

# NASA and Public Private Partnerships



**Gary Martin**

Director, New Venture and Communication!  
Ames Research Center!



# NASA Public Private Partnerships!



" **NASA Headquarters, Washington, DC [Management] #**  
Management over the space flight centers, research centers, and other installations that constitute NASA!



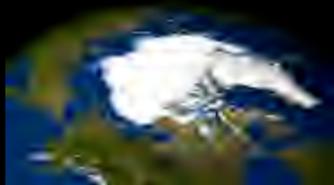
" **Ames Research Center, California [Research] #**  
Research geared towards creating new knowledge and new technologies that span the spectrum of NASA interests!



" **Dryden Flight Research Center, California [Research]#**  
Lead for flight research !



**Glenn Research Center, Ohio [Research]#**  
Develops and transfers critical technologies for aeronautics, aerospace, and space applications!



! **Goddard Space Flight Center, Maryland [Mission] #**  
Expand knowledge on the Earth and its environment, the solar system, and the universe through space observations!



**Jet Propulsion Laboratory [Mission] #**  
Managed by the California Institute of Technology is lead center for robotic exploration of the Solar System.!



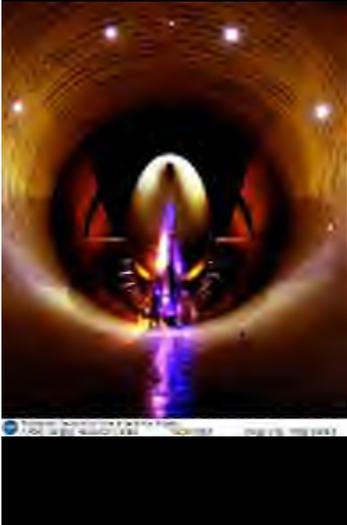
# NASA Public Private Partnerships!



! **Johnson Space Center [Mission] #**  
Leads NASA's effort in Human Space Exploration!



! **Kennedy Space Center [Launch Operations] #**  
Preparing and launching missions around the Earth and beyond!



! **Langley Research Center [Research] #**  
Aviation and space research for aerospace, atmospheric sciences, and technology commercialization to improve the way the world lives!



! **Marshall Space Flight Center [Mission] #**  
Access to space and use of space for research and development to benefit humanity!



! **Stennis Space Center [Propulsion Test] #**  
Rocket propulsion testing and for partnering with industry to develop and implement remote sensing technology!



# NASA Public Private Partnerships!



## NASA Center Locations

● AMES

● DRYDEN

● JPL

● GLENN

● HEADQUARTERS

● GODDARD

● LANGLEY

● MARSHALL

● STENNIS

● JOHNSON

● KENNEDY



## There are Many Ways to Build Public-Private Partnerships with NASA



- " Space Act Agreements (Non-Reimbursable, Reimbursable, Memorandum of Understanding, Memorandum of Agreement, Interagency, and International) !
- " Licensing Agreements (Exclusive, Nonexclusive, and Limited Exclusive) !
- " Software Agreements!
- " Cooperative Research and Development Agreements (CRADA)!



# NASA Public Private Partnerships!



## 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!**



# NASA Public Private Partnerships!



## Facilities !



**National Full Scale Aerodynamic Complex, 80x120 Wind Tunnel**



**Vertical Motion Simulator**



**Small Spacecraft Development Facility**



**Unitary Plan Wind Tunnel**



**SOFIA**



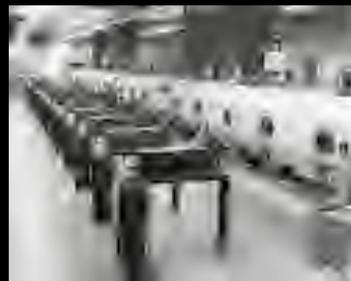
**Machine Shops**



**Small Satellite Lab**



**Columbia Super Computer**



**Ballistic Range**



**Arc Jets**



Image copyright Dariusz Jezewski



**Airfield and Hangars**



# NASA Public Private Partnerships!



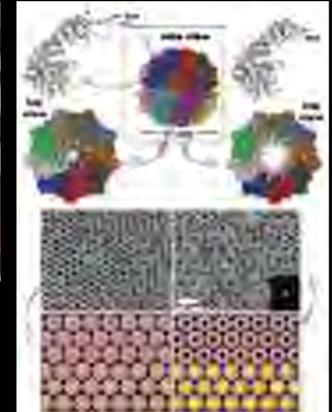
## Ames Technology Areas!



