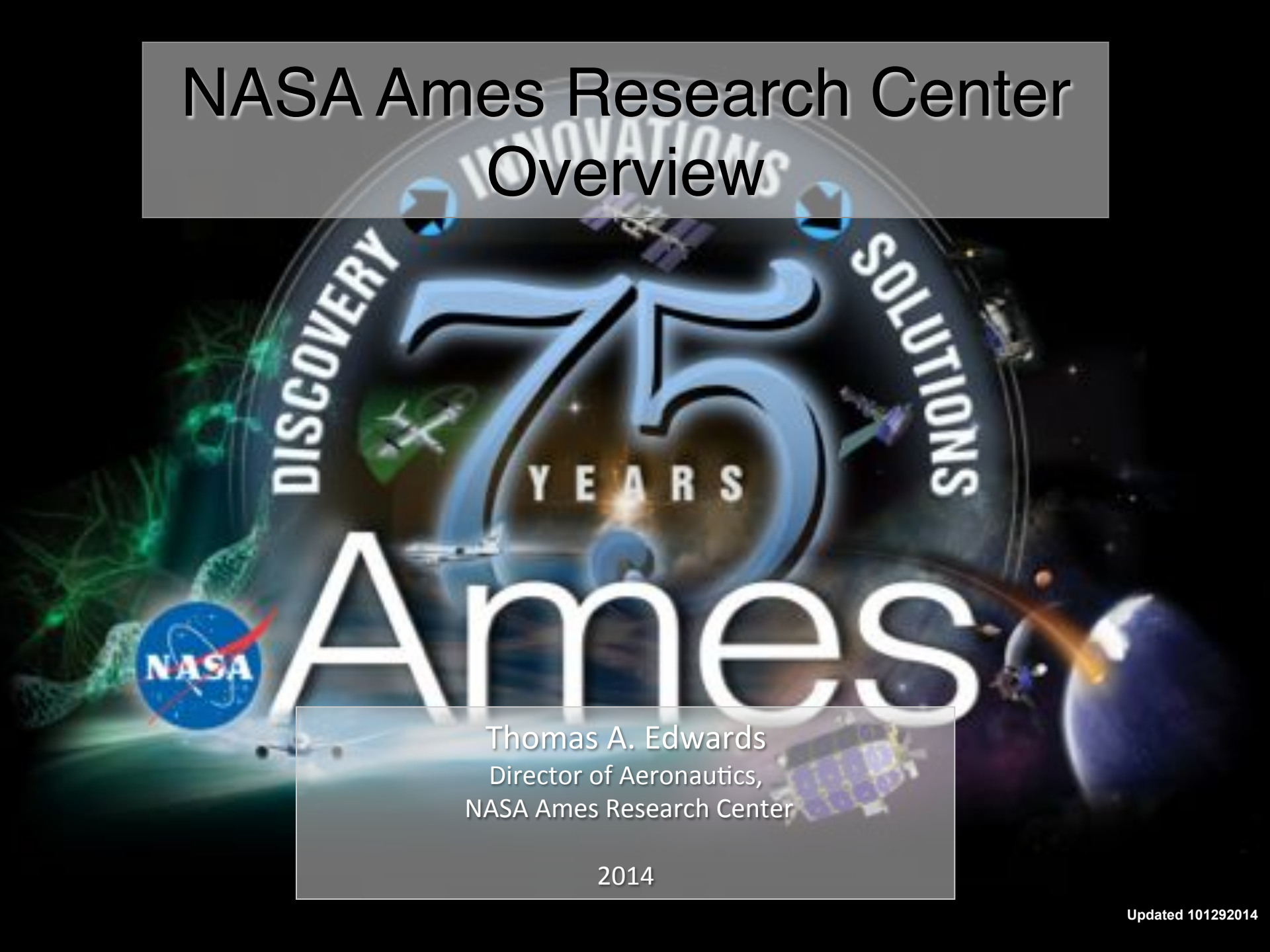
NASA Ames Research Center Overview



Thomas A. Edwards
Director of Aeronautics,
NASA Ames Research Center

2014

Updated 101292014

NACA Laboratories

NACA

Joseph S. Ames

Langley

Ames

Lewis

Dryden

NASA

1915 **1939** **1940** **1946** **1958**

Ames
ANNIVERSARY

National Aeronautics and Space Administration

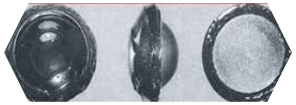
Aerial View of NASA Ames Research Center

