UNIVERSITY OF
PLYMOUTH

FINAL
REPORT

GROUP 8

Business Process and ERP

2025

GROUP MEMBERS & CONTRIBUTION

Name	NSBM ID	Plymouth ID	Contribution
Rateralalage Thilakaratna (Leader)	31229	10952412	Created the To-Be model and UI/UX.
Wikramasinghe	31741	10952401	Developed the ER diagram and database.
Maddumage Abeynayaka	29389	10952407	Responsible for report creation and finding solutions for weaknesses.
Diyithi Gamage	31546	10952411	Handled hardware/infrastructure requirements, special skills, and limitations.
Pallipitiya Gihan	29906	10952397	Designed input and output, and created the Power BI dashboard.

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1. INTRODUCTION

1.1. Overview of the Organization

The organization in question is a Sri Lankan state hospital (Homagama Base Hospital) that treats many outpatients every day. Managing the Outpatient Department (OPD) receipt-issuing process, which is essential for patient registration, consultation, and treatment, presents difficulties for the hospital.

2. SUGGESTED IMPROVEMENTS TO ELIMINATE WEAKNESSES

1.Manual Receipt Issuance.

If a patient has not bought the Smart Card, the counter employee can easily give a temporary token for the patient after getting the patient NIC number. The employee can also deactivate the previously issued Smart Cards if the patient needs a new one, provided that the maximum allowance count is less than three.

2.Redundant data entry

Eliminating the Enter patient details to record book activity can prevent redundant data entry.

3.Technical Problems with Barcode Scanning

Using The Smart Card that contains QR code of the patient can also eliminate the need for a barcode reader and technical issues as it is more dependable and ease of use.

4.Limited Doctor Counters Causing Queue Congestion

Assign a queue employee to manage the queue. The employee will scan the Smart Card or the Token to find whether patients have reports to show. If he/she has reports, the employee will direct the patient to previously visited doctor. Patients who do not have reports will be directed to less crowded counters, reducing waiting times and congestion.

5.Enter all report details into the patient's profile in the system.

Implement an option to add patient reports to the system as an image. The doctor can also tick the reports that are already checked. For time saving, implement an AI tool to analyze the report easily.

6.Remove the counter issues for patients coming back loop when they got redirected for further examination.

Redirected patients are struggling to find the previous doctor counter making queue conflicts. The queue employee can direct patient after scanning the Smart Card or Token for right doctor counter.

7.Remove the workload of doctors and give them traditional methods.

Although implementing a computer-based system has a lot of benefits, most doctors still want to use traditional handwritten methods. We have resolved this issue by providing handwritten prescriptions. Those details in paper receipts will be added to the system at the next business process, which is drug issuing.

8.Extra Enhancements

AI Tools: Use AI tools to analyze patient reports and previous prescriptions.

3. TO-BE BUSINESS PROCESS

3.1. Description

By introducing the Smart Card and Token for patient identification, the enhanced procedure does away with manual receipt issuing and superfluous data entering. New patients have their information entered into the system. Registered patients are directed straight to the doctor's counter and patients who have not bought their card will be issued a temporary Token. Moreover, patients can also apply for a new Smart Card after deactivating the previous Smart Card if the maximum allowance count is less than three.
The queue employee scans the Smart Card or Token. Patients who have reports to show will be directed to the previously visited doctor, Patients who have no reports will be directed to less crowded counter.

The doctor uses the Smart Card or the Token to retrieve the patient's profile, reports and marks the checked reports. After examining the patient, the doctor recommends further examinations (Lab reports), confirm of end of treatments, or issue a prescription receipt and marks the decision in the patient profile.

Patient leaves the doctor counter as end of the process.

