



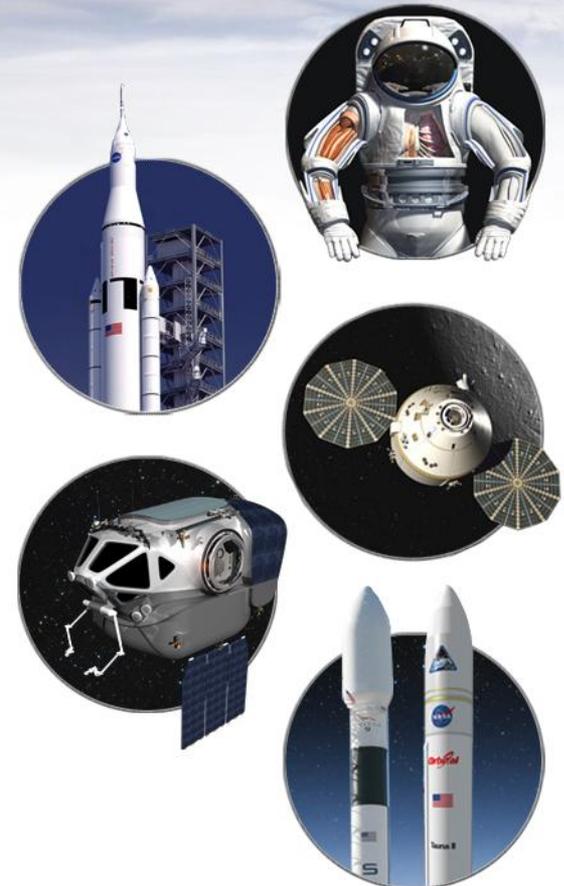
Commercial Spaceflight Status Briefing to NAC

November 1, 2011

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Director, Commercial Spaceflight Development

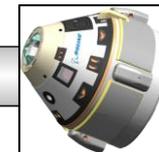
NASA HQ



CCDev2 Milestones (Boeing)



Funding	Milestone	Completion Date	2011			2012		
			Q2'11	Q3'11	Q4'11	Q1'12	Q2'12	Q3'12
Total: \$112.9M	Boeing							
\$10M	1 - NASA Kickoff	04/20/2011	▼					
\$10M	2 - Delta Systems Definition Review (SDR) Complete	05/19/2011	▼					
\$15M	3 - Phase 0 Safety Review Complete	06/16/2011		▼				
\$10M	7 - Interim Design Review (IDR) - 4	07/14/2011		▼				
\$7.5M	5 - Landing Air Bag Drop Demo #1	08/26/2011			▼			
\$7.5M	10a - Launch Vehicle Emergency Detection System/Avionics System Integration Facility Interface Simulation Test Phase 1					▼		
\$5M	6 - Phase 1 Wind Tunnel Tests					▼		
\$7.5M	10b - Launch Vehicle Emergency Detection System/Avionics System Integration Facility Interface Simulation Test Phase 2						▼	
\$10M	4 - Launch Abort Engine (LAE) Fabrication and Hot Fire Test Demo						▼	
\$4.8M	8 - Parachute Drop Test Demonstration							▼
\$2.5M	9 - Service Module (SM) Propellant Tank Develop Tests							▼
\$2.5M	11 - Preliminary Design Review (PDR) Complete							▼
\$15.2M	12 - Software Preliminary Design Review (PDR)							▼
\$4.2M	13 - Orbital Maneuvering and Abort Control (OMAC) Hot Fire Test Complete							▼
\$1.2M	14 - Service Module (SM) Propulsion Cold Flow Tests Complete							▼



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CCDev2 Milestones (SpaceX)



