

Wildfires and Aeronautics

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Discussions with Wildfire Experts



- Multiple conversations highlighted numerous issues:
 - Real-time tracking of ground teams and equipment
 - Use of multiple space-based imagery sources
 - Complications surrounding accurate fire modeling and model validation
 - Various instrumentation levels aboard various aircraft
 - Communication chains after ignition indicators
 - Controlling aircraft within the TFR created around a wildfire
 - Legislation that guides USDA (USFS) and DOI technical activities (Dingell Act)
- Numerous activities at other Federal and State Agencies (DOE)
- Multiple commercial data aggregators and service providers



Alignments and Overlaps

Wildfire aviation overlaps with NASA aviation research and goals

- Air Traffic Control in the Temporary Restricted area
- Enhanced situational awareness (both air and ground)
- Controls and precision trajectories (air tankers and retardant drops)
- Efficient fleet deployment
- Aircrew human factors
- Human-machine teaming with autonomous vehicles
- Safe and effective integration of multi-scale UAS vehicles
- Aircraft design and engineering analyses, both fixed and rotary-wing aircraft
- Existing NASA projects: SWIFT, STEReO and DRF (Data and Reasoning Fabric)



NASA Aeronautics Strategic Thrusts



U.S. leadership for a new era of flight

- 6 Strategic Thrusts
-  Safe, Efficient Growth in Global Operations
 -  Innovation in Commercial Supersonic Aircraft
 -  Ultra-Efficient Commercial Vehicles
 -  Transition to Low-Carbon Propulsion
 -  Real-Time System-Wide Safety Assurance
 -  Assured Autonomy for Aviation Transformation

ARMD's Aeronautical Research Taxonomy

Strategic Thrusts

ARMD Research is Organized into Six Strategic Thrusts

	Strategic Thrust 1: Safe, Efficient Growth in Global Operations	☒
	Strategic Thrust 2: Innovation in Commercial Supersonic Aircraft	
	Strategic Thrust 3: Ultra-Efficient Commercial Vehicles	☒
	Strategic Thrust 4: Transition to Low-Carbon Propulsion	☒
	Strategic Thrust 5: Real-Time System-Wide Safety Assurance	☒
	Strategic Thrust 6: Assured Autonomy for Aviation Transformation	☒

Outcomes

Outcomes are Defined for Each of Three Time Periods

Near Term: 2015-2025

Mid Term: 2025-2035

Far Term: Beyond 2035



Advanced Air Vehicles Program (AAVP)



Airspace Operations and Safety Program (AOSP)



Integrated Aviation Systems Program (IASP)



Transformative Aeronautics Concepts Program (TACP)

