

Overview

Readiness is a top priority for military services, with disease and nonbattle injuries being the leading cause of morbidity during wars and military operations. Wearable sensors can provide the information needed to ensure optimal physical and mental health for operational readiness and decision support.

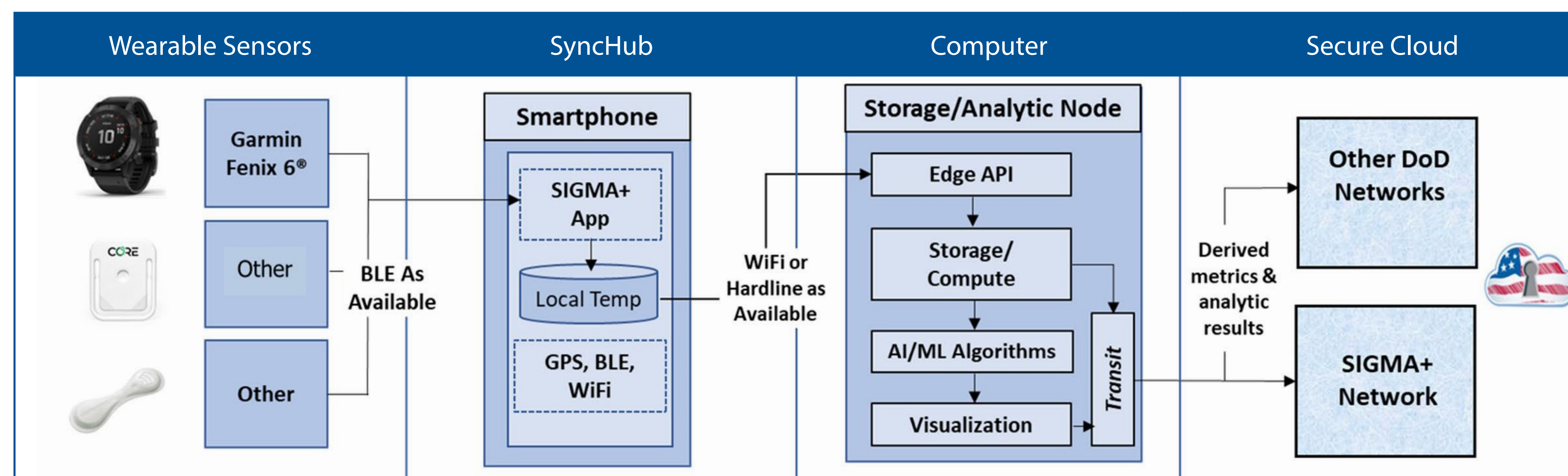
Changes in physiological parameters can indicate signs of physical or mental stress, increase or decrease in body temperature, or fatigue from extreme exertion. Wearables can also evaluate sleep quality as a measure of physical recovery or psychological health. In addition to health tracking, wearable devices can supplement operational needs such as activity tracking.

The Sigma+ Health Platform

GOAL: With support from the Defense Advanced Research Projects Agency (DARPA), create an automated system of wearable biosensors that provides pre-symptomatic warning of viral respiratory illness.

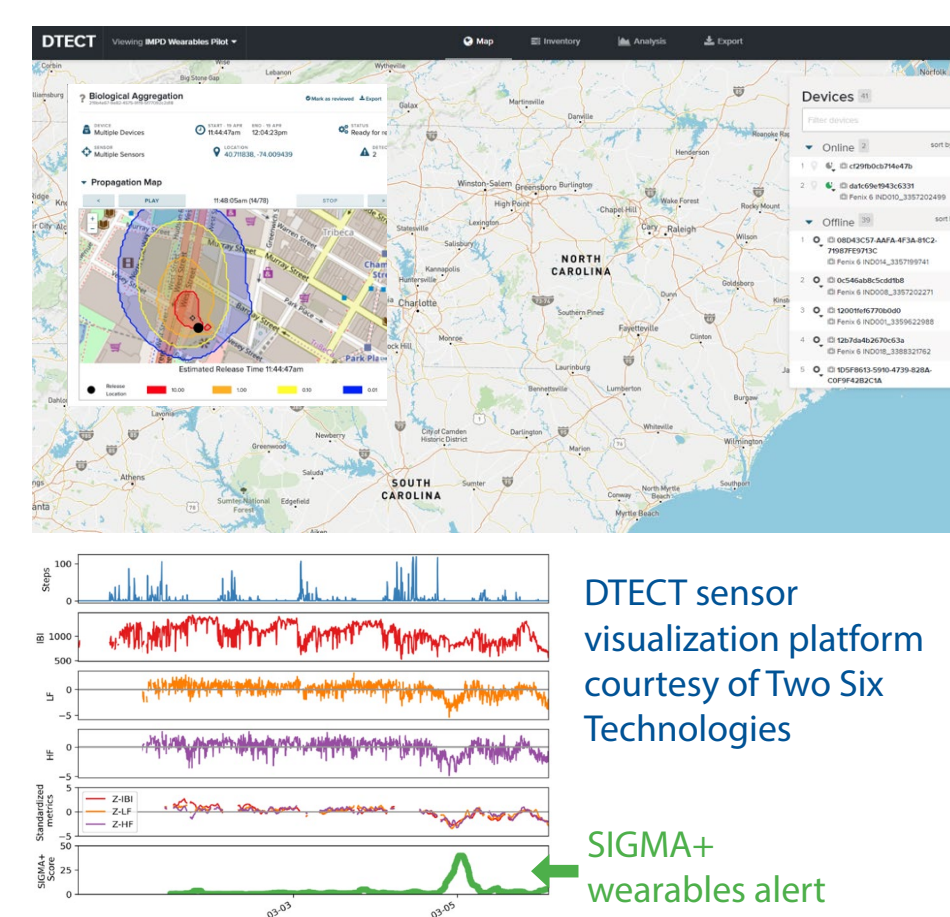
OUTPUT: RTI has developed the SIGMA+ Health platform, an automated system for collecting, processing, and analyzing physiological metrics from wearable biosensors.