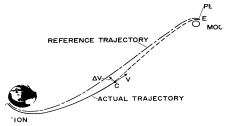
Ames Open House, Oct. 17, 2014

75 Years of Innovation

Ames Research Center

NASA


Tektites

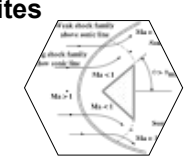


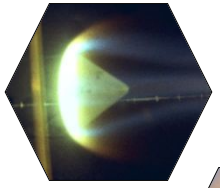
Apollo Guidance System

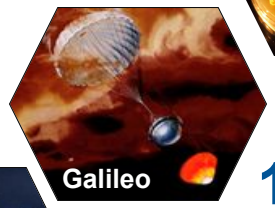

SOFIA

2014

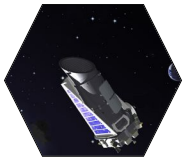

Flight Simulator


Blunt Body Concept


Apollo Heat Shield Tests

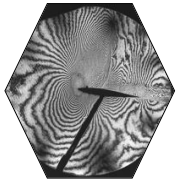



Space Biology


Kepler

1990

2000

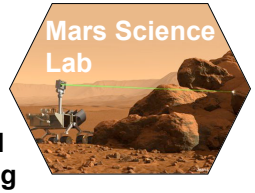

Transonic Flow


Lifting Body


Pioneer Venus

1980


Human Centered Computing

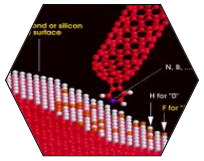



Sustainability Base


Life Sciences Research

Flight Research

1970


Nanotechnology

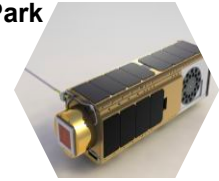

NASA Research Park


IRIS

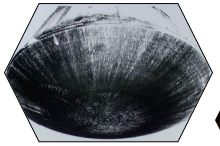

Aero Institute


Swept-Back/Wing

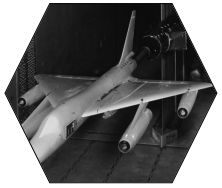
1960


O/OREOS


LCROSS


Apollo Re-Entry Shape


CFD

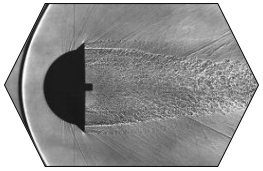

Conical Camber


Pleiades

1950

1940


Arcjet Research


Hypervelocity Free Flight


80x120 Wind Tunnel

Astrobiology Institute

Quantum Computing

LADEE

Ames Today

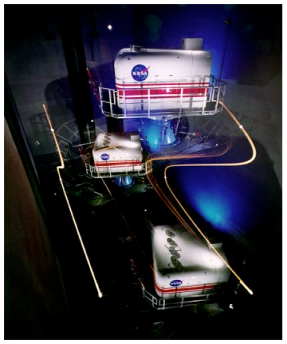
- **2480 employees***
- **≈900M + annual revenue (including reimbursable)**

***in addition, 900 students, summer 2012**

- Science
  - Space, Earth, Biological Sciences
  - Astrobiology, Lunar Science, Social Science
- Exploration Systems
  - Exploration Technology Development
  - Entry System Technology
  - Supercomputing
- Projects and Missions
- Aeronautics & Aviation
  - NextGen Airspace Systems
  - Fundamental Aeronautics
  - Aviation Safety
  - Green Aviation
- Affordable Small Satellites
- Innovation, Education, & Entrepreneurial Collaborations
  - NASA Research Park