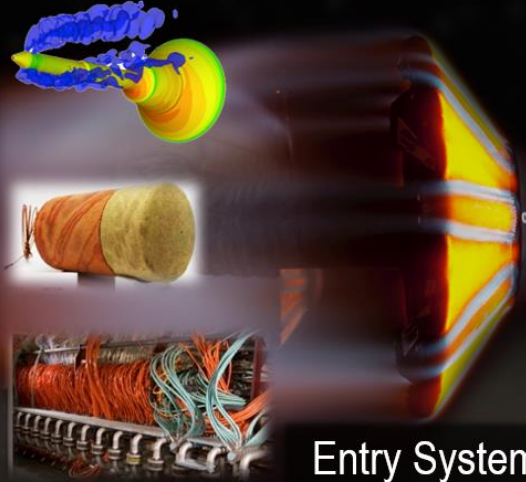
Pre-Decisional



Ames Core Competencies



Air Traffic Management



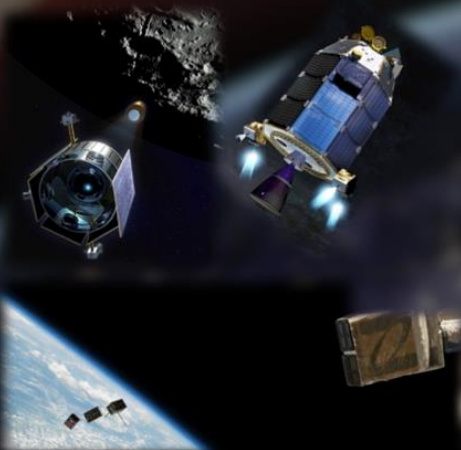
Entry Systems



Advanced Computing
& IT Systems



Intelligent/ Adaptive Systems



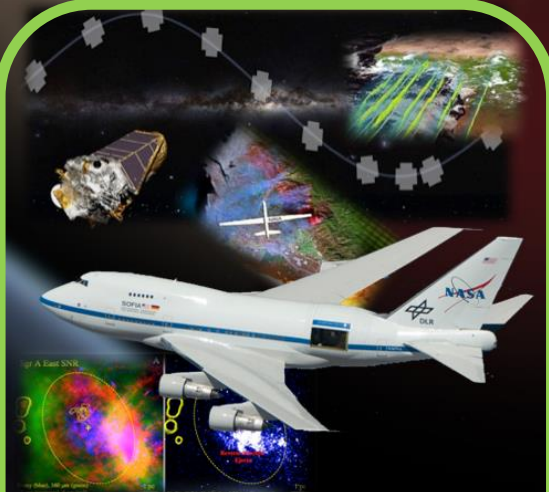
Cost-Effective Space Missions



Aerosciences



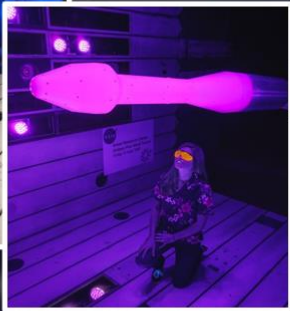
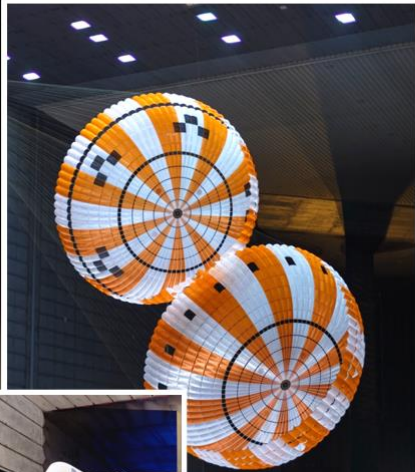
Astrobiology and Life Science



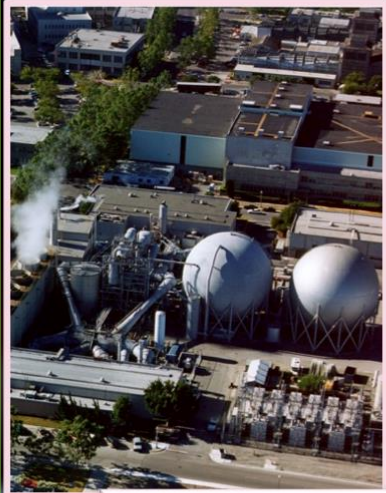
Space and Earth Sciences



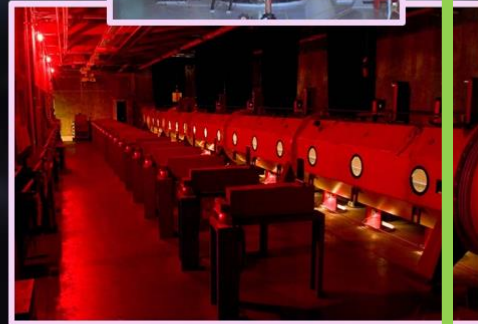
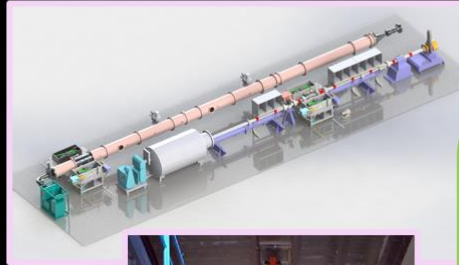
Research Facilities at Ames



