**Usability Document**

# Introduction

## Purpose of the Document

The system is engineered as an all-encompassing digital platform to enhance hospital operations, enhance patient care, and streamline management processes. This document functions as a fundamental resource for developers, designers, and stakeholders to comprehend and tackle the usability aspects of the system at every stage of its existence.

## System Overview

The Smart Hospital System is a cutting-edge solution designed to revolutionize the way hospitals handle their operations and interact with patients, doctors, nurses, and administrative staff. The system guarantees that all stakeholders are well-informed and capable of carrying out their responsibilities effectively by providing them with real-time access to crucial information.

* **For Patients:** The system provides a user-friendly interface to manage personal and medical information, book appointments, and review medical history.
* **For Doctors and Nurses:** It offers tools to view and manage appointments, access patient vitals and records, and utilize hospital equipment efficiently.
* **For Administrators:** The platform supports overseeing scheduling, managing user accounts, and ensuring the availability and functionality of medical equipment.

The system's primary objective is to attain exceptional user satisfaction through a strong emphasis on user-friendly design, accessibility, and optimal performance. The primary objective is to develop a flawless and adaptable encounter that fulfills the requirements of all users, thereby enhancing healthcare results and operational effectiveness.

# User Profiles

These profiles facilitate comprehension of the distinct requirements, behaviors, and objectives of various users, which are crucial for customizing the system's design and functionality to improve usability.

## Admin

* **Role Description:** Admins are responsible for the overall management of the hospital's digital operations. This entails supervising the coordination of schedules, distribution of resources, and administration of user accounts.
* **Primary Goals:**
  + Ensure efficient operation and scheduling.
  + Ensure the precision and confidentiality of data pertaining to users and hospital resources.
* **Typical Tasks:** Viewing and creating appointments, editing user accounts, and managing equipment status.

## Doctor

* **Role Description:** Doctors use the system to manage their appointments, access patient information, and utilize medical equipment effectively.
* **Primary Goals:**
  + Provide high-quality patient care.
  + Effectively oversee the organization and accessibility of medical equipment and their own timetable.
* **Typical Tasks:** Viewing pending and completed appointments, updating patient diagnoses, and booking necessary equipment.

## Nurse

* **Role Description:** Nurses assist doctors and play a key role in patient care management. They play a crucial role in updating patient vital signs and overseeing appointments.
* **Primary Goals:**
  + Support doctors and ensure smooth operational flow in patient care.
  + Maintain precise documentation of patient vital signs and the condition of medical equipment.
* **Typical Tasks:** Setting appointment statuses, managing equipment bookings, and updating patient information.

## Patient

* **Role Description:** Patients interact with the system to manage their health care journey, including booking appointments and maintaining their personal and medical information.
* **Primary Goals:**
  + Keep track of medical consultations and manage personal health data.
  + Efficiently arrange appointments and retrieve their complete medical records.
* **Typical Tasks:** Editing account details, viewing appointment history, and booking new appointments.

Every user profile contains distinct system interactions and expectations that guide the usability requirements and testing procedures to ensure the system effectively and efficiently meets all user needs.

# Usability Goals

Usability goals are essential criteria that direct the design and development of the Smart Hospital System to guarantee its effectiveness, efficiency, and user satisfaction. These goals are in line with the overarching objectives of optimizing hospital operations and enhancing patient care. This section delineates the primary usability objectives that the system strives to accomplish.

## Effectiveness

* **Objective:** Ensure optimal user task completion by facilitating seamless interaction with the system.
* **Measures of Success:**
  + Task completion rate categorized by user type, specifically Admins, Doctors, Nurses, and Patients.
  + Precision in task execution, including accurate input and retrieval of data.
  + User's capacity to accomplish tasks independently following initial instruction.

## Efficiency

* **Objective:** Reduce the duration and exertion needed for users to accomplish tasks, enabling a seamless workflow.
* **Measures of Success:**
  + Decrease in the duration required to perform routine activities, such as scheduling an appointment or modifying patient vital signs.
  + The total number of steps needed to finish each task.
  + The efficiency and quickness with which the system responds and loads data.

## Satisfaction

* **Objective:** Ensure that the system provides a satisfying user experience and meets or surpasses user expectations.
* **Measures of Success:**
  + User satisfaction ratings obtained via periodic surveys and feedback mechanisms.
  + Usage frequency and user retention rates.
  + Users have reported experiencing discomfort or encountering issues while interacting with the system.

## Learnability

* **Objective:** Ensure efficient onboarding and user proficiency in system navigation and usage.
* **Measures of Success:**
  + Duration required for novice users to execute fundamental tasks independently.
  + New users' reported ease of learning for critical tasks.
  + Decrease in help desk inquiries pertaining to usability problems.

