



Commercial Reusable Suborbital Research (CRuSR)

Presentation to the Sounding Rocket
Working Group

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Outline

- CRuSR background
- Commercial reusable suborbital vehicles capabilities
- CRuSR status/funding opportunities
- CRuSR transition to the Office of the Chief Technologist
- Q & A

CRuSR Background

Examples of Potential Providers



Virgin Galactic



Blue Origin



XCOR Aerospace



Armadillo Aerospace



Masten Space Systems

- First full-up test flights in 2010
- Several approaches (horizontal & vertical take-off and landing)
- Designed for high flight rates & low cost operability



CRuSR Background

- Potential Commercial Suborbital Vehicle Providers

- Virgin Galactic:

Virgin Galactic's WhiteKnightTwo has completed its test flight program having flown 27 times over the past 18 months. SpaceshipTwo was rolled out in Dec 09 and has now completed two successful flights. Full scale rocket motor test firings progressing to schedule.

<http://www.youtube.com/watch?v=rJJYjt5KF5g>

- Blue Origin

Flight tests to low altitude started in 2006. In 2009, Blue Origin selected three university payloads from Purdue, UCF, and LSU, funded by the National Science Foundation, with experiments scheduled to be delivered to Blue Origin by November 2010.

<http://www.space.com/common/media/video/player.php?videoRef=BlueGoddard1>



CRuSR Background

- Potential Commercial Suborbital Vehicle Providers
 - XCOR Aerospace:

XCOR rocket engines and pumps have already been demonstrated in ground test. Aerodynamic design final checkout in NASA wind tunnel scheduled for July 2010. Vehicle is under construction now.

<http://www.popularmechanics.com/science/space/4255991>
 - Armadillo Aerospace

Currently flying two vehicles to altitudes in excess of 1 km. Two additional vehicles are in fabrication now.

<http://www.youtube.com/watch?v=HRFSwA0UL9s>
 - Masten Space Systems:

Masten is currently flying test flights under amateur rocketry regulations They are on target to begin supersonic flights to 100,000 feet this fall.

<http://www.youtube.com/watch?v=01FcUEjwDkk>

Capabilities of commercial reusable suborbital vehicles



- CRuSR Objective: Procure space transportation services from emerging commercial reusable spaceflight companies to provide relevant environment flight exposure for technologies, hands-on experience for students, and near-space access for scientific research
- Where to find more information on vehicles:
 - <http://crusr.arc.nasa.gov/platforms> for information on individual providers, including RFI responses
 - <http://crusr.arc.nasa.gov/files/CRuSR-SuborbitalPlatformCapabilitiesMatrix.xls> for a spreadsheet side-by-side comparison of the different providers
- Spreadsheet contains information about:
 - Contact information, general flight profile description, payload mass and volume constraints, planned frequency of flights, telemetry possible, data storage possible, pointing accuracy, maximum vibration characteristics (if known), maximum g-loading (if known), normal operating temperature, and much more



CRuSR recent activities/funding opportunities

- RFI released: Suborbital providers submitted technical information about their vehicles (10+ responses received)
- Vehicle technical information from providers posted on CRuSR website
- Working with procurement on a request for quote (RFQ) for providers
- RFQ: Mechanism to buy test flights from providers
- Test flights: Will be used to fly environmental monitors in July /August timeframe
 - Characterization of the flight environment will allow for better design of payloads, the payload developers will know what vibration, g-loading, etc. to design for
- Facilitating safe and effective access to near-space through work with FAA and other regulatory agencies
- Working with flight providers to provide NASA experience and lessons learned where this knowledge can facilitate commercial development
- Planning to solicit technology payloads through Office of Chief Technologist calls
- Collaborating with NASA Office of Education to engage students
- Working with NASA Science Mission Directorate to solicit peer-reviewed science payloads



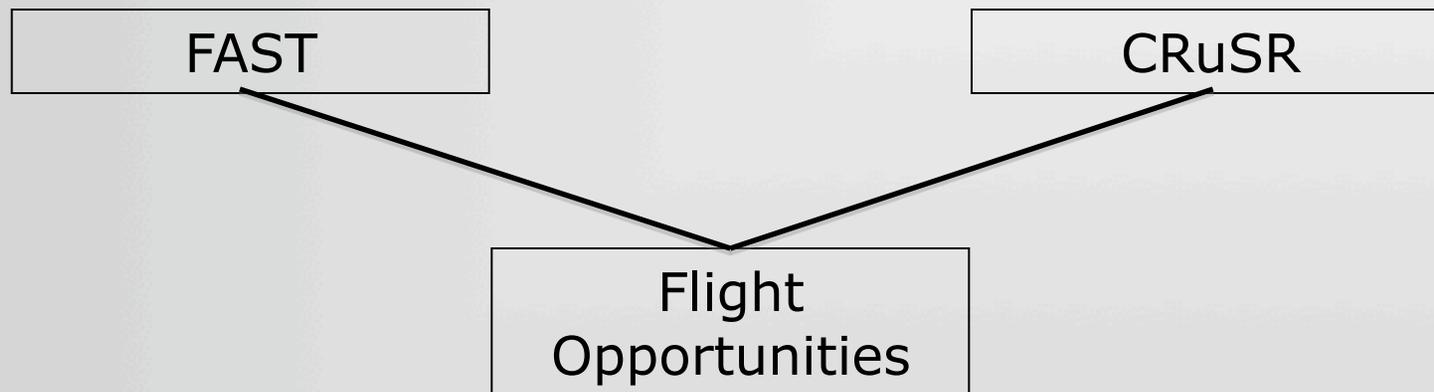
CRuSR recent activities/funding opportunities

- Working with SMD to modify ROSES call to include CRuSR (not yet modified as of 6/10/2010):
 - <http://science.nasa.gov/researchers/sara/grant-solicitations/>, click on "Research Opportunities in Space and Earth Sciences (ROSES) 2010"
- Multiple indefinite delivery / indefinite quantity (IDIQ) contracts to be awarded to commercial suborbital RLV firms. Indefinite delivery/indefinite quantity (IDIQ) contracts provide for an indefinite quantity of services during a fixed period of time. They are used when the precise quantities of supplies or services that the Government will require during the contract period are not definite. IDIQs help streamline the contract process and speed service delivery.

