

Integrated Construction and Maintenance Management System (ICMMS)

Non-Functional Requirements Specification Document

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Document Purpose

This document specifies the non-functional requirements for the ICMMS. While the functional requirements describe what the system should do, non-functional requirements define how the system should perform. These requirements ensure usability, security, scalability, and performance of the application.

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NFR 1.0: Performance Requirements

- **NFR-1.1:** The system shall support a minimum of **500 concurrent users** without degradation in performance.
 - **NFR-1.2:** Average page load time for the web application shall not exceed **5 seconds** under normal load.
 - **NFR-1.3:** Mobile API responses shall return within **5 seconds** for 95% of requests.
 - **NFR-1.4:** The AI-based blueprint analysis shall complete within **60 seconds** for plans up to 20MB in size.
 - **NFR-1.5:** Database queries shall be optimised to execute within **2 seconds** for standard operations.
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NFR 2.0: Reliability Requirements

- **NFR-2.1:** The system shall achieve **99.5% uptime** (excluding planned maintenance).
 - **NFR-2.2:** All critical business transactions (quotations, invoices, payments, project updates) must be logged to prevent data loss.
 - **NFR-2.3:** The system shall implement retry mechanisms for failed notifications (SMS/Email).
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NFR 3.0: Availability Requirements

- **NFR-3.1:** The web application shall be available 24/7 except during scheduled maintenance.
 - **NFR-3.2:** Planned downtime shall not exceed **4 hours per month** and must be communicated to stakeholders at least 24 hours in advance.
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NFR 4.0: Security Requirements

- **NFR-4.1:** User authentication shall be implemented using **Firebase Authentication** with email and password.
 - **NFR-4.2:** Passwords must be stored as **SHA-256 salted hashes** and never in plain text.
 - **NFR-4.3:** All communications between client and server shall be encrypted using **HTTPS/TLS 1.3**.
 - **NFR-4.4:** Role-based access control (RBAC) shall enforce least-privilege principles.
 - **NFR-4.5:** All sensitive actions (logins, document downloads, invoice updates) shall be recorded in an **audit log**.
 - **NFR-4.6:** The system shall comply with **POPIA (Protection of Personal Information Act, South Africa)** and **GDPR (EU General Data Protection Regulation)**.
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NFR 5.0: Usability Requirements

- **NFR-5.1:** The web interface shall be responsive and accessible on desktop, tablet, and mobile browsers.
 - **NFR-5.2:** The mobile app shall support Android version **9 (Pie)** and above.
 - **NFR-5.3:** All role-specific dashboards shall be intuitive and require **no more than 4 clicks** to access key tasks.
 - **NFR-5.4:** The system shall comply with **WCAG 2.1 accessibility standards** for visually impaired users.
 - **NFR-5.5:** Online help and tooltips shall be provided for all complex workflows.
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NFR 6.0: Maintainability Requirements

- **NFR-6.1:** The system shall follow a **modular architecture** (separation of concerns between project management, maintenance, documents, AI, etc.).
 - **NFR-6.2:** The source code shall follow **SOLID principles** and industry-standard naming conventions.
 - **NFR-6.3:** Automated unit tests shall cover at least **70% of core business logic**.
 - **NFR-6.4:** New developers should be able to onboard and contribute within **1 day**, aided by documentation.
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NFR 7.0: Scalability Requirements

- **NFR-7.1:** The system shall support up to **10,000 registered users** without redesign.
 - **NFR-7.2:** The messaging and notifications module shall handle **up to 50 messages per second**.
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NFR 8.0: Portability & Compatibility Requirements

- **NFR-8.1:** The web application shall be compatible with latest versions of Chrome, Edge, Firefox, and Safari.
 - **NFR-8.2:** The mobile application shall run on both **emulators and real devices**.
 - **NFR-8.3:** The system shall support migration to different cloud providers (AWS, Azure, GCP) with minimal changes.
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NFR 9.0: Compliance Requirements

- **NFR-9.1:** The system shall comply with **South African ICT regulations, POPIA**, and where applicable, **GDPR**.
 - **NFR-9.2:** Audit logs must be retained for **at least 5 years**.
 - **NFR-9.3:** All financial data shall comply with **IFRS (International Financial Reporting Standards)**.
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