Current Active Facilities, 2014

National Full Scale Aerodynamic Complex, 80x120 Wind Tunnel



Vertical Motion Simulator

Small Spacecraft Development Facility

Unitary Plan Wind Tunnel

SOFIA

Machine Shops

Small Satellite Lab

Pleiades - Columbia Super Computer
Quantum Computer

Ballistic Range

Arc Jets

MSL – Chem Lab

Air Traffic Management Lab

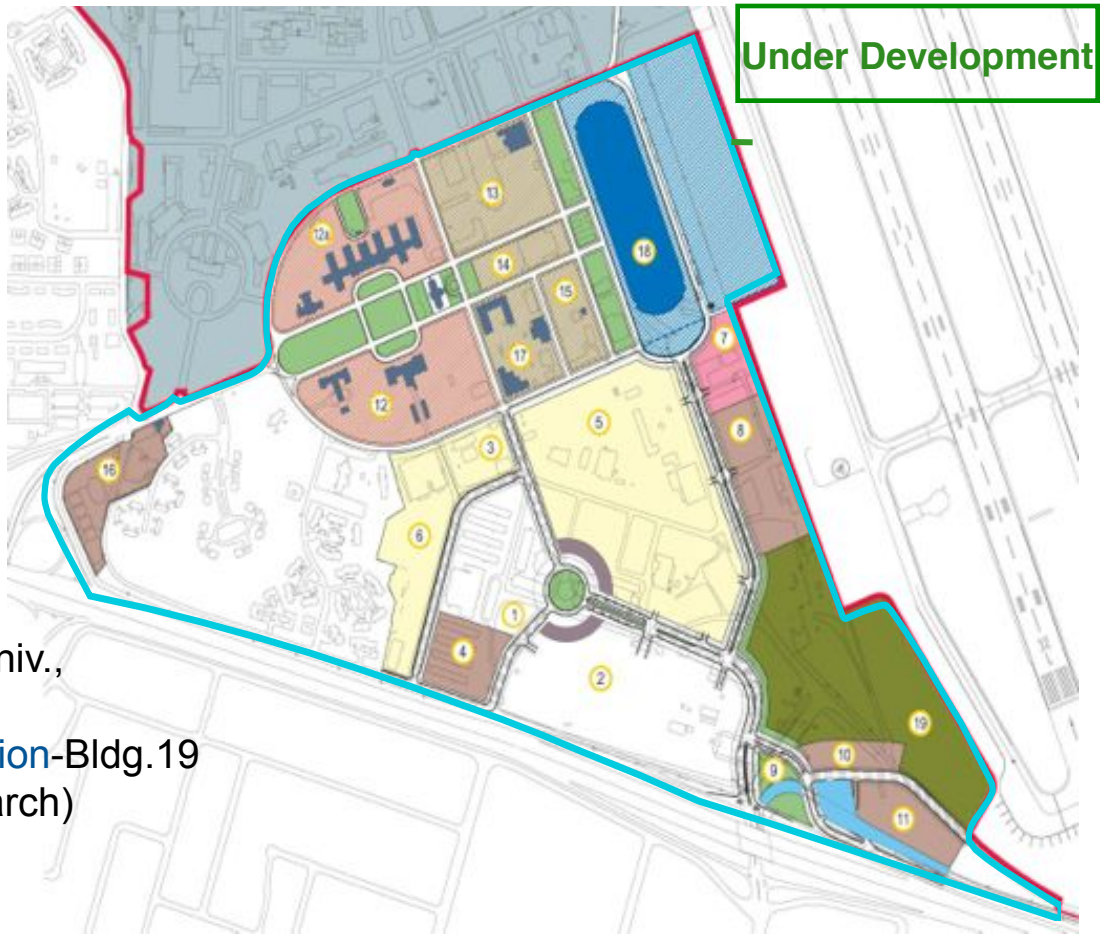
Virtual Institutes

NASA Research Park

Innovative Collaboration in Science, Engineering & Education

90+ Partners Today

University Associates
Google-North East Section
University of California/UARC-Bldg. 555
M2MI Corporation-Bldg.19
Carnegie Mellon University-Bldg. 23
San Jose State University
-Metropolitan Technology
Center in Bldg. 583C
Foothill-De Anza Community College
United Negro College Fund Special
Programs Corporation-Bldg.19
Space Technology Center
-San Jose State, Stanford, Santa Clara Univ.,
Utah State Univ. /Micro Satellite Classes
Kentucky Science & Technology Corporation-Bldg.19
Bloom Energy-Bldg. 543 (Fuel Cell Research)
Industry Partners-Bldg. 566 & 19
UAV Center-Bldg.18
International Space University
Singularity University



