Functional Requirements Document (FRD)

Document Control

Document Name	Date	Author	Role	Status
Functional Requirements Document	February 16, 2025	Sonal Khobragade	Business Analyst	Approved

1. Overview & Purpose

This Functional Requirements Document (FRD) details the specific functions, features, and capabilities required to address the order fulfillment delays identified in the Business Requirements Document (BRD). It translates the business needs into detailed functional specifications that will guide the development and implementation of process improvements and system enhancements.

The document serves as a bridge between business requirements and technical implementation, providing clear acceptance criteria for each requirement. It will be used by the development team, QA testers, and business stakeholders to ensure that all implemented solutions align with business objectives and effectively address the root causes of fulfillment delays.

2. Requirement Mapping

FRD ID	BRD Req ID	Description	Priority	AC ID
FRD001	FR001	Order Status Visibility Dashboard	High	AC001-AC005
FRD002	FR002	At-Risk Order Identification System	High	AC006-AC010
FRD003	FR003	Pick Path Optimization Algorithm	Medium	AC011-AC015
FRD004	FR004	Inventory Alert System	High	AC016-AC020

FRD005	FR005	Order Batch Processing Module	Medium	AC021-AC025
FRD006	FR006	KPI Dashboard System	Medium	AC026-AC030
FRD007	FR007	Automated Quality Check System	High	AC031-AC035
FRD008	FR008	Shipping Carrier Integration Module	Medium	AC036-AC040
FRD009	FR009	Process Exception Alert System	High	AC041-AC045
FRD010	FR010	Workload Balancing Module	Medium	AC046-AC050
FRD011	FR011	Order Traceability System	High	AC051-AC055
FRD012	FR012	Order Prioritization Engine	Medium	AC056-AC060

3. Detailed Functional Requirements

FRD001: Order Status Visibility Dashboard

Description: A real-time dashboard that provides visibility into order status throughout the fulfillment process.

Acceptance Criteria:

- **AC001:** Dashboard shall display real-time status of all active orders in the fulfillment process.
- **AC002:** Users shall be able to filter orders by status, date range, order type, and customer priority.
- **AC003:** Dashboard shall update automatically every 60 seconds without user intervention.
- **AC004:** Users shall be able to drill down into individual order details from the dashboard.
- **AC005:** Dashboard shall be accessible to authorized users based on role-based permissions.

Business Rules: BR001, BR008

Dependencies: Integration with OMS and WMS

FRD002: At-Risk Order Identification System

Description: A system that automatically identifies and flags orders at risk of missing promised delivery dates.

Acceptance Criteria:

- **AC006:** System shall evaluate all active orders against predefined risk criteria every 30 minutes.
- **AC007:** System shall assign risk levels (High, Medium, Low) based on configurable business rules.
- **AC008:** High-risk orders shall trigger automated notifications to designated personnel.
- **AC009:** System shall provide recommended actions for mitigating risks for each flagged order.
- **AC010:** System shall maintain a history of risk assessments and actions taken for each order.

Business Rules: BR001, BR008

Dependencies: Integration with OMS, WMS, and shipping carrier APIs

FRD003: Pick Path Optimization Algorithm

Description: An algorithm that optimizes picking routes to minimize travel time and increase efficiency.

Acceptance Criteria:

- **AC011:** Algorithm shall generate optimized pick paths based on order items and warehouse layout.
- **AC012:** Optimized paths shall reduce average picking time by at least 20% compared to current routes.
- **AC013:** Algorithm shall support batch picking across multiple orders when appropriate.
- **AC014:** System shall provide visual maps of pick paths for pickers via mobile devices.
- **AC015:** Algorithm shall adapt to real-time inventory location changes and zone congestion.

Business Rules: BR002, BR005

Dependencies: Integration with WMS, accurate warehouse mapping data

FRD004: Inventory Alert System

Description: A system that provides automated inventory alerts when stock levels reach predefined thresholds.

Acceptance Criteria:

- **AC016:** System shall monitor inventory levels for all SKUs in real-time.
- **AC017:** System shall generate alerts when inventory falls below configurable thresholds.
- **AC018:** Alerts shall be prioritized based on order demand and replenishment lead time.
- **AC019:** System shall provide forecasted stock-out dates based on current demand patterns.
- **AC020:** Alerts shall be delivered via multiple channels (dashboard, email, SMS) based on severity.

Business Rules: BR004, BR009

Dependencies: Integration with inventory management system

4. Data Dictionary & ER Diagram

The following data entities and their relationships are critical to the implementation of the functional requirements:

Key Entities

Entity	Description	Key Attributes	Relationships
Order	Customer purchase request	OrderID, CustomerID, OrderDate, PromisedDeliveryDate, Status	Has many OrderItems, has one ShipmentInfo
OrderItem	Individual item in an order	OrderItemID, OrderID, ProductID, Quantity, Status	Belongs to one Order, references one Product
Product	Item available for purchase	ProductID, SKU, Description, Category, Weight, Dimensions	Has many InventoryItems, referenced by many OrderItems

