Medical Data Architecture (MDA) Project Status

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2019 NASA Human Research Program Investigators' Workshop

23 January 2018

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.

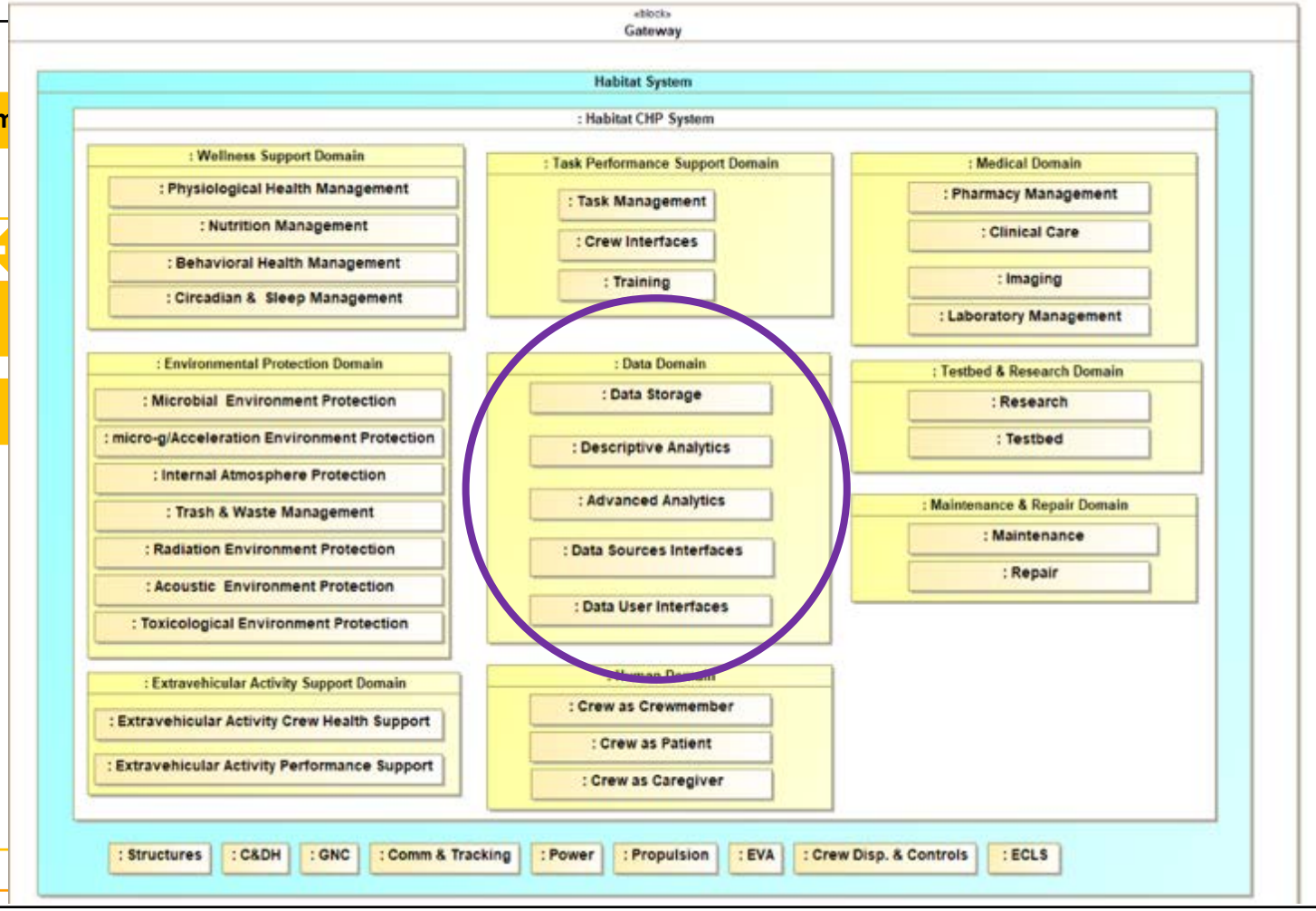
Data System – Central to the Crew Health and Performance (CHP) System

