Medical Data Architecture (MDA) Project Status

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ExMC Risk and Gap

ExMC Element Risk

Risk of Adverse Health Outcomes & Decrements in Performance due to Inflight Medical Conditions

MDA Need

ExMC Gap Med07: We do not have the capability to comprehensively process medical-relevant information to support medical operations during exploration missions.

MDA Goal

The MDA project will develop capabilities that support autonomous data collection, and necessary functionality and challenges in executing a self-contained medical system that approaches crew health care delivery without assistance from ground support.

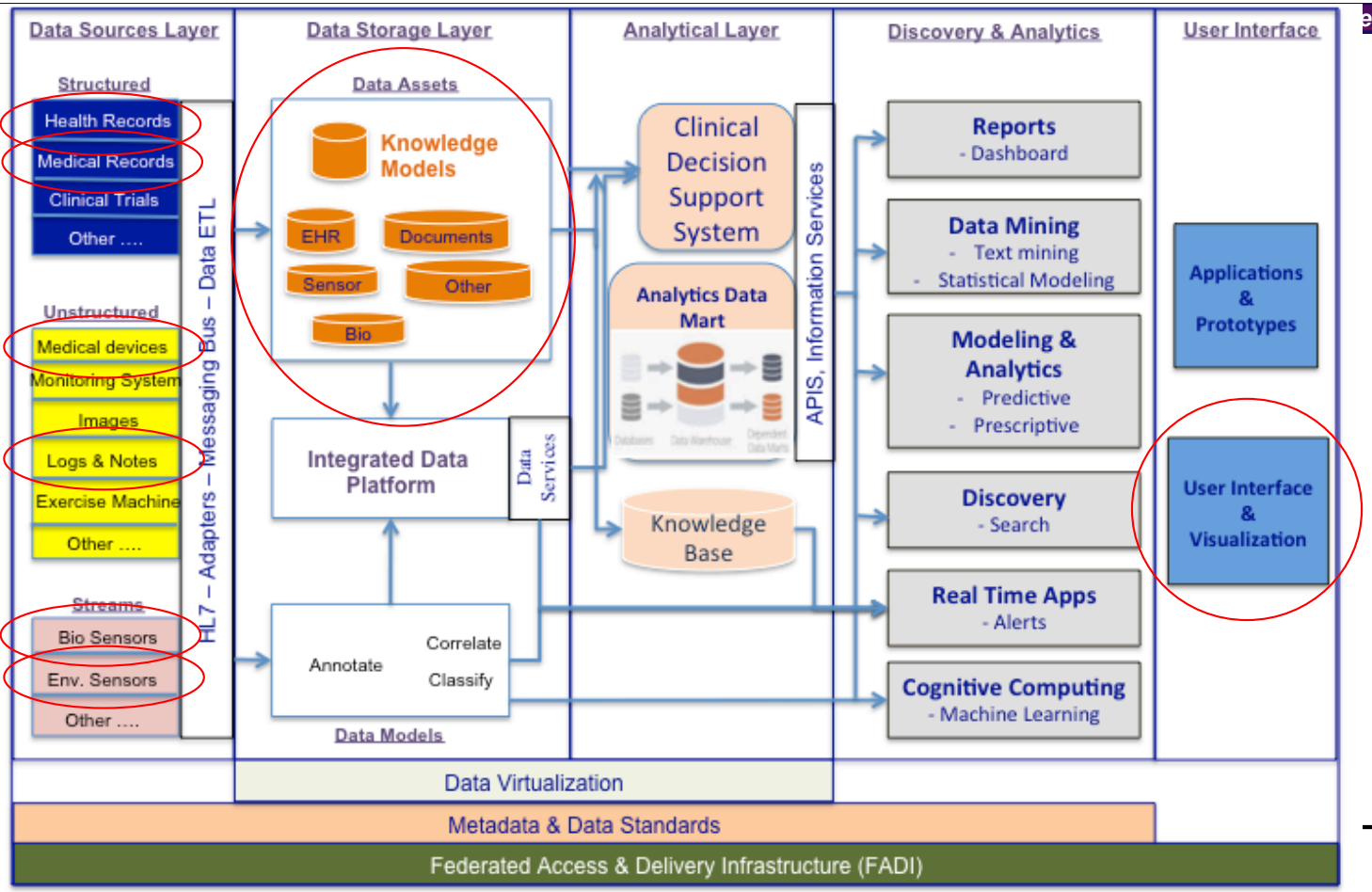
Medical Data System – Central to Crew Health and Performance

