

# SOLUTION REQUIREMENTS

## To Supply Leftover Food to Poor - Functional & Non-Functional Requirements

### Project Design Phase-II: Solution Requirements Documentation

**Date:** November 1, 2025

**Team ID:** NM2025TMID08527

**Project Name:** To Supply Leftover Food to Underprivileged Populations

**Maximum Marks:** 4 Marks

## FUNCTIONAL REQUIREMENTS

Functional requirements define **what the system must do** - the specific features, functions, and capabilities needed to meet user needs and achieve project objectives.

## DONOR MANAGEMENT FUNCTIONAL REQUIREMENTS

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)	Priority
FR-1	<b>Food Donation Registration</b>	Donors can register organization/individual profile with name, contact, address, food categories offered	High
		Profile information securely stored in donor database	High
		Donors can update profile information anytime	Medium
FR-2	<b>Food Availability Posting</b>	Donor can list available food with type (cooked/fruits/bread/dairy), quantity (portions or kg)	High
		Donor uploads photo of food for visual verification	High
		Donor specifies collection time window (morning/afternoon/evening/night)	High
		System validates all required fields before accepting posting	High
FR-3	<b>Collection Confirmation</b>	Food listing appears in volunteer mobile app within 2 minutes	High
		System sends notification to donor when food collection assigned to volunteer	High
		System sends confirmation when collection completed	High
		System sends confirmation with photo evidence of collection	Medium
FR-4	<b>Impact Feedback</b>	System generates monthly impact report showing meals from donor's food distributed	Medium
		Report includes beneficiary count and satisfaction metrics	Medium
		System calculates CO2 emissions prevented from donor's contribution	Medium

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)	Priority
		Donor receives downloadable CSR certificate for tax purposes	Medium
<b>FR-5</b>	<b>Recurring Donations</b>	Donor can set up recurring daily/weekly food donations	Medium
		System automatically schedules collection times for recurring donations	Medium
		Donor can modify or cancel recurring schedule	Medium
<b>FR-6</b>	<b>Donor History</b>	System maintains complete history of all donations by each donor	Low
		Donor can view personal donation history and cumulative impact	Low
		Donor can download historical reports	Low

## COLLECTION & VOLUNTEER FUNCTIONAL REQUIREMENTS

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)	Priority
<b>FR-7</b>	<b>Volunteer Registration</b>	Volunteer can create profile with name, phone, email, skills, availability	High
		Volunteer can specify preferred collection/distribution zones	High
		Volunteer completes food safety training certification	High
		System stores volunteer profile and certification status	High
<b>FR-8</b>	<b>Collection Assignment</b>	System sends real-time notification to nearby available volunteers when food available	High
		Notification includes donor location, food type, quantity, time window	High
		Volunteer can accept or decline collection assignment	High
		System assigns to next available volunteer if declined	High
		Assignment confirmation sent to both volunteer and donor	High
<b>FR-9</b>	<b>In-App Navigation</b>	Mobile app provides turn-by-turn GPS navigation to collection location	High
		Navigation estimates travel time and distance	High
		Volunteer can access donor contact information in app	High
		Navigation accounts for traffic and provides alternate routes	Medium
<b>FR-10</b>	<b>Food Safety Checklist</b>	Mobile app displays food safety verification checklist at collection point	High
		Checklist items: visual inspection, odor check, contamination evidence, storage condition	High
		Volunteer must record temperature using in-app input (target <5°C or <2hr safe)	High

