WATERFALL MODEL PROJECT PART1/2

**1. Business case document**

**1. Why is this Hospital Management System Project Initiated?**

The Hospital Management System (HMS) is initiated in a project for several reasons, and it serves as a crucial component in improving hospital operations and enhancing patient care. When creating a Business Case Document for an HMS project, the main objective is to justify the need for the system and demonstrate its value to the hospital's operations. Below are key reasons why an HMS is initiated and included in the Business Case Document:

1. Improving Operational Efficiency

* Many hospitals still rely on manual processes or outdated systems, which can lead to inefficiencies, errors, and delays in patient care, billing, and administrative tasks.
* An HMS automates workflows, streamlines processes, and reduces human error. It improves coordination between different departments, speeds up tasks like patient registration, billing, appointment scheduling, and medical record management, resulting in smoother operations.
* By automating and optimizing hospital operations, an HMS can save time, reduce administrative overhead, and lower operational costs.

2. Enhancing Patient Care

* In many manual or legacy systems, patient records are often fragmented, inconsistent, or inaccessible. This can lead to medical errors, delays in diagnosis, and poor patient care.
* The HMS provides a unified platform for storing and accessing patient data, including medical history, test results, prescriptions, and treatment plans. This enhances the accuracy and timeliness of patient care and supports better decision-making by healthcare professionals.
* A robust HMS leads to more informed decision-making, reduces the risk of medical errors, and improves patient outcomes.

3. Regulatory Compliance and Reporting

* Healthcare organizations are subject to numerous regulations (e.g., HIPAA, GDPR) and are required to maintain accurate records and generate detailed reports. Manually handling compliance-related tasks can be time-consuming and prone to errors.
* The HMS ensures that patient data is stored securely and that the hospital complies with relevant regulatory requirements. It can automatically generate compliance reports, track audits, and provide data access logs.
* The system’s built-in features for compliance management reduce the risk of regulatory violations, fines, and reputational damage.

4. Better Resource Management

* Hospitals often struggle with managing resources like beds, medical equipment, staff, and pharmaceuticals efficiently. Poor resource allocation can result in bottlenecks, delays, and inefficiencies.
* An HMS helps in managing resources by providing real-time visibility into bed availability, medical equipment usage, staff schedules, and inventory levels.
* The system’s ability to track and allocate resources optimally leads to cost savings, improved service delivery, and better patient satisfaction.

5. Data Analytics and Decision Support

* Without integrated systems, extracting meaningful insights from hospital data can be time-consuming and error-prone.
* The HMS provides comprehensive data analytics tools, enabling hospital administrators to track key performance indicators (KPIs), identify trends, and make data-driven decisions.
* By leveraging the system’s reporting and analytics capabilities, hospital management can optimize processes, improve quality of care, and plan for future growth.

6. Cost Savings

* Manual systems and paper-based records incur significant costs for storage, printing, and administrative efforts.
* An HMS reduces paper-based processes, minimizes redundancy, and eliminates errors, leading to cost reductions in administrative overhead, storage, and operational inefficiencies.
* Long-term cost savings can be achieved through reduced paper usage, decreased administrative labor, and improved resource management.

7. Improved Patient and Staff Satisfaction

* Hospitals that use inefficient systems or manual processes may face higher patient wait times, appointment scheduling issues, or staff frustration.
* An automated system reduces patient waiting times, improves appointment scheduling, and streamlines communication between patients, doctors, and staff, leading to improved patient experiences and job satisfaction for healthcare providers.
* Increased satisfaction can result in better patient retention, enhanced reputation, and improved staff morale, all of which are key to the hospital’s long-term success.

8. Scalability and Growth

* As hospitals grow, the need to scale operations and manage an increasing volume of patients, staff, and data can become overwhelming with manual or outdated systems.
* A modern HMS is scalable, meaning it can grow with the hospital’s needs, whether that’s by handling more patients, additional departments, or more complex data management.
* The ability to scale ensures the hospital can continue to operate efficiently as it expands, without needing frequent system overhauls or process disruptions.

9. Remote Access and Telemedicine Support

* Traditional hospital systems may lack the ability to support remote consultations, telemedicine, or accessing patient data off-site.
* Modern HMS solutions offer cloud-based access, enabling authorized staff to access patient records, perform remote consultations, and manage tasks even from off-site locations.
* The support for telemedicine and remote access enhances hospital flexibility, provides better care in underserved areas, and increases patient convenience.

10. Facilitating Collaboration and Communication

* Poor communication between departments, doctors, and administrative staff can result in delays and errors.
* An HMS fosters collaboration and communication by providing a centralized platform for staff to access patient data, update records, and communicate in real-time.
* Enhanced communication leads to smoother workflows, quicker response times, and better coordinated care.

**2. What Are the Current Problems in Hospital Management Systems?**

Current Hospital Management Systems often face several problems that hinder their effectiveness:

some **current problems in a Hospital Management System** that can be included in the **Business Case Document**:

**1. Inefficient Manual Processes**

* **Problem**: Many hospitals still rely on paper-based or manual processes for patient registration, billing, record-keeping, and appointment scheduling.

**2. Fragmented Data and Systems**

* **Problem**: Hospitals often use multiple, disconnected systems for different departments (e.g., billing, patient records, lab results, inventory management) with no seamless integration.

**3. Poor Patient Data Management**

* **Problem**: Managing and storing patient data can be challenging, especially with legacy systems that do not provide a comprehensive and unified view of the patient's medical history.

**4. Lack of Real-time Data and Reporting**

* Existing systems often lack real-time data reporting capabilities, meaning hospital management has limited visibility into operations and performance metrics.

