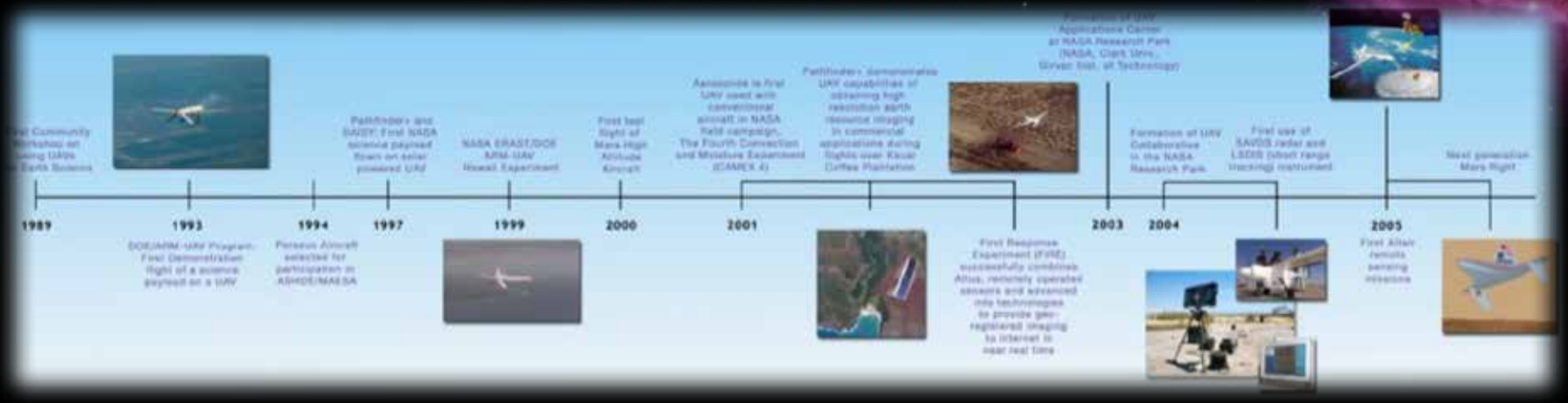

Center Overview and UAV Highlights at NASA Ames Research Center
Welcome to the Federal Unmanned Aircraft Systems (UAS) Workshop
Ms. Deborah Feng
Associate Center Director


EARTH *RIGHT* NOW
Your planet is changing. We're on it.
OFF THE EARTH, FOR THE EARTH.
INTERNATIONAL Space Station
NASA'S JOURNEY TO
MARS
TECHNOLOGY DRIVES EXPLORATION
NASA
AERONAUTICS
NASA
we're OUT there

Cross-cutting Role of Unmanned Aircraft Systems



Allow NASA projects to extend measurements and test new technologies

Provide a pathway for NASA instruments from ground, to balloon, to aircraft, to space.

Play a substantial role in civilian services as NASA and FAA work to develop safe and effective means for integrating them into the National Airspace System


NASA Centers and Installations
Ames Research Center
Plum Brook Station
Glenn Research Center
Independent Verification and Validation Facility
Goddard Institute for Space Studies
Goddard Space Flight Center
Headquarters
Jet Propulsion Laboratory
Armstrong Flight Research Center
White Sands Test Facility
Johnson Space Center
Michoud Assembly Facility
Stennis Space Center
Marshall Space Flight Center
Kennedy Space Center
Langley Research Center
Wallops Flight Facility

