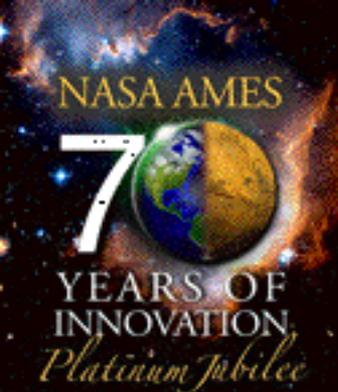




**NASA Ames Research Center  
NASA Advisory Council  
October 29, 2009**

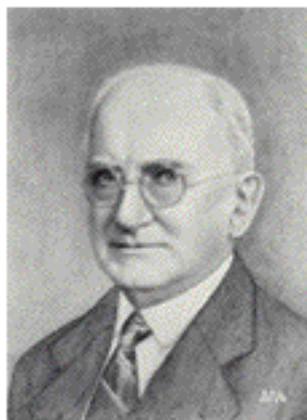


NASA Ames Research Center in Silicon Valley



# NACA Laboratories

**NACA**



Joseph S. Ames

**NASA**

**Ames**

**Dryden**

**Langley**

**Lewis**



1915

1939

1940

1946

1958



# Ames Research Center *in Silicon Valley*



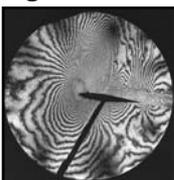
## Seven Decades of Innovation



Tektites



Flight Simulator



Blunt Body Concept



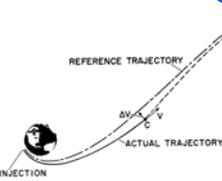
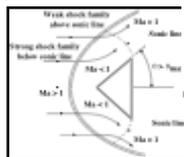
Transonic Flow



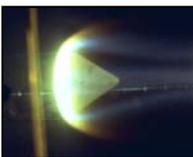
Swept-Back/Wing



Conical Camber  
**1940**



Guidance System



Apollo Heat Shield Tests



Lifting Body



Flight Research



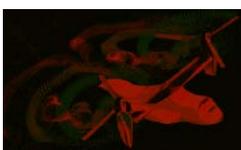
Life Sciences Research



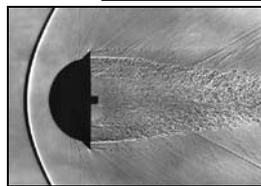
Apollo Re-Entry Shape  
**1950**



Arcjet Research



CFD



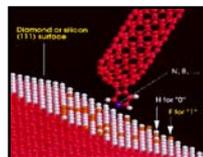
Hypervelocity Free Flight



80x120 Wind Tunnel



Air Transportation System



Nanotechnology



NASA Lunar Science Institute

**2000**

Human Centered Computing

**1990**

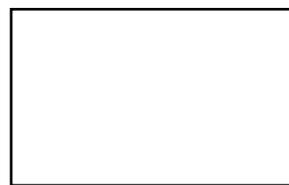


**2010**

SOFIA



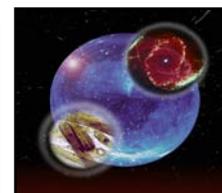
Kepler



NASA Research Park



LCROSS



Astrobiology Institute



LADEE



One of the World's Fastest Operational Supercomputers



# NASA Ames Research Center Today

- Science (Earth-Life-Space)
- Astrobiology
- Science Missions
- Exploration Systems
- Small Satellites
- Aviation and Aeronautics
- Innovative Collaborations
- 2400+ Employees
- \$700+ M Annual Budget





# Astrobiology

Scientific Study of Life in the Universe

Three Fundamental Questions

- How does life begin and evolve?
- Does life exist elsewhere in the universe?
- What is life's future on Earth
- and beyond?

NASA Astrobiology Institute  
at Ames

- Dr. Carl Pilcher, Director
- 12 Lead Member Institutions
- 6 International Partners