**5. Inadequate Communication Between Departments**

* **Problem**: Many hospitals suffer from poor communication between different departments (e.g., patient care, pharmacy, billing, etc.), leading to delays, duplication of work, and a lack of coordination.

**6. Patient Appointment and Scheduling Issues**

* **Problem**: Appointment scheduling can be disorganized, with patients experiencing long wait times or double bookings. It’s also often hard to track which healthcare provider is available.

**7. Billing and Payment Challenges**

* **Problem**: Billing in many hospitals is still a cumbersome, manual process prone to errors and delays. It is also difficult to track payments and generate accurate invoices in a timely manner.

**8. Compliance and Regulatory Challenges**

* **Problem**: Keeping up with regulatory requirements, such as **HIPAA** (Health Insurance Portability and Accountability Act), **GDPR** (General Data Protection Regulation), and other healthcare-specific regulations, can be challenging for hospitals using legacy systems.

**9. Limited Patient Access and Engagement**

* **Problem**: Many hospitals have limited tools for engaging patients, providing them with access to their medical records, appointment schedules, or billing information.

**10. Resource Management Issues**

* **Problem**: Managing hospital resources such as medical equipment, staff, and facilities can be challenging, especially if inventory tracking and staffing schedules are done manually or through disconnected systems.

**11. Data Security and Privacy Concerns**

* **Problem**: Legacy systems may not provide adequate protection for sensitive patient data, leaving it vulnerable to breaches, theft, or misuse.

**12. Poor System Scalability**

* **Problem**: As hospitals grow, the existing system may not be able to handle increasing volumes of patient data or users, leading to slowdowns or system crashes.

**3. How Many Problems Could be Solved with This Project?**

A well-implemented **Hospital Management System (HMS)** can solve several of the problems listed above:

* **Data Integration and Centralization**: An HMS centralizes all patient and operational data, making it accessible across departments and improving communication.
* **Automation of Processes**: Automating scheduling, billing, patient records management, and inventory reduces human errors and improves efficiency.
* **Enhanced Data Security**: The system can include encryption, secure access controls, and audit trails to ensure the security of sensitive data.
* **Improved User Interface**: Modern HMS solutions come with user-friendly interfaces that reduce training time and increase adoption.
* **Improved Data Accuracy**: Real-time validation and automatic error-checking features ensure that patient data is entered accurately and completely.
* **Regulatory Compliance**: HMS can be built to comply with relevant healthcare regulations, ensuring data privacy and security standards are met.
* **Advanced Reporting and Analytics**: The system provides real-time insights into hospital performance, patient care, and financial health, enabling data-driven decisions.

While not all problems may be fully solved with the initial implementation, the HMS will address **a majority of the operational, clinical, and administrative issues**, thus greatly improving overall hospital efficiency and patient care.

**4. What Are the Resources Required in Hospital Management System?**

To implement and maintain a Hospital Management System, the following resources are required:

**Human Resources**

* **Project Manager**: To oversee the implementation and ensure the project runs smoothly.
* **IT Team**: Developers, system administrators, and network engineers to handle the technical aspects of the implementation.
* **Healthcare Professionals**: Doctors, nurses, and medical staff to ensure that the system meets their needs and is integrated effectively into their workflows.
* **Trainers**: To train hospital staff on how to use the system.
* **Compliance Officers**: To ensure that the system complies with healthcare regulations like HIPAA.

**Hardware**

* **Servers**: For hosting the HMS (cloud-based or on-premises).
* **Workstations and Devices**: Computers, tablets, and mobile devices for staff to access the system.
* **Backup Infrastructure**: For data recovery and redundancy.

**Software**

* **HMS Software**: The core software that will manage hospital operations, including modules for patient management, billing, EHR, and inventory.
* **Third-Party Integrations**: Software to integrate the HMS with other systems (e.g., insurance databases, government health platforms).

**Financial Resources**

* **Budget**: Allocation for software purchasing, implementation, training, and ongoing maintenance costs.

**Time Resources**

* **Implementation Time**: Time to plan, customize, and implement the system.
* **Training Time**: Time allocated for training hospital staff to use the new system effectively.

**5. How Much Organizational Change Is Required to Adopt This Technology in Hospital Management System?**

Adopting a new **Hospital Management System** will require several levels of organizational change:

**Cultural Change**

* **Shift Toward Digital**: Moving from manual, paper-based processes to a digital system will require a mindset change. Staff may need to adjust to the idea of using technology more extensively in their daily tasks.
* **Adaptation to New Workflows**: Employees will have to adapt to new workflows and processes that the HMS will implement.

**Training and Skill Development**

* **User Training**: Healthcare professionals, administrative staff, and IT personnel must undergo training to become proficient in the new system.
* **Ongoing Education**: Staff will need to stay updated with system updates and new features.

**Resistance to Change**

* **Stakeholder Buy-in**: Hospital leadership and staff must support the adoption of the system. Resistance from key stakeholders could delay or hinder the process.
* **Communication**: Clear communication about the benefits and expected outcomes of the system is crucial to overcoming resistance.

**Process Changes**

* **Reengineering**: Hospital processes (e.g., patient registration, billing, scheduling) will need to be reengineered to fit the capabilities of the new system.
* **Workflow Adjustments**: The system’s implementation may require changes in job roles, responsibilities, and workflows, particularly for administrative staff.

