

Commercial Spaceflight Industry Indicators

Prepared by The Tauri Group
for the

Commercial Spaceflight Federation
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Objective

Define and characterize the emerging **commercial spaceflight industry** with dependable, authoritative quantitative data on the businesses and organizations enabling commercial human spaceflight

Contents

- ✦ Methodology and data collection
- ✦ Industry breakdown and revenue figures
- ✦ Investment and resources committed
- ✦ Vehicles in development
- ✦ Facility space
- ✦ Summary and contact information

Methodology

✦ Data collection

- ✦ Interviews with Commercial Spaceflight Federation (formerly Personal Spaceflight Federation) member companies, supplemented with external research
- ✦ Exclusive, proprietary dataset
- ✦ Comprehensive coverage of US industry
- ✦ Dataset: 2006, 2007, 2008

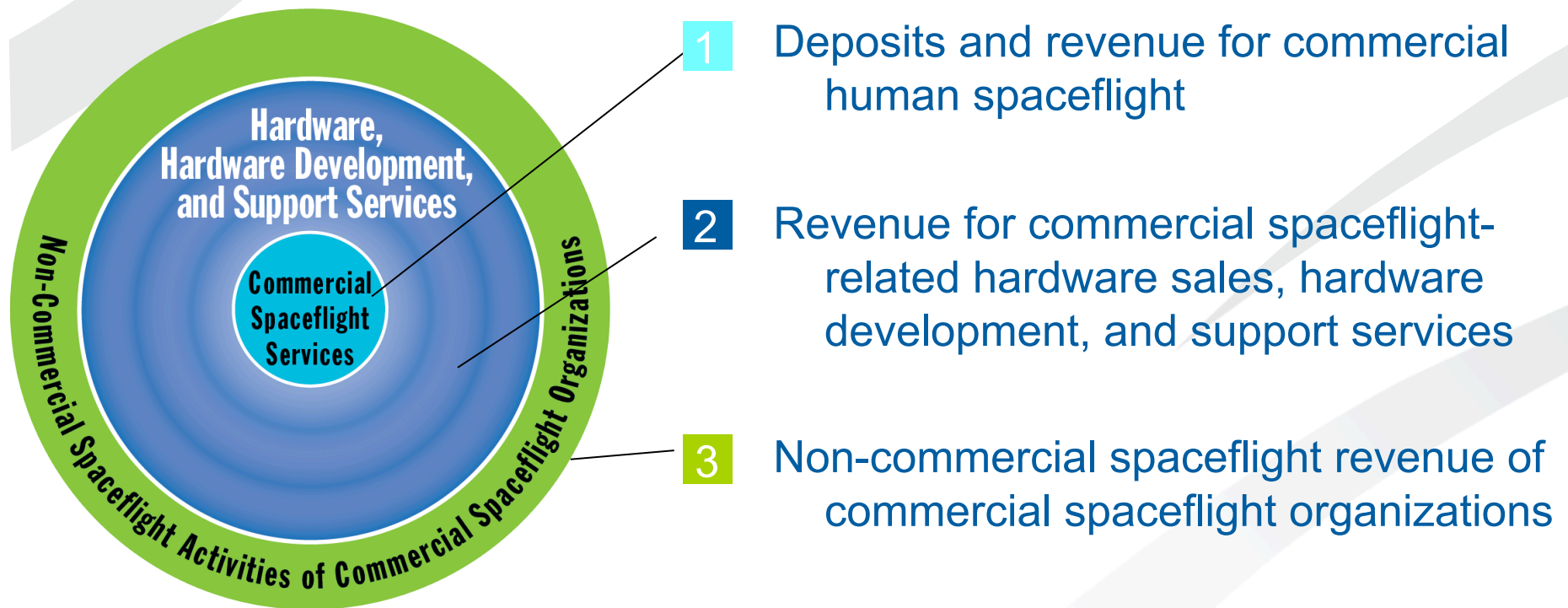
✦ Data analysis

- ✦ Aggregated to protect proprietary data
- ✦ Structured to reflect investment, employment, facilities and different types of revenue to present a detailed picture of industry activities