Ames is One of the Early NACA Laboratories



Joseph S. Ames



NACA 1915

Langley

Ames 1939

Lewis 1940

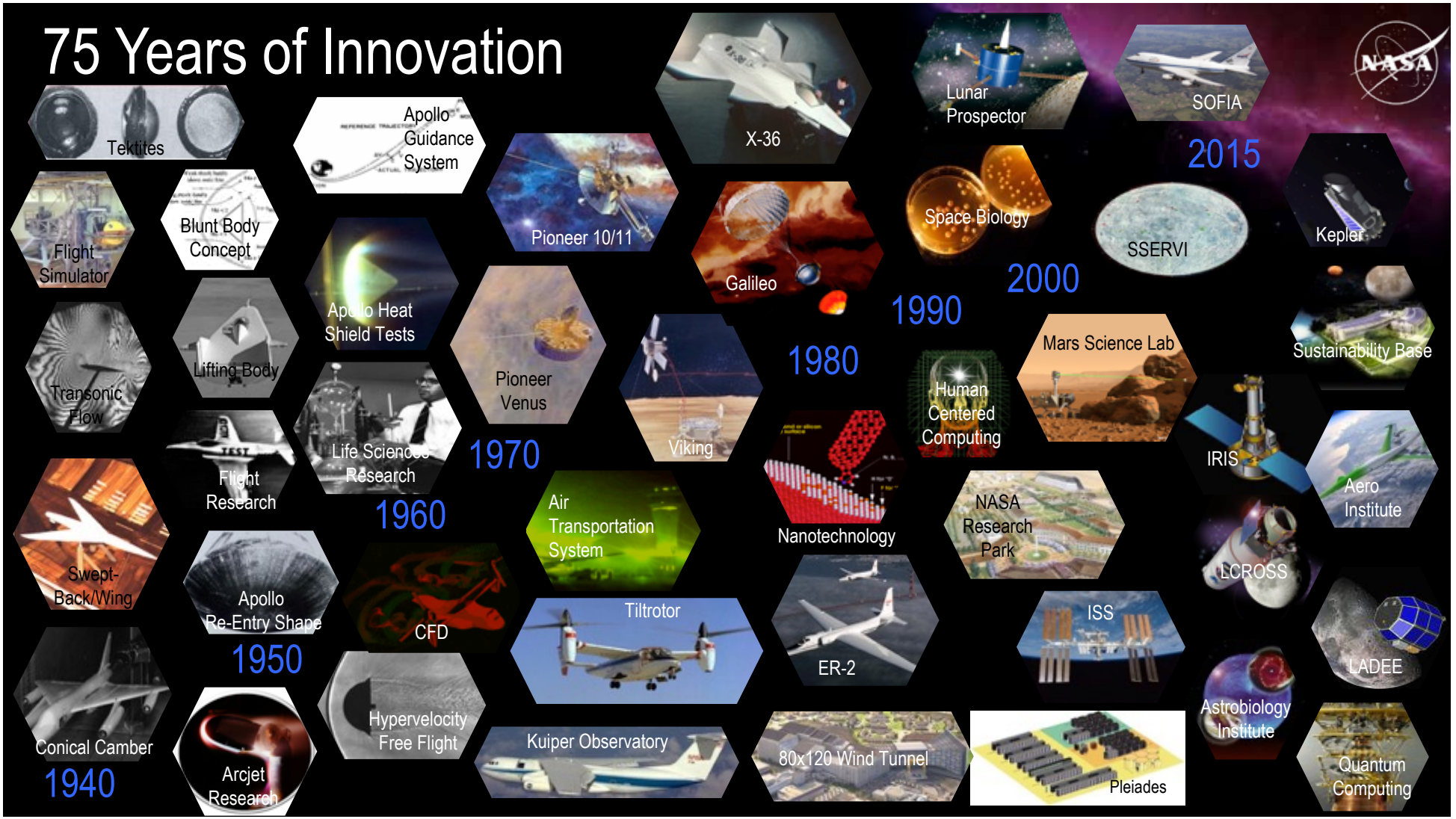
Dryden 1946

NASA 1958

Ames Research Center

- Occupants: ~1130 civil servants; ~2,100 contractors;1,650 tenants
  855 summer students in 2016
- FY2016 Budget: ~$915M (including reimbursable/EUL)
- ~1,900 acres (400 acres security perimeter); 5M building ft^2
- Airfield: ~9,000 and 8,000 ft runways

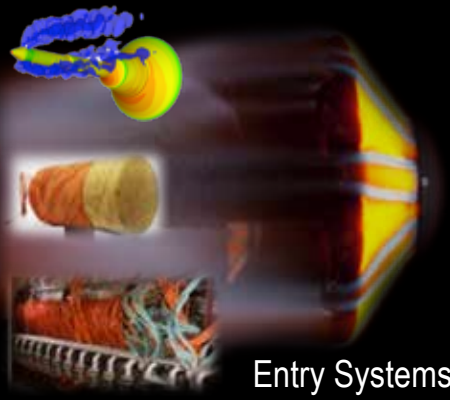



75 Years of Innovation
Tektites
Apollo Guidance System
X-36
Lunar Prospector
SOFIA
2015
Flight Simulator
Blunt Body Concept
Pioneer 10/11
Space Biology
SSERVI
Kepler
Apollo Heat Shield Tests
Galileo
2000
1990
Sustainability Base
Lifting Body
Pioneer Venus
Mars Science Lab
Transonic Flow
Viking
1980
Human Centered Computing
IRIS
Life Sciences Research
Flight Research
1970
Aero Institute
Air Transportation System
Nanotechnology
NASA Research Park
1960
Swept-Back/Wing
LCROSS
Apollo Re-Entry Shape
CFD
Tiltrotor
ISS
LADEE
1950
ER-2
Hypervelocity Free Flight
Astrobiology Institute
Conical Camber
Kuiper Observatory
80x120 Wind Tunnel
Pleiades
Quantum Computing
1940
Arcjet Research