3.2. Process Activities

- The counter employee checks the patient registration status.
- If the patient is already registered, ask for the Smart Card.
- If the patient is already registered and has not bought the Smart Card, issue a temporary token.
- If the patient needs a new Smart Card, the counter employee gets the NIC of the patient and deactivate the previously issued Smart Cards, provided that the maximum allowance count is less than three.
- If the maximum allowance count is more than three, the patient get rejected.
- If the patient is new, ask for the patient's details.
- Enter the new patient's details into the system.
- Issue a Smart Card to the new patient.
- The queue employee scans the Smart Card or the Token.

- If the patient has reports, he/she will be directed to previously visited doctor.
- If the patient does not have reports, he/she will be directed to the less crowded counter.
- The doctor scans either the Smart Card or the Token.
- The doctor can perform any of the following actions: check the patient's profile in the system, review the patient's reports, mark reports as checked, or conduct all three actions.
- The doctor examines the patient.
- The doctor can advise the patient for further examination, confirm the end of treatments, issue handwritten prescriptions, or perform all three actions.
- Then the doctor marks the decision in the patient's profile.

3.3. Actors Involved

- Patient: Provides personal information and receives a Smart Card or Token for medical consultation.
- Counter Employee: Checks registration status collects patient information, issue Smart Card and issue Token.
- Queue employee: Direct patients to the right doctor counter or first-time registration activity.
- Doctor: View the patient's profile, examine the patient, provide a prescription, advice for further referrals or end the treatments, also marks his decision in the patient's profile.
- Hospital System: Maintains and stores patient records, Prescriptions, Reports, Smart Card details.

3.4. Data and Information Needs

- New Patient: personal details (Name, NIC, Address, Birthday, Gender)
- Registered Patient: Smart Card QR, Token QR, NIC
- System records: (Patient profiles, Prescriptions, Reports, Doctor profile, Counter employee details)

3.5. To-Be Process Map (BPMN 2.0)

Please find the diagram at the end of this report

4. PROPOSED SYSTEM SOLUTION

4.1. Overview of the Suggested System

The suggested system is a digital solution that expedites the OPD receipt-issuing process by combining Smart Cards with a QR code and QR code contains token for easy management of patient and the system. The system will enhance patient flow, cut down on manual processes, and do away with redundant data entry.

4.2. Functional Requirements of the System

- Patient Registration: Issue Smart Cards and enter new patient details.
- Queue Management: Using token or smart card scans, direct patients to the proper counters.
- Doctor Consultation: Permit physicians to examine reports, write prescriptions, and view patient profiles.
- Data Storage: Keep reports, prescriptions, and patient information in one central database.

