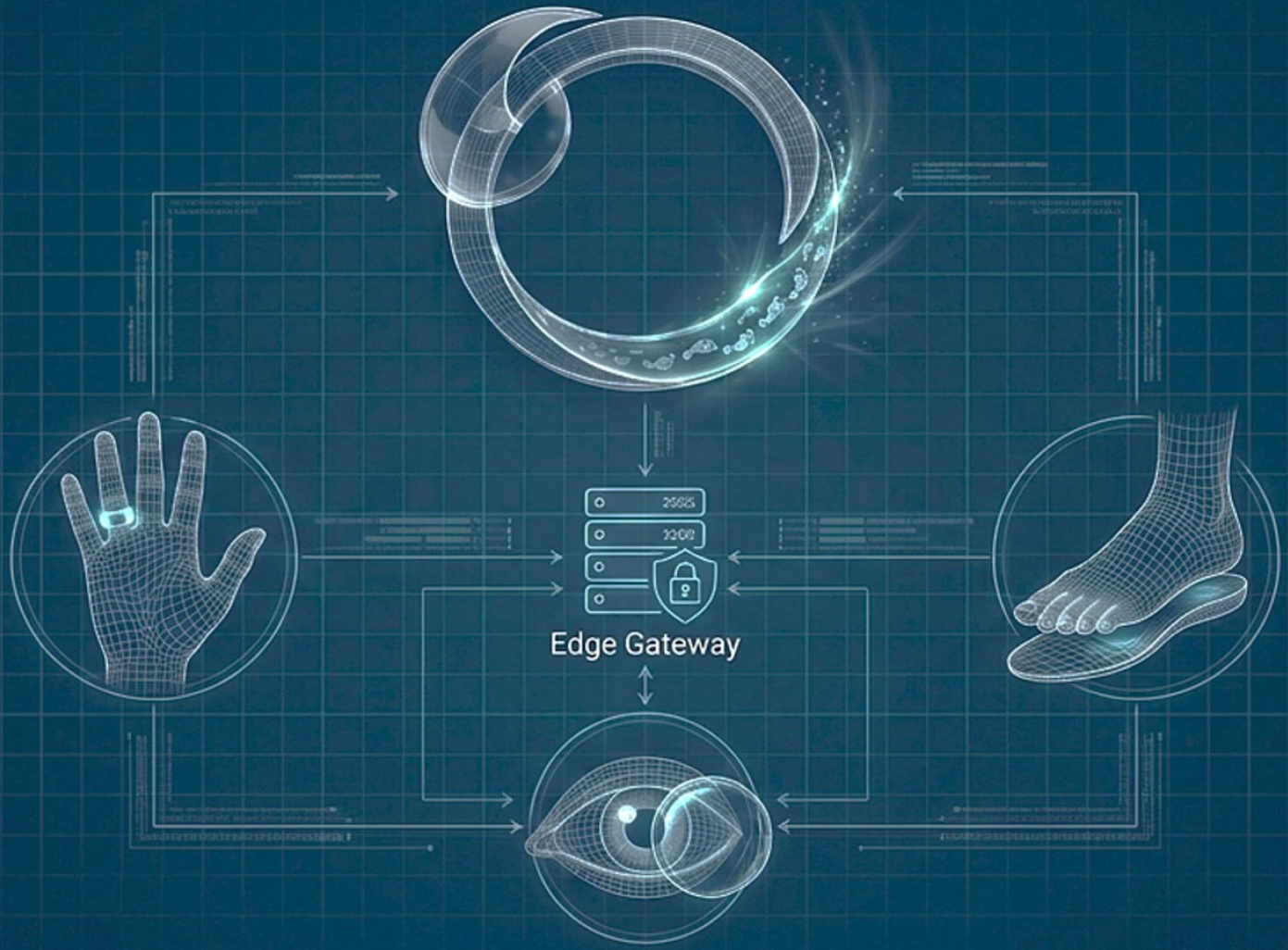


MannaRing™ Tactical Readiness Concept

Physiological Monitoring & Human Performance Optimization for Special Operations Forces (SANDF)

Confidential Pre-Decision Draft | English Edition

Prepared by Business Service Vanguard (PTY) LTD

THE PLATFORM MEASURES. IT DOES NOT ENHANCE.



THE PROBLEM

- **Metric:** ~92% Failure Rate (Approx. 8% selection pass rate).
- **Impact:** Every medically avoidable attrition in selection is a lost, vetted candidate and a massive sunk investment.
- **Blind Spot:** Heat injury, stress fractures, and under-recovery accumulate silently before becoming casualties.



