项目文档

# Functional Requirement

ID Function Requirement  
ASSET-CHECKOUT-001 Asset Checkout The system shall allow users to digitally check out and return assets via a mobile app or web portal using QR code scanning or manual serial number entry.  
ASSET-CHECKOUT-002 Asset Checkout The system shall require users to complete a condition checklist, upload a photo of the asset, and provide a digital signature during checkout and return.  
ASSET-CHECKOUT-003 Asset Checkout The system shall enforce a maximum limit on the number of assets a user can check out at one time, based on their role or user profile.  
ASSET-CHECKOUT-004 Asset Checkout The system shall detect conflicts during the checkout process (e.g., asset already booked) and suggest alternative assets if available.  
ASSET-CHECKOUT-005 Asset Checkout The system shall log all checkouts and returns in real time and maintain a tamper-proof audit trail for each action.  
APPROVAL-WF-001 Approval Workflow The system shall automatically prompt for approval based on asset type, cost, or duration of use.  
APPROVAL-WF-002 Approval Workflow The system shall support a role-based approval hierarchy, where approvers are determined by the asset type (e.g., manager for standard assets, finance for high-cost assets).  
APPROVAL-WF-003 Approval Workflow The system shall notify both approvers and requesters of approval requests and status changes via email or in-app alerts.  
APPROVAL-WF-004 Approval Workflow The system shall allow approvers to document reasons for rejection to support audit and transparency.  
MAINTENANCE-COMPL-001 Maintenance Compliance The system shall enable technicians to log maintenance tasks through a mobile app or by scanning digital forms.  
MAINTENANCE-COMPL-002 Maintenance Compliance The system shall send customizable alerts for maintenance due dates, overdue approvals, and unauthorized access attempts.  
MAINTENANCE-COMPL-003 Maintenance Compliance The system shall implement role-based access control (RBAC) to ensure only authorized personnel can access or modify sensitive data.  
MAINTENANCE-COMPL-004 Maintenance Compliance The system shall integrate with HR systems to automatically determine user roles and approval chains.  
MAINTENANCE-COMPL-005 Maintenance Compliance The system shall comply with ISO 55000 and internal policies, including data retention and audit trail requirements.  
REPORTING-ANALYTICS-001 Reporting and Analytics The system shall provide interactive dashboards to display asset usage, maintenance frequency, cost trends, and underutilization.  
REPORTING-ANALYTICS-002 Reporting and Analytics The system shall allow users to export reports to Excel with auto-updated charts for further analysis.  
REPORTING-ANALYTICS-003 Reporting and Analytics The system shall support filterable and drill-down capabilities for detailed analysis of usage and maintenance data.  
REPORTING-ANALYTICS-004 Reporting and Analytics The system shall include an automated alert system for upcoming maintenance and license renewals.  
DATA-IMP-EXP-001 Data Import/Export The system shall support user-friendly data import and export in formats such as Excel or JSON.  
DATA-IMP-EXP-002 Data Import/Export The system shall perform built-in data validation during import to prevent errors in the dataset.  
DATA-IMP-EXP-003 Data Import/Export The system shall optimize performance for large datasets (e.g., 500+ assets) to ensure smooth operation.  
DATA-IMP-EXP-004 Data Import/Export The system shall display visual indicators, such as progress bars, for long-running import/export tasks.

# External Description

The system shall comply with all applicable laws, regulations, and internal policies governing asset management and data protection. This includes, but is not limited to, ISO 55000 standards for asset management, GDPR (General Data Protection Regulation), and any local data privacy laws affecting the deployment environment.  
  
- \*\*Constraint ID\*\*: R-LEG-001   
 \*\*Statement\*\*: The system shall be designed and implemented in compliance with ISO 55000 standards for asset management.   
 \*\*Priority\*\*: Must Have   
 \*\*Rationale\*\*: To ensure the organization meets international benchmarks for asset lifecycle management and audit readiness.   
 \*\*Source\*\*: SRL 1.1 and 3.14   
 \*\*Acceptance Criteria\*\*: The system shall pass an independent ISO 55000 compliance audit.  
  