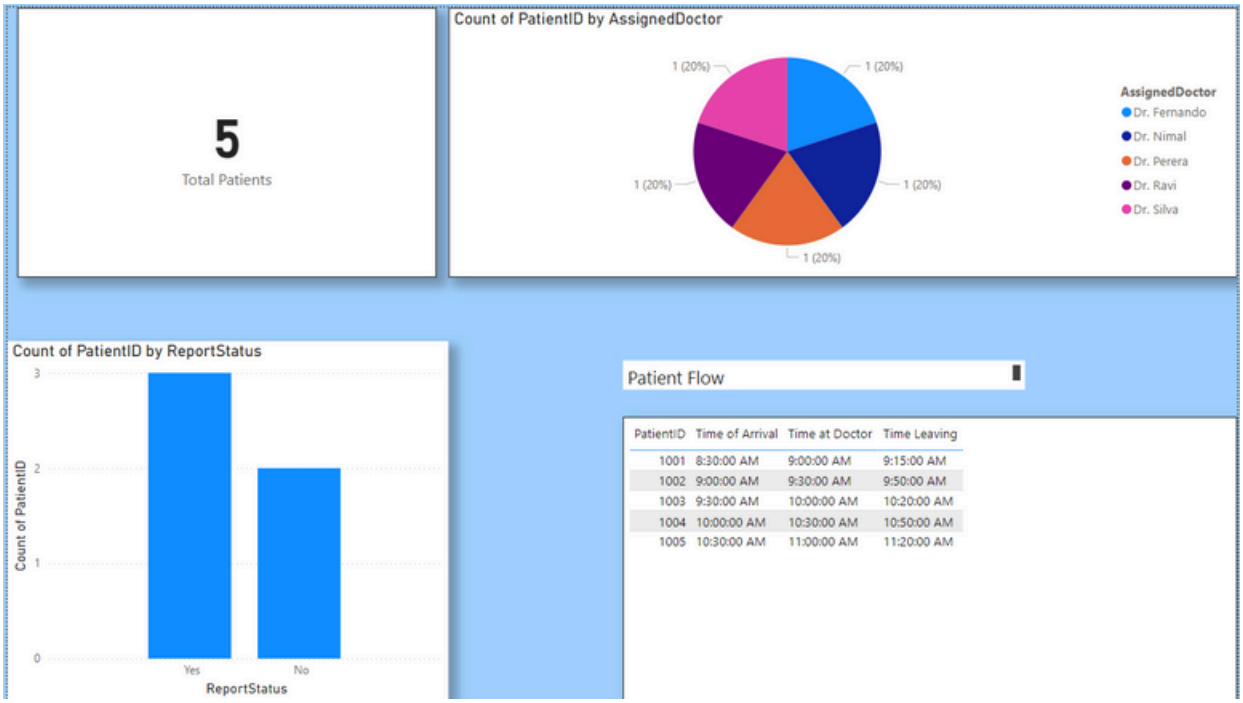
4.3. Non-Functional Requirements

- Scalability: A lot of patients should be handled by the system every day.
- Reliability: There should be little downtime and technical difficulties with the system.
- Usability: Physicians and hospital employees should find the system easy to use.