International Partnerships

Interns/ Visiting Researchers

1. Australia
2. Brazil
3. Denmark
4. France
5. Japan
6. India
7. Ireland
8. Israel
9. Italy
10. Mexico
11. Norway
12. Poland
13. Spain
14. S. Korea
15. UAE
16. UK

Technical Collaboration

1. Canada
2. Chile
3. France
4. Germany
5. Italy
6. Japan
7. Lithuania
8. Mexico
9. Netherlands
10. Norway
11. Saudi Arabia
12. Sweden
13. Spain
14. Trinidad & Tobago
15. UK

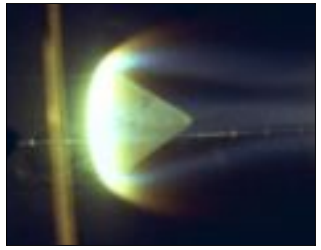
Ames Ingenuity

Earth

Air Traffic Management

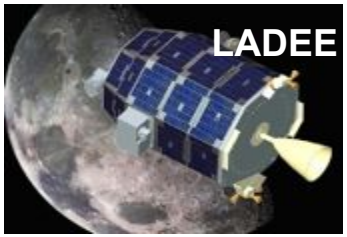
80 X 120 Wind Tunnel

Aeronautical Institute

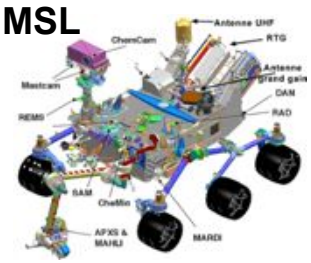


Safe Return to Earth from off Earth Missions

Solar System



Moon



Planets

CHE-MIN-EXP (Mars)

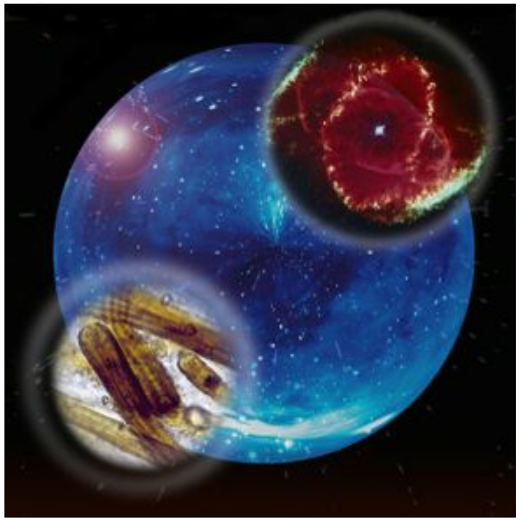
Sun

Universe

Galaxy

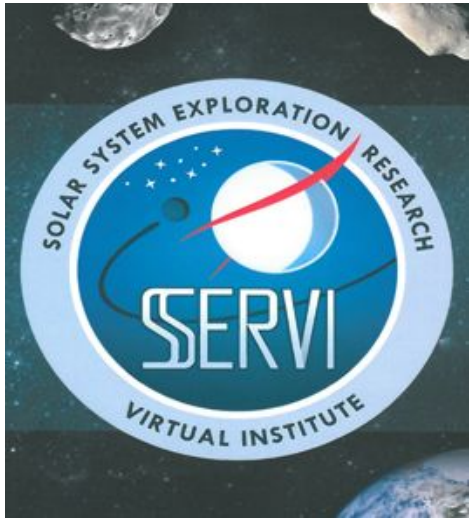
Virtual Institutes at Ames

Astrobiology Institute



Scientific Study of life

Solar System Exploration Research Virtual Institute



To advance basic and applied lunar and planetary science research and to advance human exploration of the solar system through scientific discovery