InventoryItem	Physical stock of a product	InventoryID, ProductID, LocationID, Quantity, Status	Belongs to one Product, stored in one Location
Location	Warehouse storage position	LocationID, Zone, Aisle, Shelf, Bin, Status	Contains many InventoryItems
ShipmentInfo	Shipping details for an order	ShipmentID, OrderID, CarrierID, TrackingNumber, ShipDate	Belongs to one Order, uses one Carrier
Carrier	Shipping service provider	CarrierID, Name, ServiceLevel, CutoffTime	Used by many ShipmentInfos
PickTask	Assignment to collect items	PickTaskID, OrderID, AssignedUserID, Status, StartTime, EndTime	Belongs to one Order, assigned to one User

[Placeholder for Entity Relationship Diagram - Visual representation of data entities and their relationships]

5. UI/Report Mockups

Order Status Dashboard

[Placeholder for Order Status Dashboard Mockup - Visual representation of the real-time order tracking interface]

Key elements: Order status filters, order list with status indicators, drill-down capabilities, alert notifications

Inventory Alert Console

[Placeholder for Inventory Alert Console Mockup - Visual representation of the inventory monitoring interface]

Key elements: Low stock alerts, replenishment recommendations, demand forecasts, inventory level trends

Pick Path Visualization

[Placeholder for Pick Path Visualization Mockup - Visual representation of the optimized picking route interface]

Key elements: Warehouse map, highlighted pick path, item locations, progress tracking

KPI Performance Report

[Placeholder for KPI Performance Report Mockup - Visual representation of the metrics tracking interface]

Key elements: Fulfillment time trends, order accuracy metrics, productivity indicators, comparative analysis

6. Business Rules & Validation Logic

Order Prioritization Rules

Rule ID	Description	Logic

BR001	Expedited shipping prioritization	IF order.shippingMethod = 'Expedited' THEN order.priority = 'High'
BR008	At-risk order escalation	IF (currentTime - order.creationTime) > 4 hours AND order.status = 'Processing' THEN order.priority = 'High'
BR006	Remote area delivery adjustment	IF order.deliveryZipCode IN remoteAreasList THEN order.estimatedDelivery = order.estimatedDelivery + 1 day

Inventory Management Rules

Rule ID	Description	Logic
BR004	Inventory discrepancy verification	IF |system.quantity - actual.quantity| > 5 THEN triggerManualCount()
BR009	Low inventory replenishment	IF inventory.availableUnits < 5 THEN createReplenishmentRequest()

Order Processing Rules

Rule ID	Description	Logic
BR002	Multi-zone order consolidation	IF order.items.distinctZones > 1 THEN routeToConsolidation()
BR003	Payment hold exception handling	IF order.paymentStatus = 'Hold' THEN routeToExceptionQueue()
BR005	Large order specialized handling	IF order.itemCount > 20 THEN routeToSpecializedPacking()
BR007	Regulated items compliance check	IF order.containsRegulatedItems = TRUE THEN performComplianceCheck()

Data Validation Rules

Field	Validation Rule	Error Message
Order.CustomerID	Must exist in Customer database	"Invalid customer ID"
OrderItem.Quantity	Must be greater than 0	"Quantity must be positive"
ShipmentInfo.TrackingNumber	Must match carrier's format pattern	"Invalid tracking number format"
InventoryItem.Quantity	Must not be negative	"Inventory cannot be negative"

7. Integration Requirements

System Integrations

Integration Point	Source System	Target System	Data Elements	Frequency
Order Creation	E-commerce Platform	Order Management System	Order details, customer information, payment data	Real-time
Inventory Updates	Warehouse Management System	Order Management System	Stock levels, location data	Real-time
Shipping Rates	Carrier APIs	Order Management System	Rate quotes, service levels, delivery estimates	On-demand
Tracking Updates	Carrier APIs	Order Management System	Tracking status, delivery exceptions	Every 30 minutes

Financial Transactions	Order Management System	ERP System	Order values, shipping costs, taxes	Hourly batch

API Requirements

- **Order Status API:** RESTful API to provide real-time order status information to external systems
- **Inventory API:** RESTful API to query current inventory levels and locations
- **Shipping API:** Integration with carrier APIs for rate shopping, label generation, and tracking
- **Reporting API:** API to extract KPI data for external dashboards and reporting tools

8. Assumptions & Constraints

Assumptions

- Existing systems (WMS, OMS, ERP) will remain in place during implementation
- Current hardware infrastructure is sufficient to support the new functionality
- Warehouse staff will be available for training on new processes
- Carrier APIs provide the necessary functionality for integration
- Historical data is sufficient for baseline metrics and testing

Constraints

- Implementation must be completed within existing budget constraints
- Changes must not disrupt ongoing fulfillment operations
- Solutions must work within the limitations of existing systems
- Implementation timeline must align with business peak season avoidance
- All solutions must comply with existing security and compliance requirements

9. Approval

This Functional Requirements Document has been reviewed and approved by the following stakeholders:

Name	Role	Date

Rajesh Kumar	Project Sponsor	February 16, 2025
Priya Desai	Product Owner	February 16, 2025
Sonal Khobragade	Business Analyst	February 16, 2025
Suresh Iyer	Operations SME	February 16, 2025