4.4. Data Inputs and Outputs of the System

- Inputs: Patient details, Smart Card/Token scans, doctor decisions.
- Outputs: Patient profiles, prescriptions, reports, and queue management data.

We have implemented Power BI dashboard to check the data inputs



5. SYSTEM DESIGN AND PROTOTYPE

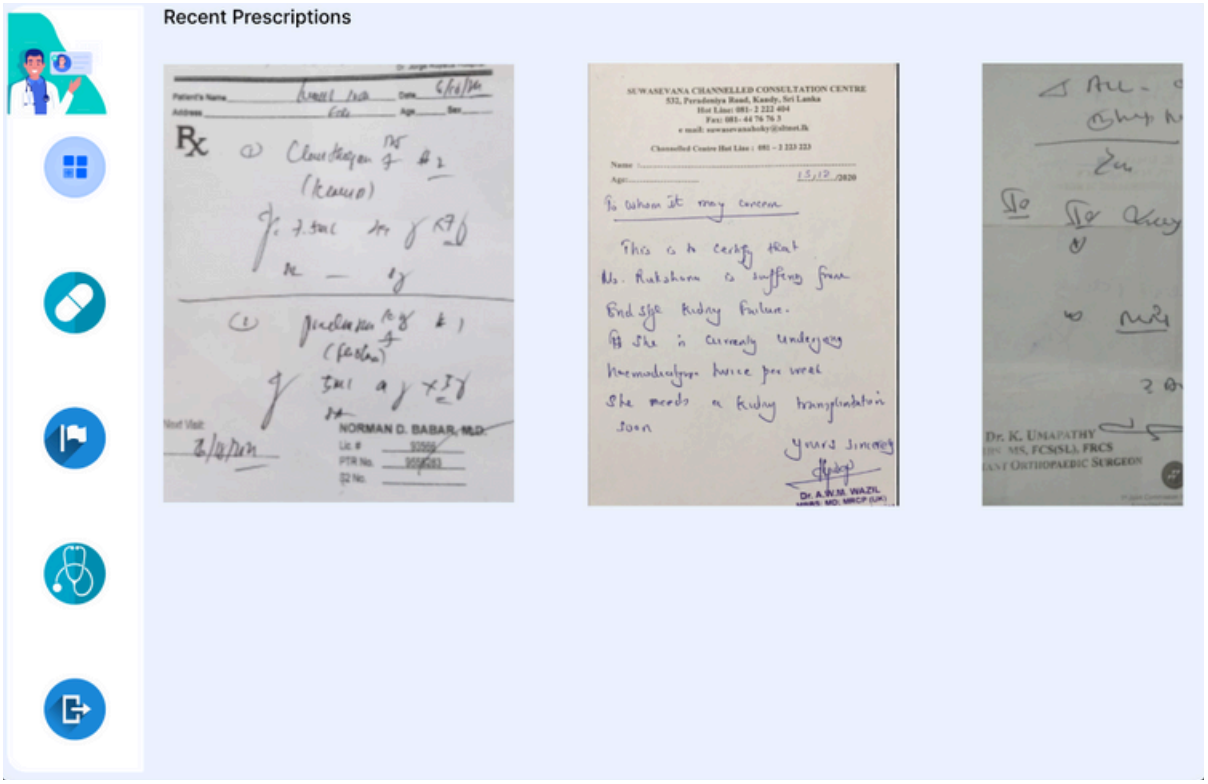
5.1. Design Diagrams (ER Diagrams)

