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NGORONGORO CONSERVATION AREA AUTHORITY

Software Requirements Specification

NCAA Digital Transformation - AI-Powered Fleet Management System

Version: 1.0

Date: 2025-11-12

Status: Draft

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1 Document Information

Field	Value
Project Name	NCAA Digital Transformation - AI-Powered Fleet Management System
Version	1.0
Date	2025-11-12
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Module Code	FLEET_MGMT
Parent Project	NCAA Digital Transformation - Ngorongoro Gateway System

2 Project Overview

2.1 What Are We Building

2.1.1 System Function

A comprehensive AI-powered fleet management system that provides real-time vehicle tracking, driver management, maintenance scheduling, fuel monitoring, and route optimization for NCAA's 30+ vehicle fleet. The system integrates telematics hardware, GPS tracking, fuel sensors, and AI-driven analytics to reduce operational costs, enhance vehicle utilization, and improve maintenance planning across all conservation area operations.

2.1.2 Users

- Fleet Managers: Vehicle allocation, maintenance scheduling, and fleet performance monitoring
- Drivers: Route navigation, vehicle checks, and duty logging
- Maintenance Teams: Preventive maintenance alerts and repair tracking
- Finance Department: Fuel consumption analysis and cost tracking
- Operations Managers: Resource allocation and efficiency monitoring
- Management: Executive fleet analytics and cost optimization insights

2.1.3 Problem Solved

Manual fleet management causing inefficient vehicle utilization, untracked fuel consumption leading to waste and fraud, reactive maintenance resulting in breakdowns, lack of driver accountability, no real-time vehicle location visibility, inability to optimize routes for conservation patrols and tourism operations, and fragmented data preventing cost analysis and strategic planning.

2.1.4 Key Success Metric

30% reduction in fuel costs through monitoring and optimization, 50% reduction in vehicle downtime via predictive maintenance, 40% improvement in vehicle utilization rates, 100% real-time fleet visibility, complete driver accountability with digital duty logs, AI-optimized routing reducing mileage by 25%, and integrated analytics enabling data-driven fleet decisions.

2.2 Scope

2.2.1 In Scope

- Real-time GPS tracking for all NCAA vehicles (30+ fleet)
- Telematics integration for vehicle diagnostics and performance monitoring
- Fuel consumption monitoring with sensor integration and fraud detection
- Driver management including duty logs, performance tracking, and credential verification
- Maintenance scheduling with predictive analytics and service reminders
- Route optimization powered by Nasera AI for patrols and operations
- Vehicle allocation and booking system for departmental requests
- Mobile application for drivers (duty logging, navigation, vehicle checks)
- Web dashboard for fleet managers and administrators
- Integration with BI System for cost analysis and reporting
- Integration with Gateway System for visitor transport coordination
- Fuel card management and reconciliation
- Vehicle utilization analytics and efficiency reporting
- Maintenance history and cost tracking
- Driver behavior monitoring and safety scoring

2.2.2 Out Of Scope

- Vehicle procurement and acquisition processes
- Insurance claim management
- Traffic violation processing
- Third-party contractor fleet management
- Public transportation services
- Heavy equipment and machinery management (focus on vehicles)
- Spare parts inventory management (handled by procurement system)

3 User Requirements

3.1 Vehicle Tracking

Feature Code	I Want To	So That I Can	Priority	Notes
FT-FLEET-GPS-TRACKING	View real-time location of all NCAA vehicles on a map	Monitor fleet deployment, ensure vehicles are in authorized areas, and respond to emergencies quickly	Must	GPS tracking every 30 seconds. Historical route playback. Geofencing alerts for unauthorized areas. Works offline with cached data sync.
FT-FLEET-GEOFENCING	Set geographic boundaries and receive alerts when vehicles enter/exit zones	Ensure vehicles stay within authorized areas and detect unauthorized use	Must	Conservation area boundaries, gate zones, restricted areas. SMS/email alerts. Integration with security protocols.
FT-FLEET-ROUTE-HISTORY	Review historical routes and vehicle movements	Audit vehicle usage, verify patrol coverage, and analyze operational patterns	Must	90-day route history. Playback with timeline controls. Export to PDF/Excel. Integration with duty logs.
FT-FLEET-LIVE-DASHBOARD	Access live dashboard showing all	Coordinate fleet operations and make real-time	Must	Color-coded status indicators (active, idle,

Feature Code	I Want To	So That I Can	Priority	Notes
	active vehicles and their status	allocation decisions		maintenance, emergency). Filter by department, vehicle type, location.

