Enhanced Individual Soldier Report System

Requirements Document

Document Version: 2.0
Date: January 6, 2025
Classification: FOR OFFICIAL USE ONLY
System: Enhanced Medical Monitoring and Performance Assessment

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1. EXECUTIVE SUMMARY

The Enhanced Individual Soldier Report System is a comprehensive medical monitoring and performance assessment application designed for military training exercises. The system analyzes soldier performance data with a focus on safety monitoring, tactical assessment, and medical emergency detection while maintaining military operational realism.

1.1 System Purpose

- **Primary:** Medical monitoring and safety assurance for soldiers during training exercises
- **Secondary:** Performance assessment based on controllable tactical factors
- **Tertiary:** Battle timeline analysis and tactical positioning evaluation

1.2 Key Principles

- Medical conditions trigger support, never penalties
- Performance evaluation focuses on controllable tactical behavior
- Battle timeline context determines appropriate behavior assessment
- Real injury detection prioritized over training activity monitoring

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2. FUNCTIONAL REQUIREMENTS

2.1 Data Processing Requirements

2.1.1 Input Data Processing

Requirement ID	Description	Priority	Acceptance Criteria
FR-001	System SHALL accept CSV files with military exercise data	CRITICAL	Successfully parse CSV files with required columns
FR-002	System SHALL validate data quality and completeness	HIGH	Report missing columns, invalid data ranges
FR-003	System SHALL handle multiple soldier callsigns in single dataset	CRITICAL	Process 1-100+ soldiers per dataset
FR-004	System SHALL automatically detect battle timeline (last 45 minutes)	HIGH	Correctly identify pre-battle vs. battle periods

2.1.2 Battle Timeline Analysis

Requirement ID	Description	Priority	Acceptance Criteria
FR-005	System SHALL differentiate pre-battle and battle periods	CRITICAL	Apply different scoring rules to each period
FR-006	System SHALL assume last 45 minutes of data represents battle period	HIGH	Automatically partition data based on timestamps
FR-007	System SHALL apply tactical assessment during battle period only	MEDIUM	Reward/penalize tactical positioning appropriately

2.1.3 Medical Monitoring

Requirement ID	Description	Priority	Acceptance Criteria
FR-008	System SHALL monitor heart rate for safety without performance penalties	CRITICAL	Generate alerts without score deduction
FR-009	System SHALL detect abnormal heart rates (<60 or >190 BPM)	HIGH	Flag all readings outside normal range
FR-010	System SHALL generate medical alerts for temperature extremes	MEDIUM	Alert for readings outside safe ranges
FR-011	System SHALL track medical alerts for safety monitoring	HIGH	Maintain medical alert history

2.1.4 Injury Detection

Requirement ID	Description	Priority	Acceptance Criteria
FR-012	System SHALL detect potential injuries during pre-battle period	CRITICAL	Identify posture changes with static GPS
FR-013	System SHALL distinguish real injuries from tactical movements	HIGH	Only flag pre-battle posture+GPS events
FR-014	System SHALL generate special injury reports automatically	HIGH	Create detailed injury incident reports
FR-015	System SHALL apply 10-meter GPS threshold for injury detection	MEDIUM	Use 0.0001 degree GPS precision threshold

2.2 Performance Assessment Requirements

2.2.1 Scoring System

Requirement ID	Description	Priority	Acceptance Criteria
FR-016	System SHALL use 100-point performance scoring system	CRITICAL	All scores range 0-100 with clear categories
FR-017	System SHALL apply military-appropriate scoring philosophy	HIGH	Focus on controllable tactical factors
FR-018	System SHALL penalize poor tactical positioning during battle	MEDIUM	Deduct points for excessive standing in combat
FR-019	System SHALL reward good tactical positioning during battle	MEDIUM	Award bonus points for proper combat posture
FR-020	System SHALL penalize casualty outcomes (wounded/KIA)	HIGH	10 points wounded, 20 points KIA