**Aerospace and Aeronautics**



**BioTech/Biomedical**



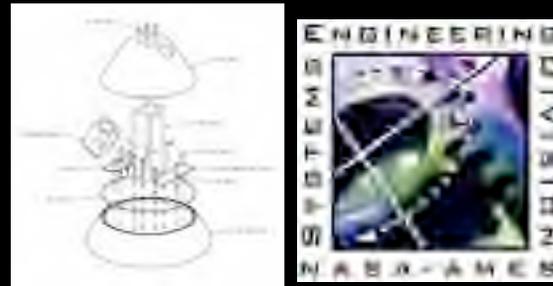
**Nanotechnology**



**Integrated Systems Health Management (ISHM)**



**Small Satellite Systems**



**Systems Engineering and Design**



**Robotics and Artificial Intelligence**



**Materials Science and Entry Systems**



**Software and High-end Computing**



# NASA Public Private Partnerships!



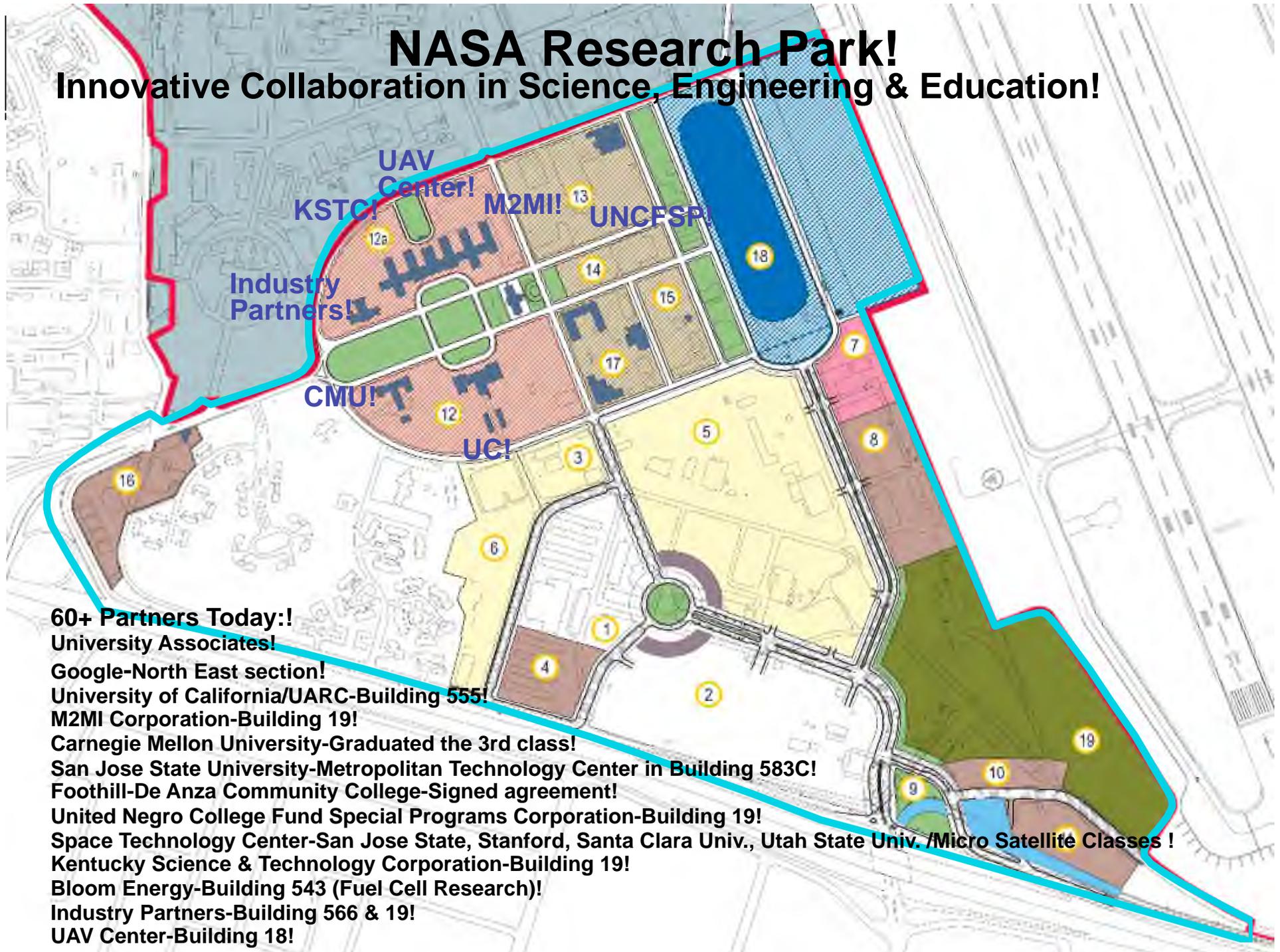
## NASA Silicon Valley Partnerships!