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)	Priority
		Volunteer must take photo of food as evidence	High
		System validates all checklist items completed before allowing submission	High
		If any item fails safety check, system prevents collection acceptance	High
<b>FR-11</b>	<b>Quantity &amp; Documentation</b>	Volunteer records actual quantity collected (grams or portions)	High
		Volunteer records donor name and contact information	High
		Volunteer captures donor digital signature via mobile app	High
		System logs collection timestamp and GPS location	High
<b>FR-12</b>	<b>Transport to Hub</b>	GPS tracking active during transport from collection point to hub	High
		System logs route taken and time taken to hub	High
		Temperature monitored during transport (backup monitoring if app unavailable)	High
		System alerts if transport time exceeds 30 minutes	Medium
		Volunteer must verify arrival at hub in app	High
<b>FR-13</b>	<b>Collection Completion</b>	Upon hub arrival, volunteer confirms food received by hub staff	High
		Hub staff verifies quantity and condition match collection record	High
		System logs collection completion with all data	High
		Volunteer receives completion confirmation and hours logged	High
<b>FR-14</b>	<b>Volunteer Hours Tracking</b>	System automatically logs volunteer hours from acceptance to completion	High
		Volunteer dashboard shows cumulative hours contributed	Medium
		System calculates volunteer value in imputed labor cost	Medium
		Hours data available for monthly recognition and reporting	Medium

## COLD CHAIN & STORAGE FUNCTIONAL REQUIREMENTS

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)	Priority
<b>FR-15</b>	<b>Temperature Monitoring</b>	Digital thermometers log temperature readings every 6 hours at hub facility	High
		Temperature readings stored in database with timestamp	High
		If temperature deviates >5°C, system generates alert immediately	High

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)	Priority
		Alert notification sent to hub manager via SMS and app	High
<b>FR-16</b>	<b>Backup Power System</b>	Hub facility equipped with backup generator for power outages	High
		System tracks backup generator status and fuel level	Medium
		Temperature maintained 0-5°C even during power outage	High
		System logs any power outage events and resolution time	Medium
<b>FR-17</b>	<b>Inventory Management</b>	All food items logged into system upon hub arrival	High
		Inventory database records: food type, quantity, date received, expiration date	High
		System tracks food storage location within hub (shelf, bin number)	High
		FIFO (First-In-First-Out) rotation status tracked for each item	High
		System automatically flags items approaching expiration date	High
<b>FR-18</b>	<b>Food Segregation</b>	System ensures cooked foods stored separately from raw ingredients	High
		Vegetarian and non-vegetarian items stored in separate areas	High
		Items with allergens labeled and segregated appropriately	High
		Documentation of segregation protocols maintained	Medium
<b>FR-19</b>	<b>Food Labeling</b>	All packaged food items labeled with: date received, contents, expiration time	High
		Labels include allergen information prominently	High
		Labels include storage temperature requirements	Medium
		Volunteer can scan label barcode to verify item details	Medium
<b>FR-20</b>	<b>Waste Tracking</b>	System records any food items discarded as spoiled or waste	High
		Waste records include reason (expired, contaminated, damaged) and quantity	High
		Waste data compiled for environmental impact calculations	Medium

## DISTRIBUTION & BENEFICIARY FUNCTIONAL REQUIREMENTS

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)	Priority
<b>FR-21</b>	<b>Beneficiary Endpoint Registration</b>	System registers beneficiary organizations (shelters, orphanages, communities)	High
		Registration includes: location, contact person, daily meal capacity, preferred delivery times	High