3.2 Telematics Diagnostics

Feature Code	I Want To	So That I Can	Priority	Notes
FT-FLEET-TELEMATICS	Receive real-time vehicle diagnostics including engine health, battery status, and error codes	Detect issues early and prevent breakdowns during critical operations	Must	OBD-II integration. Engine hours tracking. Battery voltage monitoring. Check engine light alerts.
FT-FLEET-PERFORMANCE-METRICS	Monitor vehicle performance metrics including speed, RPM, temperature, and efficiency	Identify vehicles operating outside optimal parameters and address issues proactively	Should	Dashboard displaying key performance indicators. Trend analysis. Comparison across fleet.
FT-FLEET-HEALTH-SCORE	View overall vehicle health scores based on telematics data	Prioritize maintenance and make informed replacement decisions	Should	AI-calculated health score (0-100). Alerts when score drops below threshold. Monthly health reports.

3.3 Fuel Management

Feature Code	I Want To	So That I Can	Priority	Notes
FT-FLEET-FUEL-MONITORING	Monitor real-time fuel levels and consumption rates for all vehicles	Detect fuel theft, optimize consumption, and plan refueling schedules	Must	Fuel sensor integration. Anomaly detection for sudden drops (theft). Consumption vs distance analysis.
FT-FLEET-FUEL-EFFICIENCY	Track fuel efficiency metrics and compare across vehicles and drivers	Identify inefficient vehicles and improve driver behavior to reduce fuel costs	Must	Liters per 100km calculations. Driver comparison reports. Vehicle efficiency trends over time.
FT-FLEET-FUEL-ALERTS	Receive alerts for abnormal fuel consumption patterns indicating theft or leakage	Investigate and resolve fuel-related issues immediately	Must	Threshold-based alerts. Fuel drop detection when engine off. Refueling vs consumption reconciliation.
FT-FLEET-FUEL-CARD	Manage fuel card transactions and reconcile with actual consumption	Prevent fraud and ensure accurate fuel accounting	Should	Fuel card integration. Transaction vs sensor data matching. Variance reporting and investigation workflow.

3.4 Driver Management

Feature Code	I Want To	So That I Can	Priority	Notes
FT-FLEET-DRIVER-ASSIGNMENT	Assign drivers to vehicles and track current assignments	Maintain accountability and ensure only authorized drivers operate vehicles	Must	Driver database with licenses and credentials. Vehicle-driver pairing. Assignment history and audit trail.
FT-FLEET-DUTY-LOG	Digitally log driver duties including start/end times, odometer readings, and purpose	Track vehicle usage, verify duty compliance, and analyze operational patterns	Must	Mobile app for drivers. GPS-stamped duty logs. Photo capture for odometer verification. Digital signature.
FT-FLEET-DRIVER-BEHAVIOR	Monitor driver behavior including speeding, harsh braking, and idling	Improve driver safety, reduce vehicle wear, and lower fuel consumption	Must	Telematics-based behavior scoring. Incident detection and logging. Monthly driver performance reports.
FT-FLEET-DRIVER-CREDENTIAL	Verify driver licenses and credentials before vehicle assignment	Ensure compliance with legal requirements and NCAA policies	Must	License expiry tracking. Automatic alerts for expiring credentials. Integration with HR system.
FT-FLEET-DRIVER-TRAINING	Track driver training and certification status	Ensure drivers are qualified for specialized vehicles and operations	Should	Training records database. Certification tracking. Refresher

Feature Code	I Want To	So That I Can	Priority	Notes
				training reminders.