NASA Ames uses its Silicon Valley location to create! innovative partnerships with! cutting-edge industries and! leading universities to conduct applied research! and produce technologies! that enable NASA missions.!



# NASA Research Park!

## Innovative Collaboration in Science, Engineering & Education!



**60+ Partners Today:!**

**University Associates!**

**Google-North East section!**

**University of California/UARC-Building 555!**

**M2MI Corporation-Building 19!**

**Carnegie Mellon University-Graduated the 3rd class!**

**San Jose State University-Metropolitan Technology Center in Building 583C!**

**Foothill-De Anza Community College-Signed agreement!**

**United Negro College Fund Special Programs Corporation-Building 19!**

**Space Technology Center-San Jose State, Stanford, Santa Clara Univ., Utah State Univ. /Micro Satellite Classes !**

**Kentucky Science & Technology Corporation-Building 19!**

**Bloom Energy-Building 543 (Fuel Cell Research)!**

**Industry Partners-Building 566 & 19!**

**UAV Center-Building 18!**



# NASA Public Private Partnerships!



## 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 and 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. !**





# NASA Public Private Partnerships!



## University Associates!

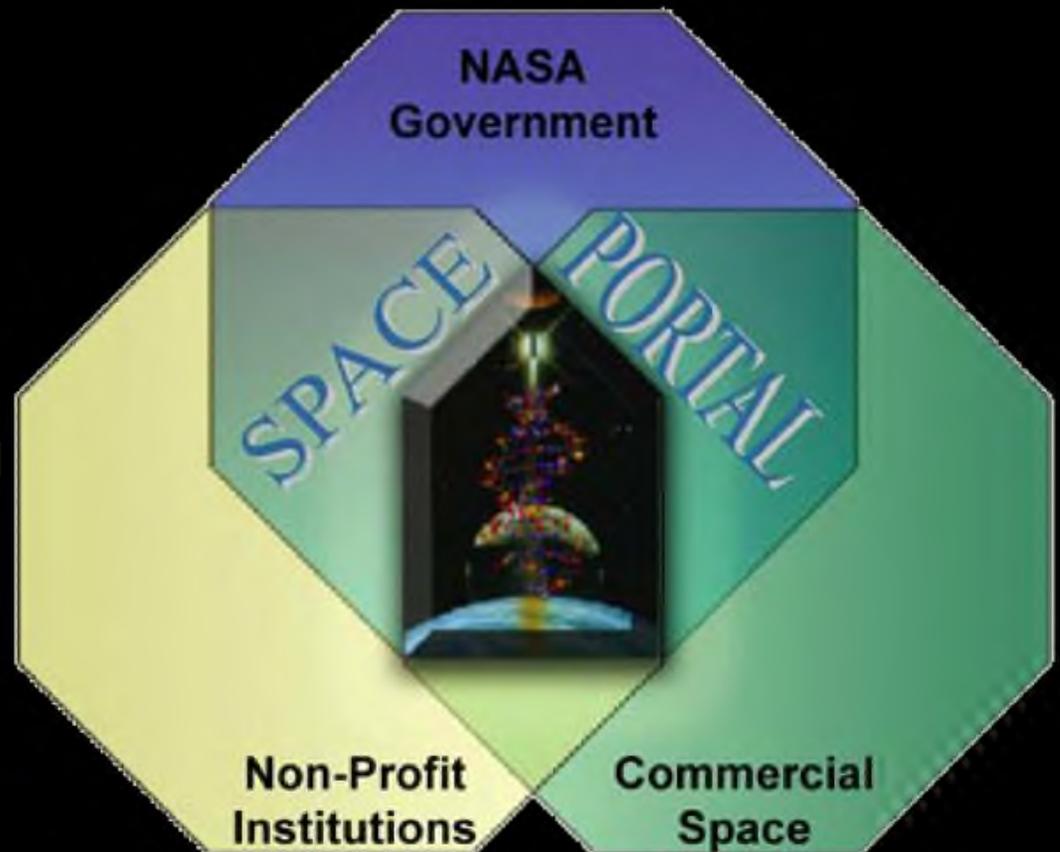
The University of California Santa Cruz (UCSC) and Foothill-De Anza Community College District will partner with NASA Ames to establish a sustainable community for education and research at the NASA Research Park (NRP). !