2.2.2 Exclusions from Performance Scoring

Requirement ID	Description	Priority	Acceptance Criteria
FR-021	System SHALL NOT penalize heart rate abnormalities	CRITICAL	No score deduction for medical conditions
FR-022	System SHALL NOT penalize fall incidents during training	HIGH	Falls considered part of exercise
FR-023	System SHALL NOT penalize battle period posture changes	MEDIUM	Tactical movement during combat is expected

2.3 Report Generation Requirements

2.3.1 Individual Performance Reports

Requirement ID	Description	Priority	Acceptance Criteria
FR-024	System SHALL generate comprehensive HTML individual reports	CRITICAL	Professional, detailed soldier reports
FR-025	System SHALL include performance score breakdown	HIGH	Transparent scoring explanation
FR-026	System SHALL display medical monitoring data	HIGH	Heart rate, temperature, medical alerts
FR-027	System SHALL show tactical assessment results	MEDIUM	Battle positioning analysis
FR-028	System SHALL include battle timeline context	MEDIUM	Pre-battle vs. battle period analysis

2.3.2 Special Injury Reports

Requirement ID	Description	Priority	Acceptance Criteria
FR-029	System SHALL auto-generate injury reports for suspected injuries	CRITICAL	Immediate report when injury detected
FR-030	System SHALL include unit-wide health status in injury reports	HIGH	All soldiers' status at time of incident
FR-031	System SHALL provide GPS coordinates for injury incidents	HIGH	Precise location data for medical response
FR-032	System SHALL include medical recommendations in injury reports	MEDIUM	Actionable medical guidance

2.3.3 Report Customization

Requirement ID	Description	Priority	Acceptance Criteria
FR-033	System SHALL allow user-selectable output directory	HIGH	Configurable file save location
FR-034	System SHALL support individual soldier selection	HIGH	Generate reports for selected soldiers
FR-035	System SHALL support batch report generation	MEDIUM	Generate all soldier reports simultaneously
FR-036	System SHALL provide report generation progress tracking	LOW	Real-time progress feedback

2.4 User Interface Requirements

2.4.1 Main Interface

Requirement ID	Description	Priority	Acceptance Criteria
FR-037	System SHALL provide intuitive GUI for non-technical users	HIGH	Simple, clear interface design
FR-038	System SHALL include file selection dialog	HIGH	Easy CSV file browsing and selection
FR-039	System SHALL display data validation results	MEDIUM	Clear data quality feedback
FR-040	System SHALL show battle analysis results	MEDIUM	Summary of exercise outcomes

2.4.2 Help System

Requirement ID	Description	Priority	Acceptance Criteria
FR-041	System SHALL provide comprehensive help documentation	HIGH	Complete scoring methodology explanation
FR-042	System SHALL include scoring calculation examples	MEDIUM	Clear examples of point deductions/bonuses
FR-043	System SHALL document military exercise philosophy	MEDIUM	Explanation of tactical vs. medical approach

3. NON-FUNCTIONAL REQUIREMENTS

3.1 Performance Requirements

Requirement ID	Description	Acceptance Criteria
NFR-001	System SHALL process 100 soldiers with 1000 records each in <60 seconds	Analysis completes within time limit
NFR-002	System SHALL generate individual reports in <10 seconds per soldier	Report creation time limit
NFR-003	System SHALL support datasets up to 100,000 total records	Handle large exercise datasets

3.2 Usability Requirements

Requirement ID	Description	Acceptance Criteria
NFR-004	System SHALL be operable by users with basic computer skills	No specialized training required
NFR-005	System SHALL provide clear error messages for data issues	User-friendly error explanations
NFR-006	System SHALL complete batch operations with progress indicators	Visual feedback during processing

3.3 Reliability Requirements

Requirement ID	Description	Acceptance Criteria
NFR-007	System SHALL handle missing data gracefully	Continue processing with warnings
NFR-008	System SHALL validate input data before processing	Prevent crashes from bad data
NFR-009	System SHALL save reports successfully to user-specified locations	Reliable file output