US Commercial Spaceflight Organizations

- ✦ Aerojet
- ✦ Armadillo Aerospace
- ✦ Blue Origin
- ✦ Bigelow Aerospace
- ✦ Environmental Tectonics Corporation (ETC) – NASTAR Center
- ✦ Excalibur Almaz
- ✦ Masten Space Systems
- ✦ Mojave Aerospace and Test Center
- ✦ Oklahoma Space Industry Development Authority (OSIDA)
- ✦ Orbital Outfitters
- ✦ Orion Propulsion
- ✦ Paragon Space Development Corporation
- ✦ Rocketplane Global, Inc.
- ✦ Scaled Composites, LLC
- ✦ Sierra Nevada Corporation
- ✦ Space Adventures
- ✦ Spaceport America
- ✦ Space Exploration Technologies Corporation (SpaceX)
- ✦ Space Florida
- ✦ Virgin Galactic
- ✦ Wyle
- ✦ XCOR Aerospace
- ✦ X PRIZE Foundation

Types of Commercial Spaceflight Industry Revenue



Revenue Definitions

1 Commercial spaceflight services

- ✦ Deposits and revenue received for commercial human spaceflight

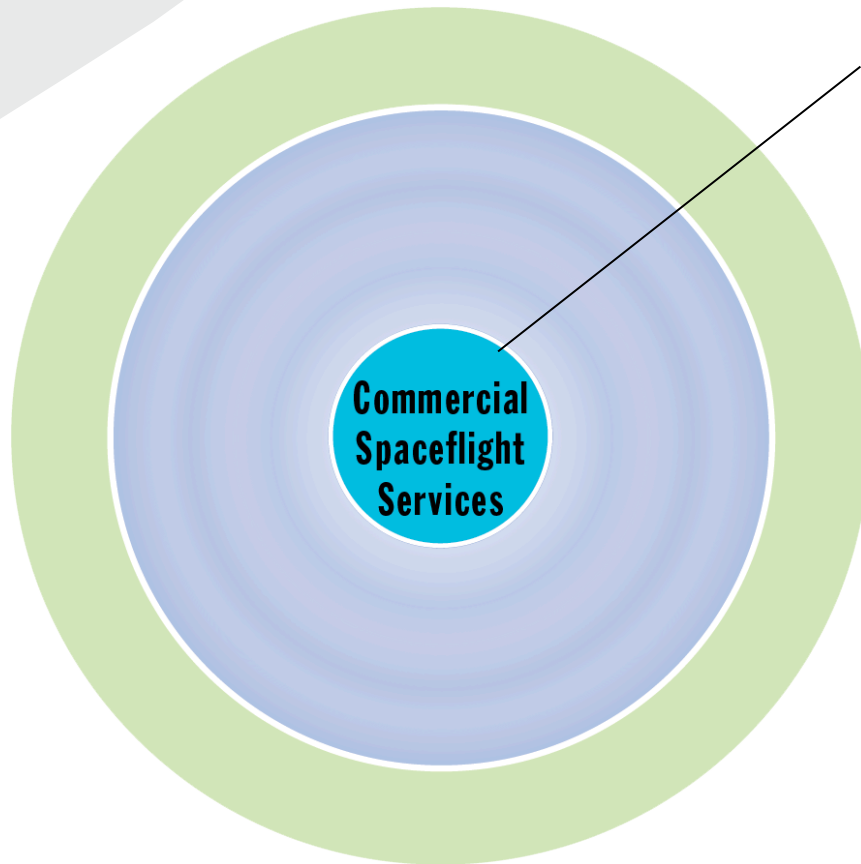
2 Hardware sales, hardware development, and support services

- ✦ Hardware and services intended for commercial spaceflight
- ✦ Sales of commercial spaceflight-related products and services to non-commercial spaceflight customers
 - ✦ E.g., rocket motors to a military client
- ✦ Sales and services that develop organizational capabilities and technologies that can leveraged for commercial spaceflight applications
 - ✦ E.g., small satellite development

3 Non-commercial spaceflight activities of commercial spaceflight organizations

- ✦ Revenue to commercial spaceflight companies unrelated to commercial human spaceflight