Please find the diagram at the end of this report

6. UI/UX DESIGN

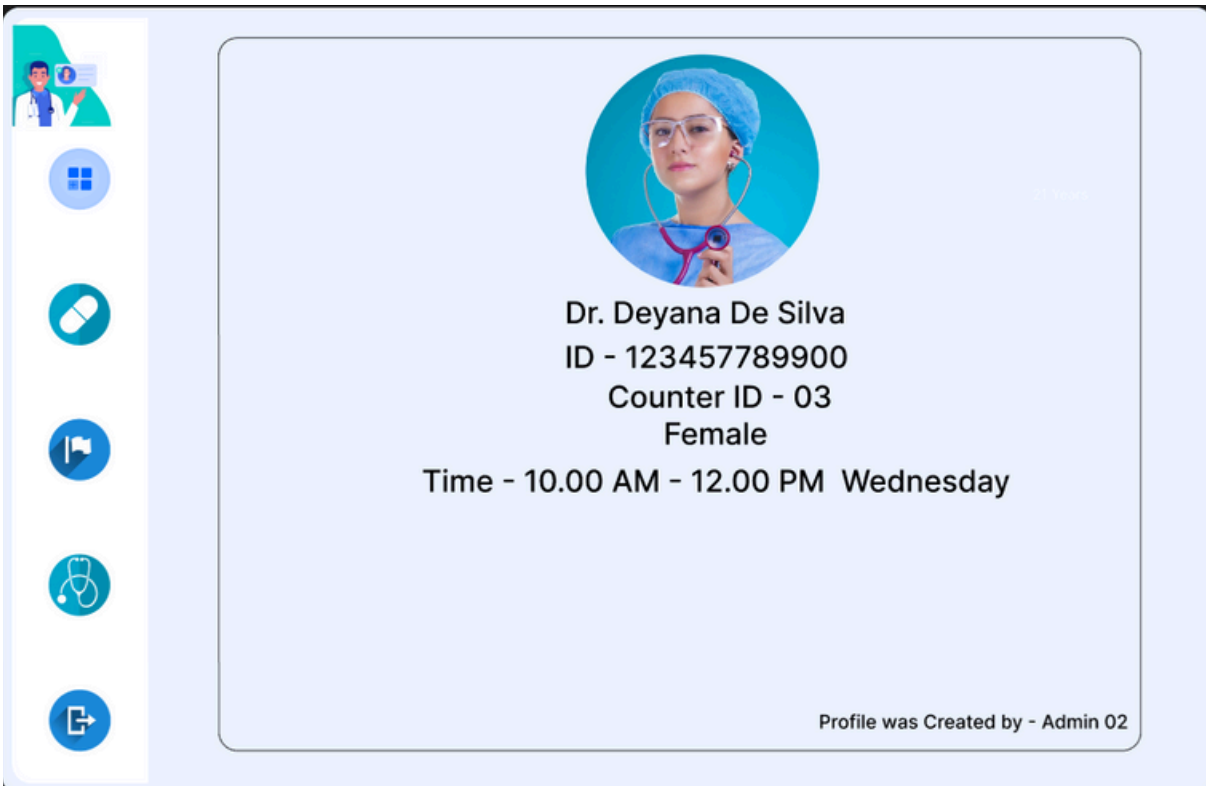
Doctor Dashboard

Prescription



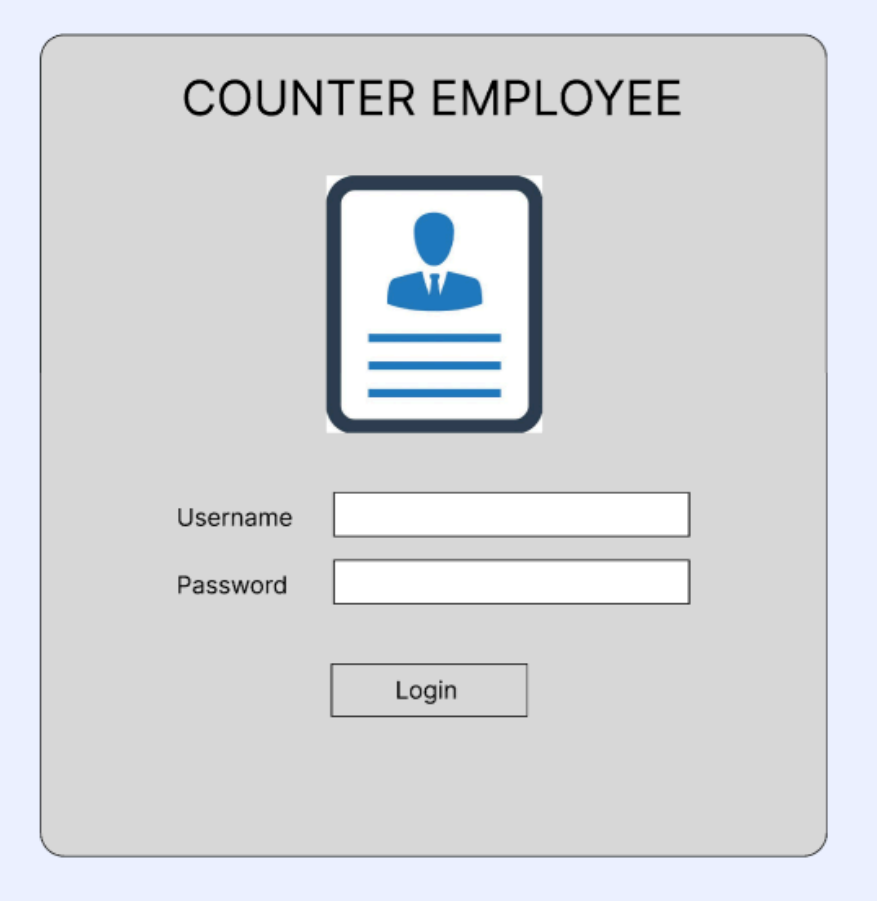
Reports

Doctor Profile



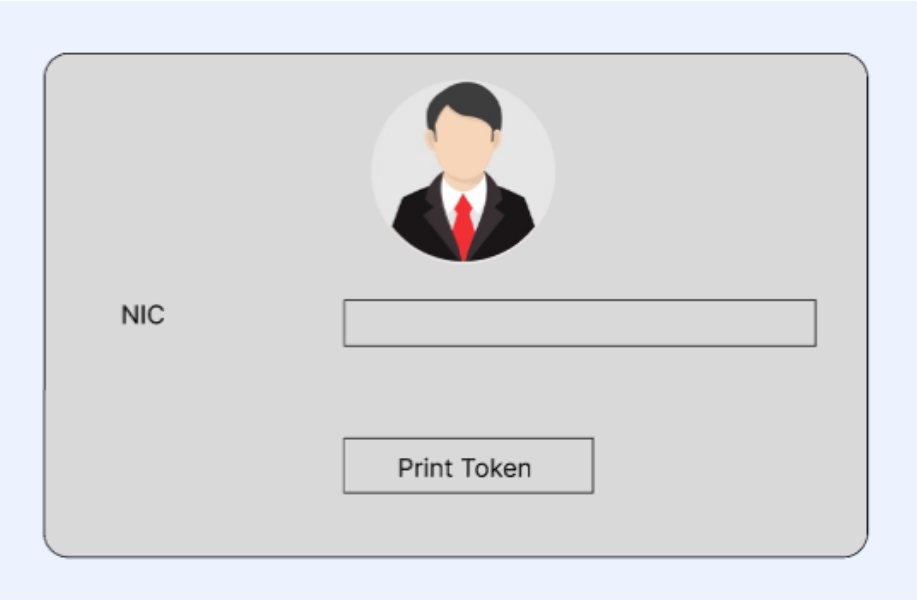
Doctor Login

Counter Employee Login



Patient Register

Patient Token Print



Patient Token

Smart Token

7. INFRASTRUCTURE REQUIREMENTS

7.1. Hardware

- Computers for counter and doctor.
- QR code scanners for doctors and Queue employee.
- Servers for data storage.

7.2. Software

- Database management system (e.g., MySQL).
- UI/UX design tools for prototyping.
- Visual Studio for development process.
- AI tools for report analysis.

7.3. Special Skills and Knowledge Required by System User

- Basic computer literacy for counter and doctor.
- Familiarity with QR code scanning for doctors and queue employee.
- Training on the new system for all staff.

9. CONCLUSION

9.1. Summary of Key Findings

The current OPD receipt-issuing process is inefficient due to manual work, redundant data entry, and technical issues. The proposed system addresses these weaknesses through Smart Card's and Token's QR codes, and queue management.