MDA Project Objectives

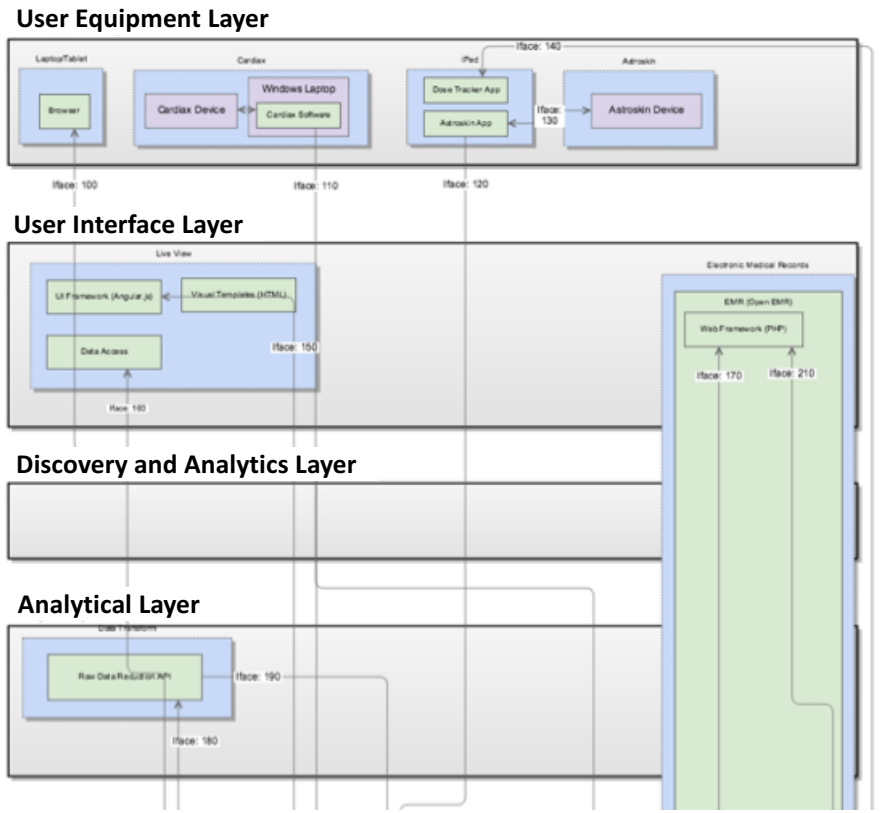
The primary objectives of the Medical Data Architecture project are to establish a robust data architecture that:

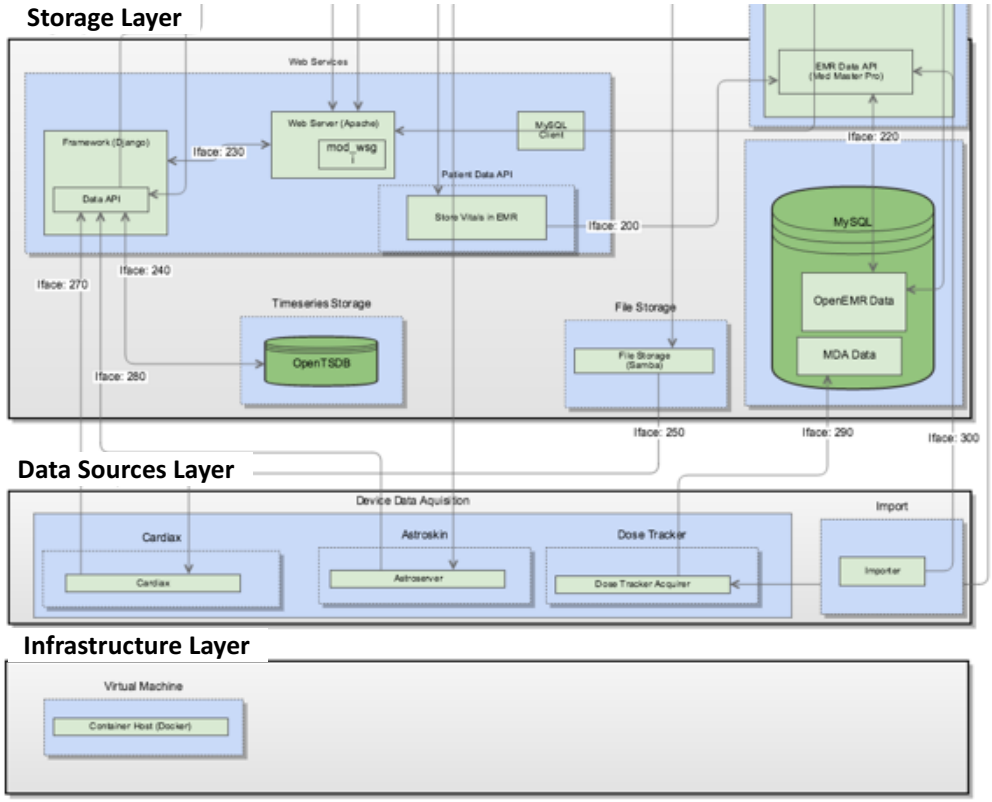
- Interfaces with Devices
- Delivers Access to Data & Analyses
- Inform Deep Space Gateway (short-term) and Deep Space Transit requirements