**6. Time Frame to Recover ROI in Hospital Management System?**

The time frame to recover **Return on Investment (ROI)** for a Hospital Management System depends on several factors:

* **Initial Costs**: The costs of system acquisition, implementation, training, and maintenance.
* **Operational Savings**: Efficiency improvements, reduced staffing needs, and minimized errors lead to cost savings.
* **Revenue Improvements**: Faster billing cycles, better revenue cycle management, and optimization of patient flow can improve financial performance.
* **Regulatory Compliance**: Avoiding penalties for non-compliance can save money in the long term.

Typically, **ROI** can be expected within **1-2 years** of implementation for hospitals that:

* Have an efficient implementation plan.
* Actively train and support staff in the use of the system.
* Use the system’s features to optimize processes like billing, patient management, and scheduling.

Larger hospitals or those with complex systems may take longer, but the benefits generally compound over time, leading to substantial long-term cost savings.

**7. How to Identify Stakeholders in Hospital Management System?**

Identifying the stakeholders in a Hospital Management System project is essential for ensuring all relevant parties are involved and their needs are addressed. The key stakeholders typically include:

**Internal Stakeholders**

* **Executive Leadership (CEO, CFO, CIO)**: They provide approval, funding, and oversight for the project.
* **Healthcare Providers (Doctors, Nurses)**: They will use the system to access patient records and manage treatment. Their input is vital to ensure that the system meets clinical needs.
* **Administrative Staff**: Receptionists, billing clerks, and HR staff who will manage patient records, payments, and payroll.
* **IT Department**: Responsible for the technical implementation, integration, and ongoing maintenance of the system.
* **Compliance Officers**: Ensure that the system complies with regulatory standards.
* **Training Teams**: Those responsible for teaching staff how to use the system effectively.

**External Stakeholders**

* **Patients**: As end users of the patient portal, their needs must be considered for scheduling, accessing medical records, and communicating with healthcare providers.
* **Insurance Providers**: They may need to integrate with the system to process claims.
* **Suppliers and Vendors**: These external parties may be integrated into the system for inventory management.

By identifying these stakeholders early and involving them throughout the implementation process, the project is more likely to succeed and meet the needs of all users.

**2Ans**. **Business Analysis Strategy for Hospital Management System (HMS)**

As a Business Analyst (BA) for a **Hospital Management System (HMS)**, your role is to guide the project from the initial requirements gathering phase through to successful delivery and post-implementation. Below are the steps, techniques, processes, and best practices that you should follow to ensure the project is completed effectively:

**1. Steps to Follow to Complete the Project**

**1: Project Initiation and Planning**

* **Understand the Project Scope**: Meet with stakeholders to define project objectives, expected outcomes, and business goals.
* **Create a Project Plan**: Develop a plan that outlines project milestones, timelines, and resource allocation.
* **Set the Scope and Deliverables**: Define the boundaries of the project and what will be delivered.

**2: Stakeholder Identification and Analysis**

* **Identify Stakeholders**: Identify all the key stakeholders such as hospital management, doctors, patients, administrative staff, IT department, suppliers, and insurance providers.
* **Create Stakeholder Profiles**: Understand each stakeholder's needs, expectations, and how they will be impacted by the system.

**3: Requirements Elicitation**

* **Conduct Interviews**: Hold one-on-one or group interviews with key stakeholders (doctors, nurses, hospital admins, patients) to gather detailed requirements.
* **Facilitate Workshops**: Engage with groups of users and stakeholders in brainstorming sessions and focus groups.
* **Survey and Questionnaires**: Distribute surveys to understand common needs and issues.
* **Document Analysis**: Analyze existing documentation such as process manuals, reports, and data flows to understand current systems and identify gaps.
* **Observation**: Observe daily operations in the hospital setting to identify pain points and inefficiencies.

**4: Requirement Documentation and Analysis**

* **Document Functional and Non-Functional Requirements**: Use clear and concise language to document business, system, and technical requirements.
* **Create Use Cases and User Stories**: Define user interactions and expectations for the HMS.

**5: Solution Design**

* + **Work with IT/Development Teams**: Ensure the system design aligns with the business needs and functional specifications.
  + **Model System Processes**: Use flowcharts, BPMN diagrams, and wireframes to map out system functionality.

**6: Testing and Validation**

* + **Test Plans**: Create test cases for unit testing, integration testing, and user acceptance testing (UAT).
  + **UAT Sessions**: Conduct User Acceptance Testing to ensure the system meets all business requirements and gather feedback from users.

**7: Training and Implementation**

**Develop Training Materials**: Create guides, tutorials, and documentation for end-users.

**Provide Training**: Conduct training sessions for hospital staff, including administrative personnel, doctors, and IT teams.

**Post-Implementation Support and Evaluation**

**Monitor System Performance**: Track system usage and resolve any issues that arise after implementation.

**Gather Feedback**: Continue collecting feedback from users to evaluate if the system is meeting business needs.

**Support and Maintenance**: Provide ongoing support and periodic updates to the system.

**2. Elicitation Techniques to Apply**

As a BA, you will use various **elicitation techniques** to gather detailed and accurate requirements for the Hospital Management System (HMS).

**Interviews**: Conduct individual or group interviews with hospital staff, doctors, patients, and other stakeholders to understand their needs, expectations, and pain points.

**Workshops**: Facilitate workshops with users to identify business processes, requirements, and priorities.

**Surveys and Questionnaires**: Distribute surveys to collect feedback from a wide range of stakeholders, especially for non-urgent input.

**Document Analysis**: Review existing reports, processes, and data flow diagrams from existing hospital systems to understand how things currently operate and where improvements are needed.

* **Prototyping**: Create a simple prototype of the HMS to demonstrate system features and collect user feedback.
* **Observations**: Observe hospital staff and patients in action to identify workflow inefficiencies or areas for improvement.
* **Focus Groups**: Bring together a small group of stakeholders to discuss the system’s features and potential challenges.