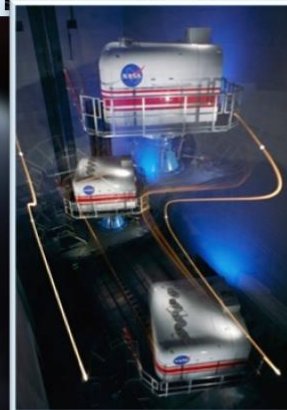
Wind Tunnels



ARC Jet Complex



Range Complex



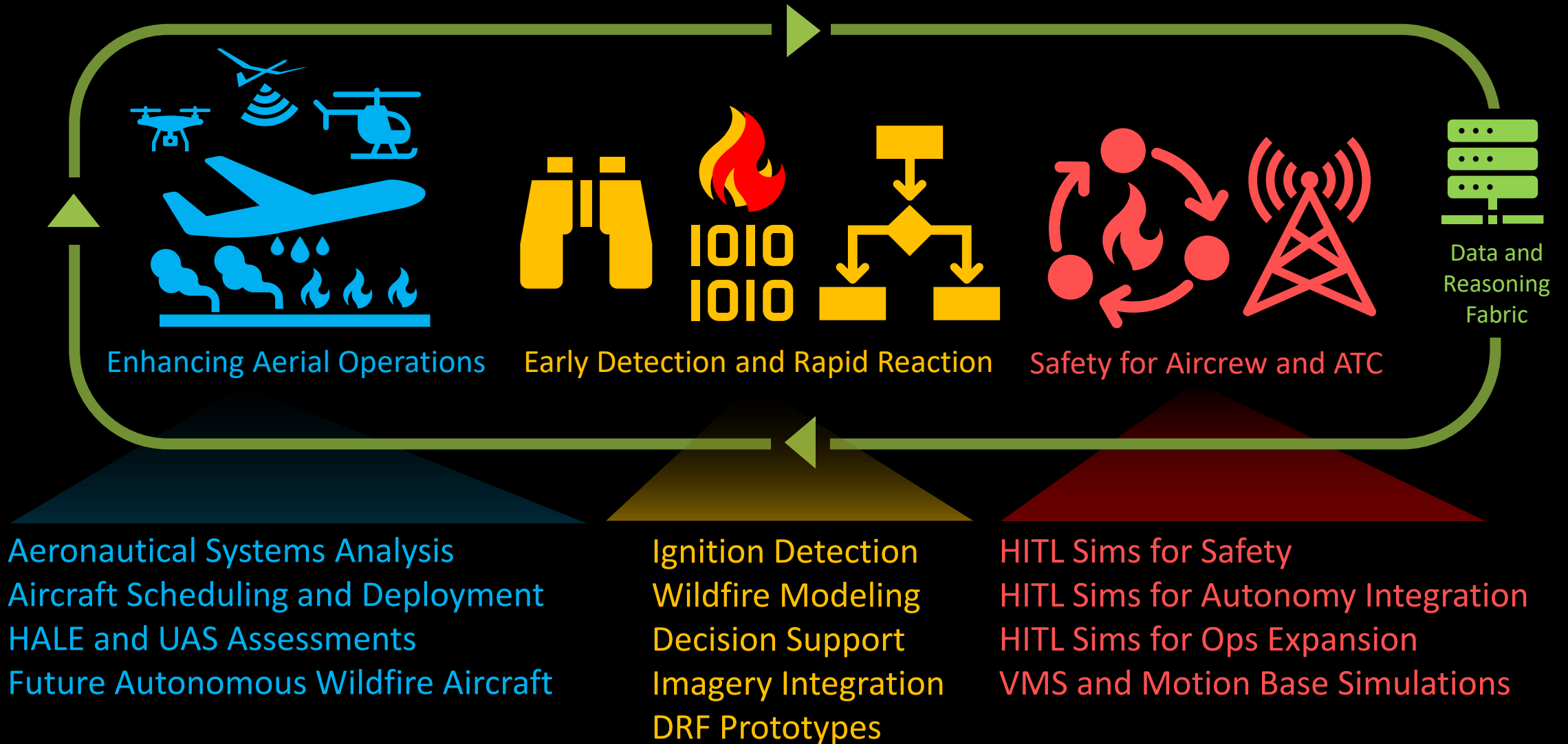
Simulators



Advanced
Supercomputing



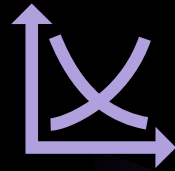
Wildfire Collaboration Areas





Enhancing Aerial Operations

Goal: *Improve wildfire effectiveness through analysis, optimizations, and autonomy*