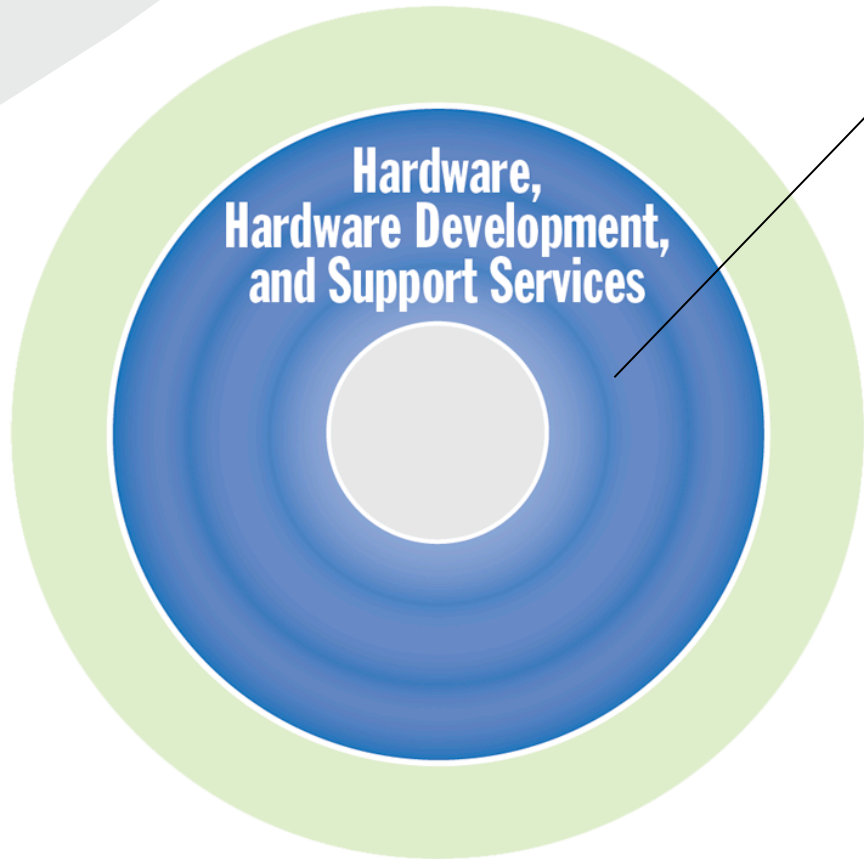
Industry Revenue: Commercial Spaceflight Services



1 Revenues and deposits for commercial spaceflight services

- ✦ 2006: \$28.8M
- ✦ 2007: \$38.8M
- ✦ 2008: \$50.0M

Industry Revenue: Hardware Sales, Development and Support Services

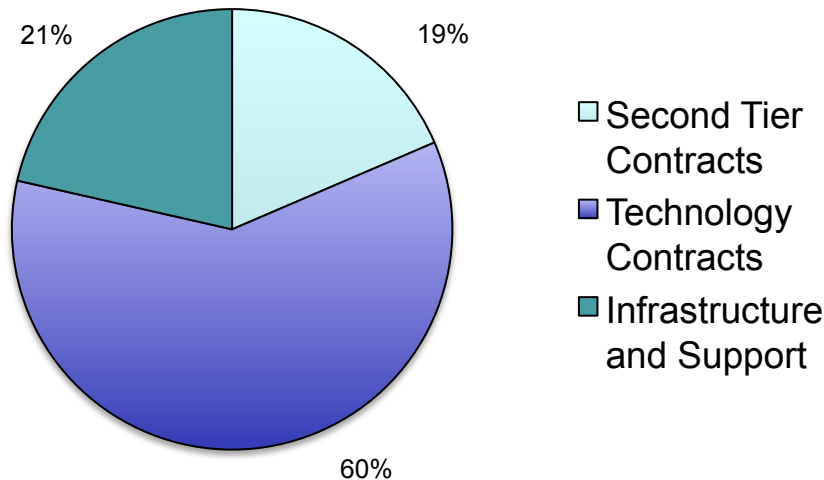


2 Revenue from sales of commercial spaceflight hardware, sales of related hardware and hardware development services, and other activities leveraged for industry development