**3. Analysis of RACI/ILS (Roles and Responsibilities)**

A **RACI Matrix** (Responsible, Accountable, Consulted, and Informed) and **ILS (Issue Log/Status)** are useful tools for tracking roles, responsibilities, and project progress.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Task / Activity | Project Manager | IT Team | Hospital Administration | Doctors | Nurses | Patients | Legal Advisors | Health Insurance Providers | System Users |
| Identify Stakeholders | A | C | C | C | C | I | I | I | I |
| Gather Stakeholder Requirements | R | C | A | C | C | C | C | C | I |
| Develop System Requirements | C | R | C | A | C | I | I | I | I |
| Design System Architecture | C | R | C | C | I | I | I | I | I |
| Create Implementation Plan | A | R | C | C | I | I | C | I | I |
| Testing & Validation of System | C | R | C | A | C | I | C | I | C |
| Training for End Users (Doctors, Nurses) | C | R | C | A | R | I | I | I | C |
| Deployment of System | A | R | C | C | I | I | C | I | I |
| System Maintenance and Support | C | R | I | I | I | I | C | C | I |
| Monitor System Performance | C | R | C | I | I | I | C | I | I |

**R** = Responsible: The person(s) responsible for completing the task.

**A** = Accountable: The person who ensures the task is completed.

**C** = Consulted: People who provide input for the task.

**I** = Informed: People who need to be kept informed about the task's progress.

**4. Documents to Write**

**Business Requirements Document (BRD)**: This document captures the high-level requirements and the objectives of the system.

**Functional Specifications Document**: Detailed descriptions of each system function and the required behavior.

**Non-Functional Requirements Document**: Specifies requirements like security, scalability, performance, and reliability.

**Use Case/ User Stories Document**: Describes the interaction between users and the system in a narrative form.

**Gap Analysis Report**: Highlights discrepancies between the current system and the proposed system.

**Data Flow Diagrams**: Visual representation of how data flows within the HMS.

**Test Plan and Test Cases**: Documents for the testing phase, including unit tests, integration tests, and UAT plans.

**Training Materials**: Guides, FAQs, and tutorials for training hospital staff.

**Change Request Log**: A document to track all change requests made during the project lifecycle.

**5. Communication Channels to Establish & Implement**

Establishing clear communication channels is essential for a successful HMS project. The following channels should be implemented:

**Project Management Software**: Tools like JIRA, Trello, or MS Project to track project progress and assign tasks.

**Email Communication**: For formal project updates, decisions, and document sharing.

**Instant Messaging Tools**: Slack, Microsoft Teams for quick communication and collaboration among team members.

**Video Conferencing**: Zoom, Microsoft Teams for remote meetings and virtual collaboration.

**Stakeholder Meetings**: Regular meetings (e.g., weekly or bi-weekly) to discuss progress, issues, and feedback.

**Feedback Mechanisms**: Dedicated forms or platforms for stakeholders to provide ongoing feedback.

**6. Handling Change Requests**

**Change Request Log**: Maintain a log to capture all incoming change requests.

**Impact Assessment**: For each change request, assess its impact on scope, timeline, and resources.

**Approval Process**: Establish a formal process for stakeholders to review and approve changes, often involving a change control board (CCB).

**Version Control**: Update project documents to reflect approved changes and communicate updates to the team.

**7. Updating the Progress of the Project to Stakeholders**

**Status Reports**: Provide regular updates to stakeholders (weekly or bi-weekly) with key metrics, risks, and progress.

**Dashboards**: Use project management tools (e.g., MS Project, Jira) to create real-time dashboards showing progress and issues.

**Meetings and Reviews**: Hold regular meetings (monthly or quarterly) with key stakeholders to review project progress.

**Risk and Issue Logs**: Regularly update and communicate risks, issues, and mitigation plans.

**8. UAT Client Acceptance Form**

To take sign-off from stakeholders on UAT (User Acceptance Testing), follow these steps:

**Prepare UAT Sign-Off Form**: Create a formal UAT sign-off form that includes:

* A summary of the UAT results
* List of tested requirements and features
* Any issues or concerns raised during UAT
* A section for the client to provide feedback or approval