THE SOLUTION

- **Capability:** Objective, continuous physiological readiness data.
- **Precedent:** Aligns with peer military deployments (e.g., US SOCOM WARP).
- **Tactical Edge:** Algorithmic prediction of exertional heat collapse 33–69 minutes before clinical onset.



Cardio-Metabolic Contour: Smart Ring

Wrist-free pulse, HRV, sleep, skin temp, SpO_2.



Motor Contour: Smart Insoles

Foot pressure, gait, mobility under 30–60 kg loads.



Oculo-Metabolic Contour: Smart Lens

XR/AI visual interface & tear-fluid sensing.

FORWARD R&D

Track 1

Track 2

Track 3

Edge Gateway



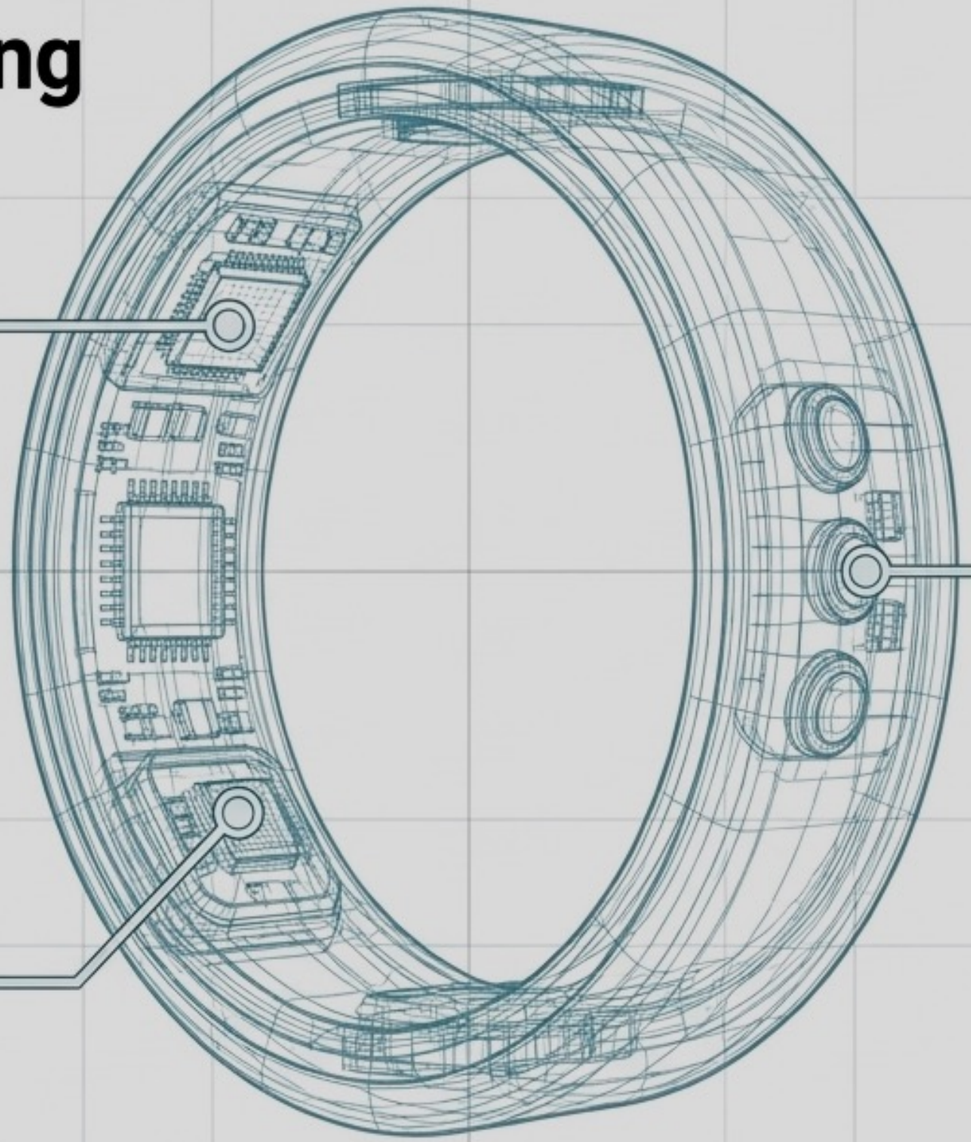
SANDF On-Premise Data Platform

Device-agnostic convergence

The Cardio-Metabolic Contour: Smart Ring

Hardware Specs

- **Target mass**: ≤4g
- **Form Factor**: Wrist-free (does not impede weapon handling, climbing, or maritime ops).
- **Battery**: ≥72 hours continuous sensing.