3.5 Maintenance Management

Feature Code	I Want To	So That I Can	Priority	Notes
FT-FLEET-MAINTENANCE-SCHEDULE	Schedule preventive maintenance based on mileage, engine hours, and time intervals	Prevent breakdowns and extend vehicle lifespan through proactive servicing	Must	Automatic scheduling based on manufacturer recommendations. Email/SMS reminders. Service due dashboard.
FT-FLEET-PREDICTIVE-MAINTENANCE	Receive AI-powered predictions for upcoming maintenance needs based on vehicle data	Address potential issues before they cause breakdowns or expensive repairs	Must	Nasera AI integration analyzing telematics data. Failure prediction models. Risk-based prioritization.
FT-FLEET-MAINTENANCE-TRACKING	Log all maintenance activities including repairs, parts replaced, and costs	Maintain complete vehicle history and analyze maintenance costs	Must	Maintenance log with photos. Parts inventory integration. Service provider tracking. Cost analysis.
FT-FLEET-BREAKDOWN-MANAGEMENT	Report and track vehicle breakdowns with location and issue details	Coordinate rapid response and minimize vehicle downtime	Must	Mobile breakdown reporting. GPS location capture. Towing coordination. Repair status tracking.
			Must	

Feature Code	I Want To	So That I Can	Priority	Notes
FT-FLEET-SERVICE-HISTORY	Access complete service history for each vehicle	Make informed decisions about repairs vs replacement and identify problematic vehicles		Chronological service records. Cost per vehicle analysis. Service frequency tracking.

3.6 Route Optimization

Feature Code	I Want To	So That I Can	Priority	Notes
FT-FLEET-ROUTE-PLANNING	Plan optimal routes for patrols, visitor transport, and operational tasks	Minimize fuel consumption, reduce travel time, and improve operational efficiency	Must	Nasera AI-powered route optimization. Conservation area road conditions. Multi-stop routing.
FT-FLEET-NAVIGATION	Provide turn-by-turn navigation to drivers via mobile app	Ensure drivers follow optimal routes and reach destinations efficiently	Should	Offline map support for areas without connectivity. Voice guidance. Route deviation alerts.
FT-FLEET-ROUTE-DEVIATION	Detect when vehicles deviate from planned routes	Identify unauthorized detours and ensure patrol coverage compliance	Should	Configurable deviation threshold. Automatic alerts to fleet managers. Integration with duty log verification.
FT-FLEET-ROUTE-ANALYSIS	Analyze completed routes to	Continuously improve routing strategies and	Should	Actual vs planned route comparison.

Feature Code	I Want To	So That I Can	Priority	Notes
	identify inefficiencies and optimization opportunities	reduce operational costs		Fuel consumption per route. Time efficiency analysis.

3.7 Vehicle Allocation

Feature Code	I Want To	So That I Can	Priority	Notes
FT-FLEET-BOOKING-SYSTEM	Submit and approve vehicle booking requests from departments	Allocate vehicles efficiently and maintain fair access across NCAA units	Must	Web-based booking interface. Approval workflow. Conflict detection for double-bookings. Priority rules.
FT-FLEET-AVAILABILITY	View real-time vehicle availability considering bookings, maintenance, and current usage	Make informed allocation decisions and plan for vehicle needs	Must	Calendar view showing bookings. Maintenance downtime blocked. Real-time status updates.
FT-FLEET-UTILIZATION	Track vehicle utilization rates across the fleet	Identify underutilized vehicles and optimize fleet size	Should	Utilization percentage calculations. Department-wise allocation analysis. Idle time tracking.

3.8 Integration Reporting

Feature Code	I Want To	So That I Can	Priority	Notes
FT-FLEET-BI-INTEGRATION	Push fleet data to BI System for comprehensive analytics	Analyze fleet performance alongside other organizational metrics	Must	Real-time API integration. Fuel costs, maintenance costs, utilization metrics. Executive dashboards.
FT-FLEET-GATEWAY-INTEGRATION	Coordinate vehicle allocation for visitor transport with Gateway System	Optimize vehicle deployment for tourism operations	Should	Visitor transport requests from Gateway. Availability sharing. Automated allocation for scheduled tours.
FT-FLEET-NASERA-AI	Leverage Nasera AI for predictive analytics and optimization recommendations	Make data-driven decisions on maintenance, routing, and fleet management	Must	AI models for failure prediction, route optimization, cost forecasting. Natural language queries for fleet data.
FT-FLEET-REPORTS	Generate automated fleet reports for management and auditing	Provide transparency, support decision-making, and ensure accountability	Must	Monthly fleet performance reports. Cost analysis reports. Utilization reports. Driver performance reports.