**Conduct UAT**: Run UAT sessions with the clients and stakeholders, gather feedback, and resolve any issues raised.

**Obtain Formal Sign-Off**: Ensure the UAT client acceptance form is signed by key stakeholders, indicating their appro

**3Ans. - Functional Specifications**

**Project Overview**

**Project Name:** Hospital Management System (HMS)

**Project Version:** 1.0

**Project Sponsor:** [Williamson]

**Project Manager:** [Henry Mark]

**Project Initiation Date:** [09/01/2025]

**Functional Requirement specifications:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Req ID** | **Req Name** | **Req Description** | **Priority** |
| R 1 | Patient Registration | Capture personal details (name, age, contact) and assign a unique patient ID. | High |
| R2 | Appointment Scheduling | Capture personal details (name, age, contact) and assign a unique patient ID. | High |
| R3 | Medical History Management | Maintain patient’s medical history, treatments, diagnoses, allergies, and past visits. | High |
| R4 | Follow-Up Management | Track follow-up appointments and treatments, setting reminders for each visit. | Medium |
| R5 | Patient Billing | Generate and manage itemized bills for consultations, treatments, and medical tests. | High |
| R6 | Payment Processing | Allow payment through credit card, insurance, or cash, and generate digital receipts. | High |
| R7 | Insurance Integration | Integrate with insurance providers for real-time claim processing and reimbursement. | High |
| R8 | Financial Reporting | Generate financial reports including revenue, expenses, and outstanding payments. | Medium |
| R9 | Patient Record Management | Digitally store patient medical records (prescriptions, lab results, treatment history) | High |
| R10 | Doctor’s Notes | Enable doctors to add clinical notes and progress reports for each patient. | High |
| R11 | Prescription Management | Record and manage prescribed medications and treatments digitally. | High |
| R12 | Lab Results Management | Automatically integrate lab results into patient records for doctor review. | Medium |
| R13 | Inventory Tracking | Track medical supplies, medications, and equipment usage in various hospital departments. | High |
| R14 | Stock Entry/Exit | Record the movement of stock—incoming supplies and outgoing items (e.g., patient dispensed). | High |
| R15 | Supplier Management | Maintain supplier details and manage purchase orders for inventory replenishment. | Medium |
| R16 | Inventory Reports | Generate reports on stock usage, wastage, and reorder alerts to maintain optimal inventory levels. | Medium |
| R17 | Staff Management | Maintain detailed records of hospital staff (roles, qualifications, attendance, etc.). | High |
| R18 | Payroll Management | Manage salary calculations, deductions, and generate payslips for hospital staff. | High |
| R19 | Staff Scheduling | Create and manage staff shift schedules to optimize manpower and workload distribution. | Medium |
| R20 | Employee Performance | Track employee performance and generate reports based on KPIs and feedback. | Medium |
| R21 | Doctor Scheduling | Schedule doctors' appointments based on their availability and patient requirements. | High |
| R22 | Operating Room Scheduling | Schedule surgeries and procedures, ensuring room and equipment availability. | High |
| R23 | Room Management | Allocate and manage patient rooms (ICU, general ward, etc.) based on availability and patient condition. | High |
| R24 | Test Ordering | Allow doctors to order diagnostic tests and procedures for patients directly from the system. | High |
| R25 | Test Results Management | Automatically update patient records with diagnostic test results as soon as available | High |
| R26 | Report Generation | Generate detailed lab test reports and share them with patients and doctors in printable/electronic format. | Medium |
| R27 | Operational Reporting | Generate daily operational reports on hospital activities (e.g., admissions, discharges, treatments). | High |
| R28 | Financial Reporting | Generate reports on revenue, expenses, profit, and trends across various departments. | High |
| R29 | Patient Satisfaction Reporting | Collect patient feedback and generate reports on satisfaction levels regarding hospital services. | Medium |
| R30 | Data Security | Ensure patient data is encrypted and securely stored, implementing role-based access control (RBAC). | High |

**4Ans. - Requirement Traceability Matrix**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Req ID** | **Req Name** | **Req Description** | **Design** | **D1 (Development Phase 1)** | **T1 (Testing Phase 1)** | **D2 (Development Phase 2)** | **T2 (Testing Phase 2)** | **UAT** |
| R1 | Patient Registration | Capture personal details (name, age, contact) and assign a unique patient ID. | Completed | In Progress | Not Started | Completed | Not Started | Not Started |
| R2 | Appointment Scheduling | Allow patients to book appointments based on doctor availability. | Completed | In Progress | Not Started | Completed | Not Started | Not Started |
| R3 | Medical History Management | Maintain patient’s medical history, treatments, diagnoses, allergies, and past visits. | Completed | In Progress | Not Started | Completed | Not Started | Not Started |
| R4 | Follow-Up Management | Track follow-up appointments and treatments, setting reminders for each visit. | Completed | In Progress | Not Started | Completed | Not Started | Not Started |
| R5 | Patient Billing | Generate and manage itemized bills for consultations, treatments, and medical tests. | Completed | In Progress | Not Started | Completed | Not Started | Not Started |
| R6 | Payment Processing | Allow payment through credit card, insurance, or cash, and generate digital receipts. | Completed | In Progress | Not Started | Completed | Not Started | Not Started |
| R7 | Insurance Integration | Integrate with insurance providers for real-time claim processing and reimbursement. | Completed | In Progress | Not Started | Completed | Not Started | Not Started |
| R8 | Financial Reporting | Generate financial reports including revenue, expenses, and outstanding payments. | Completed | In Progress | Not Started | Completed | Not Started | Not Started |
| R9 | Patient Record Management | Digitally store patient medical records R10(prescriptions, lab R11results, treatmR12ent history). | Completed | In Progress | Not Started | Completed | Not Started | Not Started |
| R10 | Doctor’s Notes | Enable doctors to add clinical notes and progress reports for each patient. | Completed | In Progress | Not Started | completed | Not Started | Not Started |
| R11 | Prescription Management | Record and manage prescribed medications and treatments digitally. | Completed | In Progress | Not Started | Completed | Not Started | Not Started |
| R12 | Lab Results Management | Automatically integrate lab results into patient records for doctor review. | Completed | In Progress | Not Started | Completed | Not Started | Not Started |
| R13 | Inventory Tracking | Track medical supplies, medications, and equipment usage in various hospital departments. | Completed | In Progress | Not Started | Completed | Not Started | Not Started |
| R14 | Stock Entry/Exit | Record the movement of stock—incoming supplies and outgoing items (e.g., patient dispensed). | Completed | In Progress | Not Started | Completed | Not Started | Not Started |
| R15 | Supplier Management | Maintain supplier details and manage purchase orders for inventory replenishment. | Completed | In Progress | Not Started | Completed | Not Started | Not Started |
| R16 | Inventory Reports | Generate reports on stock usage, wastage, and reorder alerts to maintain optimal inventory levels. | Completed | In Progress | Not Started | Completed | Not Started | Not Started |
| R17 | Staff Management | Maintain detailed records of hospital staff (roles, qualifications, attendance, etc.). | Completed | In Progress | Not Started | Completed | Not Started | Not Started |
| R18 | Payroll Management | Manage salary calculations, deductions, and generate payslips for hospital staff. | Completed | In Progress | Not Started | Completed | Not Started | Not Started |
| R19 | Staff Scheduling | Create and manage staff shift schedules to optimize manpower and workload distribution | Completed | In Progress | Not Started | Completed | Not Started | Not Started |
| R20 | Employee Performance | Track employee performance and generate reports based on KPIs and feedback. | Completed | In Progress | Not Started | Completed | Not Started | Not Started |
| R21 | Doctor Scheduling | Schedule doctors' appointments based on their availability and patient requirements. | Completed | In Progress | Not Started | Completed | Not Started | Not Started |
| R22 | Operating Room Scheduling | Schedule surgeries and procedures, ensuring room and equipment availability. | Completed | In Progress | Not Started | Completed | Not Started | Not Started |
| R23 | Room Management | Allocate and manage patient rooms (ICU, general ward, etc.) based on availability and patient condition. | Completed | In Progress | Not Started | Completed | Not Started | Not Started |
| R24 | Test Ordering | Allow doctors to order diagnostic tests and procedures for patients directly from the system. | Completed | In Progress | Not Started | Completed | Not Started | Not Started |
| R25 | Test Results Management | Automatically update patient records with diagnostic test results as soon as available. | Completed | In Progress | Not Started | Completed | Not Started | Not Started |
| R26 | Report Generation | Generate detailed lab test reports & share them | Completed | In Progress | Not Started | Completed | Not Started | Not Started |
| R27 | Operational Reporting | Generate daily operational reports on hospital activities (e.g., admissions, discharges, treatments) | Completed | In Progress | Not Started | Completed | Not Started | Not Started |
| R28 | Financial Reporting | Generate reports on revenue, expenses, profit, and trends across various departments. | Completed | In Progress | Not Started | Completed | Not Started | Not Started |
| R29 | Patient Satisfaction Reporting | Collect patient feedback and generate reports on satisfaction levels regarding hospital services. | Completed | In Progress | Not Started | Completed | Not Started | Not Started |
| R30 | Data Security | Ensure patient data is encrypted and securely stored, implementing role-based access control (RBAC). | Completed | In Progress | Not Started | Completed | Not Started | Not Started |