## Emerging Commercial Space Office!

- " **NASA partnerships to explore collaboration in space launch systems and payloads launched from aircraft!**
  - " NASA Ames will become a West Coast 'space portal' for affordable small satellites and other scientific and commercial payloads!
  - " Areas of collaboration to include mission, vehicle, and payload concept analyses; systems engineering; and payload integration, as well as use of NASA Ames' facilities,

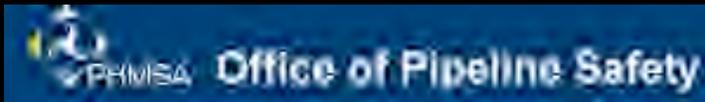




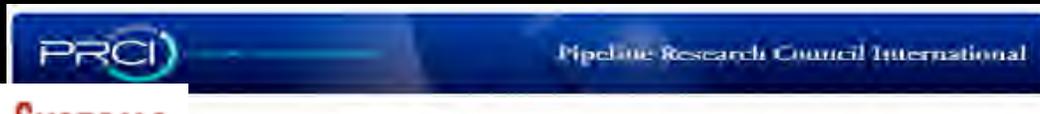
# NASA Public Private Partnerships!



## Some Partners of NASA Ames!



Bodega Algae, LLC



St. Lawrence Energy Corporation





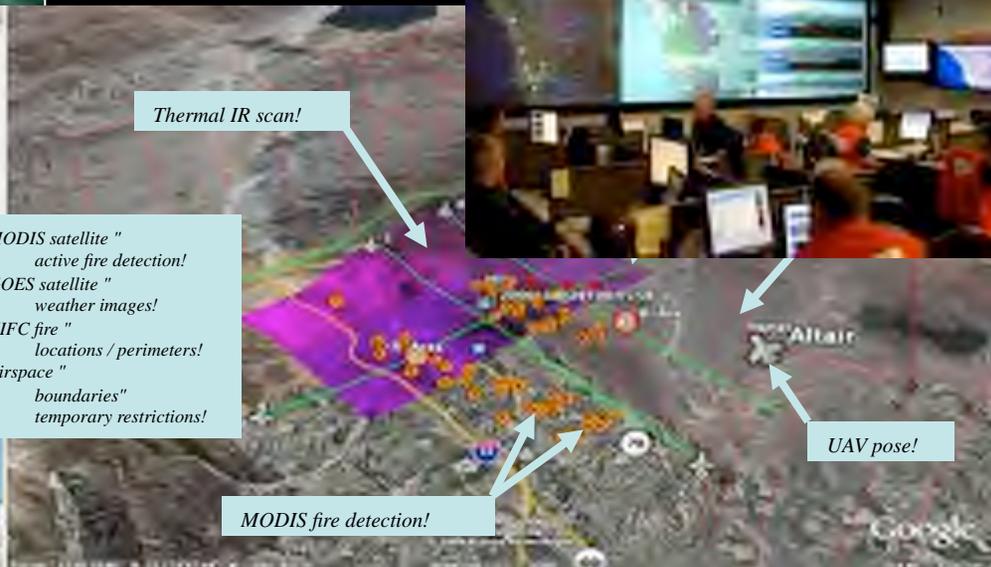
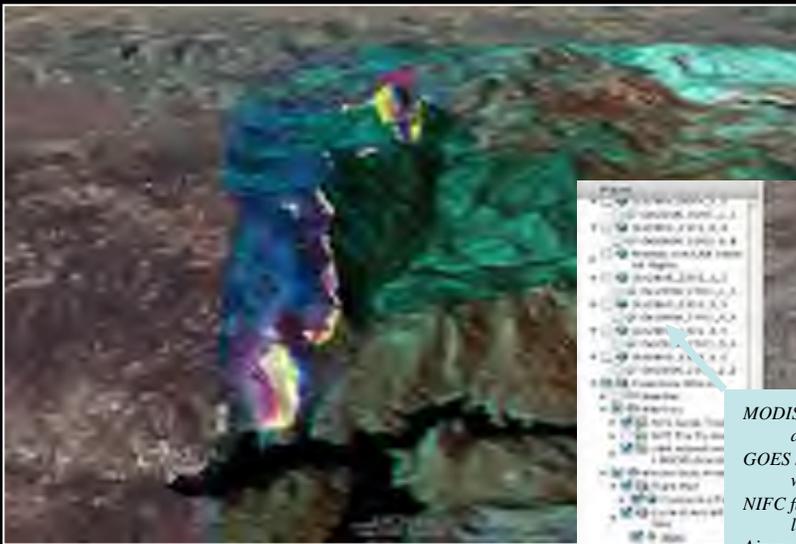
# NASA Public Private Partnerships!



## Wildfire Monitoring!

### Real-time monitoring of Western States Wildfires!

Remote sensing with autonomous modular sensor!  
 Deployment of ground, aerial (UAVs), and orbital assets!  
 Integration of weather data (images and maps)!  
 Distributed data communication!



Thermal IR scan!

MODIS satellite " active fire detection!  
 GOES satellite " weather images!  
 NIFC fire " locations / perimeters!  
 Airspace " boundaries" temporary restrictions!

MODIS fire detection!

UAV pose!

US Forest Service !  
 NASA Dryden!  
 State of California !  
 Federal Aviation Administration !