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)	Priority
		System maintains beneficiary database with status (active/inactive)	High
<b>FR-22</b>	<b>Distribution Schedule</b>	System allows beneficiary to schedule regular meal delivery times (breakfast/lunch/dinner)	High
		Beneficiary can specify special dietary requirements or preferences	Medium
		System sends confirmation of scheduled delivery times	High
<b>FR-23</b>	<b>Route Optimization</b>	System generates optimized delivery routes considering all scheduled beneficiaries	High
		Route optimization minimizes travel time and maintains cold chain during delivery	High
		System groups beneficiaries geographically for efficient delivery	High
		Routes can be modified by operations coordinator	Medium
<b>FR-24</b>	<b>Distribution Assignment</b>	System assigns volunteers to optimized distribution routes with stop-by-stop details	High
		Volunteer receives assignment with: route map, stop sequence, meal quantities per stop, delivery times	High
		System sends route summary including estimated delivery duration	High
<b>FR-25</b>	<b>On-Route Navigation</b>	Mobile app provides turn-by-turn navigation to each distribution stop in sequence	High
		App shows beneficiary contact person name and phone number	High
		App displays meal items to be delivered to each stop	High
		Volunteer can mark stop complete or note any issues	High
<b>FR-26</b>	<b>Beneficiary Verification</b>	At each distribution stop, volunteer verifies beneficiary endpoint location	High
		Volunteer confirms contact person identity	High
		System verifies meal quantity matches scheduled requirement	High
		If discrepancy, volunteer can adjust or escalate to operations	High
<b>FR-27</b>	<b>Meal Distribution</b>	Volunteer distributes meals to beneficiaries with dignity and respect	High
		Volunteer records actual beneficiary count (may differ from scheduled)	High
		System logs distribution timestamp and location	High
<b>FR-28</b>	<b>Beneficiary Feedback</b>	Simple satisfaction survey (1-5 scale) offered to beneficiaries or caretakers	Medium
		Survey includes: food quality, portion size, presentation, special requests	Medium

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)	Priority
		Feedback collected via volunteer (if no device at endpoint) or QR code	Medium
		Feedback compiled and visible to operations team for improvements	Medium
<b>FR-29</b>	<b>Issue Reporting</b>	Volunteer can report issues at distribution points (damaged meal, cold chain broken, etc.)	High
		Issues trigger alert to operations coordinator and hub manager	High
		Issue documentation includes photos and detailed description	High
<b>FR-30</b>	<b>Distribution Completion</b>	Volunteer marks distribution complete in app after all stops delivered	High
		System compiles daily distribution report with meals delivered, beneficiaries reached	High
		Operations team receives distribution completion confirmation	High

## FOOD SAFETY & COMPLIANCE FUNCTIONAL REQUIREMENTS

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)	Priority
<b>FR-31</b>	<b>Critical Control Points (CCP) Monitoring</b>	System implements 5 CCP checkpoints: collection, transport, storage, preparation, distribution	High
		Each CCP has documented verification procedures and acceptance criteria	High
		System enforces CCP verification before allowing progression to next stage	High
<b>FR-32</b>	<b>Traceability System</b>	Complete audit trail maintained for every food item from donor to beneficiary	High
		Traceability includes: source donor, collection date/time, storage location, transport details, distribution beneficiary	High
		System can retrieve complete history of any food item in seconds	High
		Traceability used for incident investigation and recall if necessary	High
<b>FR-33</b>	<b>Incident Logging</b>	System logs any food safety deviations or incidents with full documentation	High
		Incident record includes: deviation details, time reported, corrective action taken, effectiveness verification	High
		Operations team receives alert immediately upon incident logging	High

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)	Priority
<b>FR-34</b>	<b>Staff Certification</b>	System tracks food safety training completion for all staff and volunteers	High
		Certifications include date completed, expiration date, refresher training requirements	High
		System prevents non-certified individuals from handling food operations	High
		Reminders sent before certification expiration	Medium
<b>FR-35</b>	<b>Documentation &amp; Audit Trail</b>	All operations documented automatically: collections, storage, distributions, incidents	High
		Documentation includes timestamps, responsible personnel, verification signatures	High
		Complete audit trail accessible for regulatory inspections	High
		System generates compliance reports on demand	High
<b>FR-36</b>	<b>Regulatory Compliance</b>	System maintains all FSSAI required documentation and records	High
		Regular internal audits scheduled and documented	Medium
		Pre-audit checklists available for preparation	Medium
		Non-conformances tracked and corrective actions documented	High

