error correction

Using the Barcode Scanner Xenon 1900 (Honeywell Inc. Charlotte, NC, USA), which supports QR codes, the EMR terminal scans the code into the eXChart template. Additionally, the eXChart script decodes the data from the QR code and inserts it into the template's user interface elements. The eXChart template then serializes the laboratory data results into QR code data strings and displays QR codes to send the data from the EMR to the patients' mobile devices. The QR code is scanned by patients' mobile applications through the device's camera, after which the data is deserialized and saved to the device's local storage.

**Local**

**“Inventory Management in Clinics” (2021)**

In a research study published in 2021, Lim et al. examined the application of QR codes to inventory control at a medical facility. According to the research, QR codes made it easier to efficiently track medical supplies, minimizing waste and guaranteeing that necessary materials were always on hand. Additionally, this system made it possible to track inventory levels in real-time, which is essential for clinic operations.

**“Enhancing Patient Registration and Management” (2022)**

In a study published in 2022, De Guzman et al. investigated using QR codes to register patients at a nearby clinic. The use of QR codes, the researchers discovered, greatly shortened the time required for registration and minimized errors in patient data entry. Upon arrival, patients could scan their individual QR codes, facilitating faster check-in times and more effective data management.

**“Patient Education and Information Dissemination” (2023)**

Cruz and Villanueva's (2023) study emphasized the function of QR codes in providing patients with health-related information. Clinics gave patients access to educational materials about a range of health topics by posting QR codes in waiting areas. This program gave patients more information and gave them the ability to make knowledgeable decisions about their health.

Despite the many advantages that QR codes provide, potential security and privacy concerns were addressed in research conducted by Alonzo et al. (2022) in relation to their application in clinic management systems. The researchers stressed how crucial it is to put strong security measures in place to safeguard patient data while utilizing QR codes and to make sure that data protection laws are followed.

**Agile Scrum Methodology Overview**

Agile Scrum Methodology Overview for SMS: a comprehensive enhancement and strategic approach implementing QR code to optimize healthcare services for the clinic management system at Bestlink College of the Philippines.

**Introduction:**

Agile Scrum is a flexible, iterative project management framework that facilitates the development of complex systems through continuous feedback, collaboration, and incremental improvements. For the iSMS project, Scrum will guide the team in delivering a robust clinic management system that integrates QR code technology to enhance healthcare services at Bestlink College of the Philippines.

**Project Vision and Objectives:**

The goal of the project is to create a system, for managing clinics that simplifies handling patient records and enhances reporting while utilizing QR code technology to boost efficiency and accuracy in healthcare services efficiently and accurately. The main aims to improve the clinics daily operations by providing quick access, to vital information and enhancing patient care quality.

**Scrum Roles:**

Key roles, including the Product Owner, Scrum Master, and Development Team, each contributing to the project's success.

**Product Backlog:**

The Product Backlog is a dynamic list of features, enhancements, and user stories that reflect the needs of the clinic. These items are prioritized based on their business value and impact on healthcare service delivery. Key items include the development of the QR code system, secure data management features, and automated reporting tools.

**Sprint Planning:**

During Sprint Planning, the team selects high-priority items from the Product Backlog to focus on during the upcoming sprint. For each sprint, the team defines specific goals and the scope of work, such as implementing QR code scanning for patient records or enhancing the reporting module.

**Sprint Execution:**

The Development Team works collaboratively on the selected items, holding daily Scrum meetings to discuss progress, identify challenges, and adjust as needed. The goal is to deliver functional features that can be integrated into the existing system.

**Incremental Development:**

At the end of each sprint, the team delivers a potentially shippable product increment. This ensures continuous improvement of the iSMS system and allows for frequent stakeholder feedback, leading to a more refined final product.

**Sprint Review:**

The completed features are demonstrated to stakeholders, including clinic staff and college administrators, during the Sprint Review. Feedback is gathered to make necessary adjustments and reprioritize the Product Backlog.

