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CS368: Fundamentals of Software Requirements

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***Unit 5 - Individual Project***

1. Change Management Document

1.1 Overview

* This document outlines the proposed changes to HealthTrack Pro as requested by Mount Saint Michael General Hospital. The changes include 5 new requirements, 2 requirement modifications, and the removal of 4 requirements.

1.2 Proposed Changes

1.2.1 New Requirements

1. [NR1] - Implement a telemedicine module for remote consultations

2. [NR2] - Add a prescription management system with e-prescribing capabilities

3. [NR3] - Integrate a machine learning-based triage system for the ER

4. [NR4] - Develop a patient portal for accessing medical records and test results

5. [NR5] - Implement a real-time bed management system

1.2.2 Modified Requirements

1. [MR1] - Enhance the appointment scheduling system

- Original: Basic calendar-based scheduling

- Modified: AI-powered scheduling with conflict resolution and resource allocation

2. [MR2] - Upgrade the billing module

- Original: Manual input of billing codes

- Modified: Automated coding based on treatment records with insurance verification

1.2.3 Removed Requirements

1. [RR1] - Remove the legacy paper-based record archiving system

- Rationale: With the implementation of the new patient portal

(NR4) and the full digitization of records, the paper-based

archiving system is no longer necessary.

- Impact: Will require a data migration plan and staff training on

the new fully digital system.

2. [RR2] - Remove the manual bed assignment feature

- Rationale: This will be replaced by the new real-time bed management system (NR5), which offers more efficient and automated bed assignments.

- Impact: Staff will need training on the new system. A transition period may be necessary to ensure smooth changeover.

3. [RR3] - Remove the standalone appointment reminder system

- Rationale: This functionality will be integrated into the enhanced appointment scheduling system (MR1) with more advanced features.

- Impact: Minimal, as the functionality is being improved rather than eliminated. Patients will need to be informed about the new system.

4. [RR4] - Remove the separate patient feedback collection system

- Rationale: Patient feedback collection will be integrated into the new patient portal (NR4) for more efficient gathering and analysis of patient experiences.

- Impact: This will require a strategy to encourage patients to use the new system for providing feedback.

1.3 Impact Analysis

* The proposed changes will significantly enhance HealthTrack Pro's capabilities, particularly in remote care, automation, and efficiency. However, they also introduce new challenges and risks that need to be carefully managed:

1. Telemedicine Module (NR1):

- Positive Impact: Enables remote consultations, increasing accessibility of healthcare services.

- Challenges: Requires robust security measures to protect patient data during video consultations. May require additional staff training and patient education.

2. Prescription Management System (NR2):

- Positive Impact: Improves accuracy of prescriptions and reduces the potential for errors.

- Challenges: Integration with existing pharmacy systems may be complex. Staff will need training on the new e-prescribing process.

3. ML-based Triage System (NR3):

- Positive Impact: Could significantly improve ER efficiency and patient outcomes.

- Challenges: Requires careful testing and gradual implementation to ensure patient safety. Risk of algorithmic bias must be continually monitored and addressed.

4. Patient Portal (NR4):

- Positive Impact: Empowers patients with easy access to their medical information.

- Challenges: Needs strong security measures to protect patient data. May require support for less tech-savvy patients.

5. Real-time Bed Management System (NR5):

- Positive Impact: Optimizes hospital resource utilization.

- Challenges: Requires integration with multiple hospital systems. Staff may need time to adapt to the new system.

6. Enhanced Appointment Scheduling (MR1):

- Positive Impact: Improves efficiency of the scheduling process.

- Challenges: AI-powered systems may initially confuse staff and patients. Need to ensure the AI doesn't inadvertently create biases in scheduling.

7. Upgraded Billing Module (MR2):

- Positive Impact: Increases accuracy of billing and reduces manual workload.

- Challenges: The transition period may temporarily slow down billing processes. Need to ensure the accuracy of automated coding.

8. Removal of Paper-based Archiving (RR1):

- Positive Impact: Streamlines record-keeping and improves data accessibility.

- Challenges: Requires careful data migration to ensure no patient data is lost. Need for a robust backup system for the digital archives.

9. Removal of Manual Bed Assignment (RR2):

- Positive Impact: Increases efficiency of bed management.