## ANALYTICS & REPORTING FUNCTIONAL REQUIREMENTS

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)	Priority
<b>FR-37</b>	<b>Daily Metrics Compilation</b>	System automatically compiles daily metrics: meals collected, meals distributed, cost per meal	High
		Volunteer hours tracked and calculated into cost per meal	High
		Beneficiary count and satisfaction metrics compiled	High
<b>FR-38</b>	<b>Environmental Impact Calculation</b>	System calculates CO2 emissions prevented per meal diverted (baseline: 2.3 kg CO2-eq)	Medium
		System calculates water resources saved per meal (baseline: 1L per meal)	Medium
		System calculates land conservation equivalent	Medium
		Cumulative environmental metrics displayed on dashboard	Medium
<b>FR-39</b>	<b>Financial Analytics</b>	System tracks operational costs by category: labor, fuel, storage, supplies	High
		Cost per meal calculated and trended over time	High

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)	Priority
		Revenue sources tracked: government contracts, corporate sponsorships, donations	High
		Financial reports generated monthly and quarterly	Medium
<b>FR-40</b>	<b>Real-time Dashboard</b>	Operations dashboard displays live: collections in progress, distributions active, hub status	High
		Dashboard shows: vehicle GPS locations, temperature readings, inventory levels	High
		Alert system highlights any deviations or issues	High
		Dashboard refreshes every minute with latest data	High
<b>FR-41</b>	<b>Report Generation</b>	System generates daily operations report automatically	High
		Weekly impact report showing cumulative meals and beneficiaries	Medium
		Monthly executive summary with financial and impact metrics	Medium
		Reports available in downloadable formats (PDF, Excel)	Medium
<b>FR-42</b>	<b>Data Visualization</b>	Dashboard includes: line charts for trends, pie charts for cost breakdown, maps for geographic distribution	Medium
		Volunteer performance leaderboard showing top collectors/distributors	Medium
		Donor contribution visualization showing their impact	Medium

## TECHNOLOGY & INTEGRATION FUNCTIONAL REQUIREMENTS

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)	Priority
<b>FR-43</b>	<b>Mobile App Core Features</b>	Volunteer mobile app available on iOS and Android	High
		App works online and offline with data sync when reconnected	High
		Push notifications for new assignments and alerts	High
		GPS functionality integrated for navigation and tracking	High
<b>FR-44</b>	<b>Web Portal</b>	Donor portal allows food listing and impact tracking	High
		Admin dashboard provides operations management and reporting	High
		Responsive design works on desktop and tablet devices	Medium
<b>FR-45</b>	<b>User Authentication</b>	Secure login with phone-based OTP for volunteers	High
		Donor login via email and password	High
		Admin authentication with multi-factor security	High



FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)	Priority
		Session timeout for security after inactivity	Medium
<b>FR-46</b>	<b>Data Storage &amp; Backup</b>	Cloud-based database for all data storage	High
		Automatic daily backups with redundancy	High
		Data encryption in transit and at rest	High
		Disaster recovery procedures in place	High
<b>FR-47</b>	<b>API Integration</b>	Google Maps API for route optimization and navigation	High
		SMS/WhatsApp API for notifications and alerts	High
		Analytics platform integration for tracking	Medium
<b>FR-48</b>	<b>Payment Processing</b>	Donation payment gateway integrated for individual donors	Medium
		Transaction records maintained for financial tracking	Medium
		Refund procedures documented and automated	Low

## NON-FUNCTIONAL REQUIREMENTS

Non-functional requirements define **how well the system should perform** - the quality attributes, constraints, and performance standards.