**Sprint Retrospective:**

After each sprint, the team reflects on their process, discussing what went well, what could be improved, and how to enhance team dynamics and efficiency in future sprints.

**Release Planning:**

Release Planning involves high-level scheduling of future releases based on the accumulated increments. Stakeholder feedback is incorporated to ensure the system evolves according to the clinic's needs.

**Embracing Change:**

Agile’s adaptive nature allows the project to accommodate changing requirements, such as additional features or changes in healthcare regulations, ensuring that the system remains relevant and effective.

**Communication and Collaboration:**

Regular communication within the team and with stakeholders is emphasized to foster collaboration, ensure transparency, and keep everyone aligned with the project’s objectives.

**Tools and Technology:**

The project leverages Agile-friendly tools for project management, communication, and collaboration. These tools enhance transparency, track progress, and facilitate smooth communication among team members and stakeholders.

**Challenges and Solutions:**

Common challenges in Agile development, such as scope creep or balancing stakeholder expectations, are addressed through regular feedback loops, sprint reviews, and the flexibility inherent in the Scrum framework.

**Benefits of Agile Scrum for iSMS:**

The Agile Scrum approach accelerates development cycles, enhances collaboration, and allows for continuous feedback from stakeholders, resulting in a system that is well-aligned with the clinic’s needs and capable of adapting to future challenges.

**Conclusion:**

The application of Agile Scrum in the iSMS project ensures a structured yet flexible approach to developing a clinic management system that meets the evolving needs of Bestlink College of the Philippines. The methodology supports ongoing improvement and adaptability, paving the way for the successful implementation of a system that optimizes healthcare services.

**Enterprise Architecture Concepts**

**Business Architecture**

Defines the alignment of the iSMS with the clinic’s operational processes, focusing on streamlining patient data management and improving healthcare services. It ensures that QR code technology is effectively integrated into workflows, optimizing the efficiency of clinic staff and enhancing patient care.

**Data Architecture**

Structures the management and flow of sensitive healthcare information within the iSMS, ensuring data is securely stored and accessed through encrypted QR codes. The system supports timely and accurate health reporting, complying with data privacy regulations to protect patient information.

**Application Architecture**

Represents the software components of the iSMS, particularly the integration of the QR code functionality. It emphasizes modular development, where core features such as patient registration, record management, and reporting are incrementally built and enhanced.

**Technology Architecture**

Focuses on the underlying infrastructure that supports the clinic management system, ensuring reliable server and database functionality. The system leverages secure cloud storage and QR code scanning technology to facilitate fast, accurate access to patient data.

**Security Architecture**

Centers on ensuring that patient data is protected through encryption and role-based access control. The system’s security architecture ensures only authorized personnel can access sensitive medical information via QR code scanning, complying with relevant healthcare data protection laws.

**Agile and Incremental Development**

The iSMS follow Agile Scrum methodology, enabling continuous feedback from clinic stakeholders and iterative development of features like the QR code system. This approach ensures flexibility, allowing for the system to evolve based on real-time user needs and feedback.

**Microservices Architecture**

The challenge lies in enhancing the efficiency and accessibility of healthcare services at Bestlink College of the Philippines. QR codes offer a promising solution by digitizing various processes and reducing manual tasks.

**Proposed Microservices Architecture**

A microservices architecture can effectively handle the complexity and scalability of integrating QR codes into healthcare services. This approach divides the system into smaller, independent services that can be developed, deployed, and scaled independently.

**Key Microservices:**

1. **QR Code Generation Service:**
   * Generates unique QR codes for various use cases, such as Student Information, medical date schedule and medical results.
   * Integrates with a database to store and manage QR code data.
2. **Student Management Service:**
   * Handles Student information, medical history, section, and Contact No. of parent.
   * Processes QR code scans to retrieve Student data and update records.
3. **Lab Results Management Service:**
   * Processes and stores lab results.
   * Generates QR codes for medical results that can be accessed by patients and healthcare providers.