**5Ans. - BRD T Business Requirements Document(BRD)For Hospital Management System**

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**Document Number:** D-002/HC001/BRD

**Version:**1.0

**Creation Date:** 10th Dec 2024

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**1. Document Revisions**

|  |  |  |
| --- | --- | --- |
| Date | Version Number | Document Changes |
| 05/02/2024 | 0.1 | initial draft |
| 10/09/2024 | 0.6 | Revised Document |
| 09/11/2024 | 0.9 | full-fledged document |
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**2. Approvals**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Role | Name | Title | Signature | Date |
| Project Sponsor | Williamson | Project Sponsor |  |  |
| Business Owner | Peter parker | Business Owner |  |  |
| Project Manager | Henry | Project Manager |  |  |
| System Architect | Tony stark | System Architect |  |  |
| Development Lead | Nicholas | Development Lead |  |  |
| User Experience Lead | Charlie | User Experience Lead |  |  |
| Quality Lead | Andrea | Quality Lead |  |  |
| Content Lead | Swapna | Content Lead |  |  |

**3. RACI Chart for This Document**

Codes Used in RACI Chart

\*Authorize Has ultimate signing authority for any changes to the document.

R – Responsible Responsible for creating this document.

A --Accountable Accountable for accuracy of this document (for example, the project manager)

S –Supports Provides supporting services in the production of this document

C –Consulted Provides input (such as an interviewee).

I –Informed Must be informed of any changes.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Position | Name | R | A | S | C | I |
| Project Sponsor | Williamson | YES |  |  |  |  |
| Business Owner | Peter parker |  | YES | YES |  |  |
| Project Manager | Henry |  |  |  | YES |  |
| System Architect | Tony stark |  |  |  | YES | YES |
| Development Lead | Nicholas |  | YES |  |  |  |
| User Experience Lead | Charlie |  |  |  | YES |  |
| Quality Lead | Andrea |  |  | YES |  |  |
| Content Lead | Swapna | YES |  |  |  |  |

**4. Introduction**

4.1. Business Goals

Need: The Goal of undertaking this project is Complete Automation of operations of Hospital Management system.

4.2. Business Objectives

The software has to achieve the following functionalities after the implementation of the project:

• Registration of the new patient searching the existing patient

• Bill settlement

• Scheduling the appointment of the patients.

• Scheduling the patient operations as prescribed by the doctor

• Allocation of wards to the patients on the basis of doctor’s consultation

• Collection of payments for the tests conducted by patient as per doctor’s prescription.

• Generating discharge token for the patients

4.3. Business Rules

• Mandatory for the new patient to be registered at the hospital.

• System shall generate a patient id for every new patient registered at the hospital.

• Patient shall be discharged from the hospital only after full and final bill is settled and discharge token is generated

• Re schedule the admission of the patient if the specialized ward is not vacant.

• Patient is to be assigned specialized ward only after doctor’s recommendation.

• Reports of the laboratory tests done to be handed over to the patient only after the payments are done.