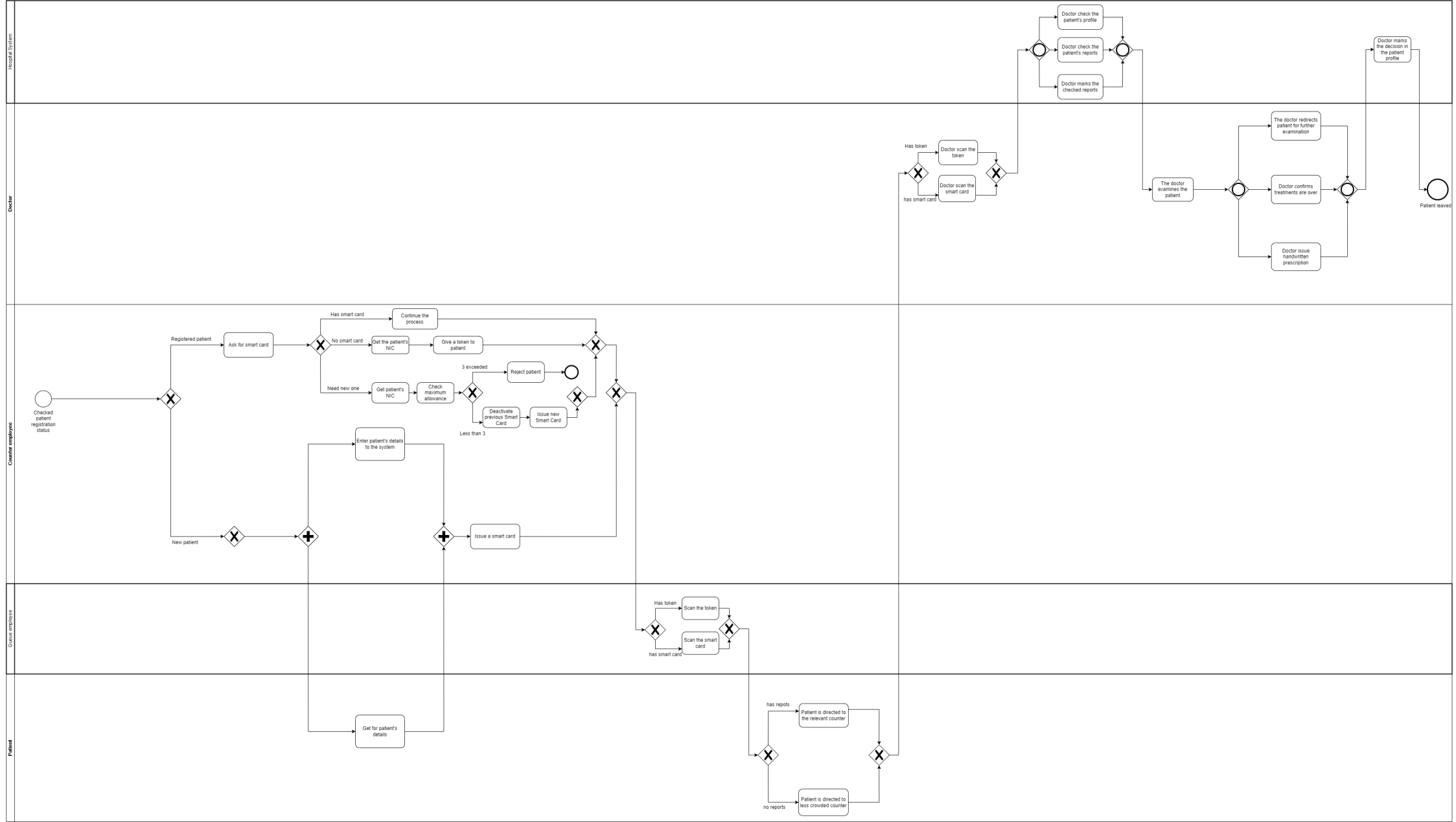
9.2. Future Recommendations

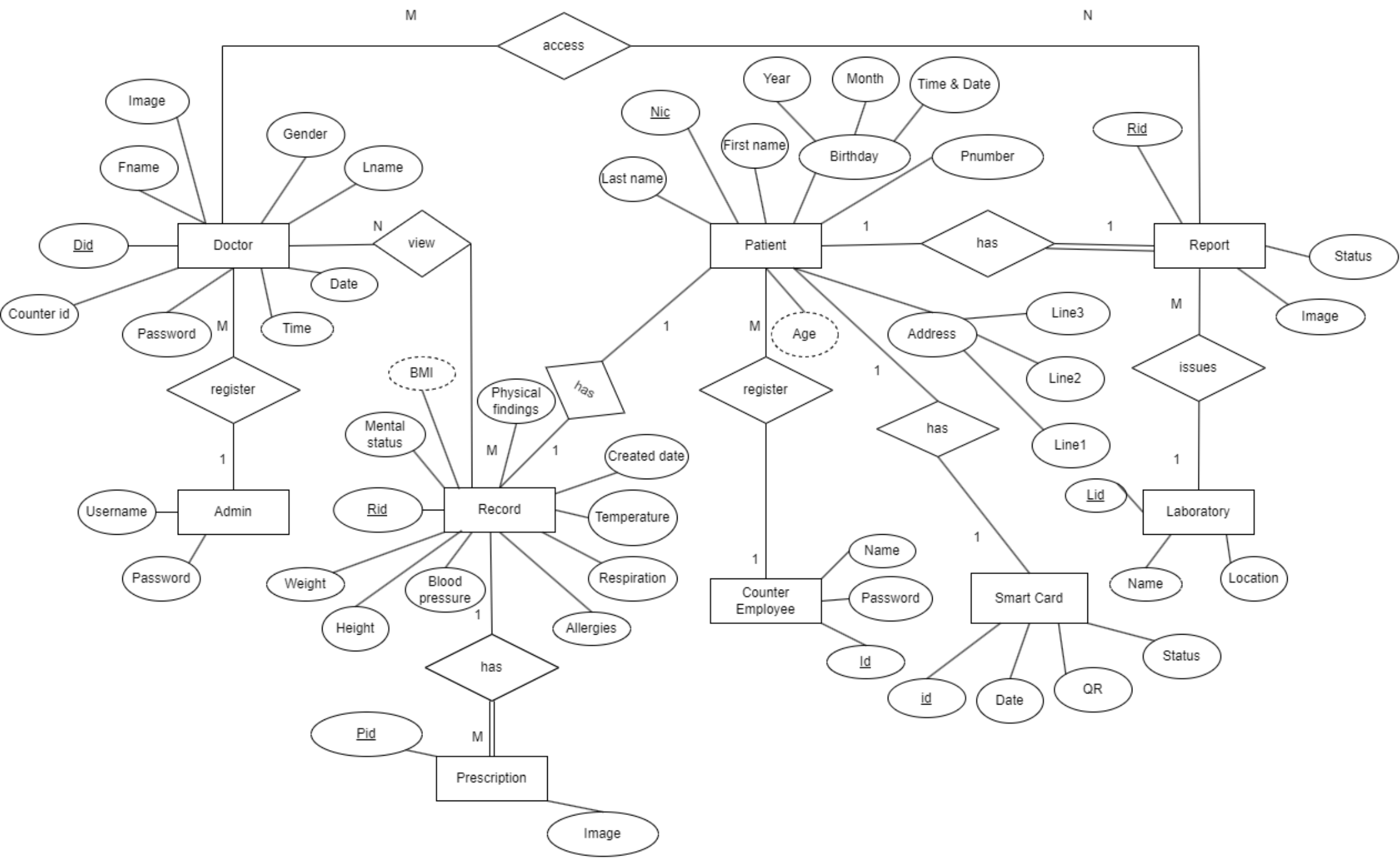
- Extend the system to additional hospital departments.
- To guarantee a seamless adoption, hold frequent training sessions for employees.

10. REFERENCES

Perera, S. (2020) Healthcare Systems in Sri Lanka: Challenges and Solutions. 2nd edn. Colombo: University of Colombo Press.

Ministry of Health Sri Lanka (2023) Annual Health Bulletin 2023. Available at: http://www.health.gov.lk (Accessed: 18 March 2025).


Hospital System
Doctor
Counter employee
Queue employee
Patient
Checked patient registration status
Registered patient
Ask for smart card
Has smart card
Continue the process
No smart card
Get the patient's NIC
Give a token to patient
Need new one
Get patient's NIC
Check maximum allowance
3 exceeded
Reject patient
Less than 3
Deactivate previous Smart Card
Issue new Smart Card
New patient
Enter patient's details to the system
Issue a smart card
Get for patient's details
Has token
Scan the token
has smart card
Scan the smart card
has repots
Patient is directed to the relevant counter
no reports
Patient is directed to less crowded counter
Has token
Doctor scan the token
has smart card
Doctor scan the smart card
Doctor check the patient's profile
Doctor check the patient's reports
Doctor marks the checked reports
The doctor examines the patient
The doctor redirects patient for further examination
Doctor confirms treatments are over
Doctor issue handwritten prescription
Doctor marks the decision in the patient profile
Patient leaved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