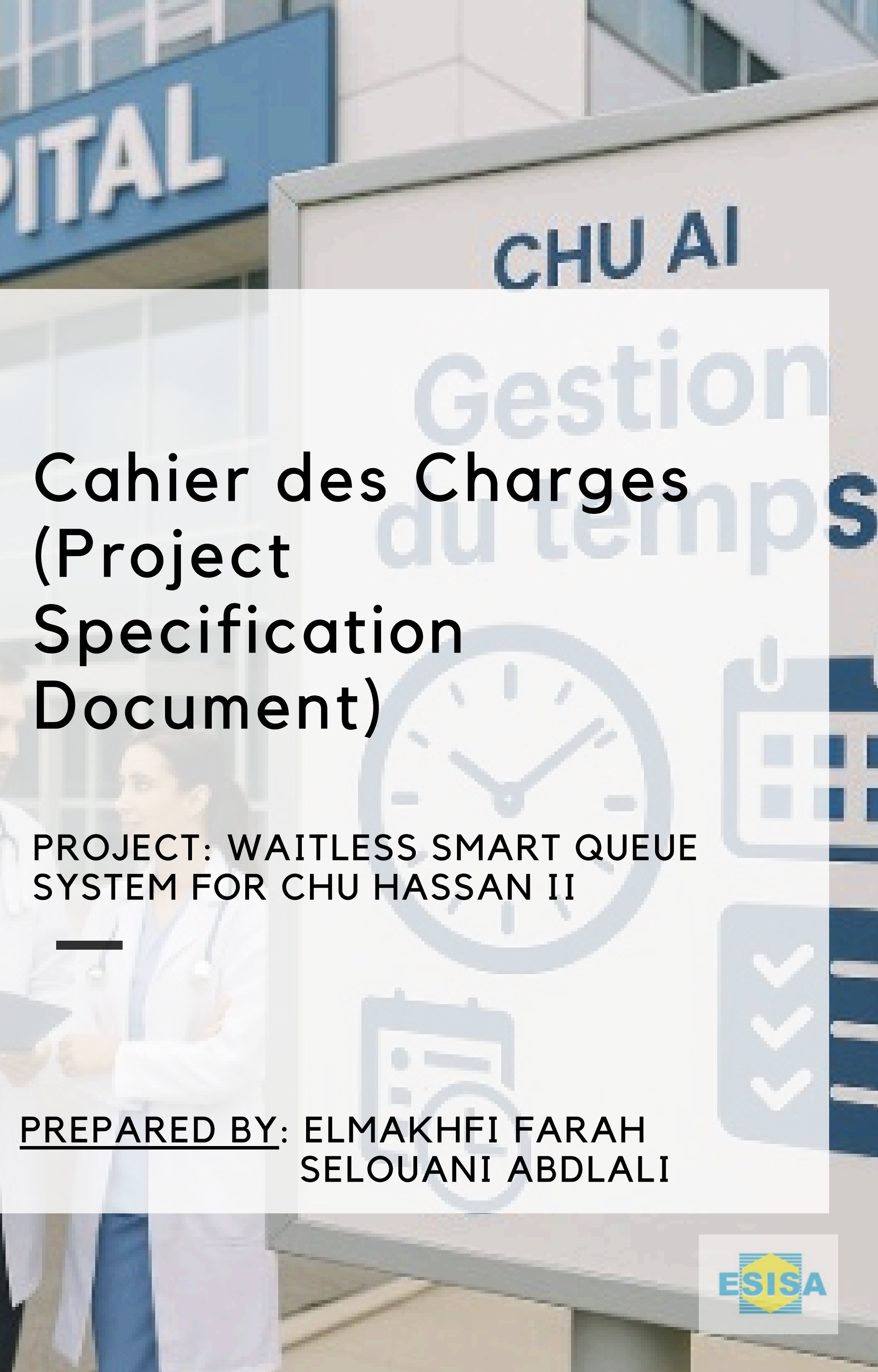

Cahier des Charges (Project Specification Document)

PROJECT: WAITLESS SMART QUEUE SYSTEM FOR CHU HASSAN II

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ESISA

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1. INTRODUCTION & CONTEXT

CHU Hassan II faces significant challenges due to overcrowded waiting areas, particularly in busy departments. Traditional manual queue systems lack real-time updates and transparency for patients. The “WaitLess” project is designed to implement a smart, digital queue management system integrated with AI for predictive wait time estimations. The system will enhance operational efficiency, improve patient experience, and align with the hospital's digital transformation.

2. PROJECT OBJECTIVES & VALUE PROPOSITION

- Objective 1: Reduce patient wait times and overcrowding in waiting areas.
- Objective 2: Enable remote queue tracking via a mobile app, reducing physical congestion.
- Objective 3: Integrate AI to dynamically estimate wait times based on real queue data.
- Objective 4: Empower staff with tools to monitor and manage queues in real time.
- Objective 5: Improve patient satisfaction, contribut1ing to positive hospital reputation.

3. STAKEHOLDER ANALYSIS & DETAILED USER PERSONAS

- Stakeholders: Patients, Reception Staff, IT Maintenance, Hospital Administrators, Developers.

- User Persona 1: Ahmed, a 65-year-old chronic disease patient, wants to minimize exposure by waiting remotely and being notified when it's his turn.