3.4 Compatibility Requirements

Requirement ID	Description	Acceptance Criteria
NFR-010	System SHALL run on Windows 10/11	Full functionality on Windows platforms
NFR-011	System SHALL run on macOS 10.15+	Full functionality on Mac platforms
NFR-012	System SHALL run on Ubuntu 20.04+	Full functionality on Linux platforms

4. DATA REQUIREMENTS

4.1 Required Data Columns

Column Name	Data Type	Range/Format	Required	Description
Callsign	String	1-50 characters	YES	Unique soldier identifier
Heart_Rate	Numeric	30-250 BPM	YES	Heart rate readings for medical monitoring
Posture	String	Enum values	YES	Standing, Prone, Moving, Kneeling, Down
Latitude	Numeric	Decimal degrees	YES	GPS latitude (6+ decimal places)
Longitude	Numeric	Decimal degrees	YES	GPS longitude (6+ decimal places)
Casualty_State	String	Enum values	YES	GOOD, WOUNDED, KIA, KILL
Time_Step	Numeric/DateTime	Sequential	YES	Timestamp for battle timeline detection

4.2 Optional Data Columns

Column Name	Data Type	Range/Format	Description
Step_Count	Numeric	0-1000+	Physical activity measurement
Temperature	Numeric	-20 to +50°C	Environmental/body temperature
Fall_Detection	Boolean/Numeric	0/1 or count	Training fall incidents
Exercise_Phase	String	Phase names	Mission phase indicators
Platoon	String	Unit names	BLUE_FORCE, OPFOR, etc.

4.3 Data Quality Requirements

Requirement	Description	Validation
Temporal Sequence	Time_Step values must be sequential	Check for chronological order
GPS Validity	Coordinates must be within realistic exercise bounds	Validate coordinate ranges
Heart Rate Limits	Values must be physiologically possible	30-250 BPM range check
Minimum Duration	At least 45 minutes of data for battle detection	Time span validation
Callsign Consistency	Same callsign format throughout exercise	String format validation

5. CONSTRAINTS

5.1 Technical Constraints

Constraint	Description	Impact
CSV Input Only	System only accepts CSV format input files	Users must convert other formats
Python Dependencies	Requires Python 3.8+ with specific libraries	Installation requirements
Memory Limitations	Large datasets may require significant RAM	May need data preprocessing
Single-threaded Processing	No parallel processing for report generation	Sequential processing only

5.2 Business Constraints

Constraint	Description	Impact
Military Context Only	Designed specifically for military training exercises	Not suitable for civilian fitness tracking
English Language Only	All UI and reports in English	International use limitations
No Real-time Processing	Batch processing of completed exercise data only	Cannot process live data streams

5.3 Data Constraints

Constraint	Description	Impact
45-Minute Battle Assumption	Battle period always assumed to be last 45 minutes	May not suit all exercise types
10-Meter GPS Precision	Injury detection uses fixed 10-meter threshold	May not suit all environments
Posture Terminology	Limited to predefined posture values	Must use standard terminology

6. ASSUMPTIONS

6.1 Exercise Context Assumptions

Assumption	Rationale	Risk
Last 45 minutes represents battle period	Consistent with military exercise structure	Some exercises may vary
Pre-battle period is preparation/movement	Standard military exercise flow	Non-standard exercises may differ
Standing during battle is tactically poor	Military tactical doctrine	Context-dependent scenarios
GPS accuracy sufficient for injury detection	Modern GPS precision adequate	Environmental GPS degradation

6.2 Medical Assumptions

Assumption	Rationale	Risk
60-190 BPM is normal heart rate range	Standard medical guidelines for active adults	Individual variation possible
Heart rate abnormalities indicate medical issues	Standard medical interpretation	Exercise-induced spikes normal
Temperature extremes indicate health risks	Environmental safety standards	Temporary exposure acceptable
Static GPS + posture change = injury	Logical inference for injury detection	False positives possible

