



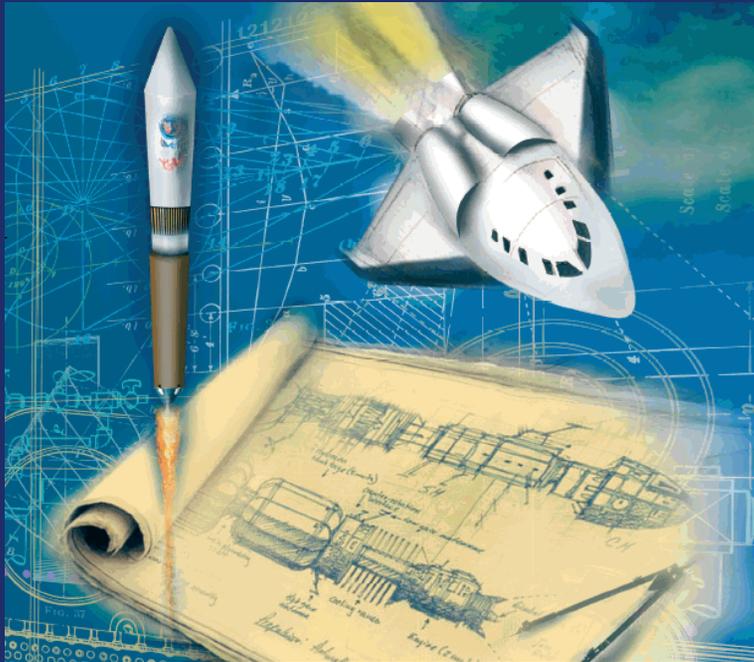
3RD SPACE EXPLORATION CONFERENCE & EXHIBIT

NASA's Commercial Development Policy: An FAA Perspective

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Federal Aviation
Administration



Overview

- Background
- FAA's Role in Commercial Development
- Perspectives on NASA's Commercial Development Efforts
- Opportunities for NASA/FAA Cooperation



Background

- The U.S. space program today has 3 sectors:
 - Civil
 - Military
 - Commercial
- The commercial sector was created in 1984 with the passage of the Commercial Space Launch Act.
- Regulatory oversight for the commercial sector was given to the Office of Commercial Space Transportation (AST), which was originally a staff office within the Department of Transportation.
- Today, AST is one of the lines of business within the FAA.



The AST Mission

To ensure the protection of the public, property, and the national security and foreign policy interests of the United States during commercial launch and reentry activities, and to encourage, facilitate, and promote U.S. commercial space transportation.



Who Needs a Launch License?

- Commercial Space Launch Act of 1984 requires U.S. citizens to obtain a license prior to conducting the launch of a launch vehicle
- Only exception is for missions conducted by and for the government (such as launches by NASA or the U.S. Air Force)
- Over the last 20 years, there have been 185 licensed launches, without any fatalities or property damage to the uninvolved public.