Sensor Payload

- PPG Heart Rate & Heart Rate Variability (HRV).
- Skin temperature & Sleep architecture.
- SpO_2 (for parachute/high-altitude profiles).

Tactical Application

- **Heat Load**: Early warning for exertional heat stroke.
- **Overtraining**: HRV suppression mapping to prevent acute injury.
- **Recovery**: Objective sleep debt tracking in garrison.

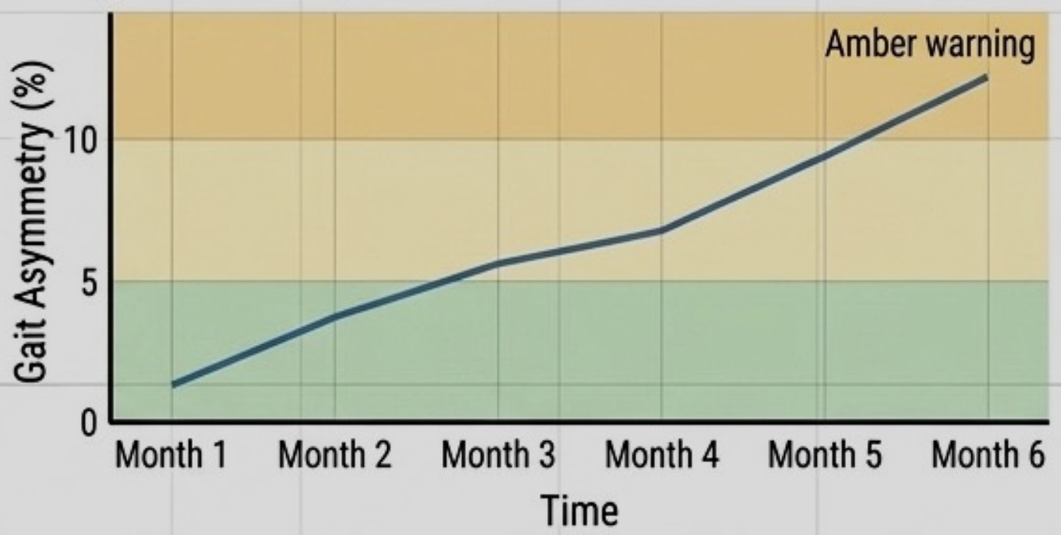
The Motor Contour: Smart Insoles

Hardware & Deployment



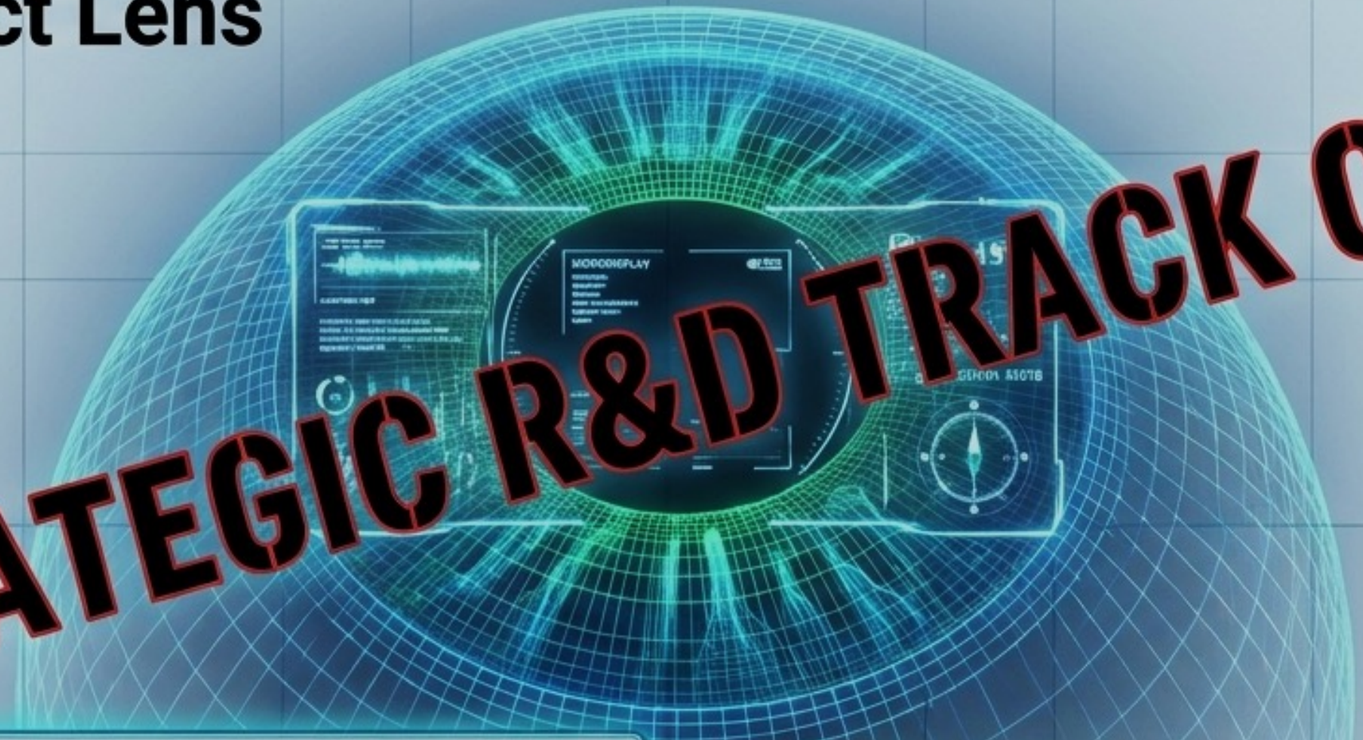
- **Form Factor:** Replaces standard insoles; compatible with standard-issue boots without altering fit.
- **Durability:** IPX5 minimum rating; ≥6-month field service life under loaded-march profiles.