**Benefits of Microservices Architecture**

* **Scalability:** Each microservice can be scaled independently based on demand, ensuring optimal performance.
* **Flexibility:** New features and services can be added without affecting the entire system.
* **Resilience:** If one microservice fails, the others can continue to operate, minimizing downtime.
* **Technology Agnostic:** Each microservice can use the best-suited technology stack for its specific requirements.
* **Continuous Delivery:** Microservices can be developed, tested, and deployed independently, enabling faster development cycles.

**DevOps and CI/CD: A Strategic Approach**

DevOps, a cultural and technical approach, bridges the gap between development and operations teams to enable faster and more reliable software delivery. Continuous Integration (CI) and Continuous Delivery (CD) are key practices within DevOps that automate the building, testing, and deployment of applications.

**Key Principles of DevOps and CI/CD:**

* **Automation:** Automate repetitive tasks like building, testing, and deployment to reduce errors and improve efficiency.
* **Collaboration:** Foster collaboration between development and operations teams to break down silos and improve communication.
* **Continuous Improvement:** Continuously seek ways to optimize processes and improve the quality of software delivery.
* **Version Control:** Use a version control system to track changes to the codebase and facilitate collaboration.

**Applying DevOps and CI/CD to QR Code Implementation (NOT SURE)**

**1. Infrastructure as Code (IaC):**

* Use IaC tools like Terraform or Ansible to define and manage the infrastructure (e.g., servers, networks, storage) required for the QR code system.
* This ensures consistency, reproducibility, and efficient provisioning of resources.

**2. Source Code Management:**

* Choose a version control system like Git to manage the codebase for the QR code system.
* This enables collaboration, tracking of changes, and easy rollback if necessary.

**3. Continuous Integration (CI):**

* Set up a CI pipeline to automate the building, testing, and packaging of the QR code system.
* This ensures that code changes are integrated and tested frequently, catching errors early.

**4. Continuous Delivery (CD):**

* Implement a CD pipeline to automate the deployment of the QR code system to various environments (e.g., development, testing, production).
* This reduces manual intervention and enables faster delivery of new features.

**5. Containerization:**

* Consider using containers (e.g., Docker) to package the QR code system and its dependencies into a portable unit.
* This ensures consistent behavior across different environments and simplifies deployment.

**6. Monitoring and Logging:**

* Implement monitoring tools to track the performance and health of the QR code system.
* Use logging to capture system events and troubleshoot issues.

**7. Feedback Loops:**

* Establish feedback loops to gather information about the QR code system's performance and user experience.
* Use this feedback to continuously improve the system and address any issues.

**Benefits of DevOps and CI/CD for QR Code Implementation**

* **Faster Time to Market:** Automated processes and streamlined workflows accelerate the delivery of new features and improvements.
* **Improved Reliability:** CI/CD practices help identify and address issues early, reducing the risk of production failures.
* **Enhanced Scalability:** The infrastructure can be easily scaled up or down to meet changing demands.
* **Greater Efficiency:** Automation and collaboration reduce manual effort and improve overall efficiency.
* **Increased Quality:** Continuous testing and feedback lead to higher-quality software.

**Integration of Information Systems in Enterprise Environments**

**Chapter 3**

**Agile Scrum Methodology in the Project**

Using Agile Scrum in the building of the Clinic Management system at Bestlink College of the Philippines can significantly increase adaptability, teamwork, and responsiveness to changing details. The following gives a high-level summary of Agile Scrum. For this project, I applied:

