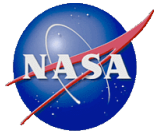




National Aeronautics and Space Administration



Commercial Crew Program Overview

Masters Forum 20

Maria Collura
April 22, 2011





CCP Objective

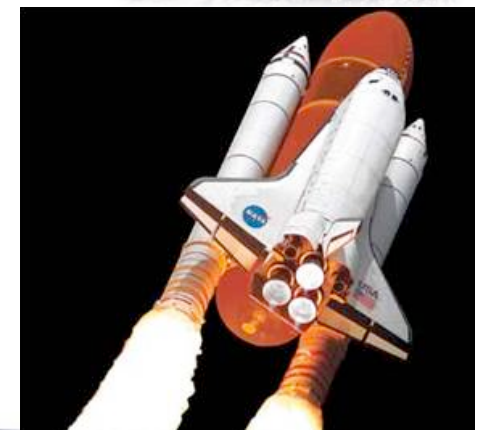


CCP is leading NASA's efforts to develop an American-made commercial capability for crew transportation and rescue services to the ISS following this year's retirement of the space shuttle fleet

- Kennedy Space Center will host the program office dedicated to enabling commercial human spaceflight capabilities.
 - Program Manager (PM) will reside at KSC
 - Deputy Program Manager located at JSC