# NASA Public Private Partnerships!

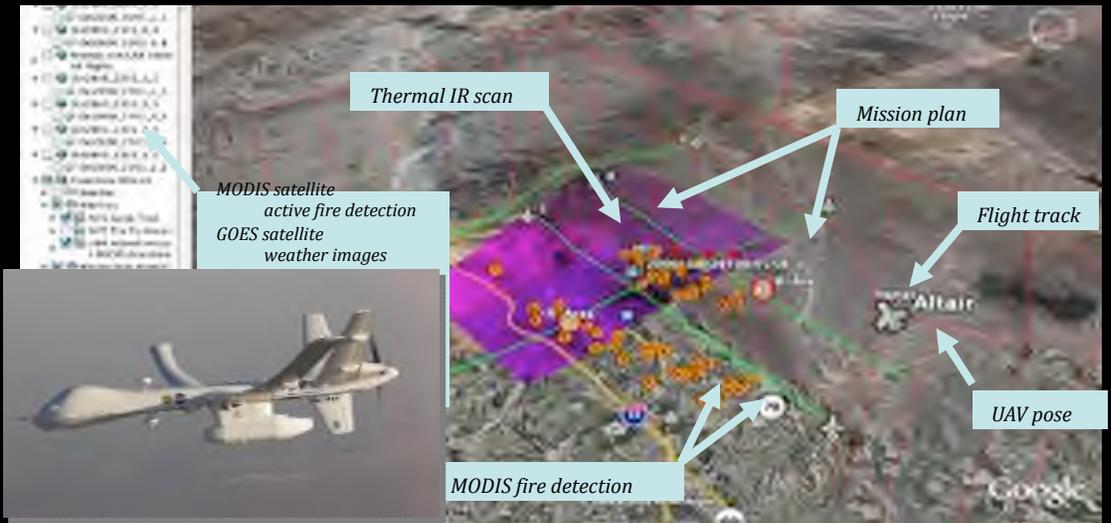
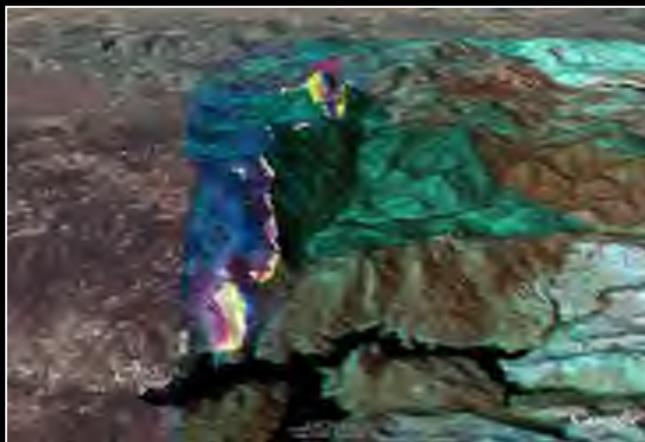


## Partnership Example: Wildfire Monitoring!



### Real-time monitoring of Western States Wildfires!

- " Remote sensing with autonomous modular sensor!
- " Deployment of ground, aerial (UAV#s), and orbital assets!
- " Integration of weather data (images and maps)!
- " Distributed data communication!





## Disaster Imaging & Response

- Improving Situational Awareness, Coordination and Speed of Response
  - Rapid image processing/overlay of satellite imagery
  - Geo-positioning of aerial fly-over imagery
  - Integrated view of disaster zones



*Ground"  
assessment*



*Aerial"  
record*

Carnegie Mellon!  
Google !  
Urban Search & Rescue!



# NASA Public Private Partnerships!



## Pipeline Rights-of-Way (RoW) Surveillance!

Third-party strikes to the nation's liquid and gas pipeline infrastructure are the leading cause of damage and spills, posing significant hazards to the general public and the environment!



### Rights-of-Way Autonomous Monitoring (RAM)



Remotely detect intrusions into liquid pipeline rights-of-way and releases from liquid/gas pipelines via sensors and imaging systems on small manned and Unmanned Aircraft Systems (UASs)

Pipeline and Hazardous Materials !  