Examples of Licensed Operations



Air Launch



Sea Launch



Launch Sites



Ground Launch

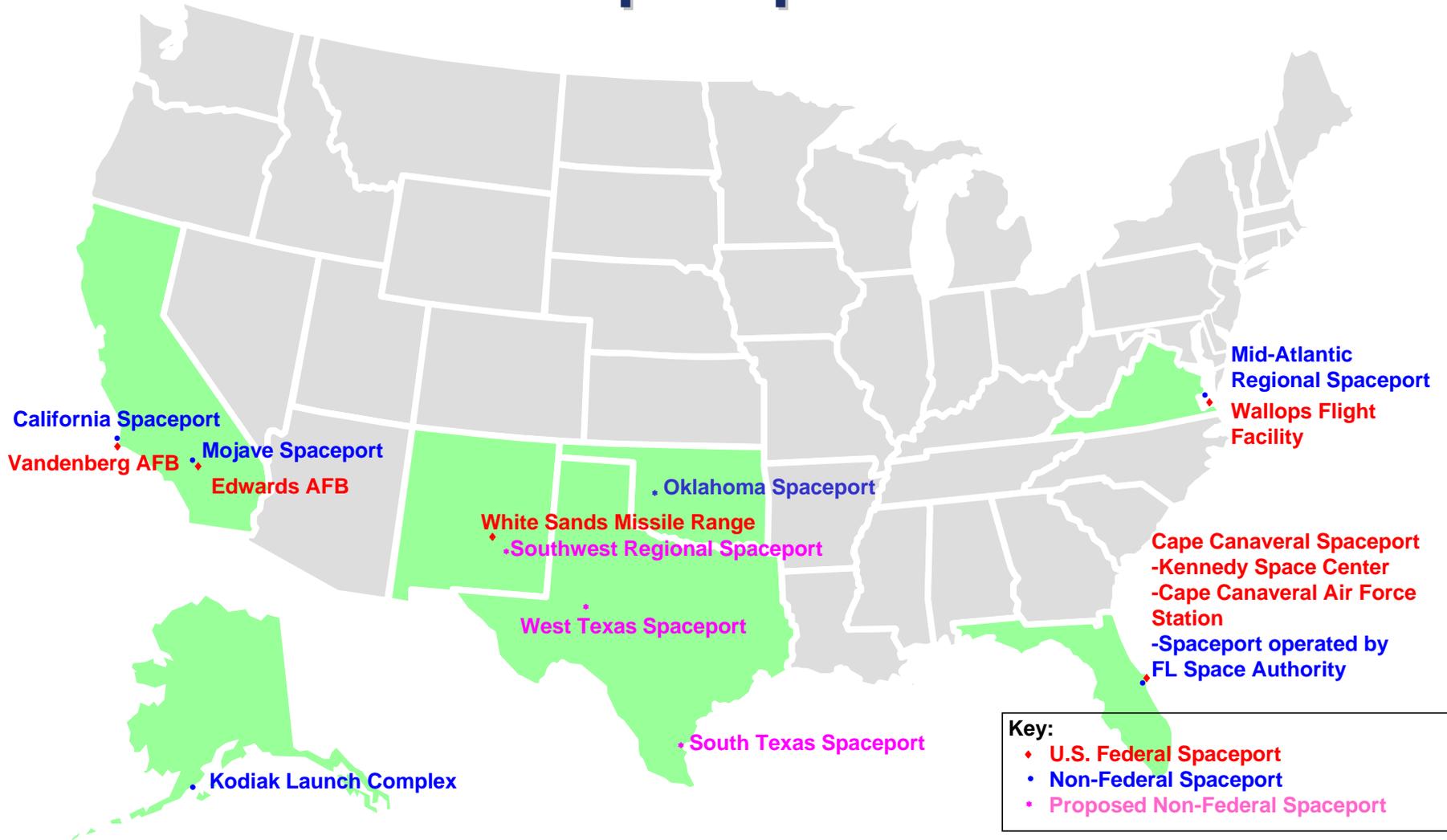


Reusable Launch Vehicles



Suborbital Rockets

Spaceports



Space Transportation Policies

It is important to recognize that support for commercial space transportation activities is not only allowed by law and national policy, it is mandated!

Some specific references:

- Vision for Space Exploration
- Aldridge Commission Report
- U.S. Space Transportation Policy
- Commercial Space Launch Amendments Act of 2004



Vision for Space Exploration

Announced by the President on January 14, 2004

“The Administrator will conduct the following activities and take other actions as required:

...Pursue commercial opportunities for providing transportation and other services supporting the International Space Station and exploration missions beyond low Earth orbit”



Aldridge Commission Report

Issued June 16, 2004

“Commercialization of space should become a primary focus of the vision...”

“NASA should procure all of its low-Earth orbit launch services competitively on the commercial market.”



U.S. Space Transportation Policy

Issued January 6, 2005

“The United States Government must capitalize on the entrepreneurial spirit of the U.S. private sector...”

“The United States Government and agencies shall purchase commercially available U.S. space transportation products and services to the maximum extent possible.”