NASA AMES



YEARS OF  
INNOVATION  
*Platinum Jubilee*

National Aeronautics and Space Administration



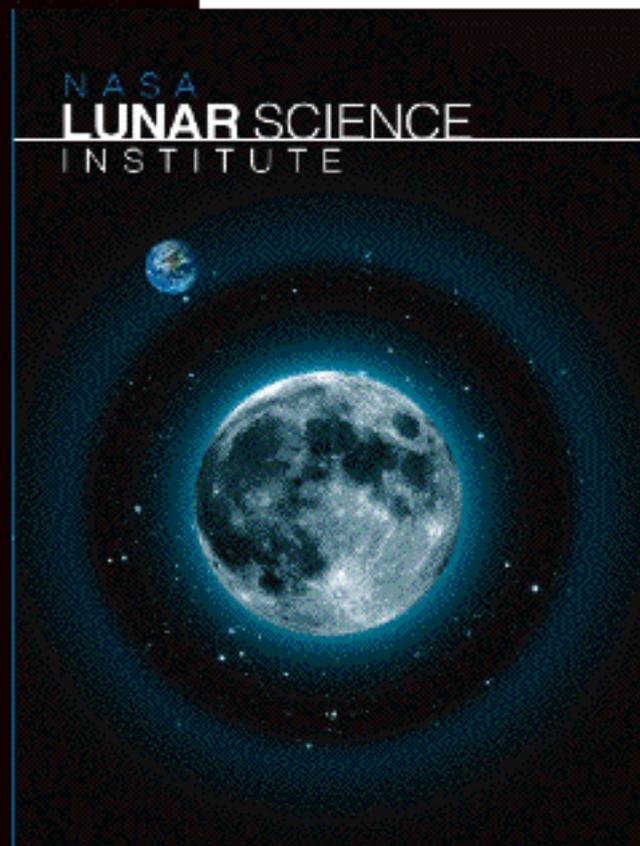
# NASA Lunar Science

## Science...

- Of the Moon
- On the Moon
- From the Moon

## NASA Lunar Science Institute at Ames

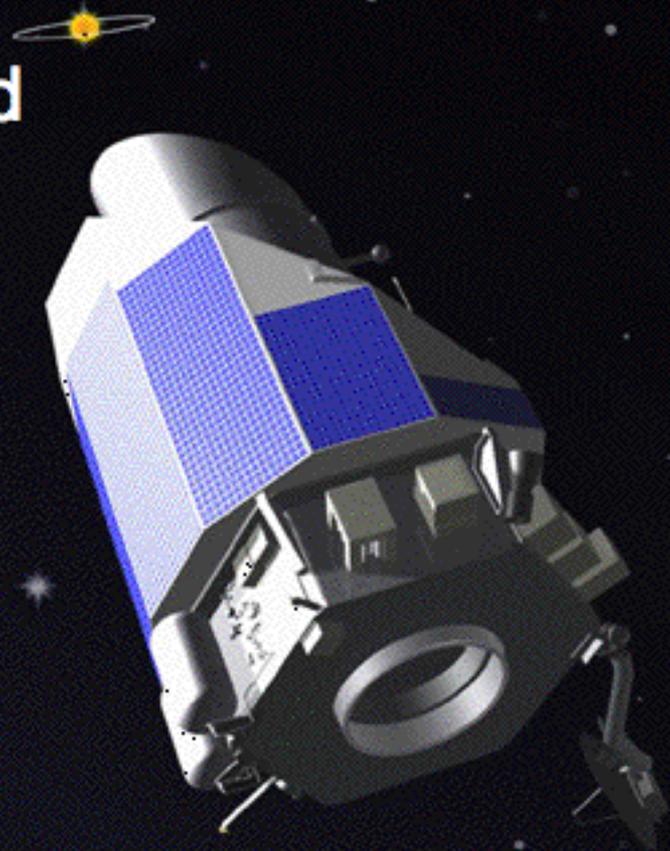
Dr. David Morrison, Interim Director  
7 Lead Member Institutions  
3 International Partners

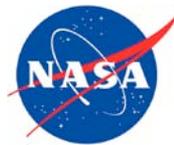
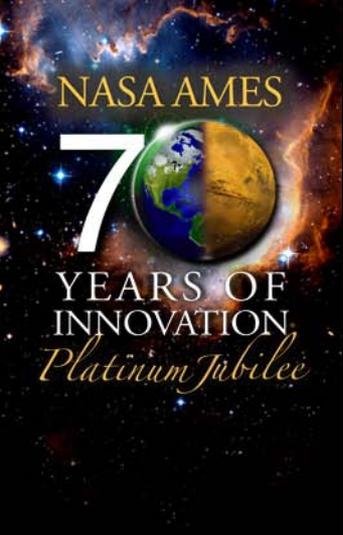




# Kepler: The Search for Habitable Planets

- Search for Earth-size and smaller planets in orbit around stars in our galactic neighborhood
- Launched March 2009
- First light April 2009





# Lunar Crater Observation and Sensing Satellite (LCROSS)

Lunar Kinetic Impactor Mission employed to reveal the presence and nature of water ice on the Moon.

