

National Aeronautics and Space Administration

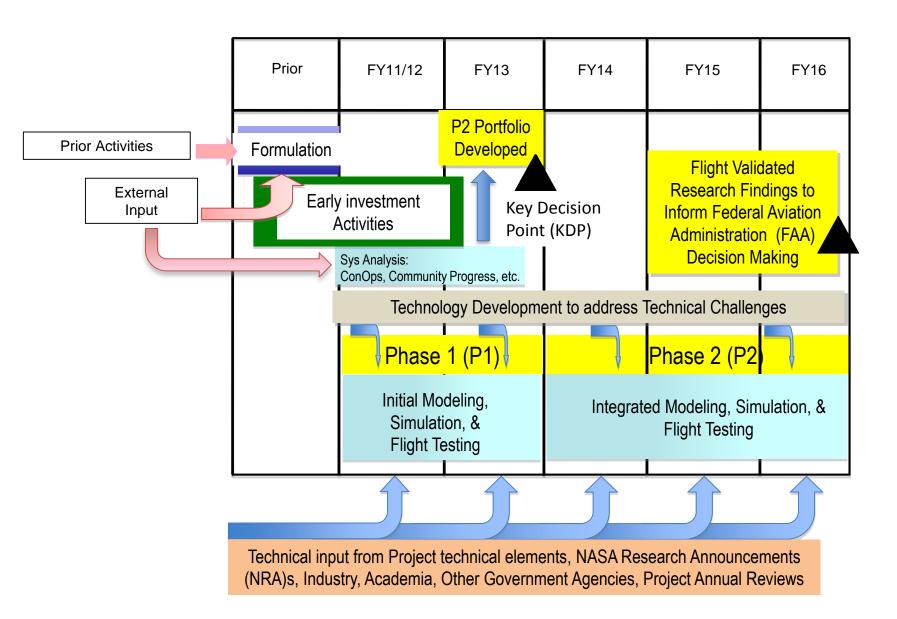
UAS Integration in the NAS Project
UAS Commercialization Industry Conference

Chuck Johnson
Vice President of Operations, The Padina Group
Former NASA UAS-NAS Project Manager

June 25, 2015



UAS-NAS Project Lifecycle





FAA Pathway to UAS Access

 The FAA uses several domestic and international forums to lay out the pathway for their priorities and investments.

Chartered to develop Detect and Avoid (DAA) and Command and Control (C2) MOPS **RTCA** FAA UAS Center of Excellence SC-228 performs strategic research to *UAS Executive Committee (ExCom):* **FAA UAS** quide the FAA, while the test **UAS** Senior gov't steering group focused COE / sites contribute essential inputs **ExCom** on streamlining public UAS access **Test Sites** through UAS testing **FAA UAS Aviation Rulemaking Pathway** World Radio Conference Committee (ARC) Developed civil (WRC), International Civil Inter-**UAS Implementation Plan based on Aviation Organization (ICAO) UAS ARC** national the FAA's UAS Concept of UAS RPAS Panel, and the **Forums Operations (CONOPs) & Roadmap Joint Authorities for OSD** Rulemaking on Unmanned SAA Office of Secretary of Defense (OSD) Sense Systems (JARUS) are **SARP** and Avoid (SAA) Science and Research addressing UAS access from Panel (SARP): Chartered by OSD to an international perspective

NASA has a leadership role within many domestic forums and participates in the international forums

identify SAA Research Gaps



ARMD Strategic Plan Flow Down to UAS-NAS Project



AERONAUTICS
STRATEGIC THRUST

Thrust 6: Assured Autonomy for Aviation Transformation



AERONAUTICS OUTCOME Outcome (2015 – 2025): Initial Autonomy Applications with Integration of UAS into the NAS



UAS-NAS

Project Goal

Goal: Provide research findings to reduce technical barriers associated with integrating Unmanned Aircraft Systems into the National Airspace System utilizing integrated system level tests in a relevant environment

UAS-NAS
Research Themes

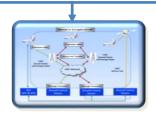
Research Theme 1: UAS Integration - Airspace integration procedures and performance standards to enable UAS integration in the air transportation system

Research Theme 2: Test Infrastructure - Test infrastructure to enable development and validation of airspace integration procedures and performance standards