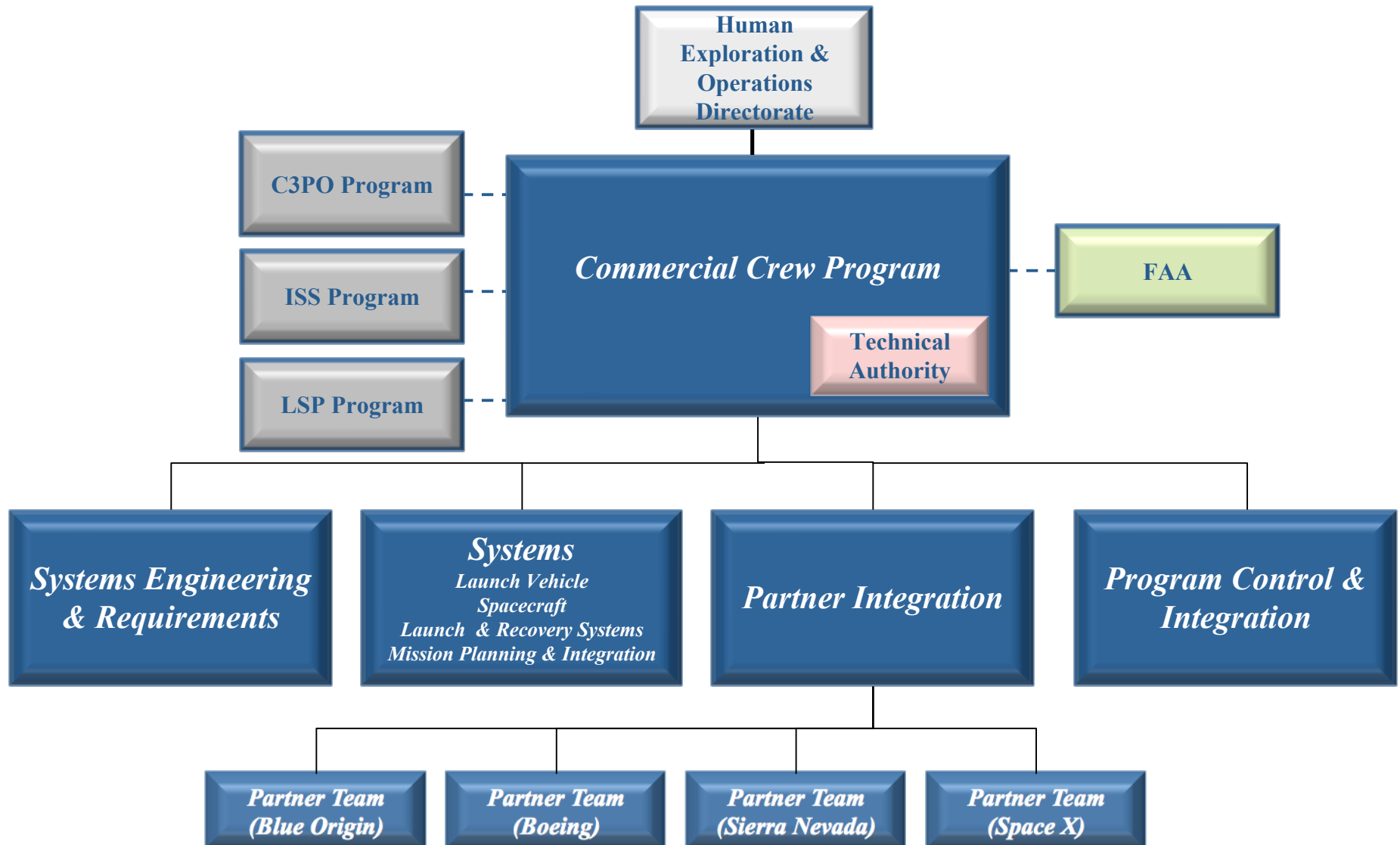
Program Mission

- Manage the investment in the development of commercial end-to-end space transportation systems
- Manage the CTS (Crew Transportation System) certification process
- Lead the technical and programmatic partner integration and approval functions



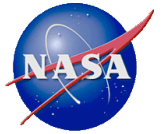


CCP Organization





CCT-1100 Series Documents



ESMD -CCTSCR-12.10

Agency and HQ Level Requirements levied on the Program intended to certify a CTS to carry a NASA crewmember to LEO



CCT-PLN-1100

High Level Program Summary of roles, responsibilities, and interfaces between CCP and partners in the development of CTS, and How NASA and the CP will work together to achieve a Certified Human Flight Vehicle

CCT-REQ -1130

Crew Transportation and Services Requirements - must meet to transport NASA Crew to the ISS

SSP 50808

ISS Visiting Vehicle Requirements - must comply with to interface with the International Space Station

CCT-PLN -1120

Crew Transportation Technical Management Processes - summary of technical management processes that support certification and expectations for evidence of compliance

CCT-STD -1140

Crew Transportation Design Standard Guidelines - provides expectations, and criteria used in evaluation of technical standards

CCT-STD -1150

Crew Transportation Operations Standard Guidelines - provides expectations for minimum criteria and practices for operations

CCT-DRM -1110

Crew Transportation System DRMs - potential reference missions for current and evolvable systems architecture designs

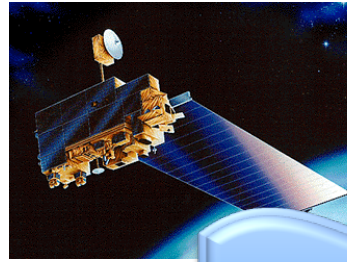
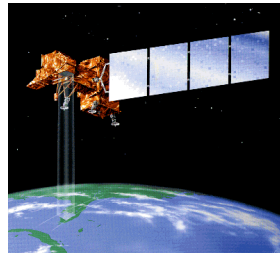
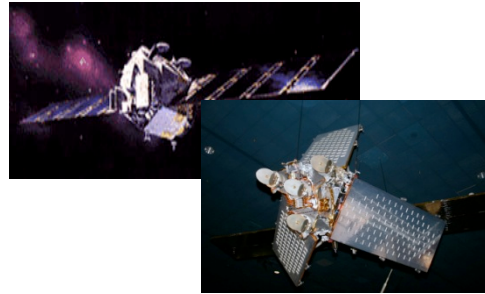


