



Commercial Spaceflight Status Briefing

NASA Advisory Committee
July 24, 2012
Goddard Space Flight Center





- Commercial Cargo Status
- Commercial Crew Development Round 2 Status
- Commercial Crew Program
 - Acquisition Strategy
 - Commercial Crew Integrated Capability

Commercial Cargo Status



- SpaceX

- C2+ flight was completed on May 31, 2012.
- All 33 out of 33 test objectives were successfully accomplished.
- Final milestone planned for August. If approved, NASA will make a final payment of \$5M for a total of \$396M and the Space Act Agreement will be concluded.



- Orbital Sciences

- Orbital Sciences has completed 24 of 29 milestones and received \$266.5M out of \$288.
- The maiden test flight date of the Antares is under review but could occur in mid-October 2012. The Demonstration Mission will potentially occur 3 months after the maiden flight.



Commercial Resupply Services (CRS) Status



- **SpaceX**

- Five missions currently in flow.
- Both cargo and external hardware manufacturing and integration activities underway.
- SpaceX planning to fly initial CRS mission in October 2012.



- **Orbital Sciences Corporation**

- Five missions currently in flow.
- Cargo integration activities and detailed planning have begun.
- Orbital has been leveraging NASA assets at Stennis Space Center for engine testing and Wallops Flight Facility for launch vehicle processing and integration.
- Orbital planning to demonstrate and fly initial CRS mission in Spring 2013.

- Mission dates will be finalized as contractors demonstrate mission and production progress.

CCDev2 Status – Funded Partners



Blue Origin

- Maturing their space vehicle design and Pusher Escape System, and accelerate engine development for their Reusable Booster System
- Successfully completed 7 of 10 milestones and received \$16.4M out of \$22M
 - Pusher Escape Test Vehicle Shipment
 - Space Vehicle Systems Requirements Review



- Maturing their CTS design through Preliminary Design Review and performing development tests
- Successfully completed 10 of 14 milestones and received \$103M out of \$112.9M
 - Landing air bag drop demonstration
 - Parachute Drop Test
 - Preliminary Design Review



- Maturing their Dream Chaser design through Preliminary Design Review and conduct hardware testing
- Successfully completed 12 of 13 milestones and received \$97.6M out of \$105.6M
 - Captive Carry Flight Test
 - Preliminary Design Review



- Maturing their Falcon 9/Dragon system focusing on developing a side-mounted Launch Abort System (LAS)
- Successfully completed 9 of 10 milestones and received \$75M out of \$75M
 - LAS Propulsion Component Test Articles Complete
 - Crew Accommodation In-Situ Trial



CCDev2 Status – Unfunded Partners



- Unfunded Space Act Agreement (SAAs) awarded to provide limited technical assistance for advancement of commercial crew space transportation concepts.

- *United Launch Alliance awarded July 2011*

- 4 of 5 milestones completed
 - Launch vehicle design equivalency review and tailored SRR completed



- *Alliance Techsystems, Inc (ATK) awarded September 2011*

- 4 of 5 milestones completed
 - Launch system initial system design review completed



- *Excalibur Almaz, Inc (EAI) awarded October 2011*

- 5 of 5 milestones completed
- Space Act Agreement concluded



Commercial Crew Program Objectives and Attributes



- The objective of the proposed commercial crew initiative is to facilitate the development of a U.S. commercial crew space transportation capability with the goal of achieving safe, reliable, and cost effective access to and from low-Earth Orbit and the International Space Station (ISS).