6.3 Performance Assumptions

Assumption	Rationale	Risk
Activity level correlates with performance	Physical fitness important for soldiers	Not always performance-related
Tactical positioning is trainable skill	Military training doctrine	Individual physical limitations
Casualty outcomes reflect performance	Mission effectiveness measure	Random factors in exercises
Falls during training are acceptable	Part of realistic training	Excessive falls may indicate issues

6.4 Technical Assumptions

Assumption	Rationale	Risk
CSV data format is consistent	Standard data export format	Format variations possible
Timestamp data is sequential	Logical data collection order	System clock issues possible
GPS coordinates are accurate	Modern GPS reliability	Environmental interference possible
All required columns are present	Data collection completeness	Missing data scenarios

7. REPORT GENERATION CONSTRAINTS

7.1 Performance Report Constraints

Constraint	Description	Limitation
HTML Output Only	Reports generated in HTML format only	No PDF, Word, or other formats
Single Soldier Focus	Individual reports cover one soldier only	No multi-soldier comparison reports
Fixed Template	Report layout and styling is predetermined	Limited customization options
English Language	All reports generated in English only	No multi-language support

7.2 Data Volume Constraints

Constraint	Description	Limitation
Maximum Soldiers	Designed for up to 100 soldiers per dataset	Performance degradation beyond limit
Maximum Records	Optimized for up to 100,000 total records	Memory limitations with larger datasets
Report Size	Individual reports may be 1-5MB each	Storage considerations for batch generation
Generation Time	Batch generation may take several minutes	No real-time report generation

7.3 Medical Reporting Constraints

Constraint	Description	Limitation
No Medical Diagnosis	System provides alerts, not medical diagnosis	Requires medical professional interpretation
Historical Data Only	Analysis of completed exercise data only	No real-time medical monitoring
Limited Medical Context	Basic vital sign monitoring only	Not comprehensive medical assessment
Alert Sensitivity	Fixed thresholds for medical alerts	May not suit all individuals

7.4 Battle Analysis Constraints

Constraint	Description	Limitation
Fixed Battle Duration	45-minute battle period assumption	May not fit all exercise types
Binary Battle Detection	Either battle detected or not	No graduated battle intensity
Tactical Assessment Simplification	Basic posture-based tactical analysis	Complex tactical situations not captured
No Environmental Context	Weather, terrain factors not considered	Limited tactical context

8. ACCEPTANCE CRITERIA

8.1 System-Level Acceptance

☐ System processes sample dataset of 50 soldiers successfully

☐ All required reports generate without errors

☐ Medical alerts trigger appropriately for test data

☐ Battle timeline detection works correctly

☐ Performance scoring follows documented methodology

☐ Help documentation is complete and accurate

8.2 Performance Acceptance

☐ Report generation completes within specified time limits
☐ System handles missing data gracefully
☐ User interface responds smoothly during processing
☐ Large datasets process without memory errors

8.3 Quality Acceptance

☐ All reports display correctly in modern web browsers
☐ Medical alerts are clearly distinguishable from performance issues
☐ Scoring breakdown is transparent and verifiable
☐ Special injury reports generate when appropriate

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9. FUTURE CONSIDERATIONS

9.1 Potential Enhancements

- **Multi-format Output:** PDF, Excel report generation

- **Real-time Monitoring:** Live data stream processing

- **Advanced Analytics:** Machine learning for pattern detection

- **Multi-language Support:** International deployment capability

9.2 Scalability Considerations

- **Database Integration:** Move beyond CSV to database storage

- **Cloud Deployment:** Web-based system for multi-user access

- **API Development:** Integration with other military systems

- **Mobile Interface:** Tablet/smartphone access capability

Document Control:

- **Author:** Enhanced Medical Monitoring Team

- **Reviewed By:** Military Exercise Safety Board

- **Approved By:** Training Command Medical Officer

- **Next Review Date:** June 2025

This document contains the complete requirements specification for the Enhanced Individual Soldier Report System. All stakeholders should review and approve before implementation or modifications.