Wellness Support

Environm

Data Sources Layer

- Medical Domain Interface
- Wellness Support Interface
- Task Performance Support Interface
- Extravehicular Activity Support Interface
- Environmental Protection Interface
- Research Support Interface
- Maintenance & Repair Interface



ance &

Human/Actors

User (Actors) Interface

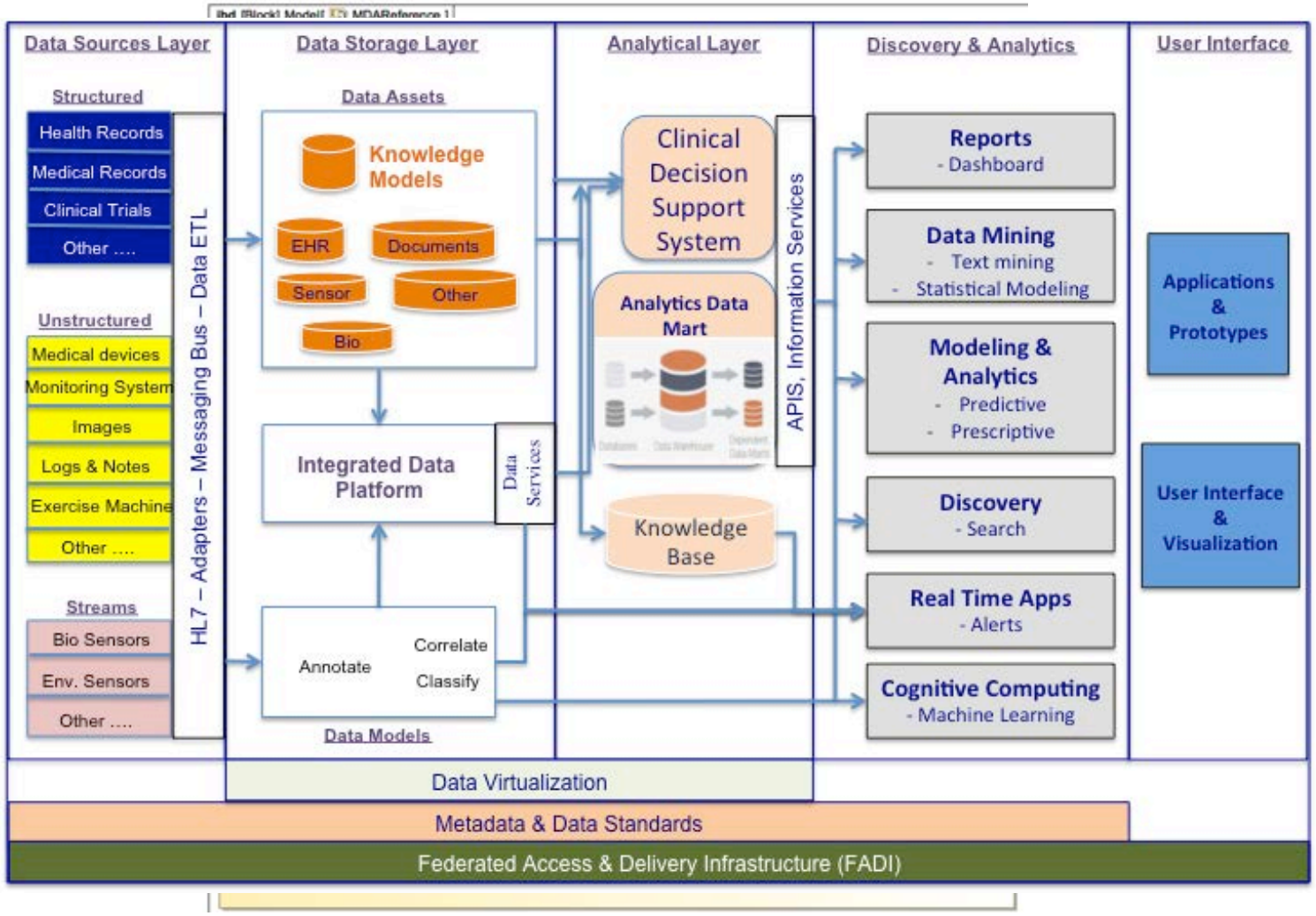
- Data
- Messaging

MDA Project Objectives

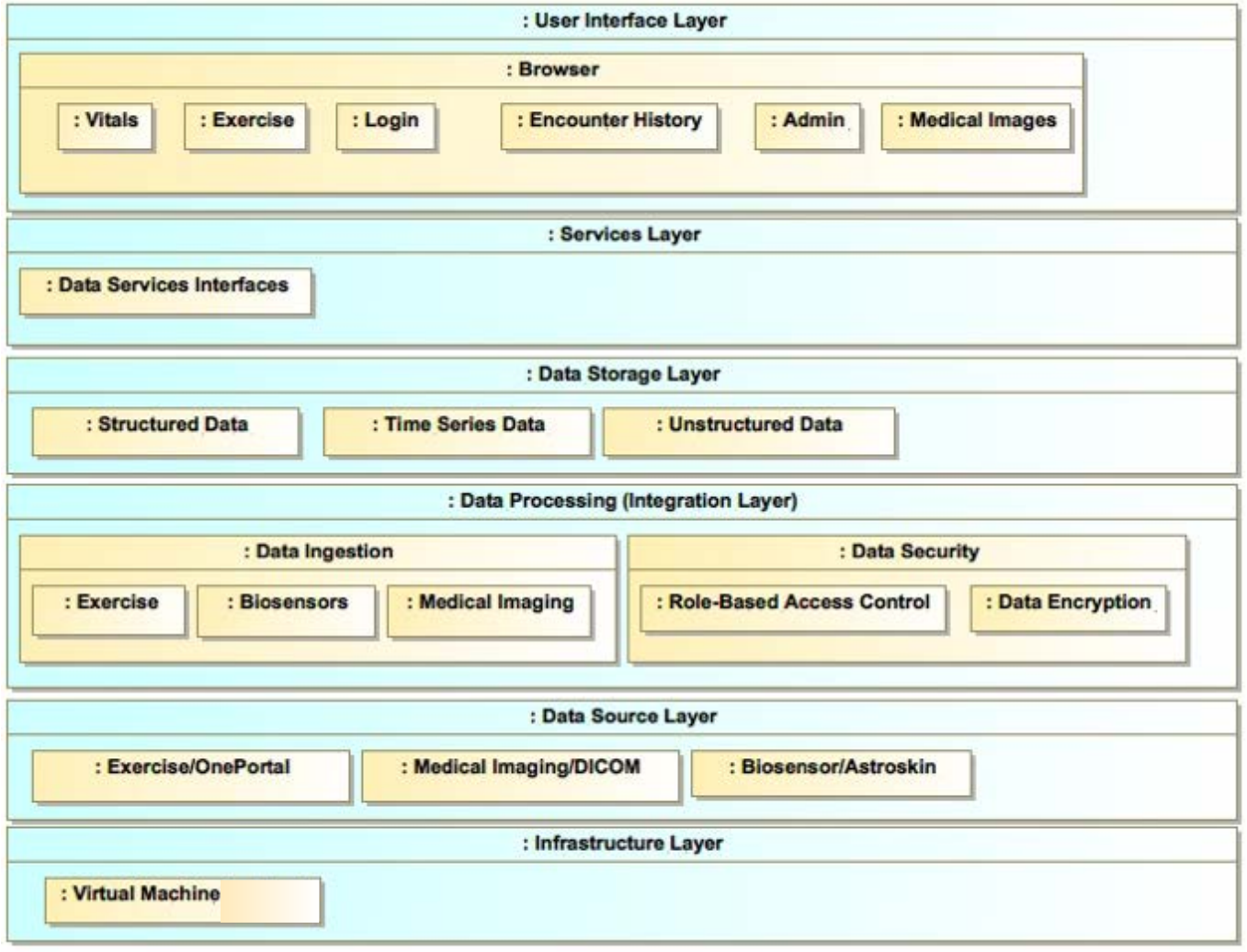
The core focus of the Medical Data Architecture prototype developments is to inform ExMC Systems Requirements definition through

- Technical design and implementation
- Analysis and trade studies
- Systems engineering

MDA Reference Architecture



MDA Test Bed 2 Architecture

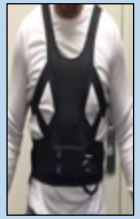


Medical Data Architecture

Medical Data Architecture 1.0 – Automated Data Management

- Enhance Medical Record
  - Automated capture and storage of vitals
  - ECG waveform retrieval
  - Customized templates for clinical notes and patient information
- Biosensor Integration
  - Astroskin, CARDIAX