Core Competencies at Ames Today



Air Traffic Management



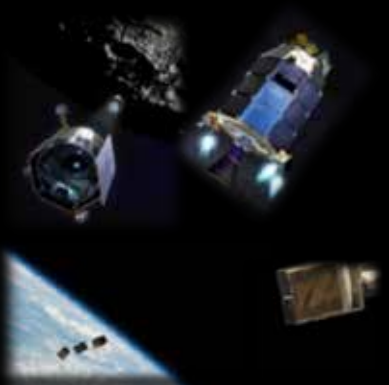
Entry Systems



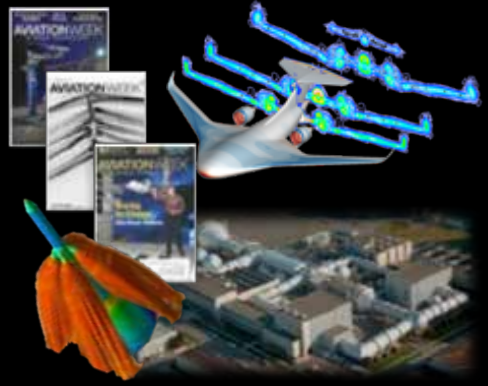
Advanced Computing & IT Systems



Intelligent/ Adaptive Systems



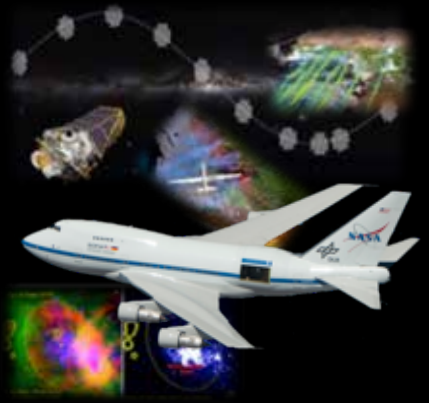
Cost-Effective Space Missions



Aerosciences



Astrobiology and Life Science



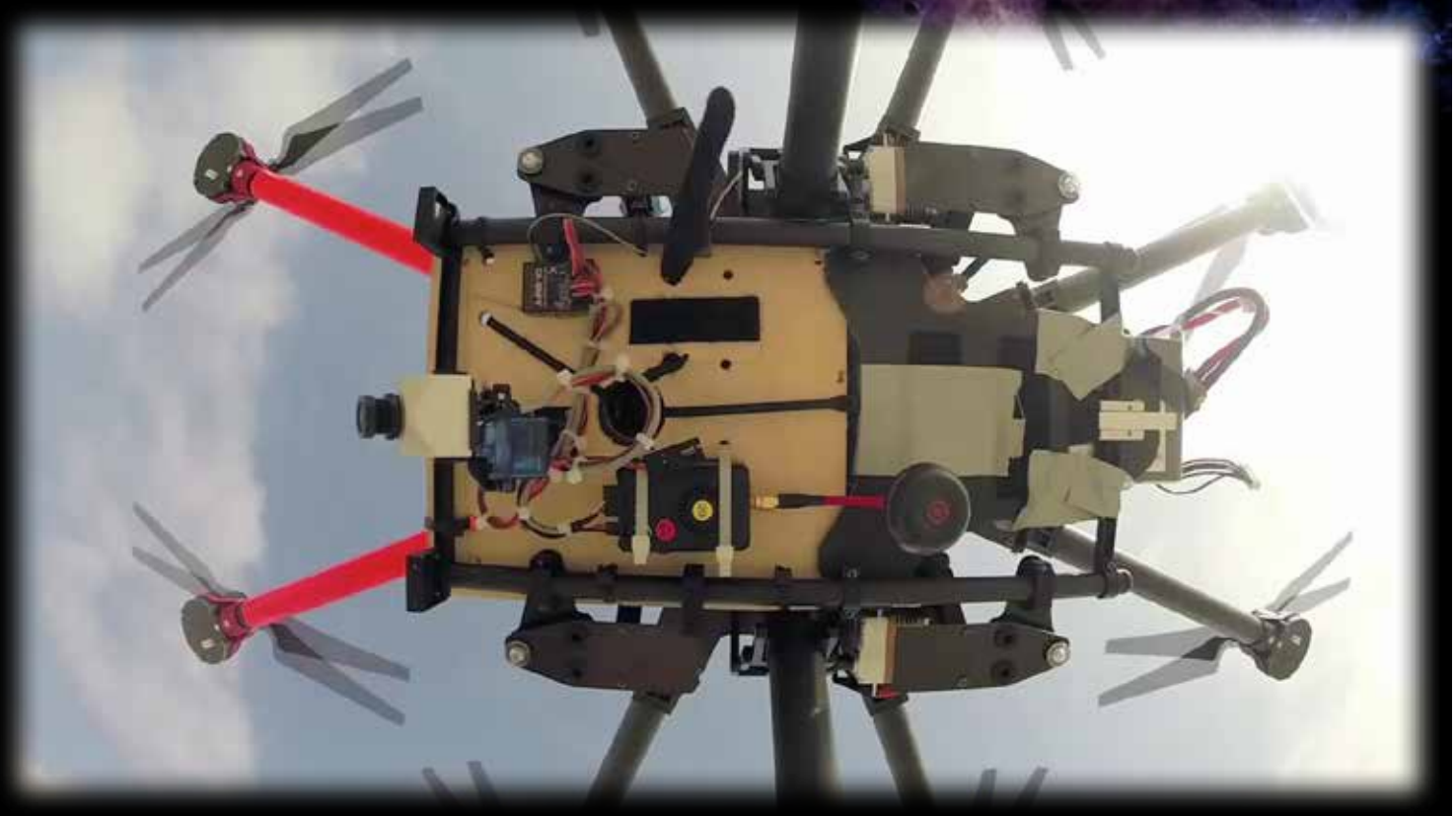
Space and Earth Sciences

Air Traffic Management and Aerosciences









UTM Convention 2015 A New Era of Aviation

UTM Convention 2016 Next Era of Aviation

Advanced Computing and IT Systems