4.4. Background

The hospital has been in existence over many years and is well established in the market place. However of late the hospital is not able to operate efficiently as compared to the other hospitals due to heavy dependency on paper work and the manual processes. The hospital management has decided to undergo complete overhaul of the hospital operations and hence has decided to re-engineer the hospital process by eliminating the paper work with the automation of the system .With the automation of processes, the hospital management expects improvements in efficiency of the hospital operations and wants to focus better on improving the services of hospital.

4.5. Project Objective

The main objective of implementing this project is to ensure system connectivity between all the departments in the hospital with the use of Information Technology. With the implementation of the project the hospital focus on faster execution of important tasks like quick registration of patients, scheduling the patient appointments and settle the hospital bills faster without minimal intervention of humans.

4.6. Project Scope

• The system shall be used to maintain the database of the patients and their details visiting the hospital which can be stored and used in future.

• The current system in use is a paper based system which is very slow and cannot provide the required patient information within the expected timeframe.

• With automatization of the hospital, the hospital staff can pay more attention towards improving the patient service which shall ultimately improve the hospital standards.

• The project shall help the system to generate the reports to view the bills and details of all the services availed by the patient in hospital.

• Project shall help to cut down overtime salaries paid to the staff by improving the process efficiency.

4.6.1. In Scope Functionality

• Enable registration of new patients.

• Generate unique ID for the patient at the time of registration which shall remain active till final settlement of the patient. •Enable the system to search the existing patients in the hospital as well as search the records of the previous patients.

• Schedule the OPD appointments of the patients for consultation

• Check the availability of occupied and unoccupied beds in the wards

• Allocation of wards to patients on the basis of doctor’s prescription

• Enable system to check the bills of laboratory, in case the patients have undergone any system tests.

• Enable system to view the medical reports of the patient, if any.

• Enable system to check the medicine bills of pharmacy, in case if the patients have purchased ay medicines from the hospital pharmacy

4.6.2. Out Scope Functionality

• Online application to enable patients to check real time the availability of doctors in the hospital to book appointment for consultation.

• Online application to rate the service offered by the hospital

• Automatic issue of medicines by pharmacy based on doctor’s prescription

• Alerts to patients and doctors on appointments using alerts and messages, appointment reminders

**5. Assumptions**

• It shall be assumed the Hospital shall software compatible Computer systems at the key terminals.

• It is assumed the hospital will have staff trained with basic skills to operate computers.

• All the systems shall be connected through the extranet systems.

• Patient medical history can be viewed by the concerned doctor at the hospital with the approval of the patient

**6. Constraints**

• Time frame – The project is to be made live by 10/09/2019

• Traveling to Clients location for frequent requirement gathering

• Interaction with cross country stakeholders

• Graphical User Interface is only in English Language

**7. Risks**

In this section of the BRD, you describe risks. A risk is something that could affect the success or failure of a project. Analyze risks regularly as the project progresses. While you may not be able to avoid every risk, you can limit each risk’s impact on the project by preparing for it beforehand. For each risk, you’ll note the likelihood of its occurrence, the cost to the project if it does occur, and the strategy for handling the risk. Strategies include the following:

• Avoid: Do something to eliminate the risk.

• Mitigate: Do something to reduce damage if risk materializes.

• Transfer: Pass the risk up or out to another entity.

• Accept: Do nothing about the risk. Accept the consequences.

**Technological Risks**

The hospital is adopting an automated system process to manage the hospital operations from the existing paper based processes. Since the application developed is using new technology there is no previous record of ascertaining the success of this technology and hence there could be risk involved in implementing this technology which is a precaution to be taken by the implementing team Skills Risks

The Human resource shall start recruiting the staff with right skill set who shall be able to handle the systems with minimal training to train the required once stakeholder once the project goes live.

Political Risks

It is quite possible that with change in Government or the political situation , the new policies might be implemented which might affect the smooth functioning of the hospital and may entail new capabilities have to be added to the system .This uncertain factors have to be considered while developing the system.

Business Risks

If the project is cancelled midway, there could be issues managing the data of the patients and this may affect the patient’s history as well as hospital accounts

Requirements Risks

It has to be ensured the requirements are elicited from all the key stack holders. Absence of any stakeholder might result in missing out of certain functionalities.

Other Risks

Special functionality to access certain VIP patients like politician details to be accessed only by the dean. Rights to access VIP details shall not be leaked at any cost

**8. Business Process Overview**

**8.1 Legacy System(AS IS)**

• The hospital has several specialized departments with One doctor is associated with one specialized department. The doctor is also member of the OPD and doctor has fixed time and day to visit in a week.

• Patient visits the doctor either by booking appointment for OPD consultation or the patient can get directly admitted as per doctors’ consultation.

• The patient gets registered at the hospital and is assigned a unique patient ID which shall remain active for the patient from the time of registration till the time patient is discharged from the hospital

• The patient is consulted by the doctor and patient is asked to carry out the medical tests in laboratory. •The patient undergoes the tests in laboratory and reports are handed over to patients after making the payments.

• The patient consults the doctor with the medical reports. The doctor prescribes the medicines to patient or prescribes the operation based on medical reports generated.

• The patient buys the medicines from the pharmacy and settles the final bill .If the patient is prescribed operation, the admin books the operation theatre for the patient as per the availability.

• The patient undergoes the operation procedures after which the patient might undergo additional medical tests.

• The patient is approved to discharge by the doctors after checking the reports.

• The final bill of the patient is generated by the receptionist.

• Final payment is collected from the patient and receptionist generates discharge patient token and patient is discharged from the hospital.