- \*\*Constraint ID\*\*: R-LEG-002   
 \*\*Statement\*\*: The system shall support data encryption and access control mechanisms that meet GDPR and other applicable data protection regulations.   
 \*\*Priority\*\*: Must Have   
 \*\*Rationale\*\*: To safeguard user and asset data, especially during transmission and storage.   
 \*\*Source\*\*: SRL 5.4 and 4.3   
 \*\*Acceptance Criteria\*\*: The system shall pass a data protection impact assessment (DPIA) and demonstrate encryption at rest and in transit using AES-256.  
  
## 5.2 Hardware Constraints  
  
The system shall be designed to operate within the constraints of the supported hardware platforms for both mobile and web interfaces. These constraints include minimum OS versions, device capabilities, and backend infrastructure scalability.  
  
- \*\*Constraint ID\*\*: H-APP-001   
 \*\*Statement\*\*: The system shall be compatible with Android 11 and iOS 14 as the minimum supported versions for mobile devices.   
 \*\*Priority\*\*: Should Have   
 \*\*Rationale\*\*: To ensure the system functions on the latest widely used mobile OS versions and avoids compatibility issues.   
 \*\*Source\*\*: SRL 5.1.1   
 \*\*Acceptance Criteria\*\*: The mobile app shall be successfully installed and run on devices with Android 11 and iOS 14 without crashes or errors.  
  
- \*\*Constraint ID\*\*: H-APP-002   
 \*\*Statement\*\*: The system shall support operation on low-end mobile devices with at least 2 GB of RAM and 10 GB of available storage.   
 \*\*Priority\*\*: Should Have   
 \*\*Rationale\*\*: To ensure usability in field environments where high-end devices may not be available.   
 \*\*Source\*\*: SRL 2.3 and 3.5   
 \*\*Acceptance Criteria\*\*: The system shall load and perform core functions (checkout, return, maintenance logging) on low-end devices within 5 seconds of launch.  
  
## 5.3 Interface Constraints  
  
The system shall provide user interfaces that are intuitive and accessible across multiple platforms. These interfaces must align with the characteristics of each user class and ensure consistency in interaction design.  
  
- \*\*Constraint ID\*\*: I-UI-001   
 \*\*Statement\*\*: The system shall provide a mobile-first interface for Technicians to support maintenance logging and asset status updates.   
 \*\*Priority\*\*: Must Have   
 \*\*Rationale\*\*: To cater to the primary usage pattern of Technicians who work in the field.   
 \*\*Source\*\*: SRL 2.2.3 and 2.3.3   
 \*\*Acceptance Criteria\*\*: The mobile interface shall allow Technicians to log maintenance tasks without exceeding 3 taps per action.  
  
- \*\*Constraint ID\*\*: I-UI-002   
 \*\*Statement\*\*: The system shall maintain consistent UI/UX across mobile and web platforms to reduce user training and confusion.   
 \*\*Priority\*\*: Should Have   
 \*\*Rationale\*\*: To ensure a uniform experience for all users regardless of the platform they use.   
 \*\*Source\*\*: SRL 2.2.1 and 2.2.4   
 \*\*Acceptance Criteria\*\*: The mobile and web interfaces shall share at least 80% of their visual and interaction components.  
  
- \*\*Constraint ID\*\*: I-API-001   
 \*\*Statement\*\*: The system shall integrate with HR systems using REST API or SAML-based authentication.   
 \*\*Priority\*\*: Must Have   
 \*\*Rationale\*\*: To automatically synchronize user roles and approval chains.   
 \*\*Source\*\*: SRL 2.4.2 and 4.4.11   
 \*\*Acceptance Criteria\*\*: The system shall successfully authenticate and retrieve user roles from the HR system within 2 seconds.  
  
- \*\*Constraint ID\*\*: I-API-002   
 \*\*Statement\*\*: The system shall support email notifications via SMTP or Microsoft Exchange for all user roles.   
 \*\*Priority\*\*: Should Have   
 \*\*Rationale\*\*: To ensure notifications reach users reliably across different email infrastructures.   
 \*\*Source\*\*: SRL 4.4.10 and 3.8   
 \*\*Acceptance Criteria\*\*: The system shall send and receive email notifications in under 3 seconds without error for at least 99% of test cases.  
  