UAS-NAS
Technical
Challenges



TC-SAA:
Sense and Avoid
Performance Standards



TC-C2:
Command & Control
Performance Standards



TC-HSI: Human Systems Integration



TC-ITE: Integrated Test & Evaluation



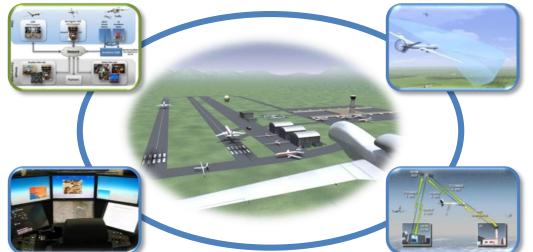
Project Goal, Research Themes, & Technical Challenges

Goal: Provide research findings to reduce technical barriers associated with integrating Unmanned Aircraft Systems into the National Airspace System utilizing integrated system level tests in a relevant environment

Research Theme 1: UAS Integration - Airspace integration procedures and performance standards to enable UAS integration in the air transportation system

Research Theme 2: Test Infrastructure - Test infrastructure to enable development and validation of airspace integration procedures and performance standards

TC-ITE: Integrated
Test & Evaluation



TC-SAA: Sense and Avoid (SAA) Performance Standards

TC-C2:

Command & Control (C2)