## PERFORMANCE NON-FUNCTIONAL REQUIREMENTS

NFR No.	Non-Functional Requirement	Description	Target
<b>NFR-1</b>	<b>Response Time</b>	Mobile app should load within 3 seconds on 4G network	<3 sec
	Dashboard queries should execute and display within 5 seconds	<5 sec	
	API endpoint response time should be <500ms (95th percentile)	<500ms	
<b>NFR-2</b>	<b>Concurrent Users</b>	System should support 100+ concurrent active users without degradation	100+ users
	Mobile app should handle 1,000+ daily active users	1,000 DAU	
	Dashboard should support 20+ simultaneous admin users	20+ admins	
<b>NFR-3</b>	<b>Data Processing</b>	Temperature data processed and alerts triggered within 1 minute	<1 min
	Collection notifications sent to volunteers within 2 minutes of posting	<2 min	

NFR No.	Non-Functional Requirement	Description	Target
	Distribution assignments calculated and sent within 5 minutes	<5 min	
<b>NFR-4</b>	<b>Scalability</b>	System should scale from 500 meals/day (Phase 1) to 50,000+/week (Phase 5)	100x growth
	Database should handle 1M+ records without performance degradation	1M+ records	
	Should support multi-city operations (10+ cities) simultaneously	10+ cities	

## AVAILABILITY & RELIABILITY NON-FUNCTIONAL REQUIREMENTS

NFR No.	Non-Functional Requirement	Description	Target
<b>NFR-5</b>	<b>System Uptime</b>	System should be available 99.5% of the time (annual uptime SLA)	99.5%
	Dashboard available during all operating hours (24/7 for hub managers)	24/7	
	Mobile app should have <0.1% crash rate	<0.1%	
<b>NFR-6</b>	<b>Disaster Recovery</b>	Recovery Time Objective (RTO): <4 hours for system recovery after outage	<4 hrs
	Recovery Point Objective (RPO): <1 hour data loss tolerance	<1 hr	
	Backup systems should switch automatically on primary failure	Automatic	
<b>NFR-7</b>	<b>Data Integrity</b>	Zero data loss tolerance for critical operations data	0 loss
	Data consistency across all copies (3+ geographic backups)	100%	
	Transaction rollback capability for all financial operations	Full rollback	
<b>NFR-8</b>	<b>Reliability</b>	System must correctly identify food safety violations 100% of the time	100%
	Temperature monitoring accuracy: $\pm 0.5^{\circ}\text{C}$	$\pm 0.5^{\circ}\text{C}$	
	GPS location accuracy: $\pm 10$ meters	$\pm 10\text{m}$	
	Traceability: 100% of food items traceable from source to destination	100%	

## SECURITY NON-FUNCTIONAL REQUIREMENTS

NFR No.	Non-Functional Requirement	Description	Target
<b>NFR-9</b>	<b>Authentication</b>	Multi-factor authentication for admin users	Mandatory
	Phone OTP for volunteer app login	Required	
	Session timeout: 30 minutes inactivity for sensitive operations	30 min	
<b>NFR-10</b>	<b>Authorization</b>	Role-based access control (RBAC): Donor, Volunteer, Beneficiary, Admin roles	Implemented
	Users can only access their own data (sandboxed)	Enforced	
	Admins require explicit approval for sensitive operations	Required	
<b>NFR-11</b>	<b>Data Encryption</b>	All data in transit encrypted using TLS 1.2+	TLS 1.2+
	All data at rest encrypted using AES-256	AES-256	
	Database encryption key managed separately from encryption data	Segregated	
<b>NFR-12</b>	<b>Compliance</b>	GDPR compliance for beneficiary personal data	Compliant
	Data privacy policy available and accepted by all users	Mandatory	
	Right to be forgotten: User data deletion within 30 days on request	30 days	
	No unauthorized data sharing with third parties	Enforced	
<b>NFR-13</b>	<b>Audit &amp; Monitoring</b>	All user actions logged with timestamp, user ID, action details	100% logging
	Access logs retained for 2 years for audit trail	2 years	
	Intrusion detection system monitoring for security threats	Active monitoring	
	Regular security audits and penetration testing (quarterly)	Quarterly	
<b>NFR-14</b>	<b>Vulnerability Management</b>	Security patches applied within 7 days of availability	7 days
	Vulnerability scanning performed monthly	Monthly	
	Responsible disclosure policy for security bugs	Documented	