3.9 Mobile Application

Feature Code	I Want To	So That I Can	Priority	Notes
FT-FLEET-MOBILE-DRIVER	Access mobile app for duty logging, navigation, and vehicle checks	Perform my duties efficiently and maintain accurate records digitally	Must	Android/iOS app. Offline functionality. GPS-stamped actions. Photo capture capability.
FT-FLEET-MOBILE-CHECKLIST	Complete digital pre-trip and post-trip vehicle inspection checklists	Ensure vehicle safety and document vehicle condition	Must	Customizable checklist items. Photo documentation of issues. Automatic alerts for critical defects.
FT-FLEET-MOBILE-INCIDENT	Report incidents and accidents immediately via mobile app	Enable rapid response and proper documentation	Must	Incident form with GPS location. Photo and video upload. Automatic notification to managers.

4 Technical Requirements

4.1 Performance Standards

Requirement	Target	How To Test
GPS tracking update frequency	Every 30 seconds when vehicle moving, every 5 minutes when stationary	Monitor GPS data stream frequency under various conditions
Dashboard load time	< 3 seconds for fleet overview with 30+ vehicles	Performance testing with production data volume
Route calculation time	< 5 seconds for multi-stop routes (up to 10 stops)	Route optimization algorithm testing with various scenarios
Mobile app responsiveness	< 2 seconds for duty log submission	Mobile app performance testing on target devices
Telematics data sync	< 1 minute latency from vehicle to dashboard	End-to-end telematics pipeline testing
System availability	99.5% uptime for tracking and critical functions	Uptime monitoring over 90-day period

4.2 Platform Requirements

Platform	Minimum Version	Target Version	Notes
Web Dashboard	Chrome 90, Firefox 88, Safari 14, Edge 90	Latest stable browsers	Responsive design for desktop and tablet
Mobile Application	Android 8.0, iOS 12	Android 13, iOS 16	Native performance via Flutter or React Native
Telematics Hardware	OBD-II compatible devices with GPS and cellular connectivity	4G LTE enabled devices with fuel sensor support	Ruggedized for harsh environmental conditions

Platform	Minimum Version	Target Version	Notes
Backend Infrastructure	Cloud-based (AWS/ Azure/GCP) with PostgreSQL 13+	Containerized microservices with PostgreSQL 15+	Scalable architecture supporting future fleet expansion

4.3 Security Privacy

Requirement	Must Have	Implementation
Data encryption	True	AES-256 for stored data, TLS 1.3 for data in transit from telematics devices
User authentication	True	OAuth 2.0 with JWT tokens, role-based access control, session timeout after 30 min
GPS data privacy	True	Access restricted to authorized fleet managers, audit logging for location data access
Driver data protection	True	Compliance with Tanzania Data Protection Act, driver consent for behavior monitoring
Telematics security	True	Encrypted device communication, tamper detection, secure firmware updates

5 External Dependencies

5.1 Third Party Services

Service	What It Does	Criticality	Backup Plan
GPS/Mapping Service	Provide maps, routing, and geocoding services	Must have	Offline maps with periodic updates, fallback to alternative mapping provider
Telematics Hardware Provider	Supply and support OBD-II devices with GPS and sensors	Must have	Multi-vendor strategy, spare device inventory
Cellular Connectivity	Provide data connection for real-time tracking	Must have	Offline mode with data caching, multi-carrier SIM support
SMS Gateway	Send alerts and notifications	Should have	Email and in-app notifications

5.2 Device Requirements

Feature	Required	Optional	Notes
OBD-II telematics device per vehicle	True	False	GPS, cellular, accelerometer, fuel sensor support. Ruggedized for conservation area conditions.
Fuel level sensors	True	False	Aftermarket fuel sensors for vehicles without built-in sensors
	True	False	

Feature	Required	Optional	Notes
Driver mobile devices (smartphones/ tablets)			Android 8+ or iOS 12+ for driver mobile app access
Internet connectivity	False	True	System works offline with periodic sync when connectivity available