- Secure cloud-based or local (no internet), high-resolution data collection streamed independent of vendor cloud
- Highly sensitive, predictive analytics
- Data never transmitted to non-DoD cloud servers



Sigma+ Health Field Demonstrations

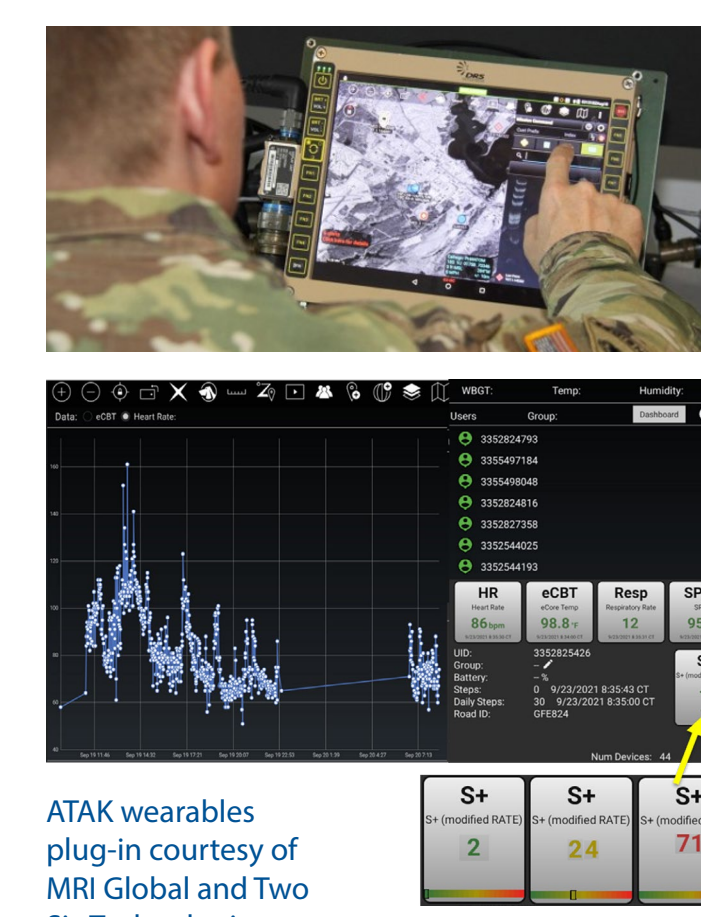
- Integrating human sentinel capability into SIGMA+ network for CBRN detection
- Pilot wearables evaluations with SIGMA+ stakeholders
 - 40 participants, 8-week data collection
 - Test data collection architecture and evaluate data quality
- Field demonstrations in FY23
 - 100 participants, 12-month surveillance
 - Demonstration of algorithms for illness detection



• Alerts to SIGMA+ network

Sigma+ Health DoD Demonstrations

- SIGMA+ demonstrated as local data collection and analytics (LDCA) architecture for simulated military scenarios
- Cyber-secure, closed-loop LDCA architecture operated with no internet connectivity
 - Situational awareness tool for garrison or tactical environments
 - Visualization integrated in Do ATAK platform
- Incorporates health metrics including SIGMA+ risk score
 - Indicates deviation from individual's healthy baseline physiological metrics
 - Relevant to illness, CBRN exposure, or extreme fatigue (physical, heat strain)



Using Smartwatches for Early Detection of COVID-19 & Other Infections

GOAL: Develop algorithms that provide pre-symptomatic detection of acute respiratory illness, including COVID-19, using wearable sensor technology.

APPROACH: 20 healthy adults received a shot containing the influenza A (H3N2) virus and were prospectively monitored from 7 days before through 10 days after inoculation, using wearable electrocardiogram and physical activity sensors. For each participant, we used a semi-supervised multivariable anomaly detection model on data acquired before inoculation and used it to classify the post-inoculation dataset.

OUTPUT: The algorithm model correctly identified 94% of positive pre-symptomatic and asymptomatic individuals, on average fifty-two hours post inoculation and twenty-nine hours before the symptom onset. These insights help quickly identify symptoms of infection from a biological attack or a pandemic illness. The study, Wearable Sensor-Based Detection of Influenza in Presymptomatic and Asymptomatic Individuals, was published in the Journal of Infectious Disease.

Cyclical Neuroactive Steroid Changes, Arousal, and Proximal Suicide Risk: An Experimental Approach

GOAL: In partnership with Dr. Tory Eisenlohr-Moul at the University of Illinois Chicago, we are examining a short-term predictor of suicide risk in women with hormone sensitivity across the menstrual cycle. Study is funded by the National Institute of Mental Health and will be completed Fall 2023.

APPROACH: 60 participants wear an Oura device that collects data for skin temperature, heart rate variability, sleep, and physical activity over a period of several months. The device will help identify vulnerable time frames when women may experience increased suicidal ideation and behaviors.

Summary

Let's Work Together

Wearable technology experts at RTI can help you with the following:

- Identify, evaluate, and select the most appropriate wearable for use in your study
- Procure, configure, and distribute wearables for your study participants
- Create training or technical reference material for individuals or study staff
- Conduct validity or reliability testing to confirm or compare performance between wearable devices
- Inform advanced data analytics and visualization for reporting
- Develop custom algorithms based on health metrics needed for your study

More Information

Interested in learning more?
Contact Us.

