



# Commercial Human Spaceflight: Context and Capabilities

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# What is Commercial Human Spaceflight?

- **What is commercial human spaceflight?**

- Systems designed for passengers
- Developed by the private sector
- Using private funds, *though not exclusively*
- Serving multiple markets, including government needs

- **Two realms of activity**

- Suborbital – *short flights above atmosphere, providing 3-5 minutes of weightlessness*
  - Adventure travel, scientific and industrial research, and astronaut training
- Orbital – *reaching orbit around Earth, providing hours or days of weightlessness*
  - Adventure travel, scientific and industrial research, manufacturing, Space Station servicing

- **Historically, commercial human spaceflight limited to:**

- Corporate astronauts riding on Shuttle to launch commercial comsats
- Tourist flights on Soyuz at \$20m per flight – seven flights to date
- Suborbital flights of SpaceShipOne in 2004 – three flights flown, each with one pilot



# Commercial Spaceflight Federation Overview

## Executive Members include developers and operators of:

- Orbital spacecraft
- Suborbital spacecraft
- Spaceports



SPACEX

MOJAVE  
AEROSPACE TEST CENTER

SNC  
SIERRA NEVADA CORPORATION



Armadillo Aerospace

XPRIZE  
FOUNDATION

## Associate Members include product and service providers for:

- Training services
- Medical services
- Life support services



NASTAR  
CENTER

wyle



OSIDA



Membership represents 2,600 employees in 30 states



Over \$1.5 billion of investment into the commercial spaceflight industry to date



# NASA FY2011 Budget Request

- **Commercial Crew Program**

- \$6.0 billion over 5 years to develop and demonstrate commercial crew transportation to the International Space Station
- Multiple providers including a range of higher-and lower-programmatic risk systems and system components
- NASA standards and processes to ensure that all systems meet the agency's stringent human-rating requirements to maintain the highest level of safety

- **Robotic precursor missions**

- \$3.0 billion over 5 years to scout exploration targets and identify hazards and resources for human visitation and habitation
- Could demonstrate robotic servicing and assembly at Lagrange points or elsewhere

- **Technology demonstration program**

- \$7.8 billion over 5 years to develop and demonstrate technologies that reduce the cost and expand the capabilities of future exploration activities
- Including in-orbit refueling and storage, using in-orbit servicing techniques

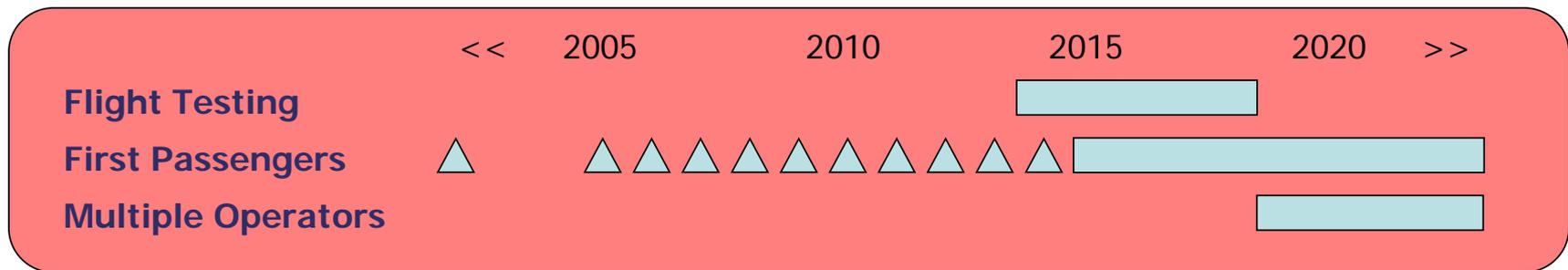


# Last 12 Months: Widespread Industry Progress



# Development Timeline – *Orbital*

## Orbital Flights



- **Flights of Private Individuals**
  - Seven people have flown to the Space Station using Russian Soyuz capsule – no American competitor available yet
- **NASA Commercial Orbital Transportation Services (COTS) Program – *Cargo to ISS***
  - NASA invested \$500 million in developing commercial cargo systems through the COTS program, followed by \$3.1 billion in service purchases from SpaceX and Orbital
  - Commercial cargo supply to Space Station starting in 2011
- **NASA Commercial Crew Program – *Crew to ISS***
  - NASA CCDev (Commercial Crew Development) program funded at \$50m to begin long-lead technology for commercial crew
  - NASA Commercial Crew Program funded at \$6.0 billion over 5 years



- **Destinations**

- Low Earth Orbit (servicing / free-flyer missions)
- International Space Station
- Bigelow Aerospace Orbital Complex

- **Customers**

- U.S. Government
- Industry / Researchers
- Private Individuals
- "Sovereign Clients"

- **Capabilities**

- Spacecraft Rendezvous, Inspection, or Servicing
- In-Space Assembly
- Launch / Re-Entry Timing
- Deployables



If private human space flight happens...

*... everything changes*



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