NASA Aeronautics Research Institute

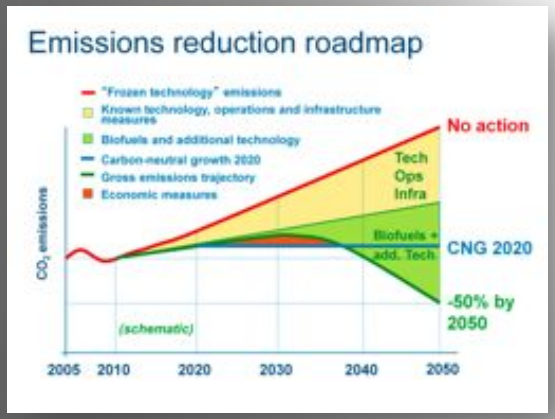
Creating new tools and technologies for reducing air traffic congestion and environmental impacts, improving safety, and designing aircraft

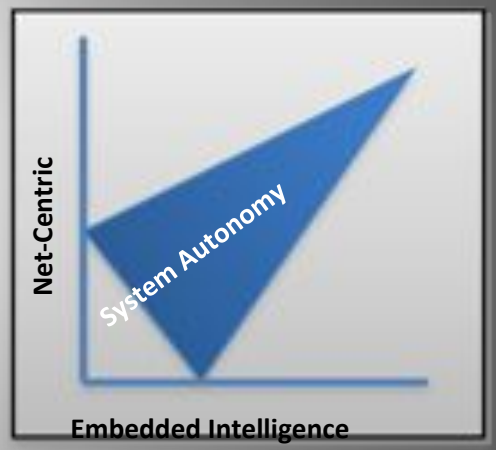
NASA Ames Aeronautics Overview

How do these trends affect aviation?

Three mega-drivers emerge.

Traditional measures of global demand for mobility – economic development, urbanization -- are growing rapidly





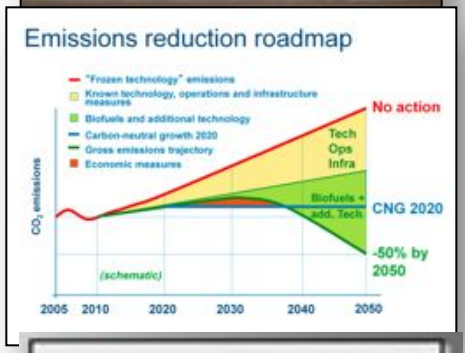
Severe energy and climate issues create enormous affordability and sustainability challenges

Revolutions in automation, information and communication technologies enable opportunity for safety critical autonomous systems

How is NASA Aeronautics responding?

Research is organized into six relevant themes.

3 Mega-Drivers



6 Strategic Research & Technology Thrusts

Safe, Efficient Growth in Global Operations

- Enable full NextGen and develop technologies to substantially reduce aircraft safety risks

Innovation in Commercial Supersonic Aircraft

- Achieve a low-boom standard

Ultra-Efficient Commercial Transports

- Pioneer technologies for big leaps in efficiency and environmental performance

Transition to Low-Carbon Propulsion

- Characterize drop-in alternative fuels and pioneer low-carbon propulsion technology

Real-Time System-Wide Safety Assurance

- Develop tools for use in a prototype of an integrated safety monitoring and assurance system

Assured Autonomy for Aviation Transformation

- Develop high-impact aviation autonomy applications

What vision has NASA set for aviation?

A revolution in sustainable global air mobility.

How are the vision's research thrusts used?

All of the new programs address more than one, or all, of the research thrusts.