LCROSS piggybacked on Lunar Reconnaissance Orbiter

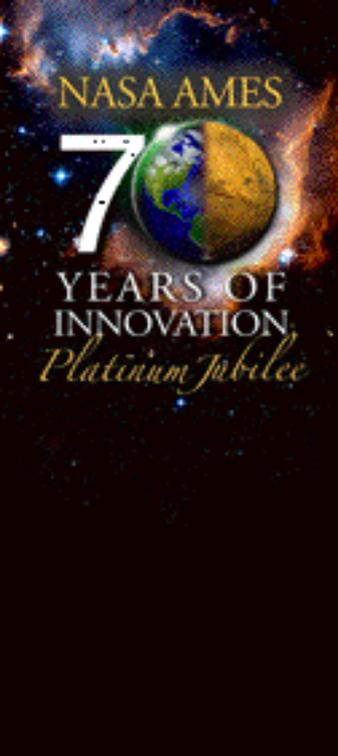
April 2009 Launch

October 2009 Impact

## Lunar Atmosphere and Dust Environment Explorer (LADEE)

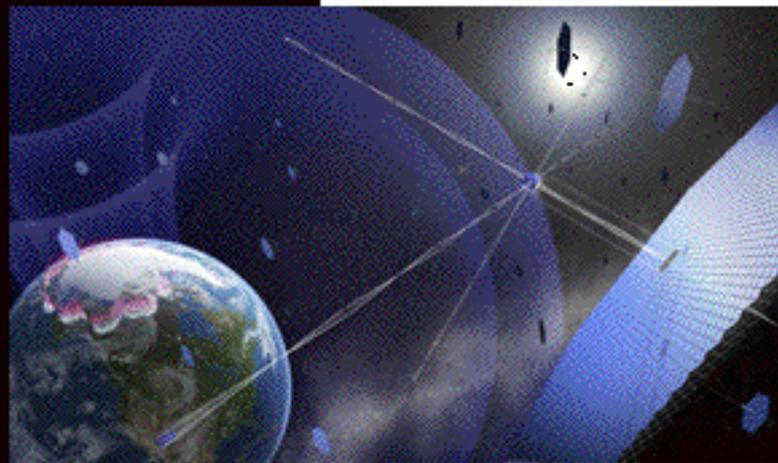
Will seek new information about the tenuous lunar atmosphere and dust environment before that environment is altered by extended human activity on the Moon.





# Small Satellites/ Suborbital Flight

Advance the effectiveness of low cost experiments in support of NASA's exploration missions and advanced technical demonstrations



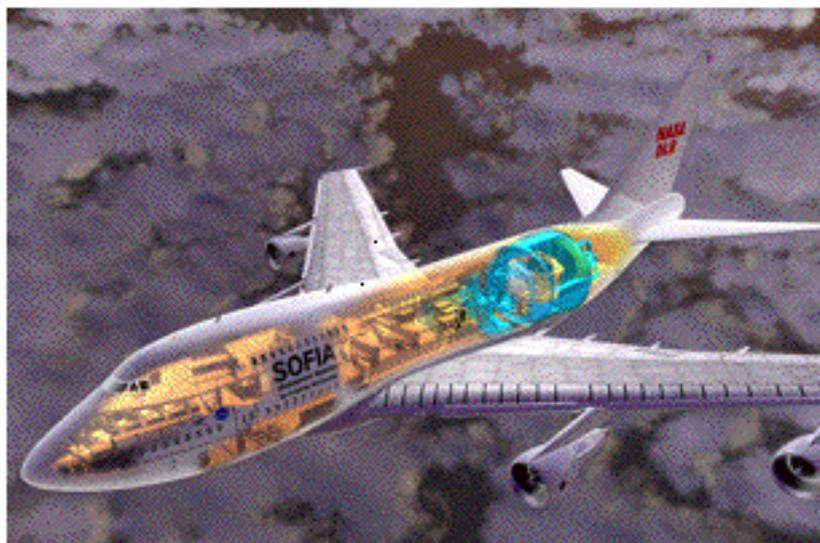
- Lasercom/IP
- XNAV
- Lunar Micro-Lander
- Lunar Science Orbiter
- GeneBox
- GeneSat-1
- Suborbital Flights



