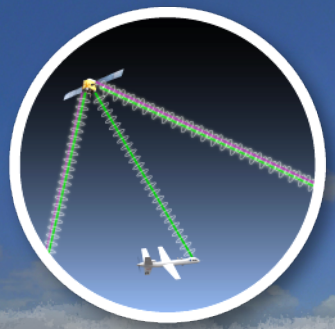


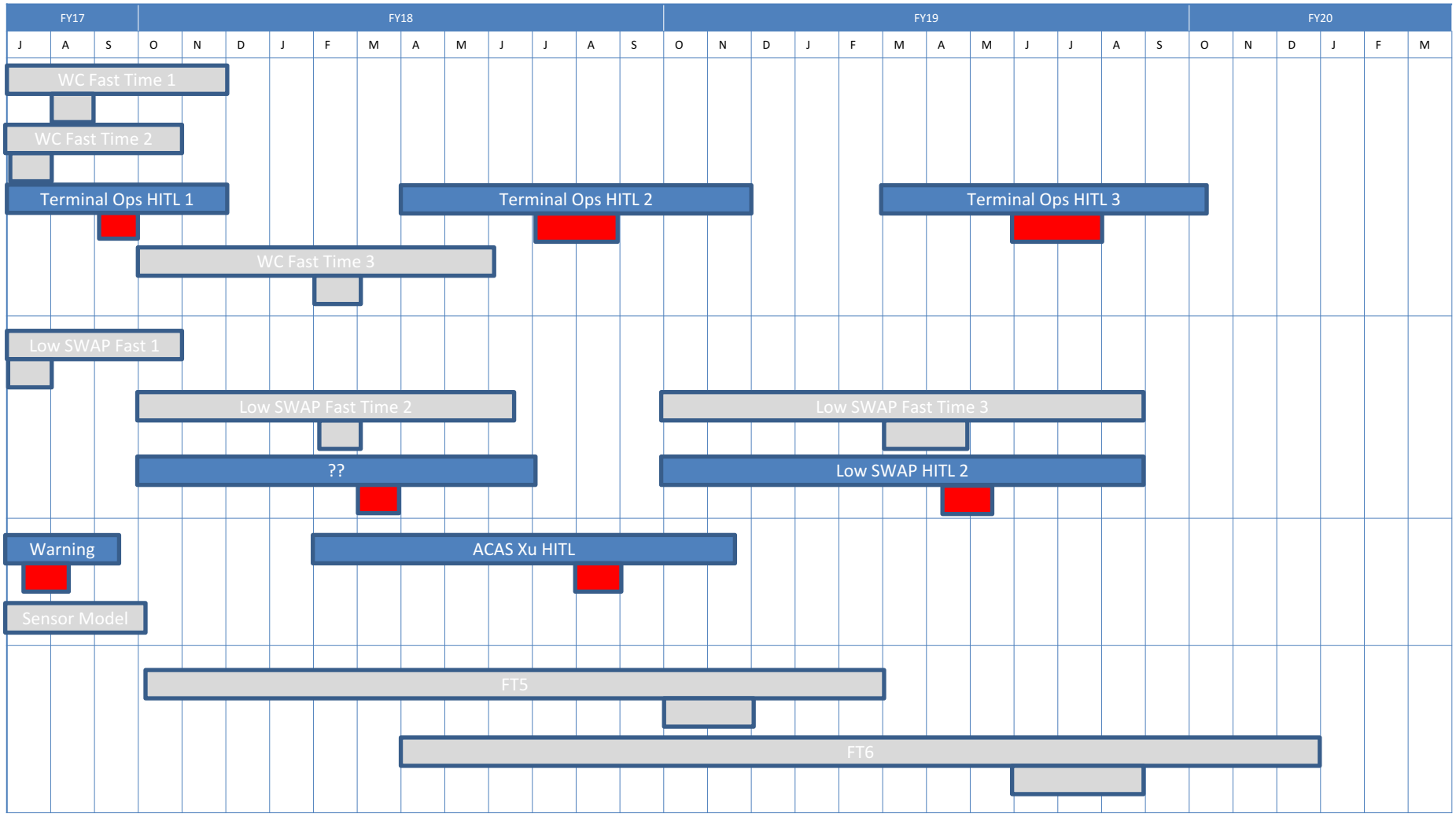
Unmanned Aircraft Systems (UAS) Integration in the National Airspace System (NAS) Project