Transmit via LAN/WIFI


NimbleHeart dry electrode harness

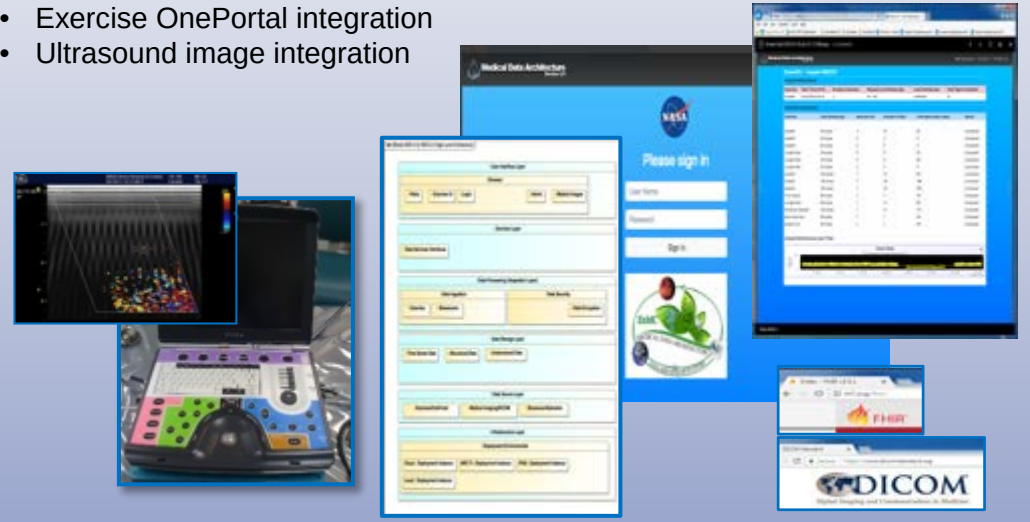

iMed CARDIAX

MDA Objectives

- Establish a robust data architecture that informs requirements
  - Deep Space Gateway/Transit
  - Interfaces with Devices/Systems
  - Delivers Access to Data and Analyses

Medical Data Architecture 2.0 – Secure Data Management

- Exercise OnePortal integration
- Ultrasound image integration



Analog Testing

- Hab Testing

Habitat Prototype

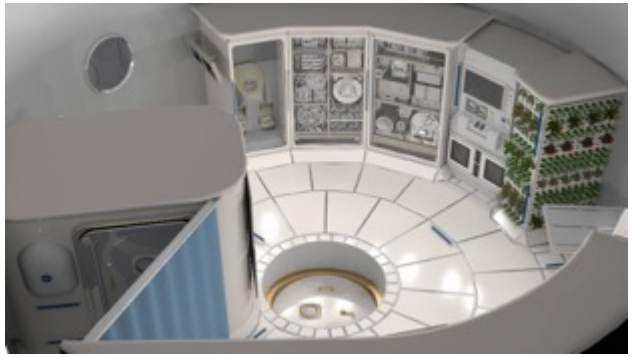

Integrated Power Avionics and Software (iPAS) Facility

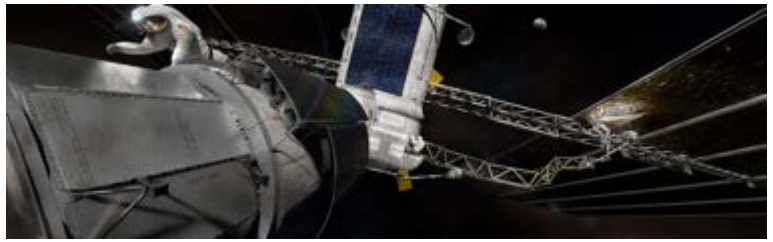
iPAS Demonstration and Habitat Testing

Objectives

- Exercise file transfer from One Portal software into the MDA system and display medically-relevant exercise data
- Ultrasound file transfer from ultrasound device into the MDA system and display DICOM formatted images from the ultrasound file
- Synchronize the data between the MDA flight system and the mirrored MDA ground system
- FY 19: Deploy same configuration in habitat assessments.