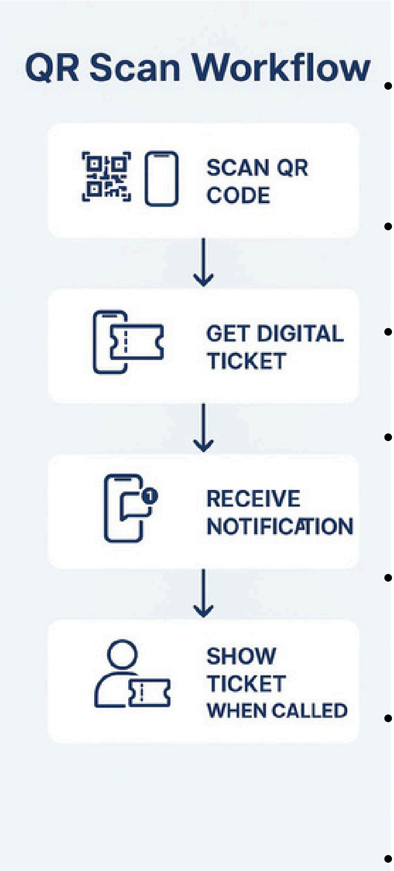
- User Persona 2: Sara, a busy working mother, appreciates knowing her estimated wait time so she can plan her day.
- User Persona 3: Youssef, reception staff, requires a dashboard to handle queues, mark no-shows, and adjust priorities.

- User Story 1: As a patient with mobility issues, I want clear notifications to avoid missing my turn.

- User Story 2: As a staff member, I need an intuitive interface to manage queues and handle exceptions.

- User Story 3: As an IT admin, I must ensure system uptime, data integrity, and seamless updates.

4. FUNCTIONAL SPECIFICATIONS (DETAILED WORKFLOWS)



- QR codes displayed at entry points, scanned by patients via the app to obtain a digital ticket.
- App assigns a unique queue number and displays estimated wait time.

- Real-time notifications: Alerts when a patient is within 3 turns, at next turn, and final call.
- AI module continuously calculates wait estimates based on service speed and queue length.
- No-show handling: If a patient misses their turn (1-minute window), system automatically requeues them at the end.
- Admin dashboard features: Overview of queue status, manual adjustments, reporting tools for analytics.
- Multiple department support: Each department operates its independent queue managed centrally.
- User authentication for secure ticket issuance and admin access.

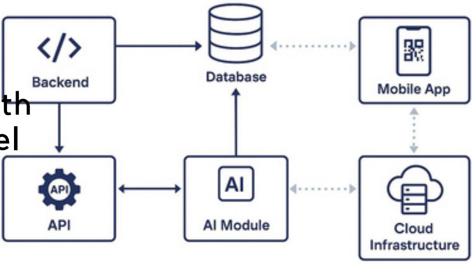
5. NON-FUNCTIONAL SPECIFICATIONS (DEEP-DIVE)

- System must support at least 200 concurrent users.
- End-to-end encryption of sensitive data (AES-256).
- Real-time data synchronization across devices.
- Automatic data backups every 24 hours.
- Support for French and Arabic interfaces.
- User-friendly design with accessibility considerations (high contrast, large fonts).
- Disaster recovery plan: automatic failover to backup server in case of system failure.

6. TECHNICAL SPECIFICATIONS & ARCHITECTURE (FIXED CHOICES)

- Backend: Python with FastAPI framework for high performance and scalability.
- Frontend: React Native mobile application.
- Database: PostgreSQL for relational data management.
- Notifications: Firebase Cloud Messaging integrated into the mobile app.
- AI Module: Python-based, with scikit-learn decision tree model for wait time prediction.
- Cloud Deployment: AWS with auto-scaling and monitoring using CloudWatch.
- Secure RESTful APIs with OAuth2 authentication.
- Placeholder for detailed architecture diagram and data flowchart.

System Architecture



7. OPERATIONAL GUIDELINES & RISK MANAGEMENT

- Staff training on app usage and admin dashboard management.
- Clear user onboarding guides integrated into the mobile app.
- Regular system updates scheduled during off-peak hours.
- Real-time monitoring with alerts for system anomalies.
- Risk mitigation for hardware failures: deploy on redundant servers.
- Plan for rapid user adoption through staff support and patient education.
- Data breach prevention through multi-layer security and access controls.

8. PROJECT MANAGEMENT PLAN & TIMELINE

- Duration: 3 months.
- Phase 1 (Week 1-2): Requirement gathering and system design.
- Phase 2 (Week 3-8): Development of backend, mobile app, and AI module.
- Phase 3 (Week 9-10): System testing, performance optimization.
- Phase 4 (Week 11-12): User acceptance testing, deployment, and handover.
- Weekly sprints with deliverables and milestone reviews.
- Resource allocation: 2 backend developers, 1 mobile developer, 1 AI engineer, 1 tester, 1 PM

9. VALIDATION & ACCEPTANCE CRITERIA

- System fully operational in at least one hospital department.
- Real-time queue tracking and notifications function as designed.
- AI estimation accuracy within ±10% of actual wait times.
- Admin dashboard tested for usability and data accuracy.
- User feedback gathered and incorporated into final deployment.
- Performance benchmarks: system latency < 2 seconds, uptime > 99.9%.

10. APPENDICES & VISUALS

- Placeholder for architecture diagram illustrating system components.
- Placeholder for QR scan workflow and ticket lifecycle.
- Placeholder for mobile app mockups and branding elements.
- Encouragement to use Canva or design tools to complete visual design.