- Challenges: Staff accustomed to the manual system may resist the change. Need to ensure the automated system can handle complex or unusual bed assignment scenarios.

10. Removal of Standalone Appointment Reminder System (RR3):

- Positive Impact: Consolidates appointment management into one system.

- Challenges: Need to ensure the new integrated system is at least as effective as the old one in reducing no-shows.

11. Removal of Separate Patient Feedback System (RR4):

- Positive Impact: Streamlines the feedback process and potentially increases engagement.

- Challenges: Need to ensure the new integrated system in the patient portal is user-friendly and encourages feedback submission.

* Overall, these changes represent a significant modernization of the HealthTrack Pro system. While they offer substantial benefits in terms of efficiency, patient care, and data management, they also require careful implementation, comprehensive staff training, and robust security measures. The transition period will be critical, and a phased approach with continuous monitoring and adjustment will be necessary to ensure success.

1.4 Implementation Plan

1. Phase 1 (Months 1-2)

* Develop and integrate the telemedicine module and prescription management system

2. Phase 2 (Months 3-4)

* Implement the patient portal and enhance the appointment scheduling system

3. Phase 3 (Months 5-6)

* Develop the ML-based triage system and real-time bed management system

4. Phase 4 (Months 7-8)

* Upgrade the billing module and conduct system-wide testing

5. Phase 5 (Month 1)

* Begin data migration from paper-based archives to digital system

6. Phase 6 (Month 3)

* Pilot test of new bed management system alongside existing manual system

7. Phase 7 (Month 5)

* Full transition to new bed management system and discontinuation of manual system

8. Phase 8 (Month 6)

* Integration of appointment reminders into the new scheduling system

9. Phase 9 (Month 7)

* Launch of integrated patient feedback system in patient portal

1.5 Testing Strategy

- Unit testing for each new and modified component

- Integration testing to ensure smooth interaction between new and existing modules

- User acceptance testing with hospital staff

- Stress testing, particularly for the telemedicine and ML-based triage systems

- Security audits for the patient portal and telemedicine module

1.6 Stakeholder Communication Plan

- Weekly progress reports to the hospital's IT department

- Monthly presentations to the hospital board

- Training sessions for staff on new features (scheduled during the last month of each phase)

- Patient information campaign about the new patient portal (to begin one month before launch)

1.7 Approval

- Dr. Bianca Santiago, Chief of Medicine: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

- Ms. Jane Smith, Hospital Administrator: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

- Mr. John Doe, Head of IT: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. Mock-up Description

2.1 Dashboard Update

- Added a new "Quick Access" panel on the left side of the dashboard, featuring icons for Telemedicine, Prescriptions, ER Triage, Patient Records, and Bed Management.

- Implemented a new "Alerts" section at the top of the dashboard to display critical patient information (e.g., allergies, high-risk patients) and system notifications (e.g., high ER occupancy).

2.2 Telemedicine Module

- Designed a new "Virtual Consultation" page with embedded video conferencing.

- Added a "Digital Whiteboard" feature for doctors to explain diagnoses or treatments visually during video calls.

- Implemented a "Waiting Room" interface for patients, showing their queue position and estimated wait time.

2.3 Prescription Management System

- Created a new e-prescribing interface with drug interaction checks and allergy warnings.

- Designed a "Prescription History" view, showing all past and current prescriptions for each patient.

- Added a "Pharmacy Locator" feature to help patients find nearby pharmacies that can fill their prescriptions.

2.4 ML-Based ER Triage System

- Developed a new triage assessment form that feeds into the ML algorithm.

- Created a visual representation of triage priorities, with color-coded patient cards sortable by urgency.

- Implemented a "Triage Oversight" view for senior medical staff to monitor and adjust triage decisions.

2.5 Patient Portal

- Designed a user-friendly interface for patients to access their medical records, test results, and upcoming appointments.

- Added a secure messaging system for patient-doctor communication.

- Implemented a "Health Tracker" feature for patients to log symptoms or vital signs between visits.