Safety Administration!  
British Petroleum!  
Pipeline Research Council International!



# NASA Public Private Partnerships!



## Odyssey Moon Ventures LLC!

### Common Spacecraft Bus Development

- Collaborate on the assessment of NASA ARC's Common Spacecraft Bus (CSB) design for use on a commercial space mission. !
- OMV intends to conduct a series of robotic missions to the moon in support of science, commerce, and exploration!



# NASA Public Private Partnerships!



## SpaceX Partnership

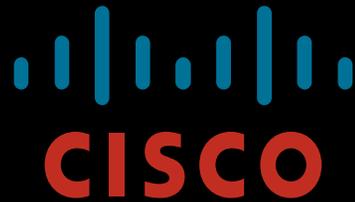


### Thermal Protection System Material Design and Analysis for the Space Dragon Capsule

- "The Space X Dragon Spacecraft has been selected as one of the winners of the NASA Commercial Orbital Transportation Services (COTS) program!
- "Successfully demonstrated December 2010!
- "NASA received funding for its engineering efforts to analyze and develop the Thermal Protection System (TPS) and thermal control system!
- SpaceX obtained expert engineering support services from experienced NASA personnel.!



# NASA Public Private Partnerships!



## Planetary Skin!

**Capturing, collecting, analyzing and reporting data on environmental conditions around the world!**





# NASA Public Private Partnerships!



## Publicizing NASA Technology!



Website - <http://technology.arc.nasa.gov>