MDA Reference Architecture



MDA Test Bed 1 Architecture





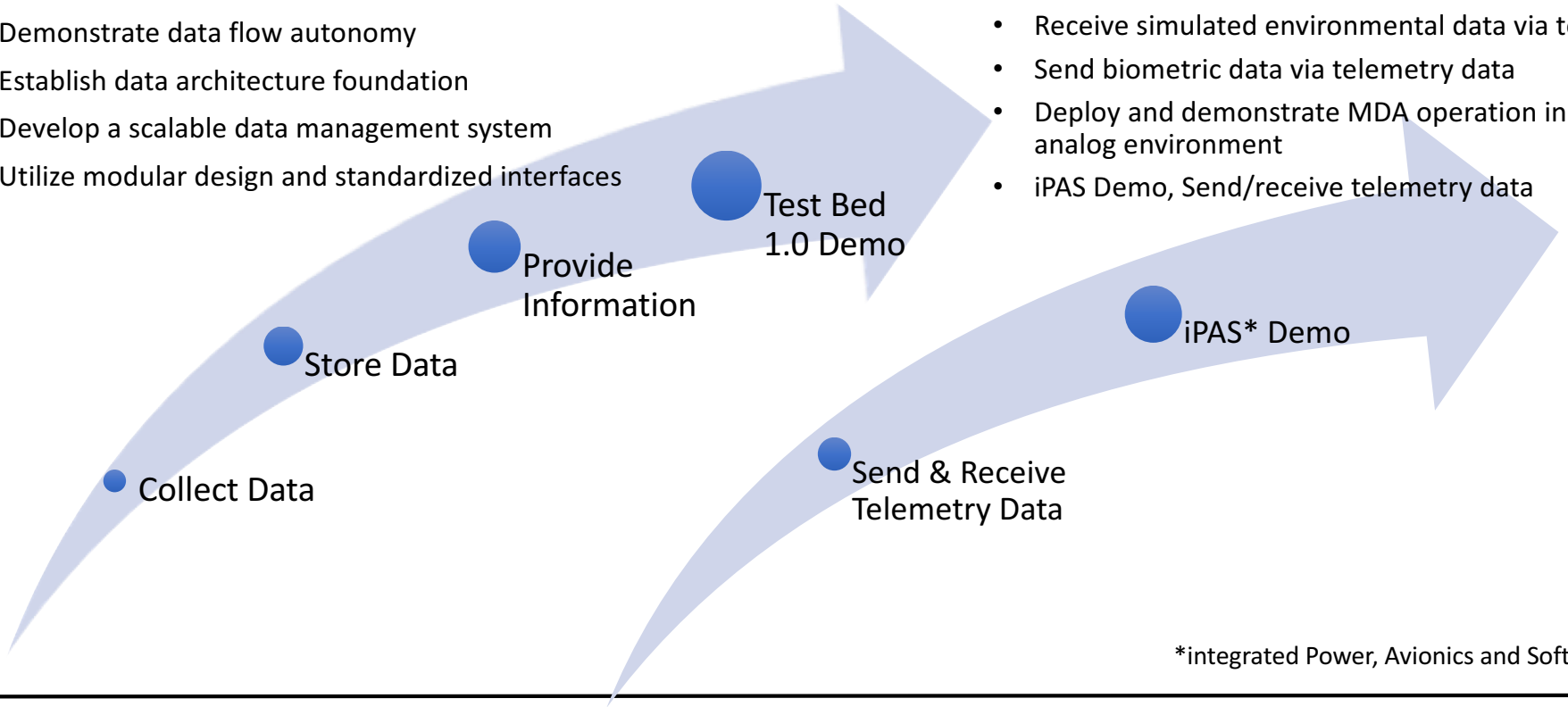
MDA Test Bed 1 Overview

Test Bed 1 Objectives

- Demonstrate data flow autonomy
- Establish data architecture foundation
- Develop a scalable data management system
- Utilize modular design and standardized interfaces

Test Bed 1.5 Objectives

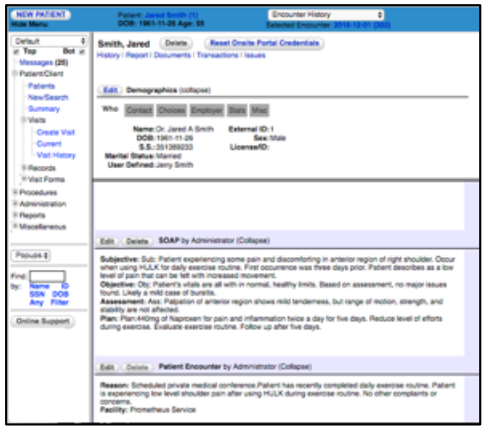
- Receive simulated environmental data via telemetry
- Send biometric data via telemetry data
- Deploy and demonstrate MDA operation in space analog environment
- iPAS Demo, Send/receive telemetry data



*integrated Power, Avionics and Software (iPAS)

ExMC Medical Data Architecture - Test Bed v1.0 (5/2017)

Automated Medical Data Management



Biosensor Integration

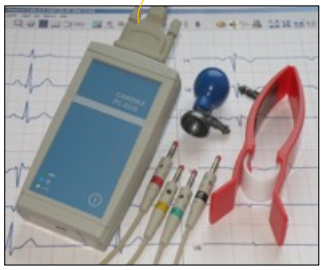
- Astroskin – Vital Signs Garment
- CARDIAX – 12-Lead Diagnostic Electrocardiogram (ECG)