Integrated, Power, Avionics and Software Test at NASA JSC

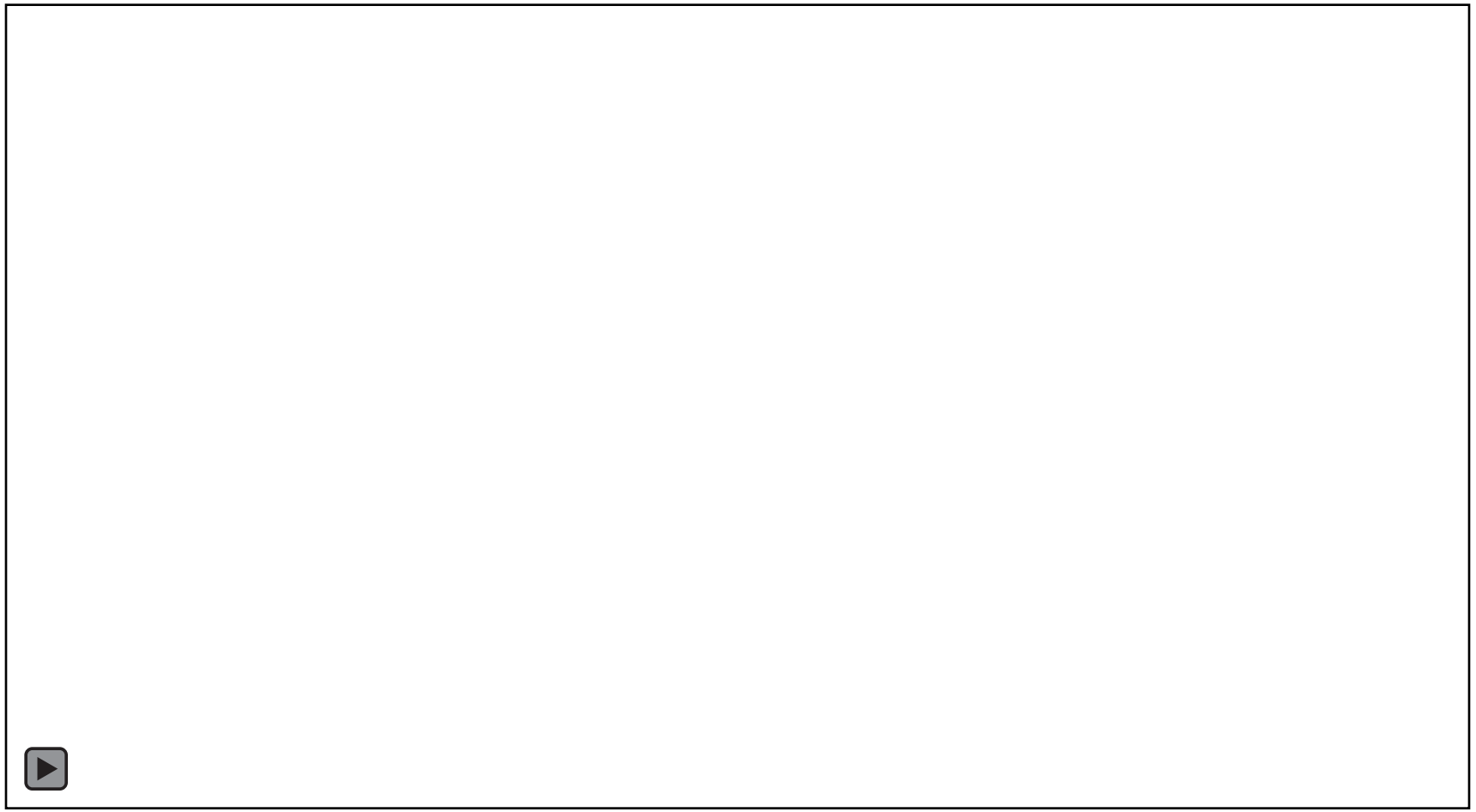




Conceptual Deep Space Habitats

https://www.nasa.gov/deep-space-habitation/overview
https://www.nasa.gov/press-release/nasa-selects-six-companies-to-develop-prototypes-concepts-for-deep-space-habitats

MDA Software Demo



FY19 Approach for MDA

MDA Test Bed 3 Approach

- Build of Test Bed 1 and 2 prototypes
- Wireless data streams from the Canadian Space Agency (CSA) On-Astronaut Wireless Sensor System
- Integration with the Flexible Ultrasound System
- Analytics layer and plug-in support
  - CSA Data Processing and Analysis plug-in integration
  - Autonomous Medical Operations integration: Image Analysis
- Further integration with the vehicle environment through iPAS and core Flight Executive system
  - Core Flight Software app