Project Title: Medical Inventory Management

Date: November 06, 2025
Team ID: NM2025TMID05285
Maximum Marks: 4 Marks

Phase 5: Project Design Phase II - Solution Requirements

Functional Requirements

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Inventory Item Registration & Setup	Medical supply registration through form; Barcode/QR code generation; Item profile with name, category, description, batch number, expiration date, storage requirements
FR-2	Inventory Management Portal	Secure login for authorized staff; View inventory by location; Check stock availability; Update inventory counts; Download inventory reports; Generate barcodes
FR-3	Medical Item Management	Add medical supplies/medications with SKU, description, specifications; Track batch/lot numbers, expiration dates, manufacturer, acquisition cost, current stock; Upload documentation; Assign storage location; Set status (available, reserved, quarantined, expired)
FR-4	Real-Time Inventory Tracking	Real-time stock levels across all locations and departments; Barcode/QR code scanning for receipt and dispensing; Location transfer tracking; Automated low-stock alerts; Multi-location visibility
FR-5	Inventory Valuation	Automated valuation based on acquisition cost; Historical valuation tracking; Inventory valuation by department and category; Cost analysis and trend reporting
FR-6	Expiration Date Management	Automated expiration date tracking with configurable alerts (90/60/30 days); Expiration list generation; Items approaching expiration flagged for usage priority; Expired item quarantine process
FR-7	FEFO/FIFO Workflow	FEFO (First Expiration, First Out) rotation recommendations; FIFO (First In, First Out) tracking for standard supplies; Automated rotation scheduling; Staff notification for rotation priorities
FR-8	Automated Reordering	Configure minimum stock levels and reorder points per item; Automated purchase requisition generation when stock falls below threshold; Consumption pattern analysis; Lead time calculations
FR-9	Purchase Requisition Management	Create purchase requisitions manually or automatically; Approval workflow (department → procurement); Link to supplier orders; Track requisition status; Historical requisition tracking
FR-10	Purchase Order Processing	Convert requisitions to purchase orders; Supplier selection and order placement; Order tracking from PO to receipt; Receipt processing with item verification; Invoice matching

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-11	Supplier Management	Supplier profile creation with contact, certifications, contract terms; Order history and delivery performance tracking; Quality ratings and issue documentation; Supplier performance metrics
FR-12	Waste Analytics & Reporting	Track expiration waste by category, department, and supplier; Cost analysis of wasted items; Trend reporting and forecasting; Root cause analysis for waste reduction opportunities
FR-13	Data Protection & Business Rules	Prevent deletion of inventory in active/pending orders; Prevent deletion of items sold/dispensed within compliance period; Audit trail for all modifications; Regulatory compliance documentation
FR-14	Security & Access Control	Role-based permissions (clinical staff, department manager, procurement, administrator, compliance officer); Multi-factor authentication for sensitive operations; Data encryption for inventory and financial data; Session management
FR-15	Compliance & Audit Trails	Complete transaction history (receipts, dispensing, transfers, adjustments); Batch traceability from receipt to usage; Automated compliance reporting (FDA, DEA, state health); Audit trail for controlled substances
FR-16	Dashboards & Analytics	Inventory valuation by department and category; Expiration forecasts and waste metrics; Stock movement analytics and consumption trends; Supplier performance comparison; Compliance audit readiness dashboard
FR-17	Mobile Access	Mobile-optimized interface for staff; Check inventory availability from mobile device; Record dispensing and inventory transactions; Perform inventory counts; Receive expiration alerts
FR-18	Reporting	Customizable reports (inventory on-hand, expiration reports, consumption trends); Scheduled report delivery; Export to Excel/PDF; Regulatory compliance reports; Shortage and overstocking alerts

Non-Functional Requirements

NFR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Intuitive interface designed for healthcare staff with varying technical abilities. Mobile app must be easy to use during clinical workflows. Training materials and in-app help available. Maximum 4 hours training required for basic operations. Support for multiple languages (English, Spanish).
NFR-2	**Security**	All sensitive data (medication information, patient-related inventory, financial transactions) encrypted at rest and in transit. Multi-factor authentication for administrative functions. Role-based access control strictly enforced. Compliance with HIPAA for healthcare data protection. Annual security audits.
NFR-3	**Reliability**	99.9% uptime guarantee for mission-critical healthcare operations. Automated backups every 4 hours to prevent data loss. Data validation rules prevent incorrect entries. Business rules ensure data integrity. Zero tolerance for data loss in medication and controlled substance tracking. Graceful error handling with user-friendly messages.