Transmit via LAN/WIFI

Customized User Interface

Electronic Medical Record

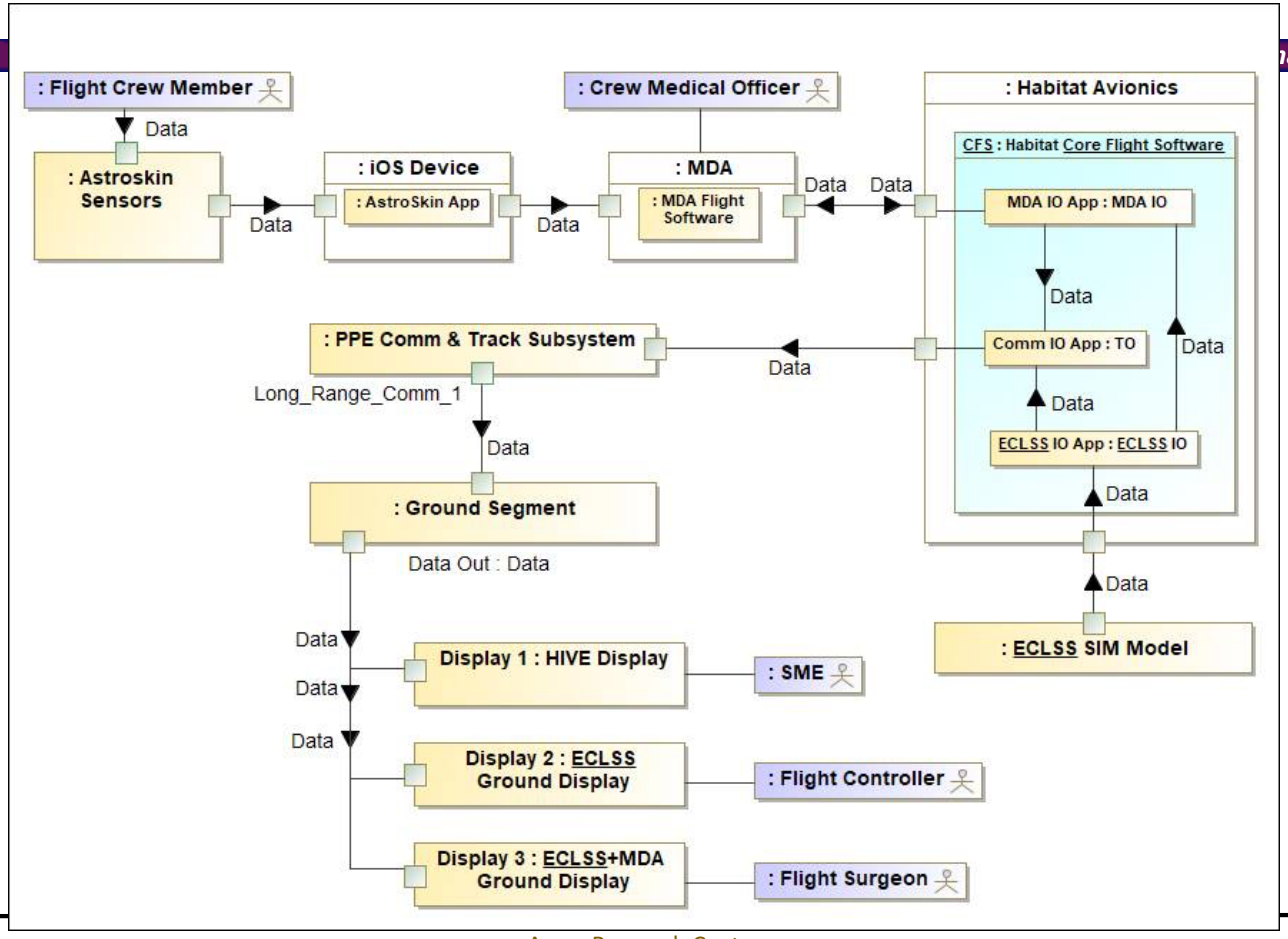
- Standard Fields
- Automated capture and storage of vital signs (Astroskin)
- ECG waveform retrieval and comparison (CARDIAX)
- Customized templates for clinical notes and patient information



Summary of Medical Data Architecture - Test Bed 1.0 Capability

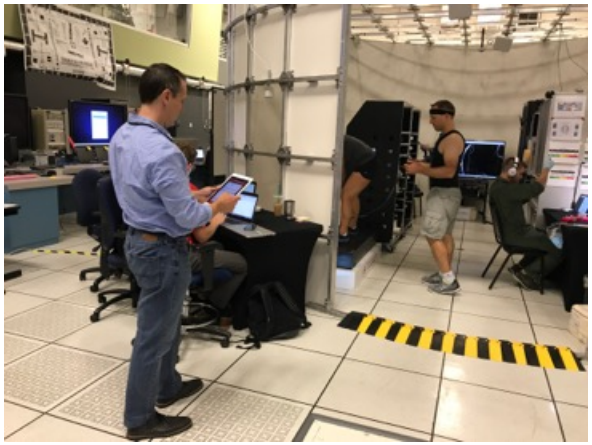
Data Source	Data Stored	Data Displayed
Astroskin	Automated population of vital signs (HR, SpO2, Systolic BP, RR, Skin Temp)	Single value for each parameter stored in EMR per session
Astroskin	Raw Astroskin signals (HR, SpO2, Systolic BP, RR, Skin Temp, 3-lead ECG, activity)	Each parameter plotted as a function of time (longitudinal)
CARDIAX	12-lead ECG	ECG waveforms for all 12 leads (graphic)
Text (Key Entry)	Manually entered vitals, clinical notes, patient information	EMR – SOAP notes, allergies, demographics, patient history, medications