Insight/Oversight Model – Level of Involvement

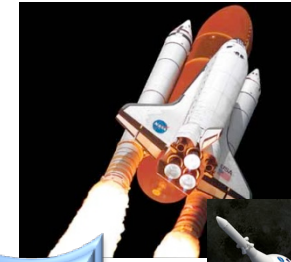


NASA will perform insight/oversight on the Commercial Partner's design, development, and certification process to evaluate the end-to-end crew transportation system

Scientific & Commercial Spacecraft--Contracted



Human Spaceflight



Commercial Crew

COTS & CRS



Launch Services Program



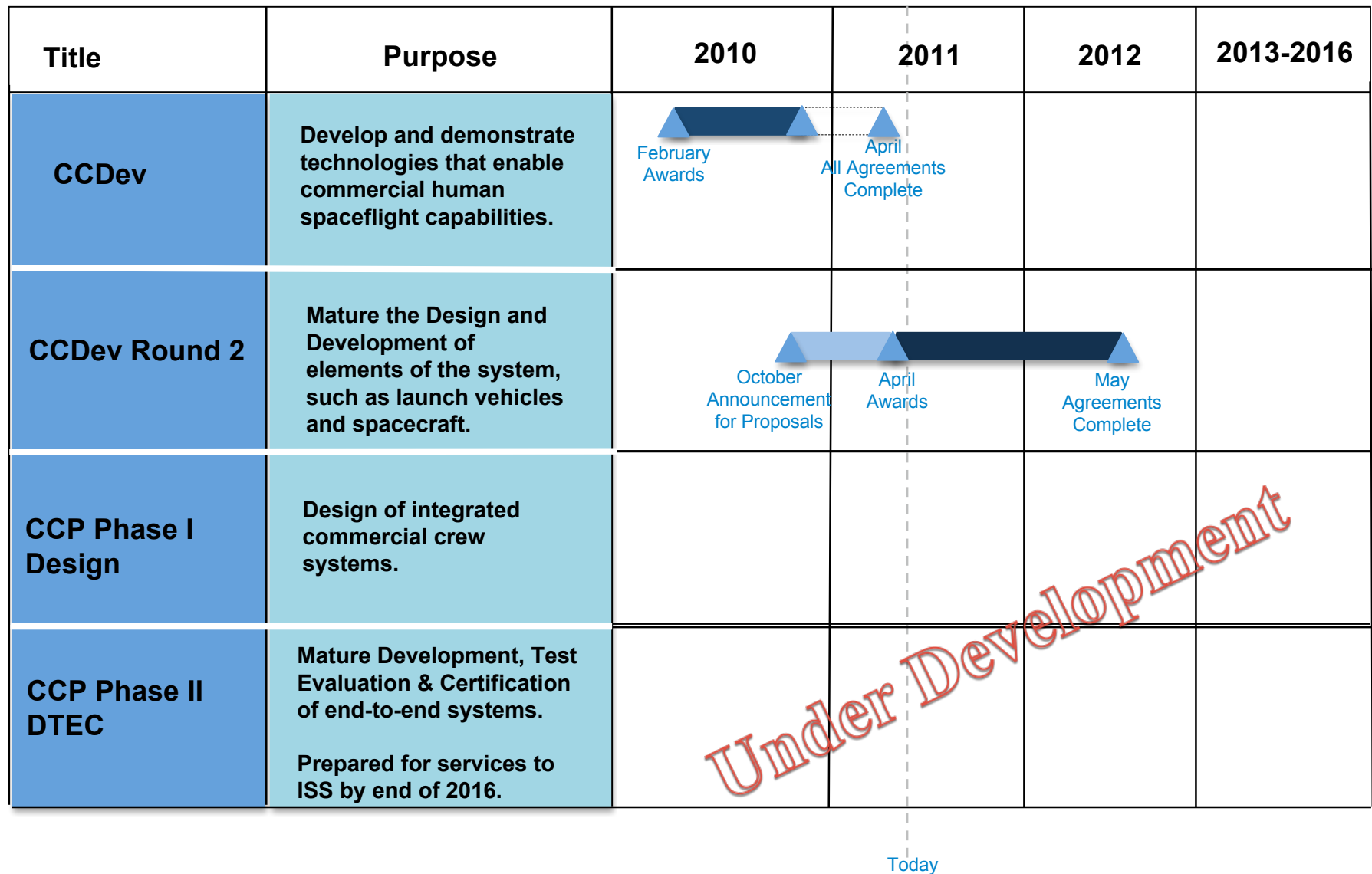
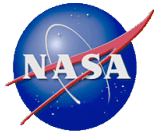
Low In/Oversight