## Accessibility

* **Objective:** Ensure the system is inclusive and accessible to users of diverse abilities, including individuals with disabilities.
* **Measures of Success:**
  + Adherence to global accessibility guidelines, such as WCAG 2.1.
  + User feedback obtained from usability testing that specifically focuses on accessibility.
  + Accessibility for individuals using assistive technologies.

The objectives aim to develop an interface that is easy to use and caters to the functional requirements of both the hospital's staff and patients. Additionally, it seeks to enhance usability for various user groups. It is crucial to continuously monitor and measure these goals by gathering user feedback and conducting system testing. This will help improve the system to better meet the needs of its users.

# User Tasks and Scenarios

The Smart Hospital System facilitates a variety of tasks for different user groups. It includes examples of practical applications and demonstrates how users might interact with the system in real scenarios.

## Admin Tasks and Scenarios

* **Objective:** Retrieve and display a comprehensive list of all scheduled appointments.
  + **Situation:** An administrator regularly accesses the system each morning to review the timetable for all medical professionals and facilities in order to predict and handle any instances of overlapping or conflicting schedules.
* **Objective:** Generate a scheduled meeting.
  + **Situation:** An administrator receives a phone call from a physician requesting an available appointment slot on short notice for a patient with a critical condition. The administrator utilizes the system to promptly assign the requisite resources.
* **Objective:** Modify user accounts.
  + **Situation:** An administrator modifies the account of a physician who has recently been promoted, making changes to the access permissions to align with their new position.

## Doctor Tasks and Scenarios

* **Objective:** Access and review outstanding appointments.
  + **Situation:** A physician commences their day by examining the roster of pending appointments in order to ready themselves for the cases and arrange the requisite medical records and instruments.
* **Objective:** Confirm or reject scheduled meetings.
  + **Situation:** When a doctor receives a notification regarding a suggested appointment. The doctor then reviews their schedule and the priority of the patient before deciding whether to accept or decline the appointment through the system.
* **Objective:** Revise patient diagnoses.
  + **Situation:** Following a consultation, a physician utilizes the system to incorporate new diagnostic information into a patient's medical record, guaranteeing the seamless continuation of their healthcare.

## Nurse Tasks and Scenarios

* **Objective:** Revise patient vital signs.
  + **Situation:** In this situation, a nurse takes the patient's vital signs when they arrive and inputs the data into the system, making sure that the information is current before the doctor examines the patient.
* **Objective:** Change the status of the appointment to OnTime.
  + **Situation:** When patients arrive, a nurse will update the status of their appointments in the system to 'OnTime'. This helps doctors to maintain their schedule throughout the day.

## Patient Tasks and Scenarios

* **Objective:** Schedule an appointment.
  + **Situation:** A patient encounters unforeseen symptoms and utilizes the system to locate and schedule the soonest possible appointment with their primary care physician.
* **Objective:** Access and review appointment records.
  + **Situation:** A patient logs into the system to examine their previous and upcoming appointments in order to prepare inquiries and additional discussions for their next medical consultation.

Each scenario demonstrates typical interactions with the system, highlighting how it facilitates daily operations and improves user experience across various roles in the healthcare setting.

# User Interface Design

The interface design plays a vital role in ensuring that the system is easy to use, user-friendly, and accessible to all users, including those with disabilities. This section of the document will provide instructions on how to design the visual and interactive elements of the system in order to achieve the usability goals that were previously identified.

## Principles of Design

* **Consistency:** Maintain uniformity in the interface throughout all system modules to minimize the time required for learning and to avoid confusion.
* **Simplicity:** Create screen designs that are clear and minimalist to prevent users from feeling overwhelmed by an excessive amount of information or choices.
* **Feedback:** Offer unambiguous and prompt feedback to users' actions to validate successful operations or elucidate errors.
* **Optimal visibility:** Ensure that all essential options and information are readily visible on the interface, allowing users to navigate effortlessly and accomplish tasks with maximum efficiency.

## Layout and Navigation

* **General Layout:** Select for a grid-based layout to effectively and logically organize information. Essential information should be readily scannable, and primary actions should be prominently displayed.
* **Navigation:** Implement a primary navigation menu that is accessible from all parts of the system, containing clearly labeled sections based on user roles such as Admin, Doctor, Nurse, and Patient.
* **Accessibility Features:** The accessibility features encompass high contrast modes, text resizing options, and keyboard navigable interfaces. These features are designed to assist users who have visual or motor impairments.