- ✦ 2006: **\$123M**
- ✦ 2007: **\$206M**
- ✦ 2008: **\$211M**

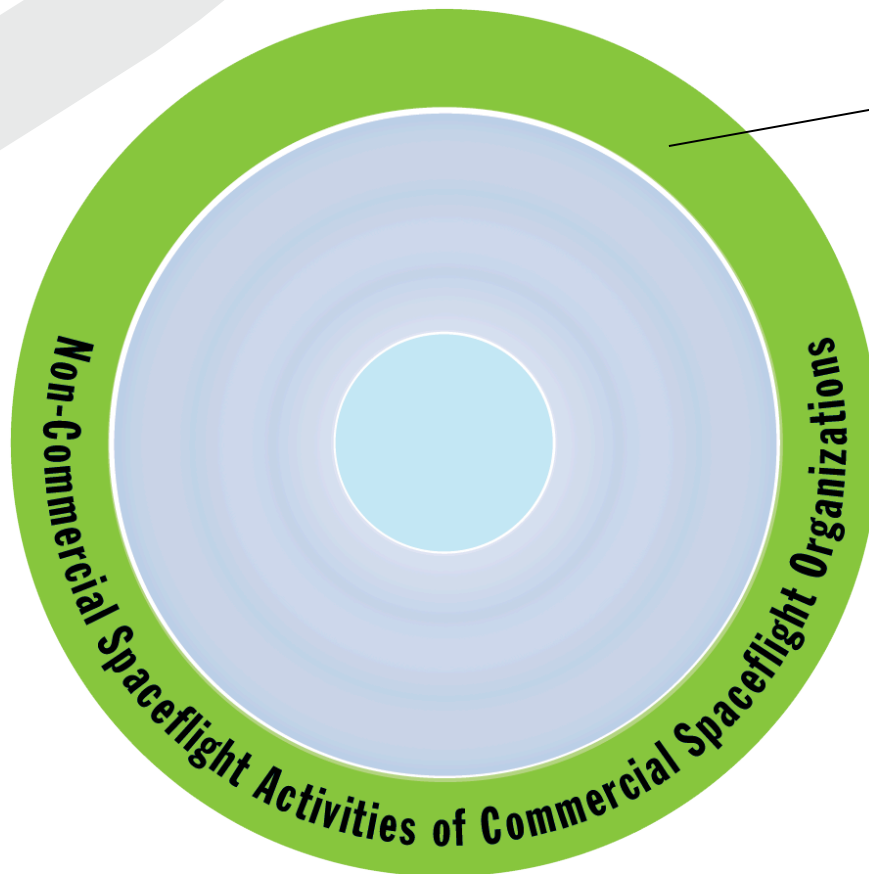
Composition of Hardware Sales, Development and Support Services

Components of Hardware Sales, Development, and Support Services Revenue, 2008



- ✦ Development services to clients (mostly government) that are leveraged for development of CSF-intended vehicles: **\$126 M**
- ✦ Second tier revenue directly supporting spaceflight, such as vehicle development and training: **\$39 M**
- ✦ Revenues (mostly from government) leveraged for the development of organizational capacity: **\$45 M**