## 5.4 Design and Implementation Constraints  
  
The system shall be developed using best practices in software engineering and must avoid design dependencies that could limit future adaptability or performance. It must also support offline functionality in a manner that does not compromise data integrity.  
  
- \*\*Constraint ID\*\*: D-DES-001   
 \*\*Statement\*\*: The system shall avoid hardcoding asset categories, workflows, or user roles; instead, these must be configurable via the admin interface.   
 \*\*Priority\*\*: Must Have   
 \*\*Rationale\*\*: To allow the system to adapt to evolving organizational structures and asset types without requiring code changes.   
 \*\*Source\*\*: SRL 3.3 and 2.3.4   
 \*\*Acceptance Criteria\*\*: All asset categories and approval workflows shall be modifiable through the Admin interface without code re-deployment.  
  
- \*\*Constraint ID\*\*: D-DES-002   
 \*\*Statement\*\*: The system shall support offline functionality for asset checkout and maintenance logging without requiring a constant internet connection.   
 \*\*Priority\*\*: Must Have   
 \*\*Rationale\*\*: To ensure usability in environments with limited or no connectivity, especially for field operations.   
 \*\*Source\*\*: SRL 2.2.5 and 5.2.2   
 \*\*Acceptance Criteria\*\*: The system shall allow users to perform checkout and maintenance logging in offline mode and synchronize data once connectivity is restored, within 30 seconds of reconnection.  
  
- \*\*Constraint ID\*\*: D-DES-003   
 \*\*Statement\*\*: The system shall be implemented using a microservices architecture to support scalability and independent deployment of modules.   
 \*\*Priority\*\*: Should Have   
 \*\*Rationale\*\*: To allow for modular updates and scaling in a cloud environment.   
 \*\*Source\*\*: SRL 5.1.3 and 2.1   
 \*\*Acceptance Criteria\*\*: The system shall be architected using at least three decoupled microservices with independent deployment pipelines.  
  
## 5.5 Other Constraints  
  
The system shall meet additional constraints not directly tied to hardware, software, or regulatory requirements but are essential for deployment and ongoing maintenance.  
  
- \*\*Constraint ID\*\*: O-OTH-001   
 \*\*Statement\*\*: The system shall provide data import/export in Excel and JSON formats to support interoperability with external tools.   
 \*\*Priority\*\*: Must Have   
 \*\*Rationale\*\*: To allow for easy data migration, backup, and integration with other systems.   
 \*\*Source\*\*: SRL 3.5 and 4.4.12   
 \*\*Acceptance Criteria\*\*: The system shall allow for the import and export of at least 500 assets in Excel and JSON formats, with data validation during import.  
  
- \*\*Constraint ID\*\*: O-OTH-002   
 \*\*Statement\*\*: The system shall be hosted in a secure, cloud-based environment that supports automatic scaling and high availability.   
 \*\*Priority\*\*: Must Have   
 \*\*Rationale\*\*: To ensure system reliability and responsiveness under varying loads.   
 \*\*Source\*\*: SRL 2.4.2 and 5.1.3   
 \*\*Acceptance Criteria\*\*: The system shall demonstrate automatic scaling and 99.9% uptime in a 30-day stress test.  
  
- \*\*Constraint ID\*\*: O-OTH-003   
 \*\*Statement\*\*: The system shall maintain a tamper-proof audit trail for all asset-related actions to support compliance and internal audits.   
 \*\*Priority\*\*: Must Have   
 \*\*Rationale\*\*: To ensure accountability and traceability for all user actions, especially in regulated environments.   
 \*\*Source\*\*: SRL 3.5 and 4.3.8   
 \*\*Acceptance Criteria\*\*: The audit trail shall record the user, timestamp, action, and asset ID for all checkouts, returns, and approvals, and shall be verifiable using cryptographic signatures.