## Interaction Design

* **Input Controls:** Create input controls (such as buttons, dropdowns, and text fields) that are sufficiently large to facilitate easy interaction on desktops.
* **Form Design:** Organize forms in a systematic manner to gather information in a logical sequence, reducing the mental effort required by the user and enhancing the likelihood of completing the form.
* **Error Handling:** Create error messages that are strategically positioned and informative, directing users to rectify errors before proceeding.

## Visual Design

* **Color Scheme:** Utilize a color scheme that aligns with the healthcare industry's norms for professionalism and tranquility, such as serene blues and pristine whites.
* **Typography:** Select fonts that are easy to read across devices and sizes, ensuring legibility and accessibility.
* **Icons:** Utilize intuitive icons and images that are culturally suitable for diverse user bases to facilitate recognition and comprehension.

## Responsive Design

* **Adaptability:** Guarantee that the interface seamlessly adjusts to various devices, such as desktops, tablets, and smartphones, while preserving both functionality and aesthetics.
* **Performance:** Enhance the efficiency of images and assets to guarantee swift loading and optimal functionality of the interface across all devices, particularly on mobile networks.

This section establishes the basis for the user interface development of the Smart Hospital System, with a specific emphasis on creating a system that is easy to understand, productive, and available to improve the experience of all individuals involved.

Usability Testing  
  
Usability testing is essential for identifying usability problems and confirming design choices through the involvement of actual users in real-life situations. This section provides a detailed explanation of the approach, characteristics of the participants, and specific situations used to carry out efficient usability tests on the Smart Hospital System.   
  
Approach

* **Testing Strategy:** Employ a blend of qualitative and quantitative methodologies, encompassing task-oriented usability testing, interviews, and surveys.
* **Testing:** Perform experiments in a regulated setting that replicates real-life usage scenarios, as well as in real-world conditions to observe the actual usage circumstances.
* **Tools:** Employ screen recording, eye-tracking, and analytic tools to collect data on user interactions, errors, and efficiency.
* **Iterations:** Incorporate multiple cycles of testing at various stages of the development process to continually enhance the interface and interactions by incorporating user feedback.

Profiles of participants

* **Diversity:** In order to ensure diversity, it is important to have a wide range of participants who represent the different types of end-users. This includes doctors, nurses, administrative staff, and patients of various ages and levels of technological proficiency.
* **Special Needs:** Inclusion of individuals with disabilities should be ensured in order to test the accessibility features.
* **Recruitment:** Participants should be selected from the pool of current system users whenever feasible, or from comparable settings.

Test Scenarios

* **Admin Tasks:** Admins are asked to create and manage user accounts, view, and schedule appointments, and manage equipment inventory.
  + **Example Scenario:** An administrator is required to rectify a situation where an appointment has been scheduled for two different parties at the same time, and subsequently inform the individuals involved via the system.
* **Doctor Tasks:** Physicians engage with the system to review their schedules, retrieve patient data, and modify treatment records.
  + **Example Scenario:** A medical practitioner is required to rearrange multiple appointments as a result of an unforeseen event and must retrieve patient records in order to prioritize rescheduling based on health requirements.
* **Nurse Tasks:** Nurses utilize the system to record and update patient vital signs, oversee appointment statuses, and aid in the management of resources.
  + **Example Scenario:** A nurse modifies the vital signs of numerous patients and collaborates with physicians to adapt care plans correspondingly.
* **Patient Tasks:** Patients interact with the system to schedule appointments, modify personal details, and retrieve their medical records.
  + **Example Scenario:** A patient endeavors to schedule an appointment with a particular physician and must navigate the system to locate the most immediate available time slot.

By actively engaging users in the testing process, the system can be improved to more effectively cater to their requirements and desires, ultimately resulting in a more triumphant implementation.

# Results and Findings from Usability Evaluation

The result includes key findings from the Smart Hospital System’s usability assessment, including user feedback, identified usability issues, and detected bugs. These insights are crucial for enhancing the system’s usability and user satisfaction with further development.  
  
Summary of Key Findings

* **User Interface Issues:** Numerous users have expressed that the user interface could benefit from being more intuitive and aesthetically pleasing. Recommendations encompass optimizing color, typography, and layout to augment legibility and user-friendliness.
* **Complexity in Task Completion:** Users encountered challenges when performing tasks that involved multiple steps or inputs, such as creating appointments or managing user accounts. Efficiency can be enhanced by simplifying these processes.

Issues and Challenges

1. **User Interface Enhancement Required:**   
   **Issue:** The overall user interface lacks coherence and contemporary design principles, resulting in decreased user satisfaction and engagement.   
   **Suggestion:** Revamp the interface by prioritizing simplicity and adhering to contemporary usability standards.
2. **Appointment Creation Process:**

**Issue:** Users perceive the appointment creation process as burdensome due to the absence of dropdown menus for selecting departments and doctors.   
**Suggestion:** Introduce dropdown menus for the selection of departments and doctors in order to make the process more efficient.