# SOFIA - Stratospheric Observatory for Infrared Astronomy

**Explore the infrared universe flying above  
interference from the Earth's water vapor  
atmosphere**

**National Academy priority from Decadal  
Surveys, 1991 & 2001**



**2.8 m IR telescope  
in 747 aircraft  
160 flights per year**

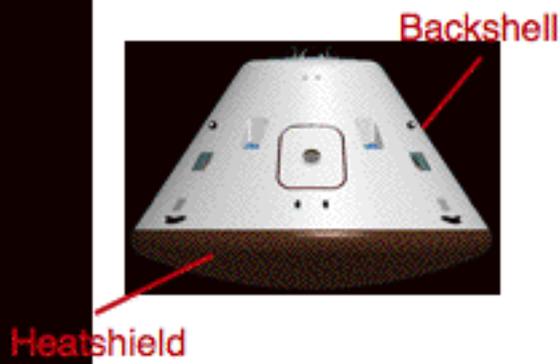


# Exploration Systems

- Thermal Protection Systems
  - Mission Operations
  - Integrated Systems Health Management
  - Software Deliverables to Missions
  - Information Technology (Autonomy, Human Factors)
  - Super Computing
- 
- A background image of a Mars surface. In the foreground, an astronaut in a white spacesuit with a NASA patch and an American flag patch is walking. In the background, another astronaut is visible near a white rover. The terrain is reddish-orange with dark rocks.

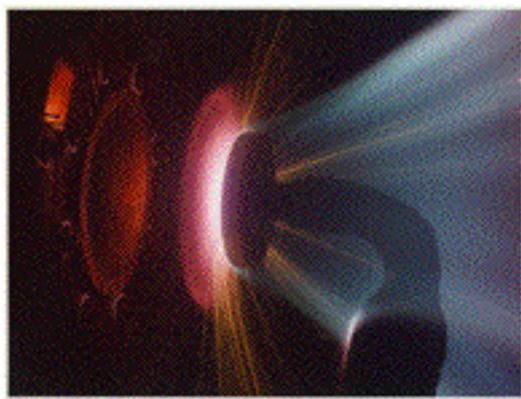
# Thermal Protection Materials and Arc-Jet Facility

- ARC leads development of Orion's thermal protection system
- Testing and/or materials for all US planetary atmospheric entry systems; Support for Apollo, Shuttle, and Crew Exploration Vehicle



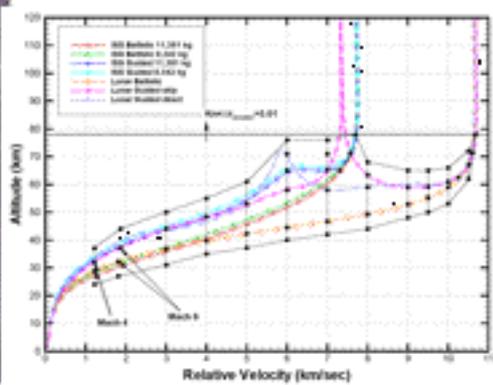
**Design**

Lunar Direct Return & Low Earth Orbit heat shield



**Testing**

Ablative Thermal Protection



**Analysis**



# Information Technology

## Intelligent Adaptive System

- Autonomous systems and robotics
- Integrated Systems Health Management
- Robust software systems

## Super Computing, Large Data Sets & Datamining

- High-end computing resources, integrated with modeling and simulation, data analysis, and visualization technologies
- The second-most-powerful “green” supercomputer in the world

Ames provides overall management of Information Technology Systems for Constellation





# Air Traffic Management/ Air Traffic Control

Traffic Management Advisor (TMA) has had significant positive impact on the National Airspace System (NAS)

Estimated annual savings of \$400M/year to airlines

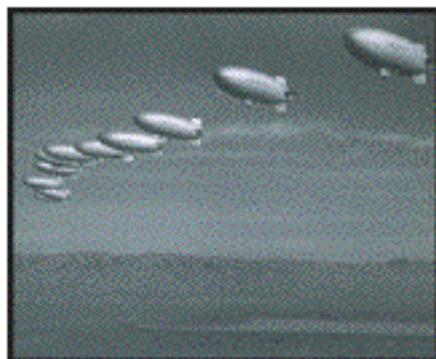


New Tools for  
Air Traffic Control:  
TMA--Deployed at 11 sites--  
Soon to be nation-wide!!