**Roles and Responsibilities**

|  |  |  |
| --- | --- | --- |
| **Name** | **Role** | **Responsibilities** |
| Joseph Oliver P. Banac | Project Manager | * Develop project plans, schedules, and budgets. * Facilitate team meetings and stakeholder updates. * Manage risk assessments and mitigation strategies. * Ensure project deliverables align with goals. |
| Angelo B. Abargos | Developer | * Front-End: Create responsive UI components, implement design mockups, and optimize performance. * Back-End: Build and maintain server-side logic, APIs, and database interactions. * Full Stack: Integrate front-end and back-end systems, ensuring seamless functionality. |
| Ariel A. Forcado | UI/UX Designer | * Conduct user research to gather insights on user needs. * Design wireframes, prototypes, and high-fidelity mockups. * Test designs through usability testing and gather feedback for iterations. * Collaborate with developers to ensure design fidelity in implementation. |
| Lister John L. Evangelista | Security Analyst | * Conduct threat modeling and vulnerability assessments. * Develop and enforce security policies and best practices. * Monitor systems for security breaches and respond accordingly. * Stay updated on cybersecurity trends and compliance regulations. |
| Andiella Mhae B. Gabad | Documentation Specialist | * Develop user manuals, installation guides, and API documentation. * Maintain a knowledge base for project artifacts and resources. * Ensure all documentation is up-to-date and easily accessible. * Assist in creating training materials for users. |

*Roles*

**Roles**

Scrum Master: The Scrum Master helps the team follow Scrum practices, removes obstacles, manages communication, and promotes collaboration to meet project goals on time.

Product Owner: The Product Owner is the main person in charge of the project. They define the project's vision and goals, prioritize features, make sure the product meets user needs, and help the development team and stakeholders communicate. This helps guide the project to successful completion.

Development Team: The development team, which includes individuals with different backgrounds and specialties, is responsible for carrying out the actual development work.

Project Manager: The project manager in IT oversees the planning, execution, and delivery of IT projects. This involves coordinating teams, and managing resources, timelines, and budgets. The project manager ensures that project objectives align with business goals and works to mitigate risks to successfully deliver technical solutions.

Developer: The developer's role is to create, code, and put into place practical solutions to ensure that the technical aspects of the project match the defined objectives. This involves combining user requirements and system functions while solving problems and using new ideas.

UI/UX Designer: The UI/UX Designer's role is to create easy-to-use interfaces and smooth experiences by researching user needs, designing wireframes, and ensuring that the system is easy to use and accessible to meet project goals.

Security Analyst: The security analyst's job is to check, plan, and set up security measures that keep data and systems safe during the project. The analyst makes sure to find and fix any weaknesses in the project's development and launch phases.

Documentation Specialist: The documentation specialist creates, organizes, and maintains project records. This includes technical reports, user manuals, design specifications, and progress documentation. The specialist ensures that the documents are clear, accurate, and compliant with project standards.

**Sprint Cycles**

Regular check-ins and progress evaluations are part of sprint cycles. This could entail holding more frequent feedback meetings between managers and staff in performance management. This check-ins offers the chance to talk about accomplishments, difficulties, and prospective goal revisions.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sprint Cycle | User Stories No. | User Story / Tasks | Timeline | Responsible Team Member |
| Sprint Cycle 1: System Initialization | | | | |
| Sprint Planning | 1 | Define project scope, objectives, and requirements | Start of Sprint 1 |  |
| Daily Standups | 2 | Maintain team alignment and communication | Daily throughout Sprint 1 |  |
| Sprint Review | 3 | Review and validate the project initiation phase | End of Sprint 1 |  |
| Sprint Cycle 2: Requirements Gathering and Planning | | | | |
| Sprint Planning | 4 |  | Start of Sprint 2 |  |
| Daily Standups | 5 |  | Daily throughout Sprint 2 |  |
| Sprint Review | 6 |  | End of Sprint 2 |  |

**Scrum Artifacts**

Product Backlog: A product backlog in performance management could be an employee's prioritized list of skills, competencies, or areas for development. It is possible to periodically review and modify this backlog.