Funding	Milestone	Completion Date	2011			2012		
			Q2'11	Q3'11	Q4'11	Q1'12	Q2'12	Q3'12
Total: \$75M	SpaceX							
\$10M	1 - CCDev2 Kickoff	05/05/2011	▼					
\$5M	2 - Launch Abort System (LAS) Propulsion Conceptual Design Review	07/26/2011		▼				
\$15M	3 - Design Status Review (DSR) 1	08/17/2011		▼				
\$10M	4 - LAS Propulsion Components Preliminary Design Review (PDR)	09/20/2011		▼				
\$15M	6 - Design Status Review (DSR) 2				▼			
SpaceX Funded	5 - Crew Accommodation Concept Prototype and In-Situ Trial 1				▼			
SpaceX Funded	7 - Crew Accommodation Concept Delta-Prototype and In-Situ Trial 2					▼		
\$5M	8 - LAS Propulsion Component Test Articles Complete					▼		
\$10M	10 - Concept Baseline Review (CBR)						▼	
\$5M	9 - LAS Propulsion Component Initial Test Cycle						▼	



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CCDev2 Milestones (Blue Origin)



Funding	Milestone	Completion Date	2011			2012		
			Q2'11	Q3'11	Q4'11	Q1'12	Q2'12	Q3'12
Total: \$22.005M	Blue Origin							
\$.905M	1 - Space Vehicle (SV) Kickoff Meeting	05/20/2011	▼					
\$2M	2 - Pusher Escape Kickoff Meeting	05/20/2011	▼					
\$3.4M	3 - Reusable Booster System (RBS) Engine Kickoff Meeting	05/20/2011	▼					
\$4M	5 - RBS Engine Thrust Chamber Assembly (TCA) Interface and Test Plan Review			▼				
\$.9M	4 - Space Vehicle Mission Concept Review (MCR)			▼				
\$3M	7 - Pusher Escape Ground Firing					▼		
\$2M	6 - Pusher Escape Test Vehicle #1 Shipment						▼	
\$1.9M	8 - Pusher Escape Pad Escape Test							▼
\$.9M	9 - Space Vehicle System Requirements Review (SRR)							▼
\$3M	10 - RBS Engine Thrust Chamber Assembly (TCA) Test							▼



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CCDev2 Milestones (ULA and ATK)



Funding	Milestone	Completion Date	2011			2012		
			Q2'11	Q3'11	Q4'11	Q1'12	Q2'12	Q3'12
Unfunded	ULA							
	1 - Launch Vehicle Certification Kickoff	07/18/2011		▼				
	2 - Design Equivalency Review (DER) Summary Review	09/20/2011		▼				
	3 - Probabilistic Risk Assessment (PRA) Review				▼			
	4 - Tailored System Requirements Review (SRR)				▼			
	5 - System Requirements Review (SRR)					▼		
Unfunded	ATK							
	1 - Launch Service Kickoff Review	09/15/2011		▼				
	2 - Technical Interchange Meeting 1				▼			
	3 - Launch System Initial System Design (ISD)				▼			
	4 - Technical Interchange Meeting 2					▼		
	5 - Program Status Review (PSR)					▼		