Performance Standards

TC-HSI: Human Systems Integration



Certification



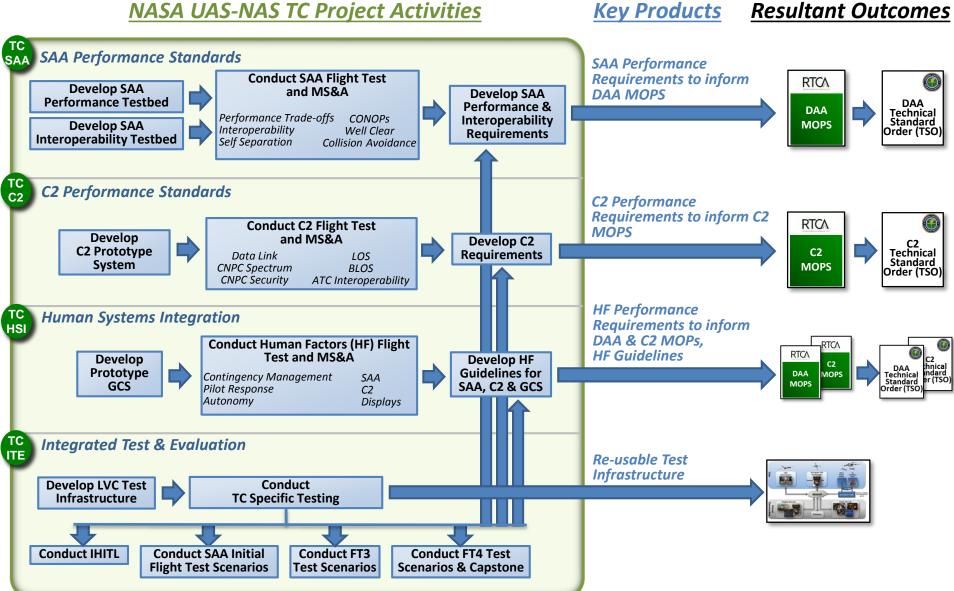


Non-TC: Small UAS Mission Support Technologies

UAS Integration in the NAS Project

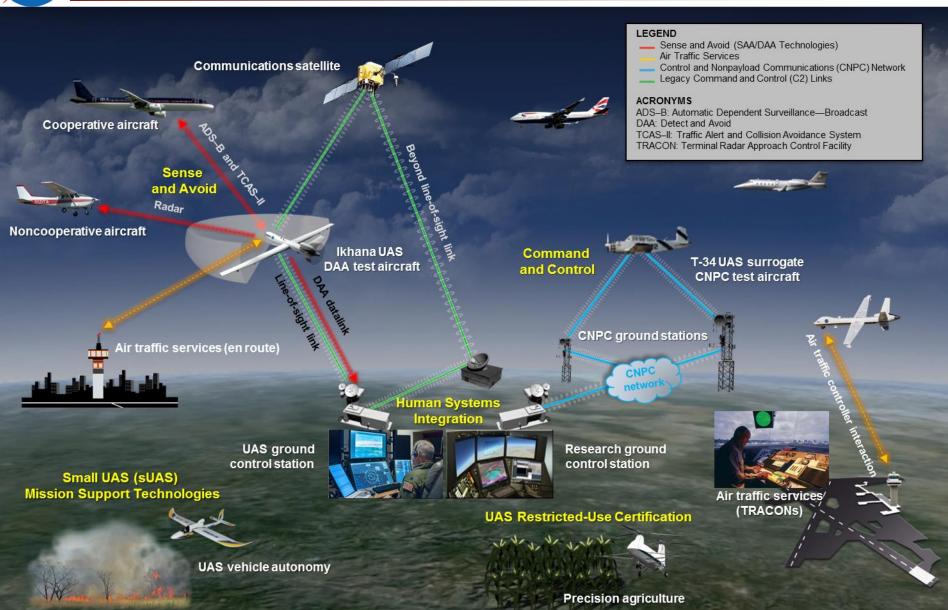
Technical Challenge Value Proposition

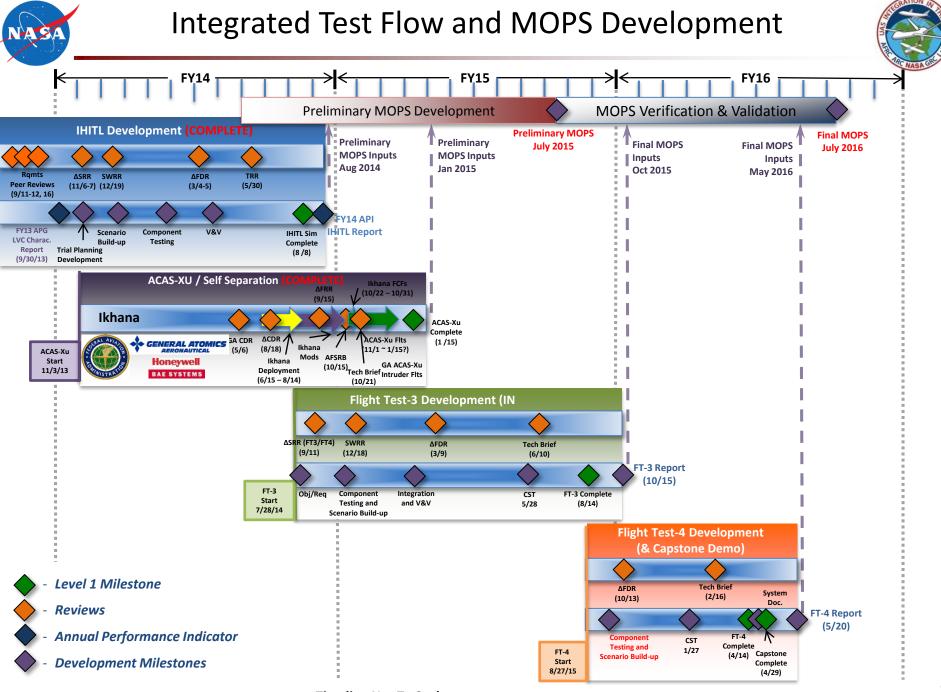






UAS-NAS Project OV-1







Other NASA UAS Access Efforts



Phase 2 MOPS ~FY17-20

- DAA MOPS for aircraft interoperating in Classes E and D Airspace
 - May require a suite of options including GBSAA, EO, cell technology, etc
- SATCOM MOPS for C2
- Necessary human systems integration guidelines

Early Implementation Program (through UAS ARC) ~FY17-20

Research findings to enable routine operations above FL180 with required equipage

UAS Traffic Management (UTM) ~FY16-26

- Low altitude volume of airspace (e.g. 400 AGL and below)
- Enable operations including goods delivery, infrastructure surveillance, agricultural support, and medical services delivery
- Upcoming UTM Convention July 28-30 at NASA Ames Research Center

NASA will continue to pursue efforts to enable UAS access over the next decade



Benefits to the Commercial Industry



Overall NASA goal - Open airspace in safe/efficient manner for civil/commercial activities

UAS-NAS Project:

Enable flights to/from Class A Airspace through Classes E and D Airspace

EIP:

Enable routine operations above FL180 (Classes A and Upper E)

Phase 2 MOPS:

Enable routine operations in Classes E and D Airspace

UTM

Enable routine operations in low altitude volume of airspace

NASA efforts, in collaboration with the entire UAS Community of Interest, will maximize commercialization opportunities