NASA Office of the Chief Technologist Flight Opportunities Program



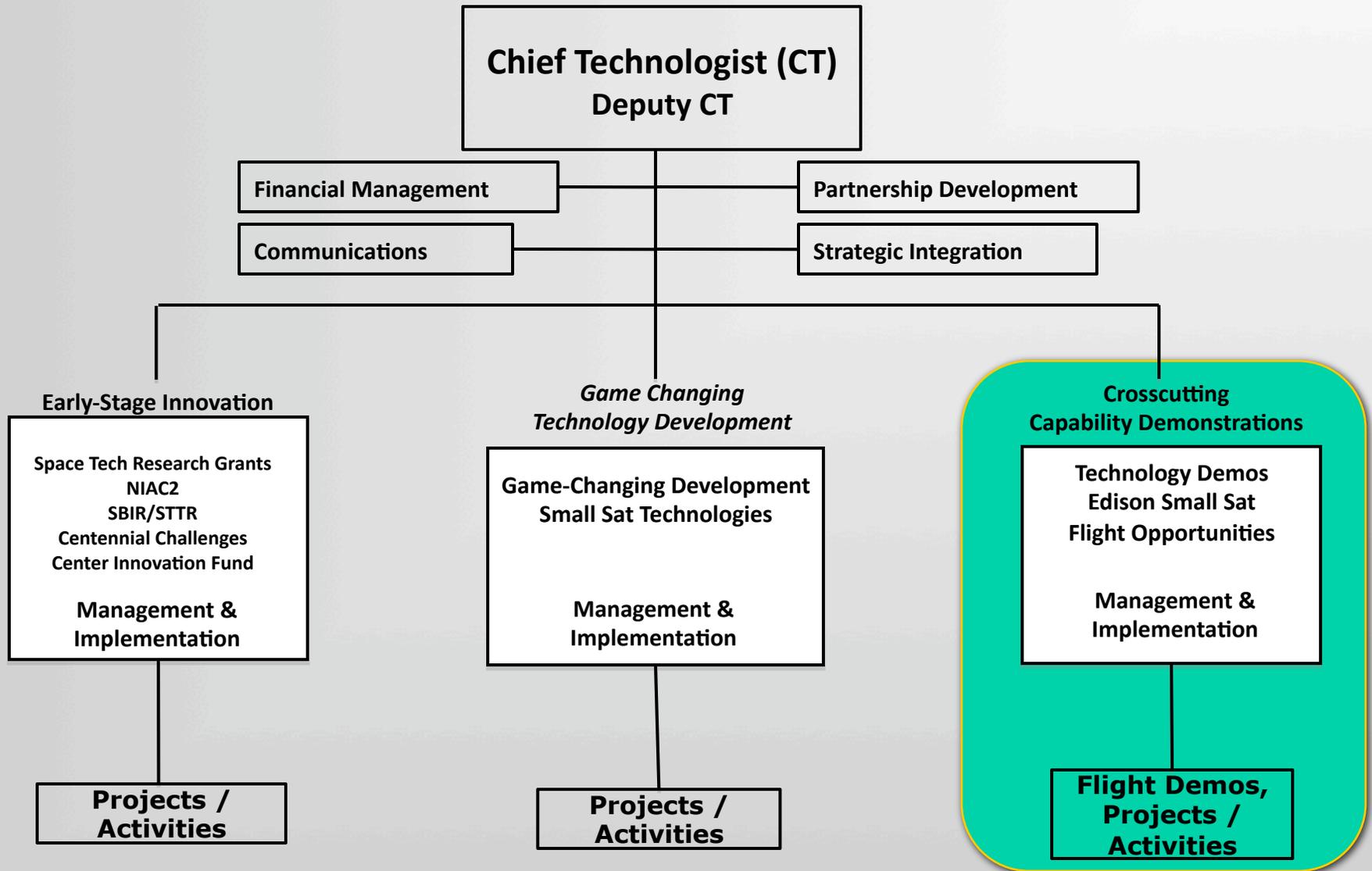
The commercial reusable suborbital activity initiated in FY10 will be transitioned into the Flight Opportunities Program within the Office of the Chief Technologist in FY11.



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NASA Office of the Chief Technologist





NASA Office of the Chief Technologist Flight Opportunities Program

- NASA to provide flight opportunities for technology development, science, and education in reduced-gravity environments, brief periods of weightlessness, and high-altitude atmospheric research
- In FY11, the Flight Opportunities Program combines the FY10 FAST and CRuSR efforts previously managed by NASA's Innovative Partnership Program.
- Goal of expanding program to other flight opportunity platforms in FY12; goal is to expand the number of reliable, affordable flight platforms for technology development, science, and education.
- FAST (Facilitated Access to the Space environment for Technology): focuses on testing technologies on parabolic aircraft flights that can simulate microgravity; competitive selection; each flight provides 40-60 parabolas, each with 25 seconds of microgravity; yearly calls for proposals with expectation of 30-40 selections each year; NASA pays for flight time, 5 projects flown in FY2008 and 19 flown in FY2009, 15-20 planned for FY2010.



Questions?