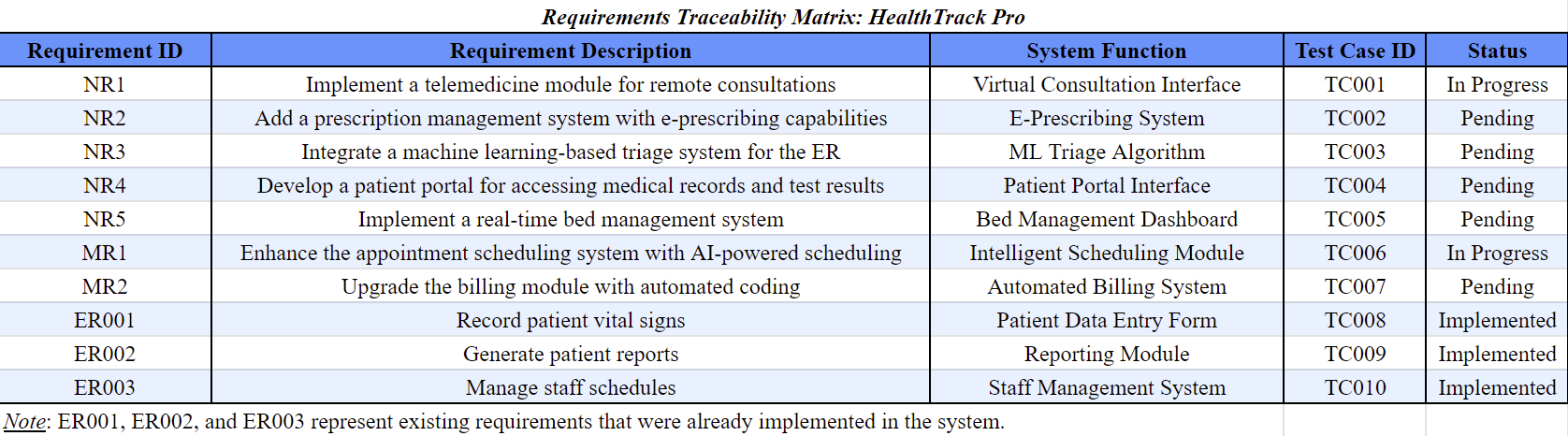
2.6 Real-Time Bed Management System

- Created a hospital floor plan view showing real-time bed occupancy.

- Implemented a drag-and-drop interface for assigning patients to beds.

- Added a predictive analytics dashboard showing projected bed needs based on current ER and scheduled admissions.

3. Requirements Traceability Matrix



4. Ethical Considerations

1. Transparency: Address the initial lack of transparency about the removed requirements. Ensure all stakeholders are fully informed about all changes, including removals.

2. Patient Safety: Ensure that the ML-based triage system (NR3) doesn't inadvertently discriminate against certain patient groups or miss critical symptoms. Implement regular audits and human oversight.

3. Data Privacy: Implement robust security measures for the new telemedicine module (NR1) and patient portal (NR4) to protect patient data and comply with healthcare regulations like HIPAA.

4. Informed Consent: Inform patients about how their data will be used in the new ML-based triage system and give them the option to opt-out if they're uncomfortable.

5. Equal Access: Ensure that the introduction of the telemedicine module and patient portal doesn't disadvantage patients who lack access to technology. Provide alternative access methods.

6. Data Integrity and Accessibility: During the removal of the paper-based archiving system (RR1), ensure all historical patient data is accurately digitized and remains accessible, even in cases of system outages.

7. Equitable Care: Design the new automated bed management system (RR2) to avoid bias and ensure fair allocation of resources to all patients, regardless of their condition or background.

8. Patient Communication: Communicate changes to the appointment reminder system (RR3) and feedback collection (RR4) to ensure patients continue to receive necessary reminders and have an avenue to provide feedback.

9. Staff Adaptation: Address potential stress or resistance among staff due to the removal of manual systems they're accustomed to. Provide adequate training and support.

To address these ethical concerns:

1. Implement a rigorous data migration plan with multiple validation steps.

2. Conduct a comprehensive security audit of the new digital systems.

3. Include diverse perspectives in the design of automated systems to minimize bias.

4. Develop a clear communication plan for patients about system changes.

5. Create a comprehensive training program for staff.

6. Establish an ethics review board to oversee the implementation of these changes.

By addressing these ethical considerations, we can ensure that the system upgrades not only improve efficiency but also maintain the highest standards of patient care and data protection.