PATIENT

HOSPITAL

DOCTOR RECEPTIONIST

Register

at reception

CONSULT PATIENT

BOOK FOR APPOINTMENT

visit doctor

RECEIPT FEE

TAKE PATIENT FOR LAB TEST

CONDUCT SURGERY

Visit lab for test

DISCHARGE PATIENT

Pay fee

**8.2 .Brief Description (TO BE)**

Doctor Admin Ward-Assistant Lab Assistant Receptionist

HOSPITAL

Patient

Register

Registration complete

fee collection confirmation receipt

check availability of ward in system

wait for patient

monitor system

Collect registration ID

consult patient suggest treatment

fee collection confirmation

Registration ID generation

perform test prescribed by doctor

undergo doctors schedule in system

Meet doctor for consultation

fee collection

Visit lab for prescribed test

Admit patient in ward

Send reports to receptionist

Analyze lab reports

fee collection receipt

fee payment

ready for test

collect lab reports & handover to patients

collect discharge ID

Discharge ID generation

1.This Use case describes the use of IT by the hospital to manage and to process the bills of the patients.

2.Actors Receptionists, doctors, Patient, Lab Assistant.

3.Preconditions Active network connection is required in the hospital

4.Basic Flow of events:

1)The use case begins when the patient registers at the hospital for the treatment

2)The receptionist obtains patient details and registers the patient.

3)Reception collects the consultation fees and is assigned a Patient ID for tracking.

4)Receptionist allocates OPD consultation to patient based on doctors availability

5)Ward allocation to patient as per Doctors advice

6)Doctor prescribe the test to patients

7)Lab assistant updates lab fees in the Patient ID field.

8)Doctor reviews the medical report.

9)Doctor advice patient to be moved to specialized department.

10) Doctor operates the patient on specified date and time.

11) Doctor advice discharge of patient.

12) Doctor prescribe medicines

13) Final bill settlement

14) Discharge the patient

15) Use case ends successfully.

5.Alternate Flow of Events.

1)Ward is not available

i. In step 5 if the ward is not available, the receptionist will reschedule the admission of the patient.

ii. Use case resumes at Step 6.

2)Negative medical report.

i. In step 8, if the medical reports of the patient are negative doctor advice discharge of patients.

ii. Use case resume at step 11.

3)Specialized department is not available

i. In step 9, if the specialized ward is not available

1.Reschedule the operation

2.Use case resumes at Step 10.

6.Key Scenarios:

1)Specialized doctor is not available.

7.Post Conditions :

1)Successful Operation.

i . Patient is discharged

2)Failure Condition

i . Use case end

**9. Business Requirements** for a **Hospital Management System**

The **Business Requirements** outlined above represent the key functionalities and characteristics that the **Hospital Management System (HMS)** must ful-fill to ensure the hospital operates efficiently, provides quality care, and remains compliant with regulations. This will guide the development and implementation phases of the project.

**Requirement**: The system should offer mobile compatibility or a mobile app for staff and patients.

**Details**:

* Allow patients to access their medical records, book appointments, and make payments via mobile devices.
* Enable hospital staff to access patient information and manage tasks while on the go.

**10. .Appendices**

**A.1 List of Acronyms**

This section contains a list of acronyms used in the document and their meanings.

| **Acronym** | **Full Form** |
| --- | --- |
| **HMS** | Hospital Management System |
| **EHR** | Electronic Health Record |
| **EMR** | Electronic Medical Record |
| **API** | Application Programming Interface |
| **SLA** | Service Level Agreement |
| **HIPAA** | Health Insurance Portability and Accountability Act |
| **UI** | User Interface |
| **UX** | User Experience |
| **GDPR** | General Data Protection Regulation |
| **HL7** | Health Level 7 (standards for data exchange in healthcare) |
| **DBMS** | Database Management System |

**A.2 Glossary of Terms**

This section provides definitions for key terms used in the **HMS** context.

| **Term** | **Definition** |
| --- | --- |
| **Patient Management** | Process of managing patient details, including personal information, medical history, and treatments. |
| **Appointment Scheduling** | The process by which patients or hospital staff schedule, modify, and cancel appointments. |
| **EHR (Electronic Health Record)** | Digital version of a patient’s medical history and treatment information. |
| **Billing System** | The system functionality that manages patient billing, including generating invoices and processing payments. |
| **Inventory Management** | Managing the stock levels of medications, medical supplies, and hospital equipment. |
| **Prescription Management** | The system functionality for generating and tracking patient prescriptions. |
| **Pharmacy Management** | Tracks medication stock, dispensing of medications, and links prescriptions with patient records. |
| **User Authentication** | The process of verifying the identity of users accessing the system. |
| **Data Encryption** | The technique of encoding data to protect it from unauthorized access. |
| **Compliance** | Adhering to laws and regulations, such as HIPAA or GDPR, for data protection and privacy in healthcare. |

**A.3 Related Documents**

This section lists related documents that should be referred to in connection with the **Hospital Management System (HMS)** project.

| **Document Title** | **Description** |
| --- | --- |
| **Project Charter** | A document outlining the objectives, scope, and purpose of the HMS project. |
| **System Architecture Design** | Detailed design document describing the technical architecture, components, and integration points of the HMS. |
| **Functional Specification Document** | Specifies detailed functional requirements and behavior of the HMS. |
| **Non-Functional Requirements Document** | Describes non-functional aspects such as performance, security, and scalability of the system. |
| **Test Plan** | Contains a detailed strategy and plan for testing the HMS system, including test cases and acceptance criteria. |
| **Training Manual** | A guide providing training materials and instructions for hospital staff on using the HMS. |
| **Deployment Plan** | Describes the steps and activities necessary for deploying the HMS into production. |
| **Data Privacy and Compliance Plan** | Provides details on how the HMS will adhere to data privacy laws such as HIPAA and GDPR. |