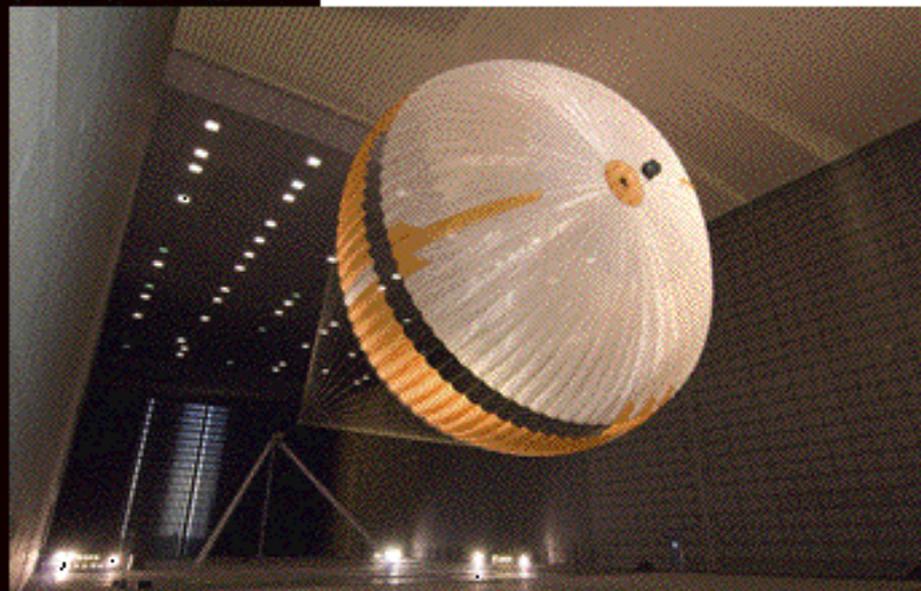
# Green Aviation

- Environmentally Responsible Aviation
- Air traffic control & management
- Automation technologies to reduce emissions
- Biomass energy
- Optimal routing of flights, automated separation assurance, and advanced aircraft control systems
- Improved propulsion systems
- Advanced aircraft concepts
- Fuel cells
- Airships

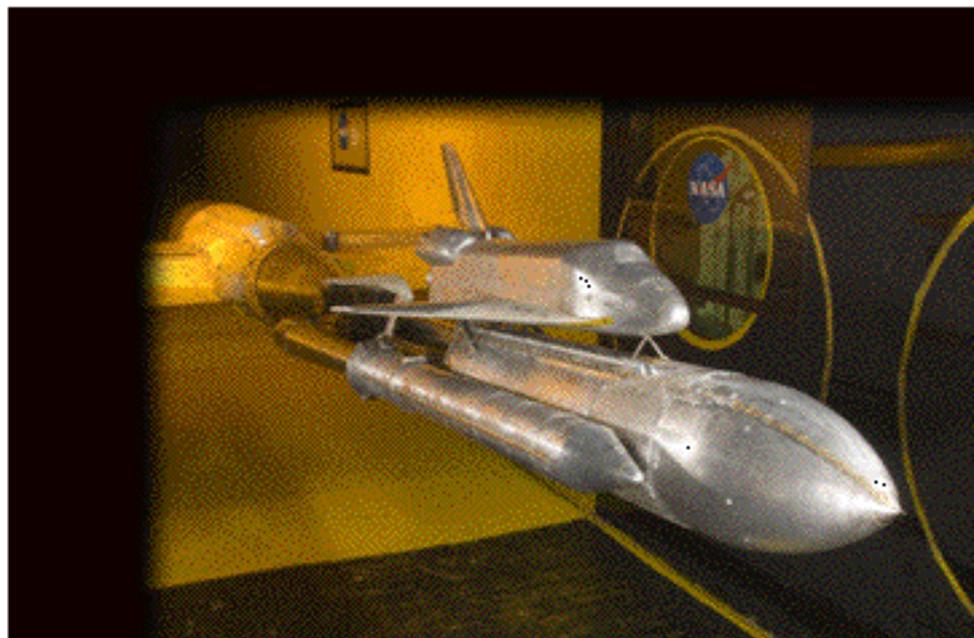


# Wind Tunnels

- Space transportation vehicles
- require significant wind tunnel testing to address
- configuration development
- for planetary exit and reentry