Commercial Space Launch Amendments Act of 2004

- Signed by the President in December 2004
- Put Congress and the Administration on the record as supporting the development of commercial human space flight.
- Established an “informed consent” regime for carrying space flight participants.
- Created a new experimental launch permit for testing reusable suborbital launch vehicles.
- Called for the FAA to develop regulations on an accelerated schedule. (Final rules have now been issued for both human space flight and experimental permits.)



FAA's Role in Commercial Development

- Ensure public safety
- Encourage, facilitate, and promote U.S. Commercial Space Transportation
 - Developing and sharing information
 - Conferences, workshops, research, reports and studies, annual Entrepreneurial RLV Summit with the USAF
 - Improving our processes to decrease the regulatory burden
 - Environmental reviews, common safety standards, support for industry consensus standards and safety approvals
 - Planning for the future
 - Working with FAA Air Traffic Organization to integrate space transportation operations into the National Airspace System

Perspectives on NASA's Commercial Development Efforts

- The FAA strongly supports NASA's new commercial development efforts
- In addition to complying with existing national policies, they offer an opportunity to take advantage of new technologies, to benefit from the results of market-based competition, and to focus scarce government resources on areas without existing commercial markets, including heavy-lift launch vehicle development, lunar exploration, and preparation for eventual human missions to Mars



Perspectives on NASA's Commercial Development Efforts (cont.)

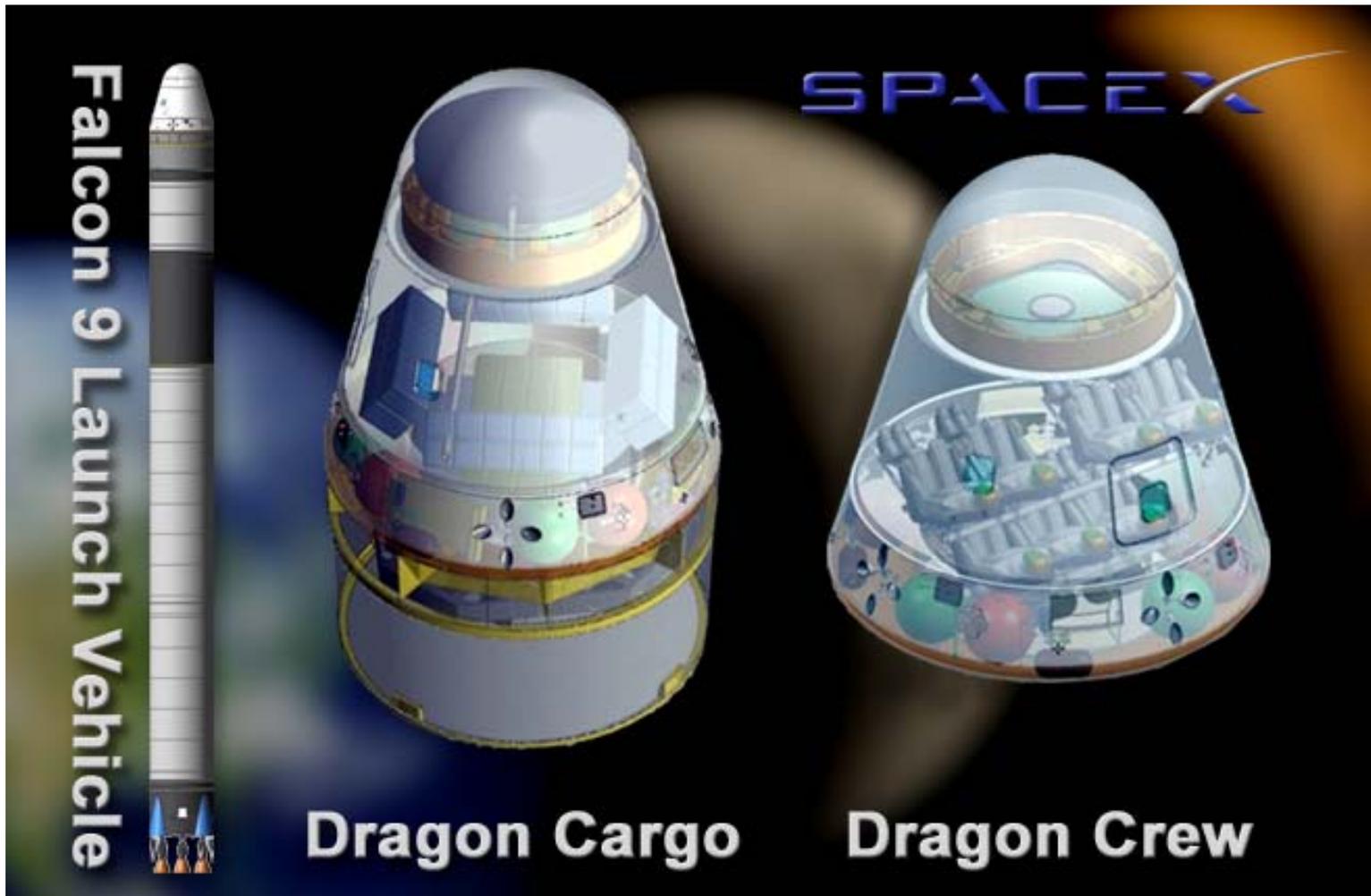
- Examples of successful efforts to date include:
 - Commercial Orbital Transportation Services (COTS)
 - Issuance of a contract for parabolic aircraft flights
 - Lunar Lander Challenge Competition