6 Release Planning

6.1 Development Phases

Phase	Features Included	Timeline	Success Criteria
Phase 1 (Core Tracking & Management - MVP)	['GPS tracking and live dashboard', 'Telematics integration', 'Fuel monitoring', 'Driver duty logging', 'Basic maintenance scheduling', 'Web dashboard for fleet managers']	16 weeks	All vehicles tracked in real-time, fuel consumption monitored, duty logs digital, basic maintenance alerts functional
Phase 2 (Advanced Analytics & Optimization)	['Predictive maintenance with AI', 'Route optimization via Nasera AI', 'Driver behavior monitoring', 'Advanced fuel analytics and fraud detection', 'Vehicle booking system', 'BI system integration']	12 weeks	AI-powered predictions operational, routes optimized, driver scoring implemented, booking system live
Phase 3 (Mobile App & Integration)	['Driver mobile application', 'Vehicle inspection checklists', 'Incident reporting', 'Gateway system integration', 'Full reporting suite', 'Performance optimization']	12 weeks	Mobile app deployed to all drivers, integrations complete, comprehensive reports available

6.2 Release Checklist

- All Must-Have features complete and tested
- Telematics hardware installed in all 30+ vehicles
- GPS tracking accuracy validated (< 10m error margin)
- Fuel sensor calibration completed for all vehicles
- Driver mobile app deployed to all drivers with training
- Web dashboard accessible to fleet managers
- Integration with BI System operational
- Integration with Nasera AI for predictions functional
- Security audit completed and vulnerabilities addressed
- User training materials prepared and training conducted
- Performance benchmarks met (dashboard < 3s, tracking < 30s updates)
- Data migration from legacy systems (if any) completed
- Backup and disaster recovery procedures tested

7 Risks Assumptions

7.1 Risks

Risk	Probability	Impact	Mitigation
Telematics device failure or tampering in field conditions	Medium	High	Ruggedized devices with tamper detection, spare device inventory, rapid replacement procedures, vendor support contract
Cellular connectivity issues in remote conservation areas	High	Medium	Offline mode with data caching, multi-carrier SIM support, sync when connectivity available, satellite backup for critical areas
Driver resistance to behavior monitoring and accountability measures	Medium	Medium	Clear communication on safety benefits, privacy policy transparency, phased rollout, incentive program for good driving behavior
Fuel sensor accuracy issues leading to false theft alerts	Medium	Medium	Professional sensor installation and calibration, periodic recalibration, threshold tuning based on vehicle characteristics
	Low	Medium	API-first design, early integration testing,

Risk	Probability	Impact	Mitigation
Integration delays with BI System and Nasera AI			phased integration approach, fallback to manual data export
Higher than expected telematics data costs on cellular networks	Medium	Low	Data compression, configurable update frequencies, negotiate bulk data plans, monitor usage and optimize

7.2 Assumptions

- All NCAA vehicles have functioning OBD-II ports for telematics installation
- Fleet composition remains relatively stable (30-40 vehicles) during implementation
- Drivers have basic smartphone literacy or can be trained
- Cellular coverage available along major routes (intermittent acceptable)
- Management committed to enforcing digital duty logging and accountability measures
- Maintenance team willing to adopt digital scheduling and logging
- Budget available for telematics hardware procurement and installation
- Fuel sensors can be installed on vehicles without factory-installed sensors
- GPS accuracy sufficient for conservation area operations (±10m acceptable)

8 Market Specific Considerations

8.1 Primary Market

- Ngorongoro Conservation Area, Tanzania - 30+ vehicle fleet

8.2 Target Demographics

- Fleet managers with varying technical skills
- Drivers with mixed smartphone familiarity
- Maintenance teams transitioning from manual logs

8.3 Local Considerations

- Harsh environmental conditions (dust, heat, rough terrain) requiring ruggedized telematics hardware
- Limited cellular coverage in remote areas requiring robust offline functionality
- Multi-lingual support (English and Swahili) for driver interfaces
- Cultural sensitivity around monitoring and accountability measures
- Integration with local fuel suppliers and service providers
- Conservation area access restrictions affecting installation and maintenance
- Power availability challenges for device charging in field
- Local technical support availability for hardware troubleshooting