- **Space Shuttle**
- **Constellation**



NASA AMES



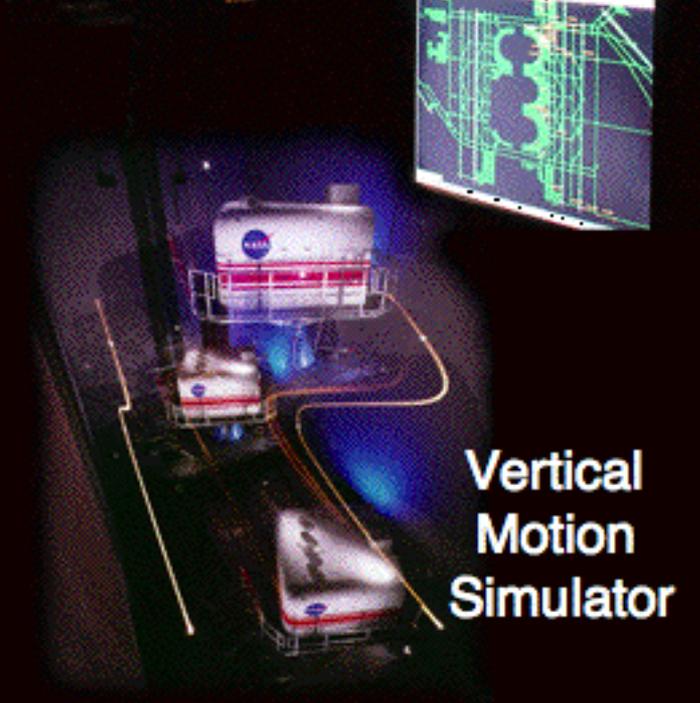
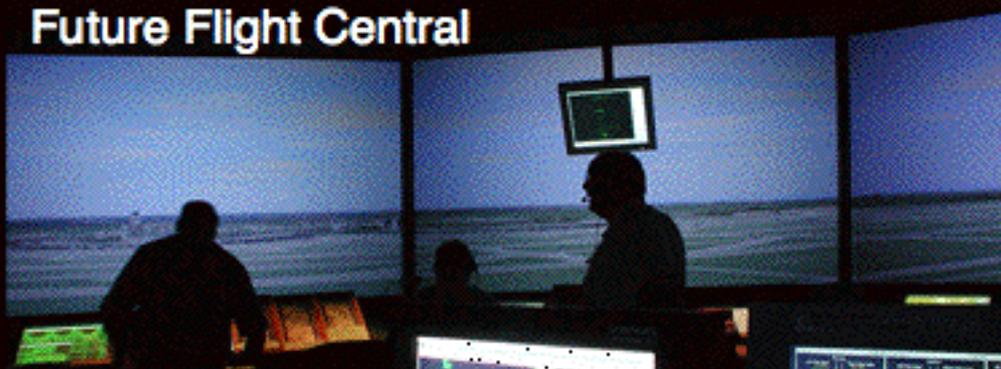
YEARS OF  
INNOVATION  
*Platinum Jubilee*

National Aeronautics and Space Administration



# Simulators

**Future Flight Central**



**Vertical  
Motion  
Simulator**



**Crew-Vehicle  
Systems**

**Research Facility**



# NASA Research Park

**Innovative Collaboration in Science,  
 Engineering & Education, (under development)**

**50+ Partners Today:**

**University Associates**

**Google**

**University of California**

**M2MI Corporation**

**Carnegie Mellon University**

**San Jose State University**

**Foothill-De Anza Community College**

**United Negro College Fund**

**Special Programs Corporation**

**Space Technology Center-**

**San Jose State University,**

**Stanford University,**

**Santa Clara University,**

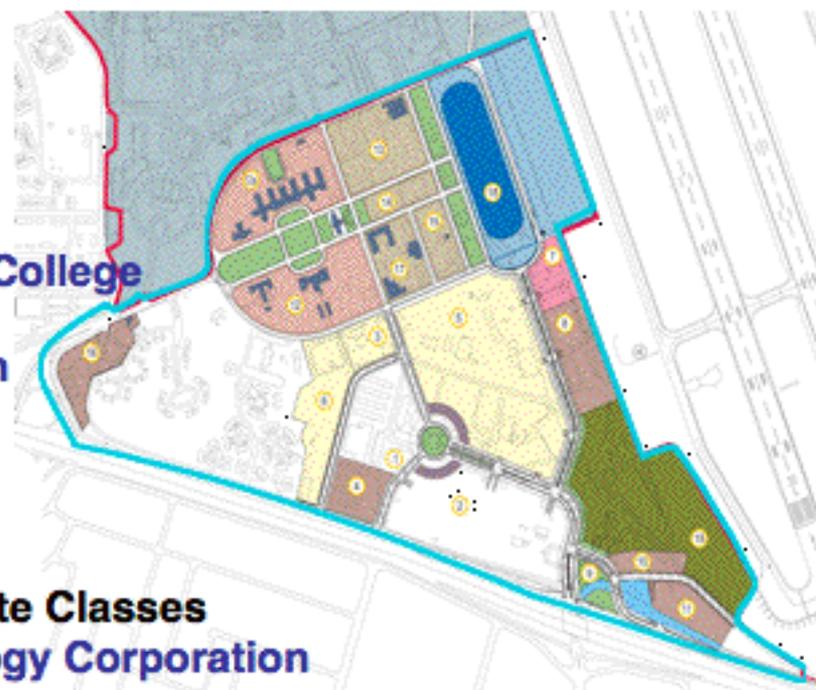
**Utah State Univ. /Micro Satellite Classes**