NFR No.	Non-Functional Requirement	Description
NFR-4	**Performance**	Page load times <2 seconds for all operations. Search results display <1 second for inventory queries. Mobile app responsive on 3G/4G networks. Support 100+ concurrent users during peak hours. Database queries optimized for large inventory (50,000+ items). Barcode scanning processed <500ms.
NFR-5	**Availability**	System accessible 24/7 for inventory access and emergencies. Maintenance windows scheduled during off-peak hours (midnight-3am). Disaster recovery with <1 hour RTO for critical functions. Automated failover for critical services. Support for emergency manual operations if system unavailable.
NFR-6	**Scalability**	Support single-location clinics to multi-facility hospital systems. Handle inventory growth from 1,000 to 100,000+ items. Scale to thousands of staff users. Support seasonal demand spikes (flu shots, vaccination campaigns). Cloud infrastructure auto-scaling. Support multiple departments and warehouses.
NFR-7	**Maintainability**	Modular design for easy feature additions and medication updates. Comprehensive documentation for administrators and clinical staff. Version control for all customizations and regulatory updates. Automated testing for core workflows (expiration alerts, reordering, compliance). Easy upgrade path for platform updates.
NFR-8	**Compliance**	FDA compliance for medication inventory and tracking. DEA compliance for controlled substance inventory. HIPAA compliance for healthcare data protection. Audit trails for regulatory compliance and inspections. Support for regulatory documentation and reporting. Healthcare facility accreditation requirements (JCaho, etc.).
NFR-9	**Compatibility**	Support iOS and Android for mobile app. Compatible with Chrome, Firefox, Safari, Edge browsers. Integration with common healthcare barcode systems (GS1, UDI). Support for barcode scanners and RFID readers. API integration with pharmacy systems and hospital information systems (HIS).
NFR-10	**Data Quality**	Validation rules for mandatory fields (expiration dates, batch numbers). Format validation for barcodes and lot numbers. Duplicate detection for inventory items and suppliers. Data cleansing tools for imports. Historical data retention for 7+ years per regulatory requirements.
NFR-11	**Disaster Recovery**	Daily automated backups to geographically distributed locations. Backup retention for 2+ years per healthcare regulations. Recovery Time Objective (RTO): 1 hour. Recovery Point Objective (RPO): 1 hour. Quarterly disaster recovery testing with full restoration validation.
NFR-12	**Internationalization**	Support multiple currencies with automated conversion. Multi-language interface (English, Spanish, French, Chinese, Hindi). Regional regulatory rules for different countries. Support for different medication naming conventions internationally.

System Architecture & Technical Specifications

Technology Stack

- **Cloud Platform:** Salesforce Health Cloud + Experience Cloud

- **Frontend:** Lightning Web Components (LWC) for web interface; Salesforce Mobile App

- **Backend:** Salesforce Apex classes, REST APIs for integrations

- **Database:** Salesforce Database with custom objects for medical inventory

- **Automation:** Salesforce Flow Builder, Process Builder, Approval Processes for workflows
- **Integration:** REST APIs for pharmacy systems, hospital information systems (HIS), barcode/RFID systems
- **Security:** Salesforce Shield for encryption, event monitoring, field audit trail, HIPAA compliance
- **Mobile:** Salesforce Mobile SDK with offline capabilities for clinical use
- **Analytics:** Einstein Analytics for dashboards, Tableau for advanced reporting