**Product Backlog (User Stories)**

|  |  |  |  |
| --- | --- | --- | --- |
| User Story No. | User Stories | User Story Priorities | Status |
| 1 | As a clinic physician, I can log in clinic system.  *Can log in* | 5 |  |
| 2 | As a clinic physician, I want to view the dashboard.  *Overview Dashboard* | 5 |  |
| 3 | As a clinic physician, I want to view, manage student information.  *Manage Student Data* | 5 |  |
| 4 | As a clinic physician, I want to view, manage medical results, medical history, and health form.  *Manage Medical Affiliation’s* | 4 |  |
| 5 | As a clinic physician, I want to track and manage the inventory of medical supplies  *Inventory Management* | 5 |  |
|  |  |  |  |
| 1 |  | 1 |  |
| 2 | As a clinic nurse, I want to update student medical records in real-time so that other staff members and authorized users always see the most current data.  *Real-Time Data Accuracy for Student Medical Records* | 1 |  |
| 3 | As a clinic nurse, I want to view a summarized version of a student’s medical history so that I can make informed decisions quickly during a clinic visit.  *Medical History Summary for Clinic Staff* | 1 |  |
| 4 | As a system administrator, I want to track and audit user access to medical records to ensure data security and identify any unauthorized access.  *Access Logs for Data Auditing* | 1 |  |
| 5 | As a system administrator, I want daily backups of the clinic’s data to ensure that no critical health information is lost in case of a system failure or data corruption.  *Data Backup and Recovery* | 1 |  |
| 6 | As a school administrator, I want access to real-time health reports (e.g., clinic visits, prevalent illnesses) so I can make informed decisions regarding school policies or closures.  *Real-Time Health Reports* | 1 |  |
| 7 | As a clinic administrator, I want to analyze student health trends (e.g., seasonal illnesses) to plan proactive healthcare strategies and reduce the spread of infections.  *Health Monitoring and Trend Analysis* | 2 |  |
| 8 | As a school administrator, I want to ensure that student health data is stored and shared securely in compliance with privacy laws (e.g., HIPAA), so the clinic meets all regulatory standards.  *Data Privacy and Student Health Confidentiality* | 1 |  |
| 9 | As a clinic nurse, I want to track and manage the inventory of medical supplies so I can ensure we have sufficient stock of essential items (e.g., bandages, medications) without running out.  *Inventory Management* | 2 |  |

*Table #: Product Backlog*

**Product Backlog for EIS Information Security**

|  |  |  |  |
| --- | --- | --- | --- |
| User Story No. | User Stories | User Story Priorities | Status |
| 1 | As a system administrator, I want to define user roles and assign permissions so that users can only access the data and functionalities necessary for their role, minimizing security risks.  *Role-Based Access Control (RBAC)* | 1 | Ongoing |
| 2 | As a system administrator, I want to require users to authenticate using both their password and a secondary method (e.g., OTP or biometrics) to prevent unauthorized access.  *Multi-Factor Authentication (MFA) for User Access* | 1 | Ongoing |
| 3 | As a data security officer, I want to ensure that all sensitive student health data is encrypted both when stored and transmitted to prevent unauthorized access and data breaches.  *Data Encryption* | 1 | Ongoing |
| 4 | As a compliance officer, I want a detailed log of all user activities related to student health data, so I can track and investigate any unauthorized access or changes.  *Audit Trails and Activity Logging* | 1 | Ongoing |
| 5 | As a network security officer, I want to be alerted to any suspicious activities or unauthorized access attempts to the system so that I can take immediate action to prevent breaches.  *Intrusion Detection and Prevention System (IDPS)* | 2 | Ongoing |
| 6 | As a system administrator, I want automatic daily backups of the EIS data so that the clinic can quickly recover in case of an incident or data loss.  *Data Backup and Recovery* | 1 | Ongoing |
| 7 | As a system administrator, I want to securely transmit data between the EIS and external systems (e.g., the registrar) to prevent unauthorized interception or data tampering.\  *Secure Data Sharing Protocols (External Integrations)* | 2 | Ongoing |
| 8 | As a security officer, I want to conduct regular vulnerability assessments and penetration tests on the system to detect and fix security flaws, ensuring the clinic’s data is protected.  *Periodic Vulnerability Assessments and Penetration Testing* | 2 | Ongoing |
| 9 | As a security officer, I want to enforce a policy requiring users to create complex passwords (including letters, numbers, symbols, and special character) and reset them periodically to enhance security.  *Secure Password Policies* | 1 | Ongoing |
| 10 | As a compliance officer, I want the EIS system to comply with regulations like HIPAA to ensure that all student health data is protected and handled in accordance with legal standards.  *Compliance with Data Protection Regulations* | 1 | Ongoing |
| 11 | As a security officer, I want the system to automatically log out users after a certain period of inactivity to reduce the risk of unauthorized access if a session is left open.  *Session Timeouts and Automatic Logouts* | 1 | Ongoing |
| 12 | As a clinic administrator, I want the clinic staff to receive regular training on data security to prevent human errors that could lead to security breaches.  *Security Awareness Training for Clinic Staff* | 4 | Ongoing |