**Kentucky Science & Technology Corporation**

**Bloom Energy**

**Industry Partners**

**UAV Center**



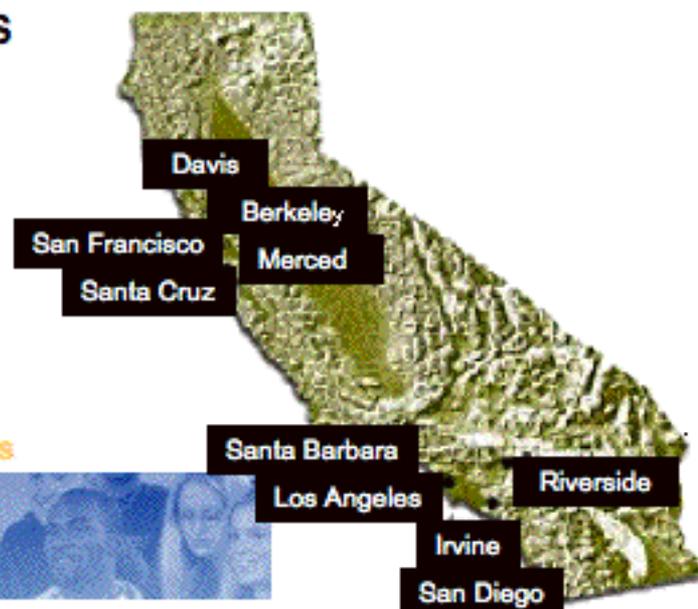


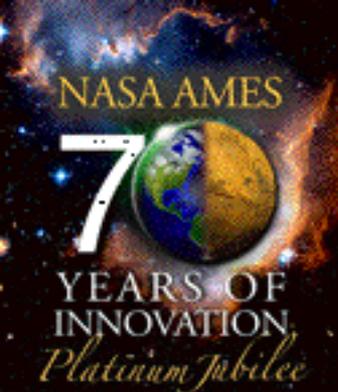
# University Affiliated Research Center (UARC)

- 10 year, \$330 M contract between NASA Ames and University of California
- UC Santa Cruz is lead UC institution-Ranked 1st in Space Science by ISI
- Beyond grants and support contracts
- Tasks that are part of NASA's critical milestones
- Flexibility to change tasks as needs arise
- UC: 10 Campuses, 3 National Laboratories
- \$18B annual budget
- 4 UC campuses rated among top 15 worldwide

5 Northern California Campuses

**University of California**  
*It Starts Here*





# Google

- 40-year agreement
- Google will lease 42.2 acres of unimproved land in the NASA Research Park to construct up to 1.2 million square feet of offices, research and development (R&D) facilities, and housing in a campus-style setting
- NASA and Google are planning to work together on a variety of areas, including large-scale data management, massively distributed computing, bio-info-nano convergence, and encouragement of the entrepreneurial space industry.





# University Associates

The University of California Santa Cruz (UCSC) and Foothill-De Anza Community College District will partner with NASA Ames to establish a sustainable community for education and research at Ames.

Other university partners may join later.



NASA AMES



YEARS OF INNOVATION

Platinum Jubilee

# Educational Activities



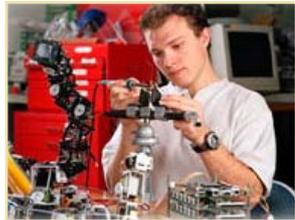
Minority University Research and Education Program (MUREP)



Summer High School Apprentice Research Program (SHARP)



JASON Project



Foothill DeAnza Internship Program

Student Space Biology Research Program (Ames PAO Education Program)