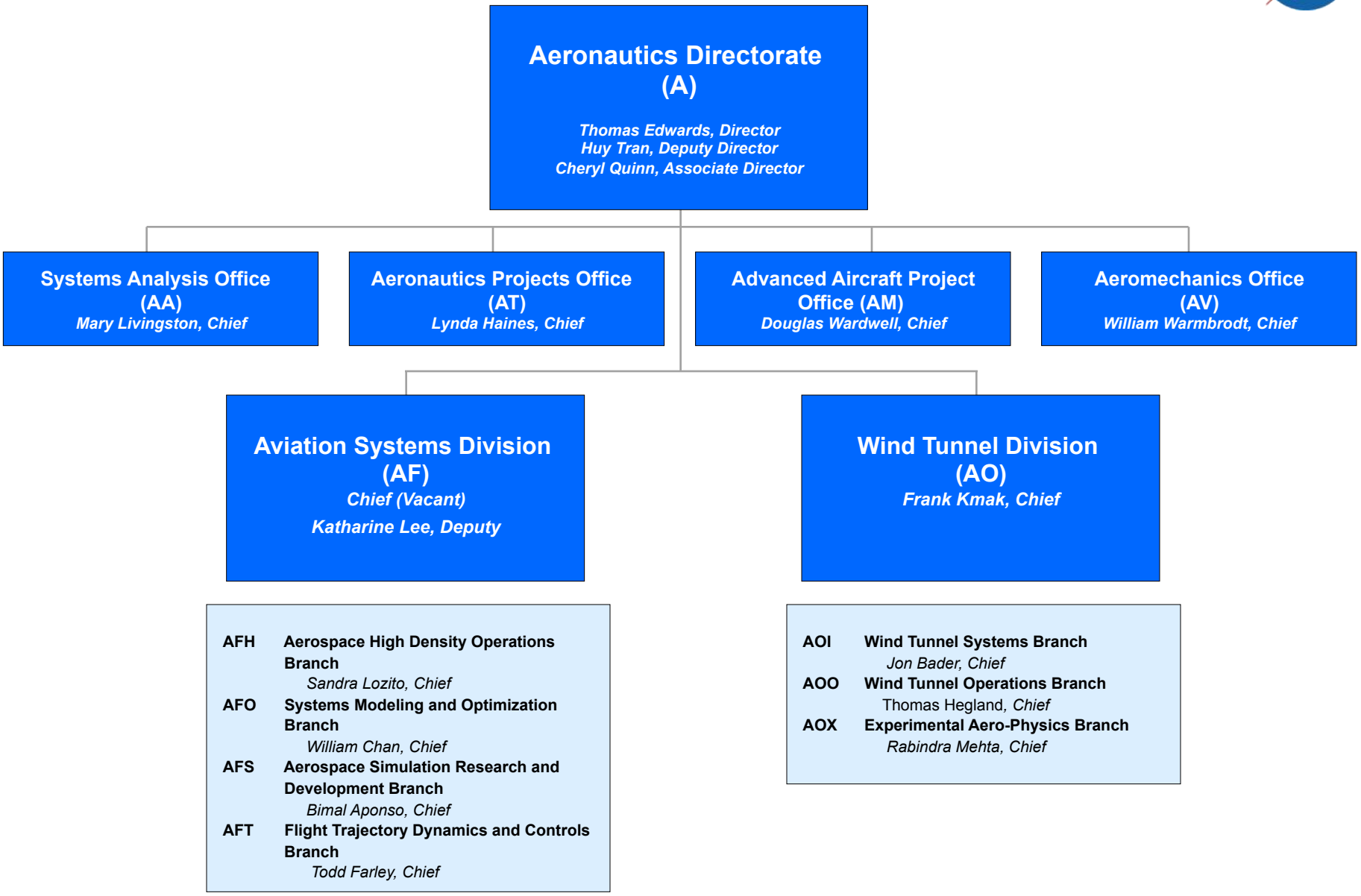
Aeronautics at Ames

Primary Research Areas:

- *Next Gen – Air Traffic Management*
- *Verification and Validation of Flight Critical systems*
- *Data mining and human machine interface*
- *Rotorcraft Aeromechanics and Controls*
- *Sonic boom reduction, advanced CFD methods*
- *Systems Design and Mission Simulation*
- *UAS in the NAS (Separation Assurance and Human Systems integration)*
- *Environmentally Responsible Aviation*

Partners: Federal Aviation Administration, Department of Defense, Industry, Academia

Aeronautics Directorate Structure



Exploration Technology Directorate Structure