COMMERCIAL SPACEFLIGHT FOR SCIENCE AND EXPLORATION

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Executive Members

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Worldview
X PRIZE Foundation
Commercial Spaceflight Industry

• Self identified

• Includes companies involved in:
  – Commercial human spaceflight
  – Spaceflight innovation (technology and business practices)
Commercial Space Timeline

• 1984 – Commercial Space Launch Act
  – “Encourage, Facilitate and Promote”
  – Establishes a licensing regime (not certification)
• 1996 – X Prize established
• 2004
  – SpaceShipOne wins Ansari X Prize
  – Commercial Space Launch Amendments Act
    • Amends original act to include human spaceflight
    • Establishes regulatory learning period
    • NASA should seek “greatest possible commercial use of space”
• 2006 NASA Commercial Orbital Transportation Services announced
• 2010 NASA Commercial Crew Program announced
• 2012 NASA Commercial Resupply Service begins
• 2013 SpaceShipTwo first powered flight
Why Commercial Spaceflight?

• Open the space frontier to more people

  – High flight rates, improved infrastructure, and lower barriers to entry will allow thousands of explorers, scientists, engineers, artists, teachers and many others to travel to space
1925: Kelly Air Mail Act
1927: Entrepreneur Charles Lindbergh crosses Atlantic
1936: Passengers reach 1 million
Present day: over 2 billion passengers
Why Commercial Spaceflight?

• Lower the spaceflight cost barrier

  – The high cost of space launch has been the single biggest barrier to the broader exploration and development of space in the last forty years

  – Commercial spaceflight, both orbital and suborbital, leverages the power of competition, innovation, and multiple design approaches to pursue lower development and operating costs and greater long-term safety
The Virtuous Cycle

1. Higher flight rate

2. Marginal launch costs drop due to economies-of-scale manufacturing
   - Fixed costs spread out over more launches
   - Larger market closes business case for investing to improve vehicles

3. Reduction in price per flight

4. Lower prices stimulate demand from existing markets
   - Lower prices make new applications or markets viable

Jump start from market demand:
- astronaut flights to ISS
- private suborbital tourism
Why Commercial Spaceflight?

• Expand existing space activities and enable new ones
  
  – Suborbital flights by individual private citizens
  – Cargo and crew missions to the International Space Station
  – Scientific and technology demonstration research flights
  – Satellite launches
  – Education and outreach activities
Why Commercial Spaceflight?

• Promote economic competitiveness and excite the public
  - Generate jobs in a dynamic industry that is entrepreneurial, high-tech, and inspirational
  - Many space entrepreneurs were inspired to enter technology careers by Apollo, and now, several decades later, they are aiming to inspire a new generation
Why Government Engagement?

• SpaceX and Orbital have now launched many successful cargo flights to the ISS
• Commercial Crew is progressing well
• Milestones, fixed prices, contractor design control, staged competition and multiple customers together produce:

LESS EXPENSIVE MISSIONS ->
MORE MISSIONS
“Commercial” can mean:

- Vehicles designed, developed and operated by the private sector
- Private investment
- Systems designed to serve more than one customer (government and/or private)
- Development based on fixed-priced, streamlined contract vehicles in which payment is based on achieving milestones
- Services and data also purchased fixed-price via commercial services contracts
- Driven by the method of doing business, not size of the company. Both large, traditional contractors and small, entrepreneurial firms are engaging in commercial spaceflight
What is next?

• COTS model has successfully been demonstrated
• But NASA (and other agencies) still think commercial contracts are the exception
• There are good reasons to use cost-type contracts, but their use should be justified
• This is a cultural change, and cultural change is hard
Commercial partnerships for human exploration

- NASA has little money for human exploration, beyond that currently spent on SLS and Orion
- Commercial and international partnerships must be involved
- NASA has started to create partnerships through ILDD and asteroid BAA
- But not all technologies have been developed, making this a different beast
- NOAA, DOD also ripe for partnerships
How does commercial change technology development?

- NACA helped jumpstart commercial air industry
- In the process, dramatically improved aircraft technology
- NASA should look for technologies that will apply to both NASA and commercial missions
- Money will flow from both NASA and companies -> faster development
In praise of failure

• Currently, early technology development is often done in partnership or by SBIR contracts
• Cost-type contracts and top-down management emerge for system dev, to avoid failure and create flexibility
• But failure is part of the process
• Failures open the door to other solutions
• No program should be “too big to fail”
Recommendations

- NASA should continue cooperative outreach for sustainable human exploration and avoid a linear, single point of failure program
- NOAA and DOD should create more commercial partnerships and reward program managers/contracting officer who think differently
- Congress should strengthen and not restrict alternative contracting mechanisms
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