NASA Phase 2 DAA HITL Schedule

Presented to: SC-228 M&S Sub Group

Lisa Fern
DAA Technical Lead,
Human Systems Integration

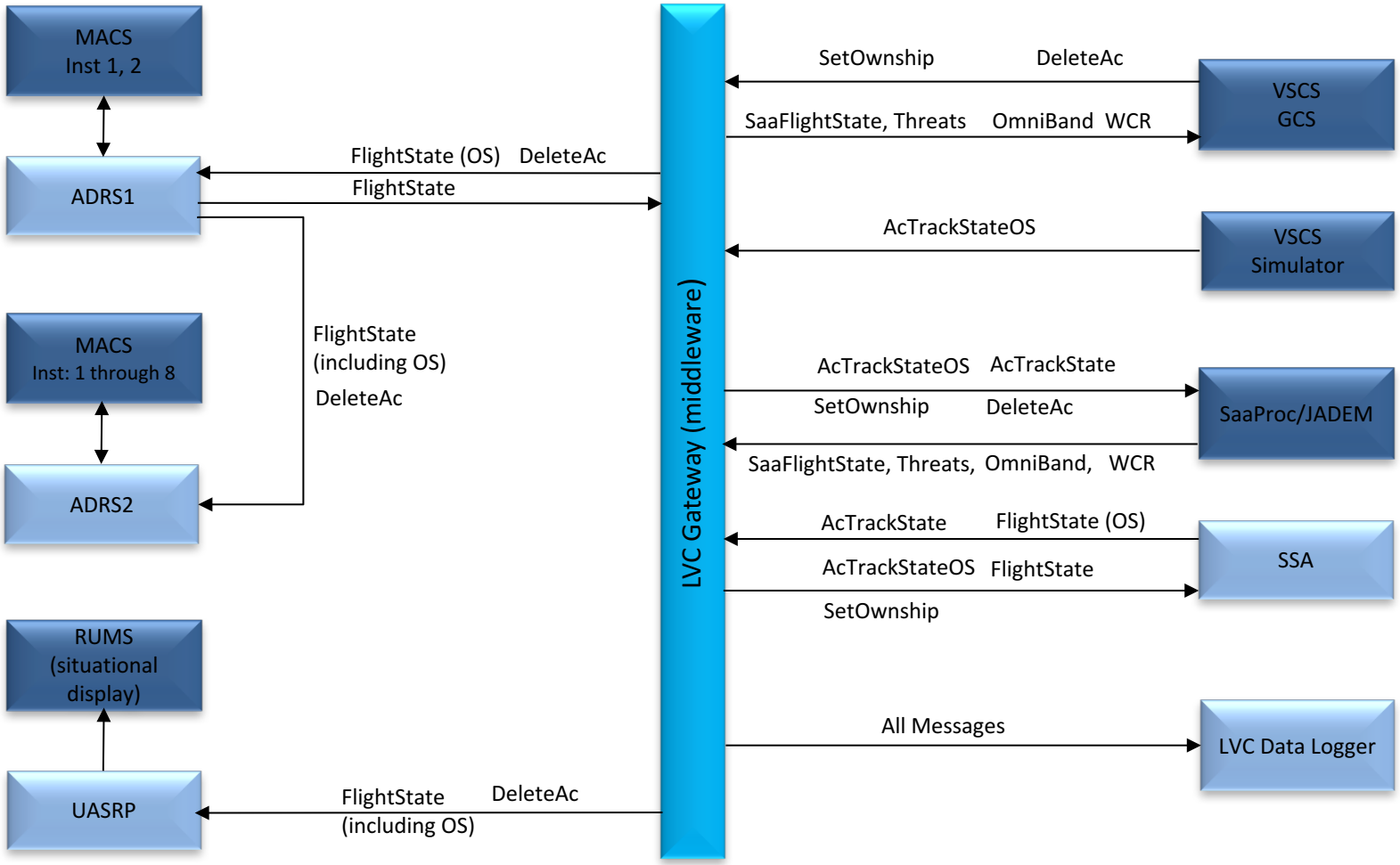
NASA DAA HITL Schedule



NASA DAA HITL Schedule

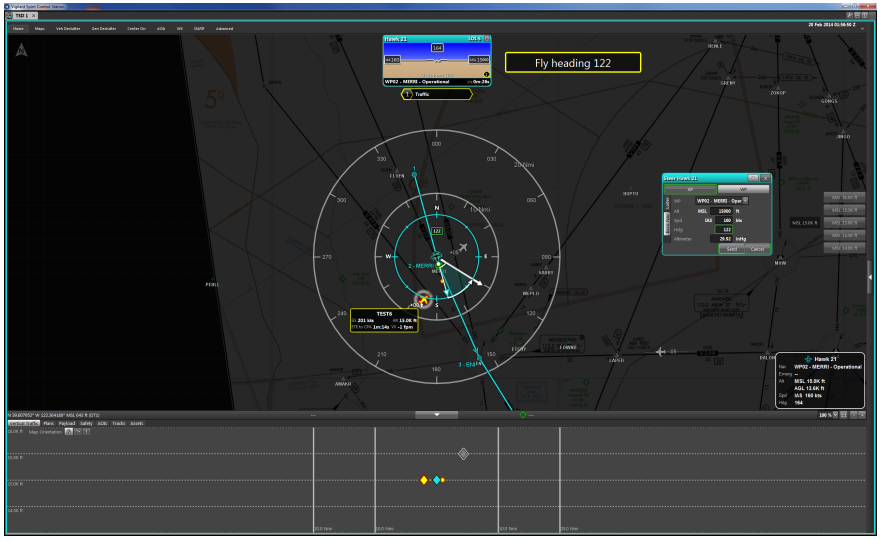
- Warning Alert HITL – Summer/Fall 2017 (in data collection/analysis y)
- Terminal Ops HITL 1 – Summer/Fall 2017 (in data collection)
- TBD HITL – Winter/Spring 2018 (planning needs to start ASAP)
- ACAS Xu HITL – Summer/Fall 2018 (planning to start this winter)
- Terminal Ops HITL 2 – Summer/Fall 2018
- Low SWaP HITL 1 – Spring/Summer 2019
- Terminal Ops HITL 3 – Summer/Fall 2019

System Architecture and Data Flow



Simulation Environment: Ground Control Station (GCS)

- The Vigilant Spirit Control Station (VSCS) developed by the Air Force Research Laboratory (AFRL)
- Main Features:
  - Robust, flexible interface
  - Realistic control and navigation displays
  - System status and health monitoring
  - STANAG 4586 Compliant
  - Multi-UAS control with VSCS has been tested in simulation and flight by AFRL
- Current UAS in the NAS version modifications/additions:
  - Single pilot – single UAS control
  - NAS-compatible database (low- and high- altitude charts with navigational aids/"fixes")
  - Integrated or stand alone traffic display configurations



Simulation Environment: Multi Aircraft Control Station (MACS)

- The Multi Aircraft Control Station (MACS) developed by the Airspace Operations Laboratory (AOL) at NASA Ames Research Center
- Provides emulation of ground- and air- side Air Traffic Control (ATC) operations
  - Air Traffic Controller work stations
  - Simulated traffic generator
  - Psuedo pilot work stations
  - IFR and VFR simulated traffic
  - Traffic scenarios in Oakland Center and Santa Rosa tower airspace (ZOA 40/41) based on current day traffic patterns

Air Traffic Control Station

Pseudo Pilot Station