Other Industry Revenue



3 Non-commercial spaceflight activities of commercial spaceflight organizations

- ✦ 2006: **\$24M**
- ✦ 2007: **\$24M**
- ✦ 2008: **Over \$1B**

New Entrants to Industry

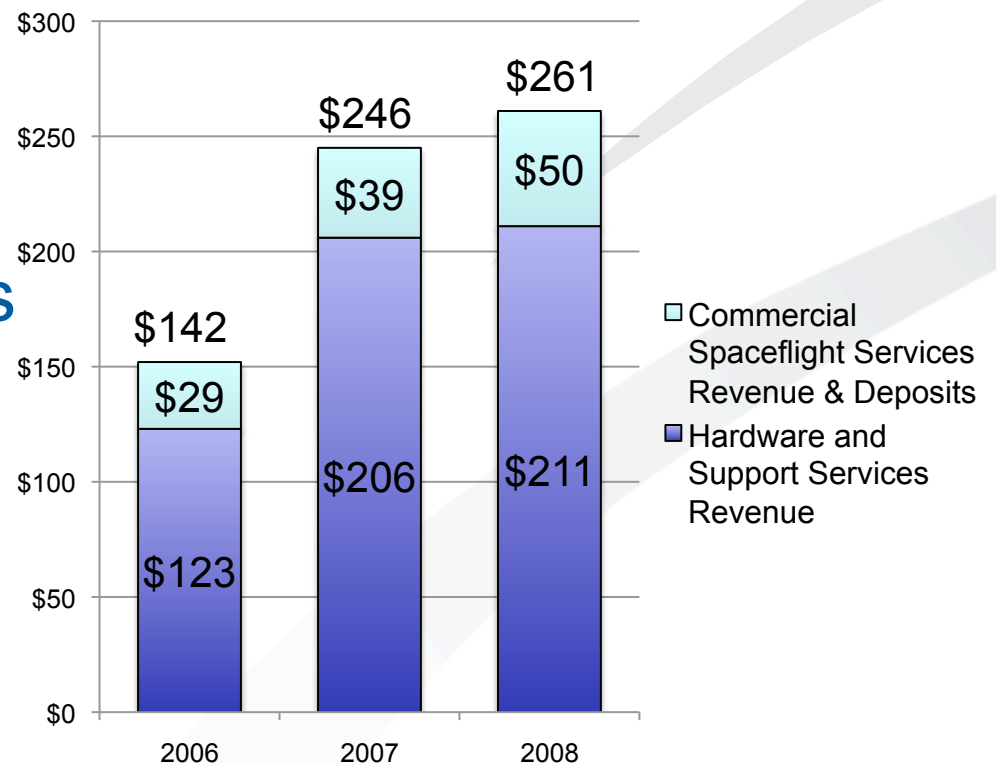
Evolving Industry Participation		
Company	Description	Total Company Revenue
Aerojet	Specialists in missile and space propulsion for aerospace and defense markets	>\$500M
NASTAR Training Center	Research and spaceflight training support	<\$1M
Orbital Outfitters	Providers of space suits and related services to commercial and government	<\$1M
Orion Propulsion	Spacecraft and rocket propulsion design and fabrication	~\$5M
Paragon Space Development Co	Designer and manufacturer of thermal control and life support systems.	~\$10M
Sierra Nevada Corporation	A diversified high-tech electronics, engineering, and manufacturing corporation	~\$1B +
Wyle	Providers of specialized engineering, scientific, and technical services to the Department of Defense, NASA, and a variety of commercial customers.	~\$1B

- ✦ Integrated firms like Sierra Nevada, Wyle, Paragon, Orion Propulsion, Aerojet, and NASTAR Center are branching into the industry as a growth strategy
- ✦ These firms provide training, specialized engineering, and other infrastructure and support services

Commercial Spaceflight Revenue

- ✦ Growth of 6% from 2007 to 2008
- ✦ Revenue still dominated by development activities
- ✦ Excludes non-commercial spaceflight revenue from industry members

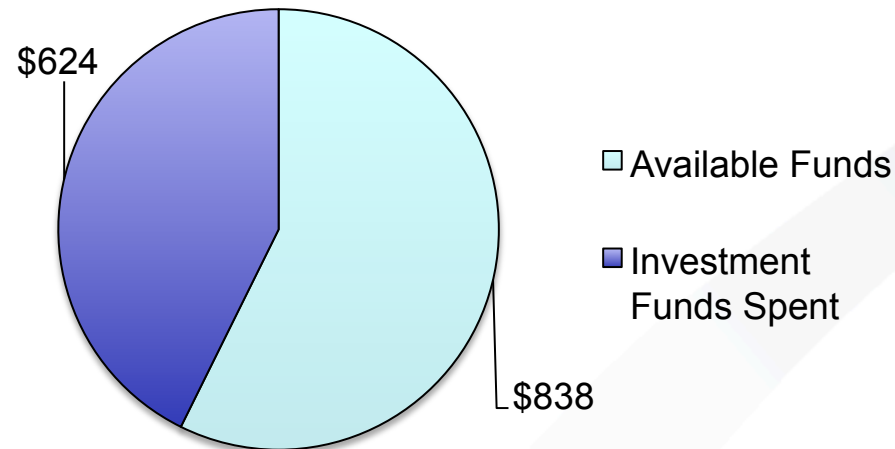
Revenue of Commercial Spaceflight Industry, 2006-2008 (millions)