Intense In/Oversight





Commercial Crew Structure and Timelines



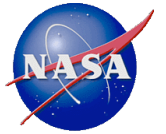


Commercial Crew Development (CCDev)



- The NASA Recovery Act stimulus funding, included \$50M to stimulate efforts within the private sector to develop and demonstrate technologies that enable commercial human spaceflight capabilities
- On February 1, 2010 five partners were announced and received funding:
 - Blue Origin
 - Boeing
 - Paragon
 - Sierra Nevada Corporation
 - United Launch Alliance (ULA)
- All Agreements were concluded by December 2010, with the exception of ULA and Boeing who received no-cost extensions to April 2011





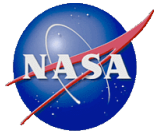
Commercial Crew Development Round 2

CCDev2





CCDev 2 Summary



Participant Name	Work Summary	NASA Funding
Blue Origin	Space Vehicle design to SRR, pusher escape ground and flight testing, and engine pump and thrust chamber testing	\$22,005,000
Boeing	CST-100 design maturation to PDR and launch vehicle integration	\$92,300,000
Sierra Nevada Corporation	Dream Chaser crew transportation system design maturation to PDR and component testing	\$80,000,000
SpaceX	Side-mount LAS engine design maturation and partner-funded crew accommodation prototype	\$75,000,000
Total Funding		\$269,305,000



Blue Origin



NASA investment: \$22M



System Description: Crew transportation system comprised of a reusable biconic Space Vehicle launched first on an Atlas V launch vehicle and then on Blue Origin's own Reusable Booster System.



CCDev2 Content: Mature Space Vehicle design through System Requirements Review, mature the Pusher Escape System, and accelerate engine development for Reusable Booster System.





The Boeing Company



System Description: Commercial crew transportation system comprises the reusable CST-100 spacecraft, launch services, and ground systems. CST-100 is compatible with multiple launch vehicles and is reusable for up to ten missions.

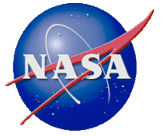
CCDev2 Content: Mature CST-100 design through Preliminary Design Review & perform development tests.

NASA investment: \$92.3M





Sierra Nevada Corporation



System Description: Dream Chaser is a reusable, piloted lifting body, derived from NASA HL-20 launched on an Atlas V.

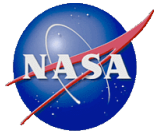
CCDev2 Content: Mature Dream Chaser design through a Preliminary Design Review with some subsystems to Critical Design Review, and conduct significant hardware testing.

NASA investment: \$80M





Space X




System Description: The crew transportation system is based on the existing Falcon 9 launch vehicle and Dragon spacecraft which have been designed since inception for crew carriage with relatively minimal modification. Both the longest-lead and most safety-critical system is the Launch Abort System.

CCDev2 Content: Mature the flight-proven Falcon 9 / Dragon transportation system focusing on developing an integrated, side-mounted Launch abort System.

NASA investment: \$75M



- 
- **A successful Commercial Crew Program will:**
 - Transform human spaceflight for future generations
 - Result in safe, reliable, cost effective crew transportation to LEO and in support of ISS
 - Free NASA's limited resources for beyond-LEO capabilities
 - Reduce reliance on foreign systems