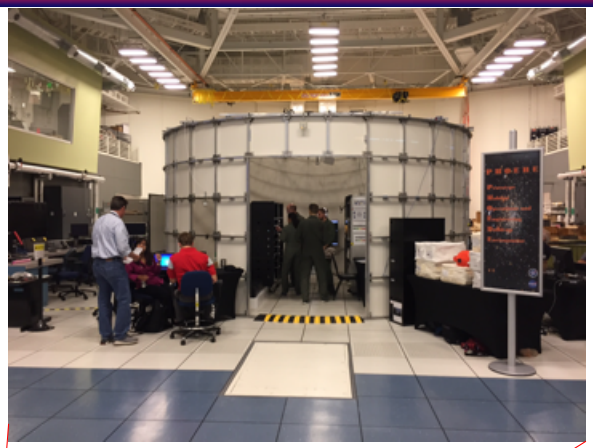
MDA Integration in iPAS Demonstration



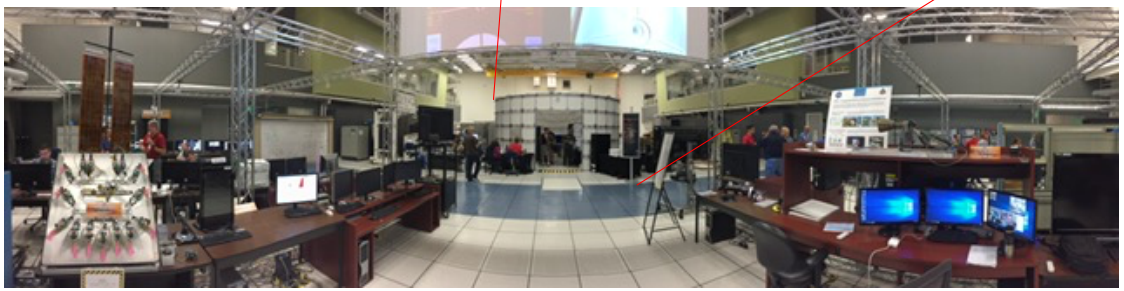
ExMC Medical Data Architecture – Test Bed v1.5 (9/2017)

Integrated MDA/iPAS Demonstration

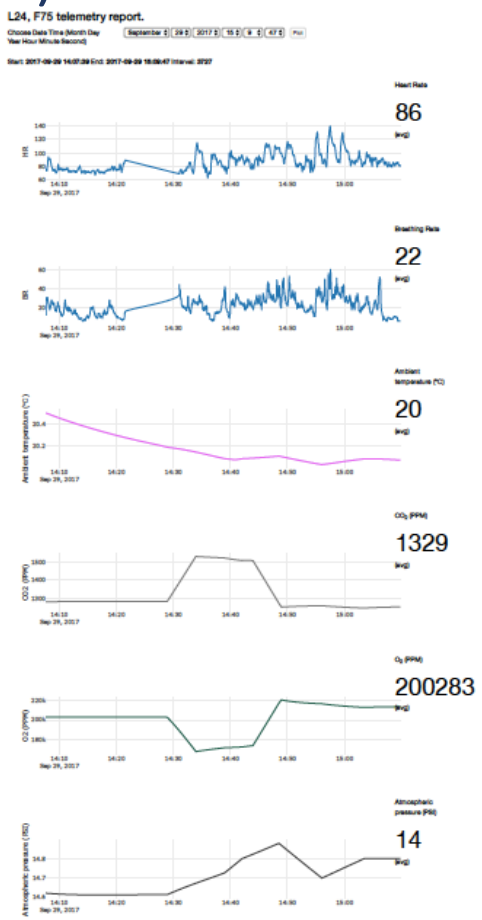




Habitat Prototype



Integrated Power Avionics and Software (iPAS) Facility



'Vehicle' display of time-coupled physiologic and environmental data.

MDA Project

FY18 Approach for MDA

- Assess critical data architecture components
- Enhance data management
  - Data tagging, data transformation (near-term)
  - Enable analytics and decision support (future)
- MDA v2.0 priorities
  - Address PII/ Encryption
  - Medical Device Integration
  - Exercise Device Integration
  - Cognitive/Activity App Integration
- Architecture evolution
  - Alignment with Avionics and Software

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