Commercial Spaceflight Investment

- ✦ Total investment committed to the commercial spaceflight industry: **\$1.46B**
- ✦ Over \$300 million in new commitments since January of 2008
 - ✦ Some displacement effect

**Cumulative Investment in the
Commercial Spaceflight Industry, 2009
Millions, USD**

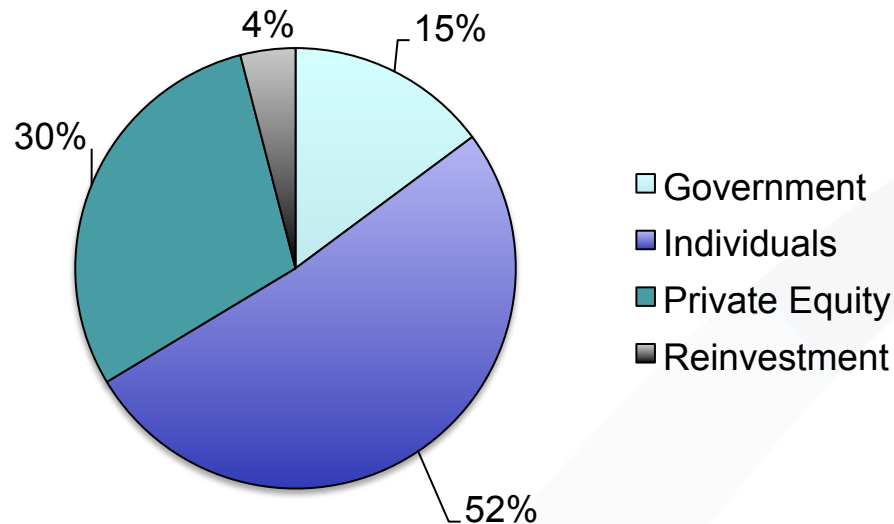


\$1.46B total

Commercial Spaceflight Investment

- ✦ Individuals / angel investors continue to be the dominant funding source
- ✦ Reinvestment small, but fastest growing segment

Investment in Commercial Spaceflight by Source, 2009



US Vehicles in Development

Commercial Spaceflight Development Vehicles

Vehicle	Company	Prototype / Test / Precursor Vehicles	Partner Vehicles (Company)
Suborbital Vehicles			
Lynx	XCOR		
New Shepard	Blue Origin	Goddard	
"Six Pack"	Armadillo Aerospace	MOD-1	
XA-1.0	Masten Space Systems	XA-0.1A, XA-.01B, XA-0.1C	
Rocketplane XP	Rocketplane Global, Inc.		
SpaceShipTwo	Virgin Galactic	SpaceShipOne	WhiteKnightTwo* (Virgin Galactic)
Orbital In-Space Vehicles			
Dragon	SpaceX		Falcon 9 (SpaceX)
Dream Chaser*	Sierra Nevada Corporation		Atlas V (United Launch Alliance)
TKS Capsule	Excalibur Almaz		
Orbital Platforms			
Almaz Space Station	Excalibur Almaz		
BA 300	Bigelow Aerospace	Genesis I	Atlas V (United Launch Alliance) Falcon 9 (SpaceX)
		Genesis II	
		Sundancer	
Orbital Launch Vehicles			
Falcon 9	SpaceX	Falcon 1	Dragon (SpaceX) BA 300 (Bigelow)

*Suborbital and orbital missions

Hangar and Factory Floor Space

**1,180,000 square feet facility
space**

Over 20 football fields

- ✦ Additional 430,000 square feet of space since 2007, with notable additions by Blue Origin, Sierra Nevada, Paragon and NASTAR
- ✦ Bigelow is constructing an additional 200,000 square feet of space, estimated to be built-out by 2010

Commercial Spaceflight Federation Member Organizations

- ✦ Aeroports de Catalunya
- ✦ Armadillo Aerospace
- ✦ Blue Origin
- ✦ Environmental Tectonics Corporation (ETC) – NASTAR Center
- ✦ Excalibur Almaz
- ✦ Masten Space Systems
- ✦ Mojave Aerospace and Test Center
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Contact

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