8.4 Vehicle Types

8.4.1 Safari Vehicles

Land Cruisers, Land Rovers - primary tourist transport

8.4.2 Patrol Vehicles

4x4 vehicles for ranger patrols and conservation work

8.4.3 Administrative Vehicles

Sedans and light trucks for office operations

8.4.4 Maintenance Vehicles

Utility trucks and specialized equipment carriers

9 Sign Off

9.1 Approval

Role	Name	Signature	Date

9.2 Document History

Version	Date	Changes Made	Changed By
1.0	2025-11-12	Initial draft based on NCAA Digital Transformation roadmap Section 2.3	SRS Development Team

10 Detailed Feature Requirements

10.1 Ft Fleet Gps Tracking

10.1.1 Priority

Must Have

10.1.2 User Story

As a fleet manager, I want to view real-time location of all NCAA vehicles on a map so that I can monitor fleet deployment and respond to emergencies quickly

10.1.3 Preconditions

Telematics devices installed; GPS signal available; Dashboard accessible

10.1.4 Postconditions

Vehicle locations displayed on map; Historical routes viewable; Geofencing alerts functional

10.1.5 Test Cases

Id	Description	Weight
FLEET-GPS-TC-001	Display all 30+ vehicles on live map with correct locations	High
FLEET-GPS-TC-002	Update vehicle positions every 30 seconds when moving	High
FLEET-GPS-TC-003	Playback historical routes for last 90 days	High
FLEET-GPS-TC-004	Filter vehicles by department, status, or location	Medium
FLEET-GPS-TC-005	GPS accuracy within 10 meters	High

10.2 Ft Fleet Fuel Monitoring

10.2.1 Priority

Must Have

10.2.2 User Story

As a fleet manager, I want to monitor real-time fuel levels and consumption rates so that I can detect fuel theft and optimize consumption

10.2.3 Preconditions

Fuel sensors installed and calibrated; Telematics data streaming

10.2.4 Postconditions

Fuel levels displayed accurately; Anomalies detected and alerted; Consumption analytics available

10.2.5 Test Cases

Id	Description	Weight
FLEET-FUEL-TC-001	Display current fuel level for all vehicles	High
FLEET-FUEL-TC-002	Detect sudden fuel drop (>10L when engine off) and alert	High
FLEET-FUEL-TC-003	Calculate fuel efficiency (L/100km) per vehicle and driver	High
FLEET-FUEL-TC-004	Generate fuel consumption report by vehicle/driver/department	Medium
FLEET-FUEL-TC-005	Reconcile fuel card transactions with sensor data	High

10.3 Ft Fleet Predictive Maintenance

10.3.1 Priority

Must Have

10.3.2 User Story

As a fleet manager, I want AI-powered predictions for upcoming maintenance needs so that I can address potential issues before breakdowns occur

10.3.3 Preconditions

Nasera AI integration operational; Historical maintenance data available; Telematics data streaming

10.3.4 Postconditions

Maintenance predictions generated; Risk levels assigned; Alerts sent to managers

10.3.5 Test Cases

Id	Description	Weight
FLEET-MAINT-TC-001	Predict maintenance needs 30 days in advance with 80% accuracy	High
FLEET-MAINT-TC-002	Alert when vehicle health score drops below 70	High
FLEET-MAINT-TC-003	Prioritize vehicles by maintenance urgency (critical/high/medium/low)	Medium
FLEET-MAINT-TC-004	Integrate predictions with maintenance scheduling system	High

10.4 Ft Fleet Route Planning

10.4.1 Priority

Must Have

10.4.2 User Story

As an operations manager, I want to plan optimal routes for patrols and operations so that I can minimize fuel consumption and improve efficiency

10.4.3 Preconditions

Nasera AI route optimization available; Conservation area maps loaded; Route preferences configured