Exploring Drone Aerodynamics with Computers

Intelligent/Adaptive Systems

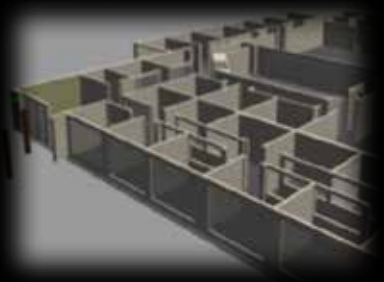
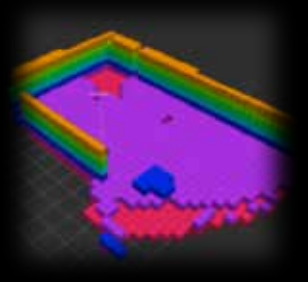
Search, Identify, and Track

- Optimal Search Planning
- Distant Object Detection
- Object Validation, Deep Learning
- Robust Tracking and Re-Search AI

Research and Test Facilities

- Outdoor – DART Site and Roverscape
- NUARC Indoor Flight Test Facility
- Advanced Simulation Environments



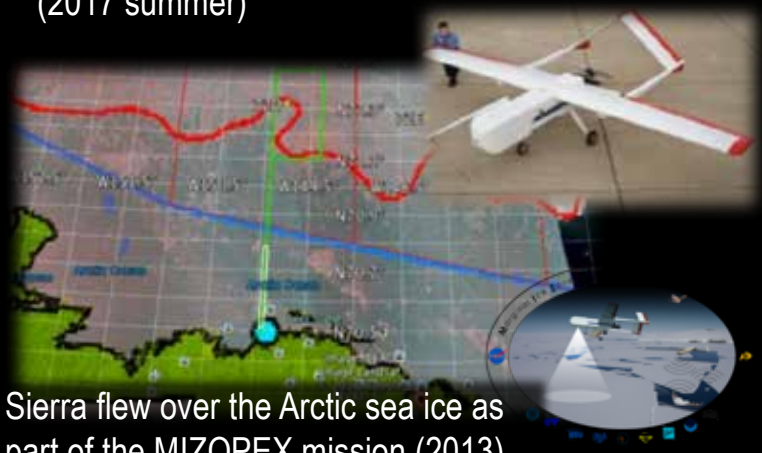






Earth Sciences



Matrice 600 hexacopter with payload to track invasive Asian carp in the Mississippi (2017 summer)