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Commercial Crew Program



Fiscal Year

2011 2012 2013 2014 2015 2016 2017 2018 2019 2020

Demo/Test Flights

Design/Development/Certification

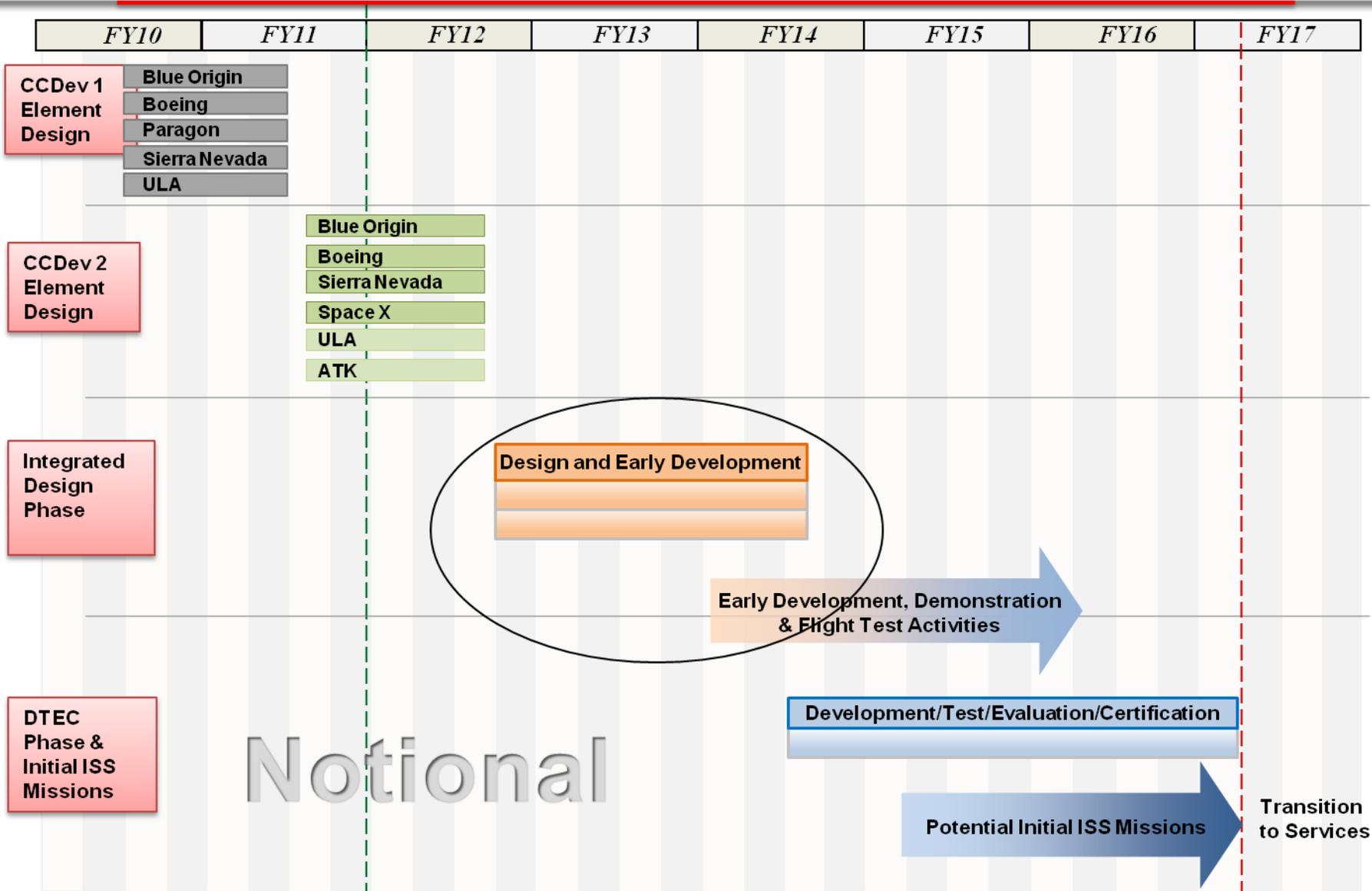


Missions



- The objective of the proposed Commercial Crew Program 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).
- Competition among multiple partners is a fundamental aspect of the strategy: incentivizes performance, supports cost-effectiveness, and eliminates NASA dependence on a single provider.
- The 2010 NASA Authorization Act established commercial crew as the primary means for ISS crew transportation.
- 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.