Effectiveness
Assessments
Analysis of Operations



Swift HALE/HAPS

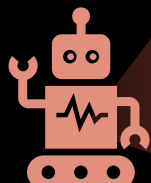


Decision and
Scheduling Tools

Metrics and Strategies Development



Replay and Analyses of Wildfire Aerial Ops



Safety via
Autonomy
Autonomy Integration
and Impacts



STEReO

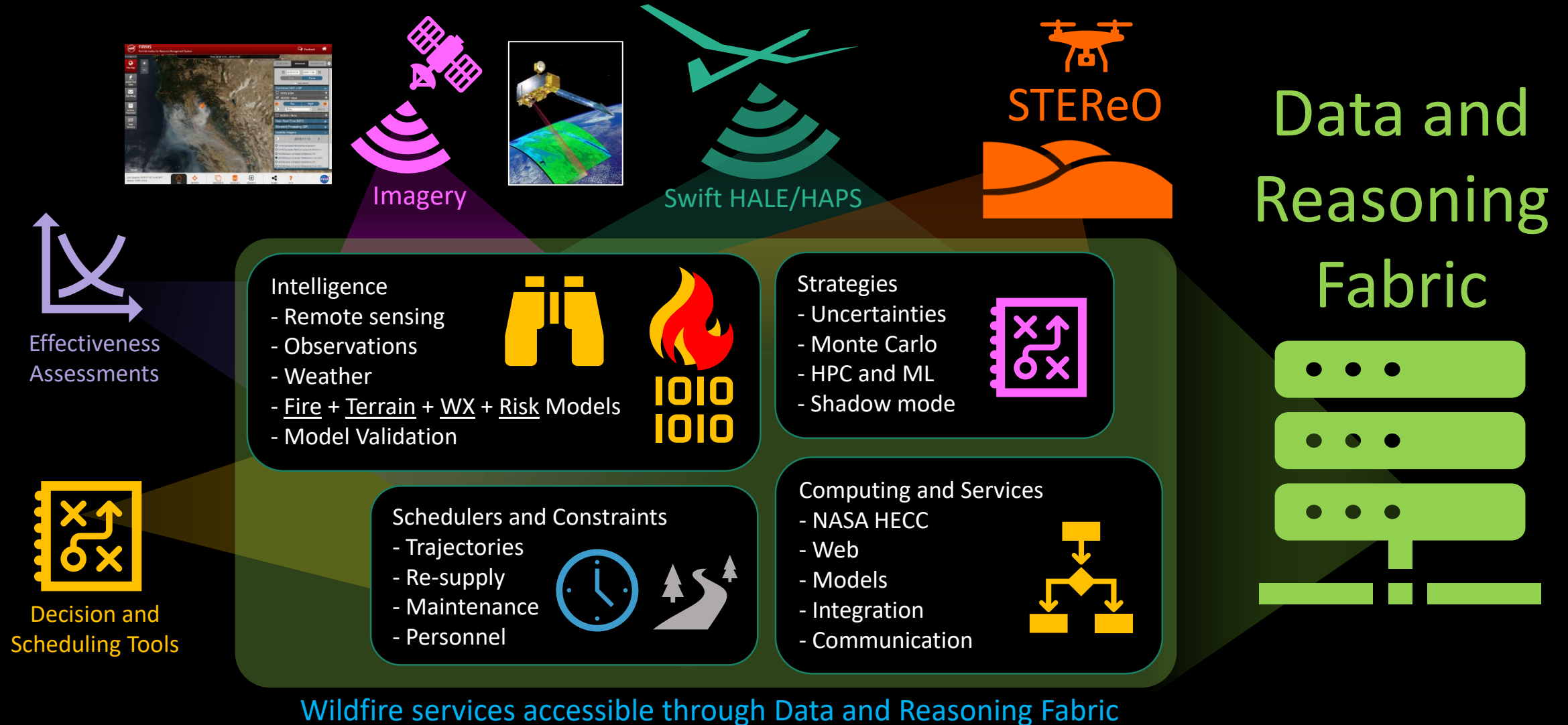


UTM ops for
USFS/CAL FIRE



Early Detection and Rapid Response with Data and Models

Goal: *Accelerate wildfire detection and response through advanced data services and modeling*



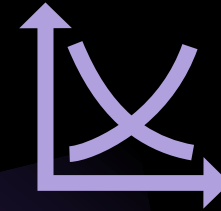


Safety and Effectiveness for Aircrew and ATC

Goal: *Improve safety and effectiveness of wildfire aircrew, ATC, and future autonomous operations*



Swift HALE/HAPS



Effectiveness Assessments

VMS, Fixed Base, and ATC Simulations

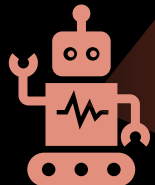


Decision and Scheduling Tools

Crew and ATC Strategies



HITL simulations of aircrew and ATC with increasing autonomy



Safety via Autonomy

Autonomy Integration and Impacts



STEReO



UTM ops for USFS/CAL FIRE



Appreciation for Inputs

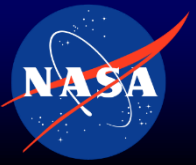


Vince, Everett
and
TFRSAC

Please join us for the Thursday discussions!



End of Presentation



NACA to NASA



Joseph S. Ames



NACA

Langley

Ames

Lewis

Dryden

NASA

1915

1939

1940

1946

1958