Commercial Orbital Transportation Services Program

- As part of the Commercial Orbital Transportation Services (COTS) program, NASA has committed \$500M in “seed money” for the private sector to develop and demonstrate the capability to deliver crew and cargo to the International Space Station.
- NASA originally selected SpaceX and Rocketplane Kistler to receive funded Space Act Agreements.
- The Agreements were fixed-price, with payments are based on the accomplishment of programmatic milestones.
- Although the Rocketplane Kistler agreement is no longer active, NASA recently announced that Orbital Sciences Corporation has been selected for a funded Space Act Agreement.

SpaceX/Falcon 9



Orbital/Taurus II



Zero-G Corporation



Stephen Hawking Goes Weightless



XPrize Cup/Lunar Lander Challenge



Armadillo Aerospace/Pixel and Mod-1



Opportunities for NASA/FAA Cooperation

- Procurement of launch services for supplying crew and cargo to the International Space Station (COTS Phase 2)
- Sharing of biomedical data from commercial suborbital flights
- Potential use of commercial suborbital flights for training, subsystem testing or checkout, and microgravity experiments
- Possibility of indirect benefits from ongoing commercial prize competitions, such as the \$30M Google Lunar XPRIZE
- Once they are operational, NASA may also be able to take advantage of commercially-operated space habitats to complement activities on the ISS

ISS Crew and Cargo Delivery



Is There Really a Market for Suborbital Space Tourism?

Futron recently conducted a Space Tourism Market Study, based on a poll of affluent Americans.

Some of the results:

- Overall, Space Tourism could generate more than \$1B per year in revenues by 2021.
- Suborbital flights will constitute the biggest share, with the potential for 15,000 passengers and \$700M in revenues per year.
- Orbital flights may involve up to 60 passengers and \$300M in revenues per year.

SpaceShipTwo with WhiteKnightTwo Carrier Aircraft



Suborbital RLVs Are Coming Soon!