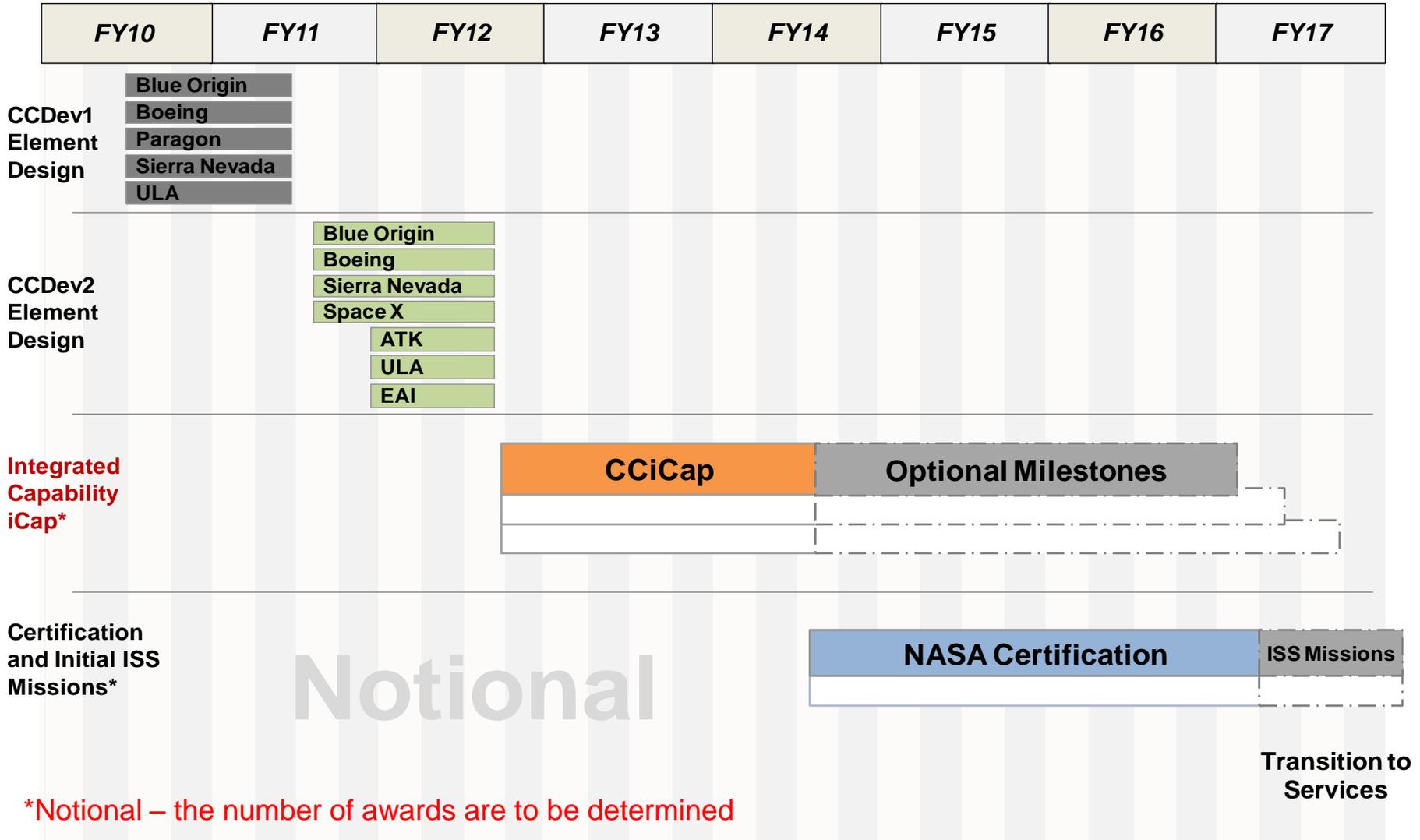
Attribute	Rationale
Performance-based Milestone Payments	Results in low cost-risk to the government.
Fixed Government Investment	Permits NASA to support the development of a risk-balanced portfolio of multiple systems.
Requires Industry Financial Investment	Supplements government funds and provides strong incentive to the industry partners to perform and “stay in the game”.
Contractor-Retained Intellectual Property	Allows uninhibited commercial sale and application of capabilities.
Only High-Level Objectives Mandated	Enables cost and system-wide performance optimization by the industry partners, allows creative solutions, and minimizes NASA oversight/insight.
Relief from Requirement for an Approved Accounting System	Relieves industry of the requirement for approved accounting system, enabling companies without such accounting systems to compete, thereby expanding the list of potential suppliers.
Competition	Multiple industry partners provide incentive to perform and does not leave the government dependent on sole provider thereby generally producing lower prices and mitigating the risk of failure of an individual provider.
Human Rating Certification	Systems must receive human rating certification prior to operational flights to the ISS.