Acquisition Roadmap





- Commercial Cargo Status
- Commercial Crew Development Round 2 (CCDev2) Status
 - Agreements
 - Partner Status/Milestones
- Commercial Crew Program (CCP)
 - Overview
 - Acquisition Roadmap
 - Integrated Design Contract

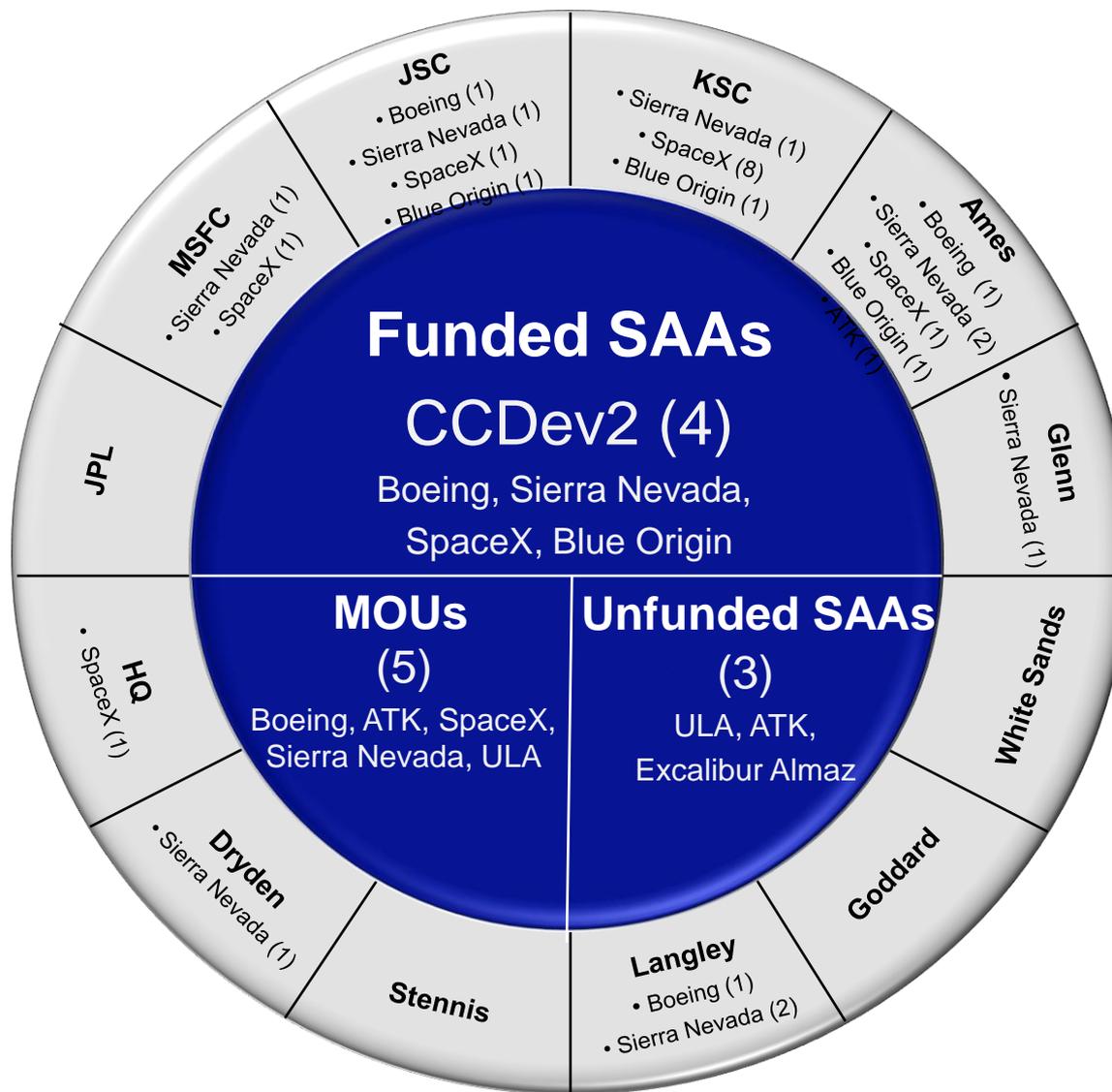
Commercial Cargo Status



- SpaceX
 - As of September 30, SpaceX has completed 32 of 40 milestones and received \$356M out of \$396M.
 - NASA is still assessing SpaceX's proposal to combine the mission objectives of Demo Flights 2 and 3 into one mission.
 - The next mission's Dragon capsule arrived at Cape Canaveral on October 23. SpaceX is beginning spacecraft checkouts in preparation for the next launch.
 - Next flight date is under review. SpaceX has requested a range window on December 19.
- Orbital Sciences
 - As of September 30, Orbital Sciences has completed 23 of 29 milestones and received \$261.5M out of \$288.
 - The first pressurized cargo module for the Cygnus spacecraft was delivered to the Wallops Island launch site.
 - Testing of the Taurus II main rocket engine testing resumed with a successful hot-fire operation of an AJ26 engine at NASA's Stennis Space Center.
 - The maiden test flight of the Taurus II has moved approximately two months from December 2011 to late February or early March 2012.



Agreements Landscape



CCDev2 Milestones (Sierra Nevada)



Funding	Milestone	Completion Date	2011			2012		
			Q2'11	Q3'11	Q4'11	Q1'12	Q2'12	Q3'12
Total: \$105.6M	Sierra Nevada							
\$12.5M	1 - SRR	06/02/2011	▼					
\$2.5M	2 - Canted Airfoil Fin Selection	06/16/2011	▼					
\$5M	3 - Cockpit Based Flight Simulator	07/20/2011		▼				
\$10M	4 - Vehicle Avionics Integration Laboratory	09/22/2011			▼			
\$12.5M	5 - System Definition Review (SDR)					▼		
\$7.5M	6 - Flight Control Integration Laboratory					▼		
\$12.5M	7 - Engineering Test Article (ETA) Structure Delivery					▼		
\$4.5M	10 - Captive Carry Interface & ETA Landing Gear Drop Tests						▼	
\$5M	8 - Separation System Test						▼	
\$6M	11 - ETA Captive Carry Flight Test Readiness Review						▼	