Google Lunar XPRIZE Teams



Odyssey Moon



Astrobotic



Team Italia



Micro Space



SCSG



FredNet



ARCA



Lunatrex

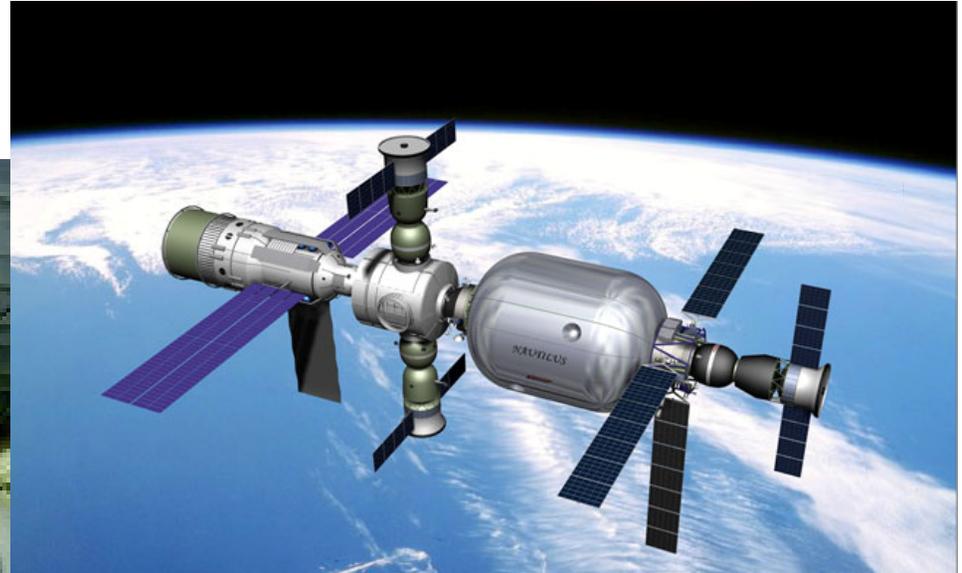
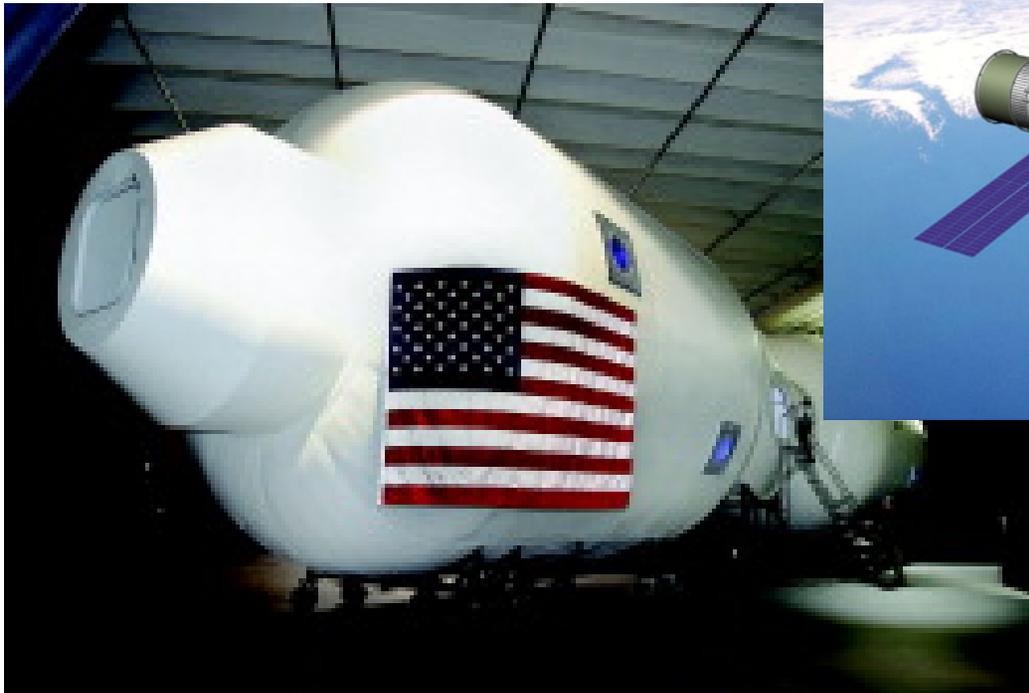


Quantum3



Chandah

Bigelow Aerospace's Inflatable Space Habitats



Conclusions

- In accordance with current government policy, NASA should consider using commercially available U.S. space transportation products and services to the maximum extent possible.
- NASA should also evaluate the potential benefits associated with suborbital Reusable Launch Vehicles, which are expected to begin regular operations in the near future.
- Implementing the Exploration Systems Mission Directorate Commercial Development Policy would offer NASA and the industry an opportunity for mutually beneficial collaboration on future space transportation activities.
- The FAA is looking forward to partnering with NASA in implementing its Commercial Development Policy, and to providing other assistance as needed, in support of the nation's space program.