Tactical Application



- **Load Bearing:** Configured for cadence and foot-pressure analysis under 30–60 kg load profiles.
- **Injury Prevention:** Detects early impact-loading asymmetry (the primary precursor to stress fractures) before the operator reports pain.
- **March Discipline:** Objective monitoring of load distribution across a unit.

The Oculo-Metabolic Contour: Smart Contact Lens



STRATEGIC R&D TRACK ONLY

Core Capability: Tear-fluid sensing (glucose, intraocular pressure) combined with XR computing driven by AI. Delivers visual effects directly to the retina without headsets.

Alternate Pathway: Intracorneal implants with microdisplays for operators whose corneas do not support external lenses (proven on human donor eye).

Strategic Posture

- Maintained strictly as a strategic R&D partnership (Xpanceo primary, Mojo Vision alternate).
- Governed by a strict Stage-Gate model (Gates 3–5).
- Operates via SDK/API-based integration outside the current 2027–2030 tactical kits.

Tactical Exclusions: Field Limitations of the Smart Lens



Environmental Hazards

Highly susceptible to dust, sand ingress, and strict field hygiene limitations during extended remote operations.

Equipment Conflicts

Impractical to integrate alongside mandatory ballistic eye protection (goggles/glasses).

Deployment Decision

Verdict: Completely excluded from the tactical feasibility pilot and 2027–2030 field deployment kits.

Focus: Tactical deployment remains 100% focused on the highly durable Ring and Insole contours.

Deployment Across the Training Lifecycle



Establishes objective readiness baselines. Early identification of dangerous thermal loads or acute fatigue accumulation.

Manages acute-to-chronic load ratios. Prevents overtraining via HRV suppression tracking; stress-fracture early warnings.

Verifies heat-acclimatization status and readiness scoring against unit baselines.

Cold-water exposure tracking; dive-adjacent recovery monitoring.

Provides structured, evidence-based return-to-duty metrics (HRV recovery trajectory, sleep restoration).

Data Synthesis: The Readiness Score Engine

Commander's Dashboard



- **Output:** Converts complex, multi-sensor data into a single daily actionable score.
- Bands indicate medical intervention thresholds, not pass/fail judgments.

The Algorithm (Illustrative Weights)

30% – HRV Recovery (Strongest indicator of autonomic recovery).

20% – Sleep Debt (Degradation of endurance and decision-making).

20% – Thermal Load (24-48h heat exposure tracking).

15% – Gait Asymmetry (Overuse/impact loading trend).

15% – Activity Balance (Acute-to-chronic load ratio).

Note: *Weights are fully configurable by SAMHS unit medical staff.*

The Clinician-Commander Firewall

SAMHS Medical Interface



- Full individual-level physiological data and trend history.
- Access strictly restricted to SAMHS-credentialed medical officers.
- **Role:** Clinical interpretation and medical decision-making.