Data Model & Custom Objects

- **Medical_Item:** SKU, category, description, batch/lot number, expiration date, manufacturer, dosage (for medications), storage requirements, acquisition cost, current stock, status, location
- **Inventory_Location:** Department/room, facility, storage type (cabinet, shelf, refrigerator), temperature monitoring, capacity
- **Supplier:** Company name, contact information, certifications (FDA, DEA if applicable), contract terms, performance metrics
- **Purchase_Requisition:** Department, requested items/quantities, priority, approval status, budget code
- **Purchase_Order:** Supplier, items, quantities, price, delivery date, status
- **Inventory_Transaction:** Date, type (receipt/dispensing/transfer), item, quantity, batch number, location from/to, staff member, notes
- **Expiration_Alert:** Item, expiration date, alert status, department notified, action taken
- **Compliance_Log:** Transaction date, type, user, item, quantity, batch number, regulatory purpose

Key Business Rules

- **BR-1:** Prevent deletion of inventory items with pending orders or used within past 7 years
- **BR-2:** Require manager approval for inventory write-offs >$500
- **BR-3:** Automated alerts when inventory item approaching expiration (90, 60, 30 days)
- **BR-4:** Automated low-stock alerts when item falls below minimum threshold
- **BR-5:** Automated FEFO/FIFO rotation recommendations during dispensing
- **BR-6:** Require batch number and staff identification for all dispensing transactions
- **BR-7:** Automated audit logging for controlled substance inventory
- **BR-8:** Prevent approval of purchase orders without proper authorization codes
- **BR-9:** Automated expiration waste reporting monthly to department managers
- **BR-10:** Mandatory incident reporting for medication shortages or recalled items

Acceptance Criteria

Requirement	Acceptance Criteria
FR-1 to FR-2	Medical supplies registered; barcode generation working; 1000+ test items; portal accessible via web and mobile
FR-3 to FR-5	5000+ medical items entered with complete specifications; barcode scanning operational; real-time valuation working
FR-6 to FR-7	Expiration tracking functional; 500+ items with expiration alerts working; FEFO/FIFO rotation recommendations accurate
FR-8 to FR-10	Automated reordering triggered correctly; 100+ purchase orders tracked; receipt processing functional
FR-11 to FR-12	Supplier profiles created; waste analytics reports generated; cost analysis accurate
FR-13 to FR-14	Business rules prevent 100% of unauthorized modifications; role-based permissions enforced; zero security breaches
FR-15 to FR-18	Dashboards loading <2 seconds; mobile app functional on iOS and Android; compliance reports exportable; audit trails complete
NFR-1 to NFR-4	90% of staff trained in <4 hours; 99.9% uptime achieved; all pages load <2 seconds; zero data loss
NFR-5 to NFR-8	System scales to 20 locations without performance degradation; HIPAA and FDA compliance certified; audit trails complete
NFR-9 to NFR-12	Mobile app works on iOS/Android; barcode/RFID integration successful; multi-language support working; backups tested successfully

Constraints & Dependencies

Constraints

- **Budget:** Mid-size healthcare facility budget constraints
- **Timeline:** 46 days for complete development and deployment
- **Team:** 3 developers with varying Salesforce and healthcare IT expertise
- **Compliance:** Must meet HIPAA, FDA, and DEA requirements
- **Data:** Existing legacy inventory system data requires migration and cleansing

Dependencies

- **Salesforce platform:** API limits and governor limits for healthcare applications
- **Third-party integrations:** Pharmacy systems, hospital information systems (HIS), barcode/RFID hardware
- **Hardware:** Barcode scanner and RFID reader availability and compatibility with healthcare systems
- **Staff adoption:** Clinical staff training and change management in healthcare workflows
- **Data migration:** Quality and availability of legacy inventory data from existing systems

- **Regulatory approvals:** Healthcare facility compliance with new system validation requirements

Conclusion

Phase 5 establishes comprehensive functional and non-functional requirements for the Medical Inventory Management system. These requirements address the unique challenges of healthcare inventory management including medication expiration tracking, multi-location visibility, regulatory compliance, automated reordering, and comprehensive audit trails. With clear acceptance criteria and technical specifications aligned with healthcare industry standards (HIPAA, FDA, DEA), the development team has a precise roadmap to deliver a solution that improves operational efficiency, enhances patient safety, ensures regulatory compliance, and reduces inventory waste for healthcare facilities.