\$7.1M	12 - ETA Captive Carry Flight Test						▼	
\$12.5M	9 - Preliminary Design Review (PDR)							▼
\$8M	13 - ETA Free Flight Test							▼



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Integrated Design Contract (IDC) Procurement



- Description of Effort: Integrated design and early development necessary to achieve a U.S. developed, safe, reliable, and cost effective human space transportation service to and from low Earth orbit and the International Space Station for U.S. government and other potential customer use.
- Estimated Value: \$1.61B with multiple awards. Phasing: FY12 = \$0.72B; FY13 = \$0.69B; FY14 = \$0.20B. Consistent with the FY12 President's Budget Request.
- Type of Competition: Full & Open Competition
- Contract Type: Firm Fixed Price
- Contract Period: Base period will be July 2012 – April 2014 with ability to extend technical performance up to 6 months through optional performance milestones.
- Expected Outcome: A complete end-to-end design to integrated CDR level compliant with NASA technical requirements for two or more contractors (integrated design includes spacecraft, launch vehicle, launch services, ground and mission operations, and recovery).
- Milestones:
 - Milestone 1 – Integrated System Baseline Review
 - Milestone 2 - Integrated System Safety Analysis Review
 - Milestone 3 - Integrated Critical Design Review
 - Additional contractor-proposed milestones

Conclusion



- This program seeks to ensure that American companies will transport U.S. crews to the International Space Station by mid-decade and that aerospace jobs will remain here in America.
- There are currently three (3) soon to be five (5) ISS cargo resupply systems. Yet, there is only one single ISS crew transportation system. This “single string” capability for ISS crew rotation and rescue services represents a risk to the productivity and viability of the ISS.
- NASA is requesting \$850M in FY12 to continue development of U.S. commercial crew transportation systems. Funding levels less than this request would result in delays in fielding an operational system.