1. **User Account Editing:**

**Issue:** Administrators encounter challenges when modifying user accounts as they are required to manually enter full names without any search assistance.   
**Suggestion:** Implement an autocomplete functionality that presents user accounts that match the entered letters.

1. **Equipment Management Interface:**

**Issue:** The interface for adding equipment is perplexing, as it contains overlapping elements and an ambiguous status selection.   
**Suggestion:** Revamp the equipment management page to enhance clarity and incorporate dropdown menus for selecting rooms.

1. **Management Features for Admin:**

**Issue:** Administrators lack precise management functionalities to effectively supervise doctors, rooms, and departments.   
**Suggestion:** Enhance the capabilities of the admin panel by incorporating extensive management features for these specific areas.

1. **Issue with Appointment Filtering:**

**Issue:** The appointment filters are not working as intended, which hinders the ability to effectively sort and view appointments.   
**Suggestion:** Improve and optimize the filtering algorithm to guarantee precise and prompt filtering.

1. **Issue with Equipment Booking Clarity:**

**Issue:** Doctors express bewilderment regarding the procedure for reserving equipment, attributing it to a dearth of explicit instructions and interface prompts.   
**Suggestion:** Revamp the interface for booking equipment by incorporating explicit sequential instructions and visual aids.

1. **Filtering Completed Appointments:**

**Issue:** Doctors encounter a malfunction in the filters used to view completed appointments, impeding their ability to review previous activities.   
**Suggestion:** Rectify the filtering functionality and guarantee its thorough testing to ensure dependability.

1. **Modify the status of equipment by nurses:**   
   **Issue:** Nurses encounter ambiguity and irrelevance when attempting to modify the status of equipment.   
   **Suggestion:** Customize the editing options for equipment status to more effectively meet the requirements and workflow of the nurses.

Suggestions for Future Advancement

The system should be subjected to a thorough evaluation and overhaul, with a specific emphasis on incorporating user-centered design principles. In order to effectively address these usability concerns, it is imperative that future development cycles prioritize the implementation of iterative testing and the integration of feedback.

# Recommendations and Improvements

This section outlines actionable recommendations and suggested improvements based on the findings from the usability evaluation. These recommendations aim to address identified usability issues and enhance the overall user experience of the Smart Hospital System.

### User Interface Redesign

* **Improve the UI:** Implement a modern and intuitive user interface design that prioritizes clarity, consistency, and ease of use. This includes improvements to layout, color scheme, typography, and visual hierarchy.

### Streamlined Task Flows

### **Simplify Appointment Creation:** Introduce dropdown menus for selecting departments and doctors during the appointment creation process to streamline and simplify the user flow.

* **Enhance User Account Editing:** Implement an autocomplete feature for user account editing to facilitate quicker and more accurate updates.

### Enhanced Functionality

* **Improvements to Equipment Management:** Redesign the equipment management interface to provide clearer options for adding new equipment and selecting equipment status. Include dropdown menus for room selection.
* **Expanded Admin Panel:** Extend the admin panel functionalities to include comprehensive management options for doctors, rooms, and departments.

### Bug Fixes and Error Handling

* **Fix Appointment Filtering:** Debug and enhance the filtering logic to ensure accurate and responsive filtering of appointments.
* **Clarify Equipment Booking Process:** Redesign the equipment booking interface to include clear instructions and visual cues for users.
* **Ensure Filter Functionality:** Fix the filtering feature for completed appointments to enable doctors to review past activities effectively.
* **Tailored Equipment Status Editing:** Customize the equipment status editing options for nurses to better suit their workflow and needs.

### Usability Testing Iterations

* **Continued Usability Testing:** Conduct regular usability testing cycles throughout the development process to validate design changes and ensure ongoing usability improvements.
* **User Feedback Integration**: Establish mechanisms for collecting and integrating user feedback into future iterations of the system to address evolving user needs and preferences.

### Training and Documentation

* **User Training Materials:** Develop comprehensive training materials and documentation to help users familiarize themselves with the system's features and functionalities.
* **In-App Guidance**: Implement contextual tooltips or help overlays within the system to provide guidance to users as they navigate through different tasks and features.

### Iterative Development Approach

* **Iterative Development:** Adopt an iterative development approach that prioritizes continuous user feedback and incremental improvements to the system's usability and functionality.

These recommendations are aimed at addressing the identified usability issues and improving the overall user experience of the Smart Hospital System. By implementing these improvements, the system can better meet the needs of its users and contribute to improved efficiency and effectiveness in hospital operations.