10.4.4 Postconditions

Optimal routes calculated; Routes shared with drivers; Route performance tracked

10.4.5 Test Cases

Id	Description	Weight
FLEET-ROUTE-TC-001	Calculate optimal route for multi-stop patrol (5-10 stops) in < 5 seconds	High
FLEET-ROUTE-TC-002	Reduce total mileage by 20-30% compared to manual routing	High
FLEET-ROUTE-TC-003	Account for road conditions and conservation area restrictions	High
FLEET-ROUTE-TC-004	Provide turn-by-turn navigation to driver mobile app	Medium

10.5 Ft Fleet Driver Behavior

10.5.1 Priority

Must Have

10.5.2 User Story

As a fleet manager, I want to monitor driver behavior including speeding and harsh braking so that I can improve safety and reduce costs

10.5.3 Preconditions

Telematics accelerometer data available; Behavior thresholds configured; Driver profiles created

10.5.4 Postconditions

Behavior incidents logged; Driver scores calculated; Reports generated

10.5.5 Test Cases

Id	Description	Weight
FLEET-DRIVER-TC-001	Detect speeding incidents (>10% over limit)	High
FLEET-DRIVER-TC-002	Detect harsh braking events (deceleration > 0.4g)	High
FLEET-DRIVER-TC-003	Calculate monthly driver safety score (0-100)	High
FLEET-DRIVER-TC-004	Generate driver comparison report for management	Medium
FLEET-DRIVER-TC-005	Alert supervisors for critical safety violations	High

10.6 Ft Fleet Mobile Driver

10.6.1 Priority

Must Have

10.6.2 User Story

As a driver, I want to access a mobile app for duty logging and navigation so that I can perform my duties efficiently

10.6.3 Preconditions

Mobile app installed; Driver authenticated; GPS enabled

10.6.4 Postconditions

Duty logged digitally; Navigation available; Vehicle checks documented

10.6.5 Test Cases

Id	Description	Weight
FLEET-MOBILE-TC-001	Log duty start with GPS location and odometer photo	High
FLEET-MOBILE-TC-002	Complete pre-trip inspection checklist digitally	High
FLEET-MOBILE-TC-003	Follow turn-by-turn navigation (offline map support)	Medium
FLEET-MOBILE-TC-004	Report incident with photos and GPS location	High
FLEET-MOBILE-TC-005	Log duty end with final odometer and fuel level	High

10.7 Ft Fleet Bi Integration

10.7.1 Priority

Must Have

10.7.2 User Story

As a management team member, I want fleet data integrated with BI System so that I can analyze costs and performance alongside other organizational metrics

10.7.3 Preconditions

BI System API available; Fleet data pipeline configured; Authentication established

10.7.4 Postconditions

Fleet data synchronized to BI; Dashboards updated; Reports available

10.7.5 Test Cases

Id	Description	Weight
FLEET-BI-TC-001	Sync fuel consumption data to BI hourly	High
FLEET-BI-TC-002	Sync maintenance costs to BI daily	High
FLEET-BI-TC-003	Display fleet KPIs on BI executive dashboard	High
FLEET-BI-TC-004	Enable cross-departmental cost analysis in BI	Medium

11 Additional Context

11.1 Success Metrics

11.1.1 Fuel Cost Reduction

30% reduction through monitoring, fraud detection, and driver behavior improvement

11.1.2 Vehicle Downtime Reduction

50% reduction via predictive maintenance and proactive servicing

11.1.3 Utilization Improvement

40% improvement through better allocation and booking system

11.1.4 Fleet Visibility

100% real-time location tracking for all vehicles

11.1.5 Driver Accountability

100% digital duty logging replacing manual logbooks

11.1.6 Route Optimization

25% mileage reduction through AI-powered routing

11.1.7 Maintenance Cost Reduction

20% reduction through predictive vs reactive approach

11.2 Integration Architecture

11.2.1 Telematics Layer

OBD-II devices with GPS, fuel sensors, accelerometers sending data via cellular

11.2.2 Data Collection

Cloud-based ingestion pipeline processing telematics streams in near-real-time

11.2.3 Analytics Engine

Nasera AI analyzing patterns, predicting failures, optimizing routes

11.2.4 Presentation Layer

Web dashboard for managers, mobile app for drivers, BI integration for executives

11.2.5 Integration Apis

RESTful APIs connecting to Gateway, BI System, Nasera AI, and mobile applications