## USABILITY NON-FUNCTIONAL REQUIREMENTS

NFR No.	Non-Functional Requirement	Description	Target
<b>NFR-15</b>	<b>User Interface</b>	Volunteer mobile app interface intuitive, 80%+ first-time success rate	>80%
	Complex operations completable in <5 minutes average	<5 min	
	Error messages clear and suggest corrective actions	Clear messaging	
<b>NFR-16</b>	<b>Accessibility</b>	App accessible to users with visual impairments (WCAG 2.1 Level AA)	Level AA
	Support for multiple languages (Hindi, English initially)	Multi-lingual	
	Font sizes adjustable for readability	Adjustable	
<b>NFR-17</b>	<b>Learning Curve</b>	First-time volunteer can complete collection in <20 minutes with app guidance	<20 min
	Minimal training required for basic operations (1-2 hour training)	1-2 hrs	
	Help system and tutorials available in-app	Available	
<b>NFR-18</b>	<b>Documentation</b>	User documentation available (Quick Start Guides, FAQs)	Comprehensive
	Video tutorials for major processes	Available	
	In-app tooltips and context-sensitive help	Implemented	

## OPERATIONAL & SUPPORT NON-FUNCTIONAL REQUIREMENTS

NFR No.	Non-Functional Requirement	Description	Target
<b>NFR-19</b>	<b>Support</b>	Support ticket response time: <24 hours	<24 hrs
	Critical issues (food safety, security) responded within 1 hour	<1 hr	
	Support available 7 days/week during operating hours	7 days/week	
<b>NFR-20</b>	<b>Maintenance</b>	System maintenance windows: max 2 hours/month at scheduled times	2 hrs/month
	Maintenance announcements sent 48 hours in advance	48 hrs notice	

NFR No.	Non-Functional Requirement	Description	Target
	Zero-downtime deployments for non-critical updates	Zero-downtime	
<b>NFR-21</b>	<b>Compatibility</b>	Mobile app: iOS 12+, Android 6.0+ support	iOS 12+/Android 6.0+
	Web browser support: Chrome, Firefox, Safari, Edge latest versions	Latest versions	
	Offline functionality on mobile without internet for 4+ hours	4+ hrs offline	
<b>NFR-22</b>	<b>Reporting</b>	System generates all required compliance reports automatically	Automatic
	Reports audit-ready for regulatory inspection	Audit-ready	
	Historical data retained for minimum 7 years	7 years	

## REQUIREMENT PRIORITIES

### Critical (High Priority) Requirements

These must be implemented for basic system functionality:

- Food donor registration and listing (FR-1, FR-2)
- Collection verification and safety checks (FR-10, FR-31)
- Cold chain temperature monitoring (FR-15)
- Beneficiary distribution (FR-26, FR-27)
- System uptime and reliability (NFR-5, NFR-6)
- Security and authentication (NFR-9, NFR-10)

### Important (Medium Priority) Requirements

These enhance system value but can be deferred if necessary:

- Recurring donations (FR-5)
- Beneficiary feedback (FR-28)
- Advanced analytics (FR-40)
- Performance optimization (NFR-1)
- Accessibility features (NFR-16)

**Enhancement (Low Priority) Requirements**

These provide additional value but are not critical:

- Donor history tracking (FR-6)
- Multi-language support (NFR-17)
- Advanced reporting features (FR-41)

**REQUIREMENT TRACEABILITY**

Requirement Category	Count	Status
Functional Requirements	48	Defined
Non-Functional Requirements	22	Defined
Total Requirements	70	Complete

**SIGN-OFF**

Role	Name	Date	Signature
Project Lead	[To be filled]	[Date]	[Signature]
Product Owner	[To be filled]	[Date]	[Signature]
Technical Lead	[To be filled]	[Date]	[Signature]
Stakeholder Representative	[To be filled]	[Date]	[Signature]