Instrument Comparison



Feature	Cost Plus Contract	Space Act Agreement
Performance-Based Milestone Payments		X
Fixed Government Investment		X
Industry Financial Investment		X
Intellectual Property Rights	Traditional FAR Approach	Provider Retains Value in IP
High Level Goals Rather than Detailed Design Requirements		X (Standard)
Cost Accounting Standards Avoidance		X
Competition via Multiple Providers	(Insufficient Budget)	X
	X	X
Human Rating Requirements and Certification	(NASA applies requirements)	(Company "opts in")

Early 2012 Overall Strategy



Revised Certification Strategy – Proposed



FY12	FY13	FY14	FY15	FY16	FY17	FY18



Alignment with NASA certification requirements

Certification Products Contract

Certification to include at least one crewed ISS mission

Certification Contract



Notional



Why Commercial Crew and Why Now?



- 1) Federal budgets, including NASA's, are extremely constrained
 - COTS and CCDev have shown that we can change the cost equation
 - We hope to fund multiple partners for less than \$6B
- 2) Well understood technology
 - Human spaceflight is hard, but no breakthroughs are needed
 - We have been launching people into orbit for over 45 years
- 3) Strong and mature industrial base
 - Global commercial space industry revenues have doubled from \$80B to \$160B during the last five years
- 4) Strong potential for customers other than the U.S. government
 - Non-U.S. astronauts, space tourism, research and development
- 5) Decision to extend the International Space Station to at least 2020
 - For the first time in history, we have a long-term, sustainable market for commercial human space transportation services

Commercial Crew Integrated Capability (CCiCAP)



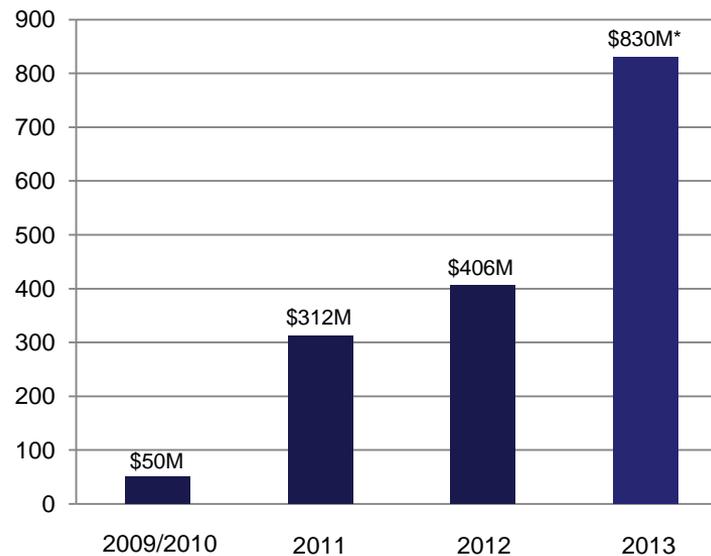
- CCiCap Strategic Goals
 - Advance multiple integrated crew transportation systems (CTS) to crewed orbital demo by mid-decade
 - Commercial Provider investment
 - Affordable development costs leading to cost-effective access to LEO
 - Develop a CTS capability to LEO that supports a commercial market
- Base Period: 21 months, August 2012 – May 2014. Multiple awards with expected range of \$300M – \$500M per award.
- Optional Milestones Period: Following the Base Period through orbital crewed flight demonstration.
- Awards expected in July/August 2012.



CCP Overall Accomplishments and Status



- Commercial Crew Program established; CCDev1 successfully completed; CCDev2 almost complete; ISS safety and performance requirements baselined; CCiCAP about to be awarded.
- Industry is making significant progress on multiple crew transportation system designs.
- Budget status reflects steady progress.



* FY2013 President's Budget Request

- Together with the capabilities to explore deep space provided by the Space Launch System and the Multi-Purpose Crew Vehicle, NASA has a robust, complementary U.S. human space flight program.