Ames Cooperative Education Programs

Stanford Visiting Professors Programs

1950

1960

1970

1980

1990

2000



First MOU with Santa Clara University



California Academic Partnership Program



Ames Exploration Encounter



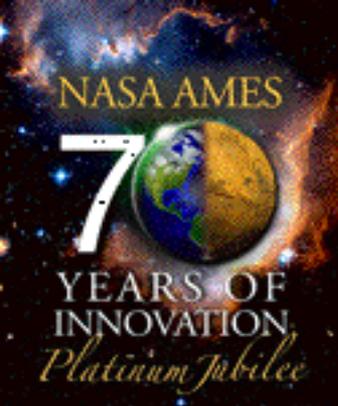
NASA Explorer Schools



Robotics Alliance Project



Aero Expo



## ISU and SU



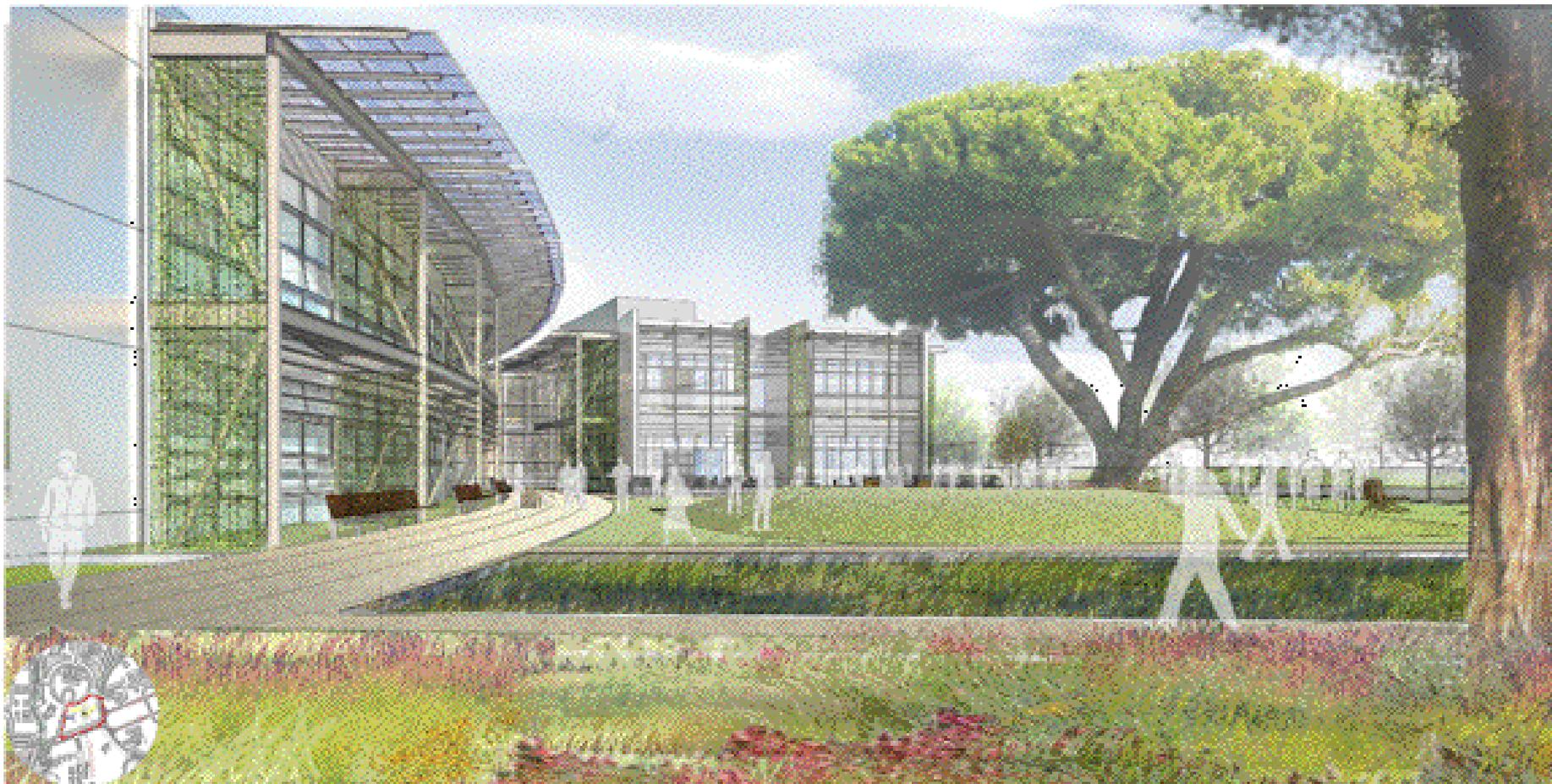
- **ISU** is an institution founded on the vision of a peaceful, prosperous and boundless future through the study, exploration and development of Space for the benefit of all humanity.
- 2009 Space Studies Program to be held at Ames Research Center.

# SU

**Singularity University** aims to assemble, educate and inspire a cadre of leaders who strive to understand and facilitate the development of exponentially advancing technologies and apply, focus and guide these tools to address humanity's grand challenges.



# Ames Research Center *in Silicon Valley*



NASA Ames Research Center - Collaborative Support Facility Moffett Field, CA

STATE HISTORICAL PRESERVATION SUBMITTAL

ARCHITECTURE

Perspective from South Courtyard

A10

01 October 2008