FIREWALL

Command Interface



- Aggregated, anonymized readiness indicators only.
- Zero exposure of individual health records to the chain of command.
- **Rule:** Data cannot be used for coercion, punishment, or disciplinary action. The platform measures; the clinician decides.

Critical Constraint: OPSEC & Emission Control

The Core Principle: Sensor accuracy is secondary to signature management.



14+ Days Local Buffer

Emission-Off by Default
No autonomous radio transmission. Devices act as passive data loggers in the field.

Secure Sync
Scheduled, wired, or authorized BLE uploads only in secure areas via tactical gateways.

Zero Signature
No unique vendor RF signatures or proprietary beacons.

Zero Telemetry
Contractually prohibited and technically verified zero-transmission to external manufacturers.

Hardware Security & Data Sovereignty



SANDF On-Premise Server

Air-Gapped Deployment: Data platform hosted entirely on SANDF-controlled, on-premise infrastructure. No external cloud dependency.

Sovereignty: All raw data, derived algorithms, and generated models remain the sole property of the SANDF.

Edge Gateway

Tactical perimeter syncing; localized data normalization.

Device Hardware

Encryption: AES-256 encryption at rest. Keys are held exclusively by the SANDF, not the vendor.

Sanitization: Total removal of commercial branding, logos, or model identifiers.

Zeroisation: Cryptographic erasure of all device memory upon tamper detection, unit command, or loss.

Environmental Constraints & Durability Requirements



Temperature

Operating range validated from -10°C to +55°C. (Storage: -20°C to +60°C).



Ingress Protection

IP67 minimum for the Smart Ring. IPX5 minimum for Smart Insoles.



Shock & Vibration

Repeated drop tolerance from 1.5m onto a hard surface without functional loss.

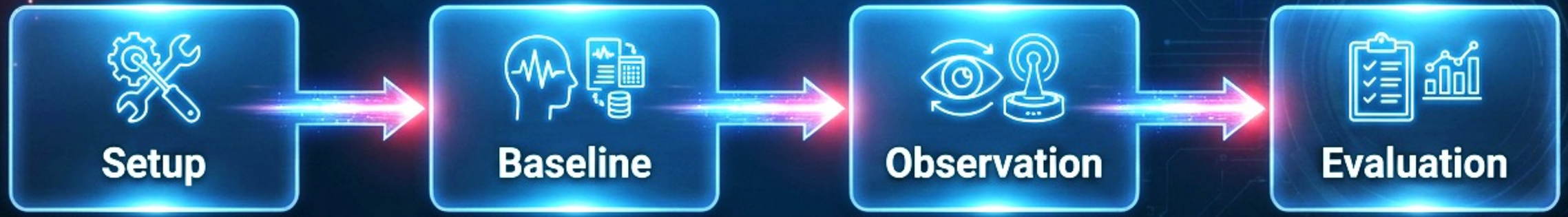


Corrosion & Chemical

Resistant to human sweat, standard-issue sunscreen, DEET-class insect repellents, and saltwater exposure.

Logistics: Fleet charging cases compatible with field power (12/24V DC); Ring mandates ≥72-hour continuous sensing to accommodate sustainment rhythms.

Feasibility Pilot Design: The Proof Engine



Pilot Parameters

- **Cohort:** 20–40 volunteer operators/selection candidates (informed consent required).
- **Duration:** 6 months (2-month garrison baseline + full selection/training cycle).

Budget Assumption: R1.8m – R2.5m (B2G service model; hardware, deployment, support).

Strict Acceptance Criteria (KPIs)

- **Adherence:** >85% wear compliance across the observation window.
- **Security:** Independent network monitoring verifies absolute zero OPSEC leakage/unauthorized RF transmission.
- **Utility:** SAMHS medical officers validate the readiness score as a decision-useful tool for attrition reduction.

Conclusion & Immediate Next Steps

Value Proposition Summary

- Objective physiological measurement to prevent avoidable elite attrition.
- Highly secure, zero-emission, on-premise data architecture.
- The platform measures; SAMHS clinicians decide.

(No Initial Funding Required)

Step 1: Secure Capability Sponsor (Brigade Command) & Medical Sponsor (SAMHS).

Step 2: Conduct a 1-hour structured live-demonstration briefing (system demo, OPSEC architecture, data-flow walkthrough).

Step 3: Initiate OEM technical diligence (SDK access, physical re-marking feasibility, durability verification).