*Table #: Product Backlog for EIS Information Security*

**Product Backlog for EIS Standards**

**UI/UIX**

|  |  |  |  |
| --- | --- | --- | --- |
| User Story No. | User Stories | User Story Priorities | Status |
| 1. |  |  |  |
| 2. |  |  |  |
| 3. |  |  |  |

*Table #: Product Backlog for EIS Standards*

**Product Backlog for Integration**

|  |  |  |  |
| --- | --- | --- | --- |
| User Story No. | User Stories | User Story Priorities | Status |
| 1 | As a clinic administrator, I want the system to integrate with the school's registrar / student portal so that I can access and retrieve student information (e.g., contact details, grade level, enrollment status) in real-time without manually entering data.  *Registrar Integration for Student Data* | 1 | Ongoing |
| 2. |  |  |  |
| 3. |  |  |  |

*Table #: Product Backlog for Integration*

Sprint Backlog: A sprint backlog in performance management could be an employee's commitment to completing particular tasks or goals in a shorter amount of time.

**Sprint Backlog**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| User Story No. | User Stories | User Story Priorities | Requirements Reference | Revision Priority | Status |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

*Table #: Sprint Backlog*

**Microservices Architecture**

**DevOps Implementation**

* 1. **Strategic Planning and Review:**

Action What Optimize the provision of health services in the clinic of ***Bestlink College of the Philippines*** through an improved Clinic management system by linking the application with QR code and incorporating DevOps practices to ensure automation, cooperation, and continuous delivery.

* Requirements Gathering: The member of the staff at the clinic, members from the IT teams, doctors, and so on need to be brought together to understand what they require in the inclusion of QR code integration and CMS functionality improvement.
* DevOps Readiness: basically, assessing the maturity levels of the adoption of DevOps practices in the provided IT and development infrastructure by understanding the status quo.
  1. **Define the Target Outcomes**

**Expected Benefits:**

• **Faster Access to Patient Data:** Use of QR code log-ins for instant patient data access. Appointments to be booked and managed seamlessly with QR codes, therefore easy to track the patients.

• **More Accurate with Data:** The automation of input processes reduces human errors in the student records.

• **Improved Patient Experience:** Service delivery has been enhanced by more effective quicker response to the medical check-up visit.

**• It will provide DevOps advantages:** automated testing, continuous deployment, and monitoring, on Clinic Management System that produces updates swiftly with a stable platform.

* 1. **Design and Implementation Plan**

**Implementation Plan**

•**Student Record:**

The QR code must be used as a unique identification number for each patient. The scanning of it must be used to obtain the information about a patient's history.

**•Access to Medical Result:**

Implement secure authentication systems that allow healthcare providers to give the medical result via QR codes, ensuring quick access and secure results.

**Innovation Integration**