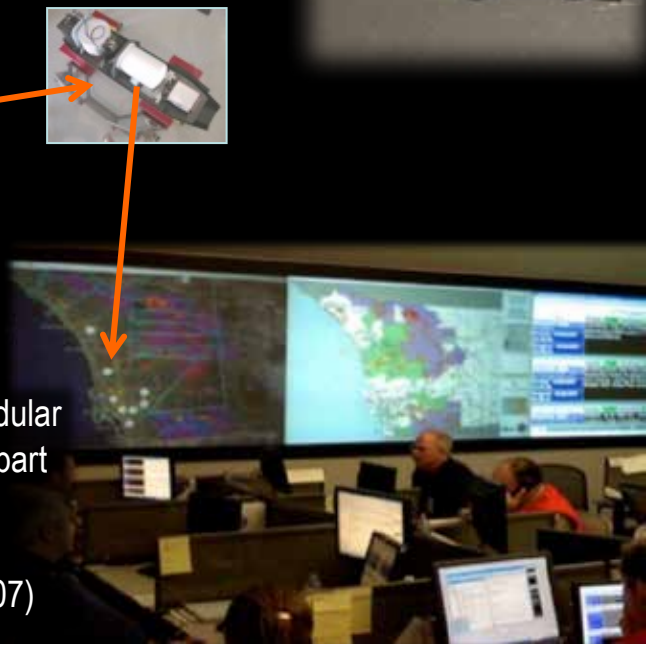


Sierra flew over the Arctic sea ice as part of the MIZOPEX mission (2013)



Dragon Eye @ Turrialba crater (Costa Rica) and Kilauea Crater (Hawaii) (2013)





Ikhana (using an autonomous modular sensor to see through smoke) as part of a Collaborative Decision Environment, relating real time information to fire responders (2007)

Partnerships at Ames

Commercial



Virtual Institutes



NARI
NASA AERONAUTICS RESEARCH INSTITUTE

SERVI
SOLAR SYSTEM EXPLORATION RESEARCH VIRTUAL INSTITUTE

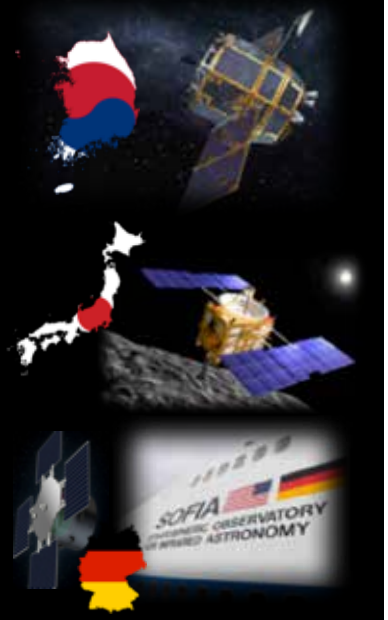
Inter-Agency

USGS
science for a changing world

NASA Research Park



International



Academia

UC Santa Cruz · Cal · Stanford · Georgia Tech · MIT

Partnerships and UTM

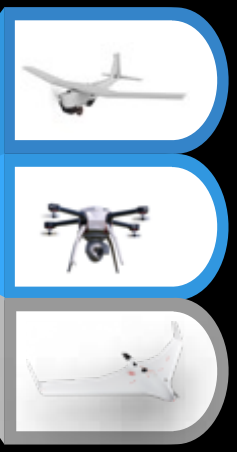
Commercial

- Use cases and operational needs
- Readiness of technologies (e.g., sense & avoid)
- Validation of the concept of operations
- Participation in flight tests and demonstration
- Technology options for vehicle

14 Partner Organizations

2 Simultaneous Altitude Stratified Expanded Operations

11 UAS Platforms



FAA

- Subject matter expertise
- Concept of operations
- Information requirements
- Roles/responsibilities definition
- Integration & interoperability needs
- Engagement on potential solutions

NASA

- Concept of operations
- Overall UTM information architecture and data exchange definition
- UTM research platform, flight test planning and execution
- Performance requirements for operations including planning, scheduling, track/locate, sense & avoid