Commercial Reusable Suborbital Research (CRuSR) Program

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Caveat

NASA center work assignments released 8 April 2010 indicate the CRuSR Level 2 Program Office will move to Dryden Flight Research Center. ARC currently working with DFRC to effect transition.

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Why CRuSR

- ‘ … foster the **development of the commercial reusable suborbital transportation industry**, an important step in the longer-term path that envisions suborbital RLVs (reusable launch vehicles) evolving to **provide the Nation with much lower-cost and much more reliable access to orbital space**.’

  President Obama’s FY11 Budget submission for NASA

- “one of my greatest challenges — **the job I was given by the President — is to lead our NASA team in inspiring the next generation of Americans** to once again become interested in math, science, engineering, and technology so that our nation can maintain its technological leadership in the world.“

  Remarks By NASA Administrator Charles Bolden, National Association Of Investment Companies, Washington, DC, October 20, 2009

- “I now dream of a day when any American can launch into the vastness of outer space and see the magnificence and grandeur of our home planet, Earth, as I have been blessed to do.“

  Remarks By Charles Bolden, Confirmation Hearings for NASA Administrator, Senate Committee on Commerce, Science and Transportation, 8 July 2009

STRATEGY: Leverage Advances by U.S. Commercial Reusable Suborbital Developers

Industry is flying real hardware to Near-Space

Virgin Galactic - Scaled

Blue Origin

XCOR

Armadillo Aerospace

Masten Space Systems

- First test flights in 2010
- Many approaches (Horizontal & vertical)
- Significant private investment
- All designed for high flight rates & operability
- From 0-6 passengers

How Do We Foster a Commercial RLV Industry?

- **Create a tipping point** after which the industry will take off and growth becomes self sustaining
- **Take an N.A.C.A.-like approach**
  - **Be a customer by buying flight services**
    - Steady and dependable procurements
  - **Help resolve common industry problems**
    - High risk R&D
    - Share experience and lessons learned
    - Transfer NASA developed technologies to industry
  - **Educate and enable the user community**
    - Promote awareness of benefits of using new platforms
    - Develop standard payload equipment

Be a Customer

- **Buy Flight Services**
  - Pathfinder contracts
    - Early high risk test flights
    - Limited duration
    - Fly "expendable" payloads and payloads that are now ready to go
  - Blanket Purchase Agreements with Indefinite Delivery and Indefinite Quantity
    - Use **F**acilitated **A**ccess to the **S**pace Environment for **T**echnology (FAST) and Sounding Rocket models
    - Provide flights for research, technology development and STEM education
- **Procure Support Services**
  - Standardized payload "canisters" and racks
  - Payload integration, and operations centers at the Spaceports

Help Industry Resolve Common Problems

- **Use the Commercial RLV Technology Roadmap to guide development of new technologies**
- **Refine procedures for payload processing and safety assurance**
- **Develop/procure standard equipment for payloads**
  - Batteries, data loggers, etc.
  - Canisters and racks
  - Pointing platforms
  - Permanently mounted sensors for atmospheric research
- **Work with FAA <u>and</u> industry to resolve issues such as**
  - Traffic Control
    - Automatic Dependent Surveillance-Broadcast (ADS-B)
    - Next Generation GPS
  - Safety

Educate and Enable the Users

- **Promote the benefits**
  - Prolonged high-quality microgravity – 4 to 6 minutes
  - Frequent, low-cost flights - Build a little, test a little
  - New territory to explore – Mesosphere & Lower Thermosphere or the "Ignorosphere"
- **Promote awareness**
  - Support conferences
  - Establish a community web presence
    - Current information
    - Discussion Groups
    - Multimedia and Social Networking
  - Provide flights and equipment for academic payloads
- **Provide a catalog of CRuSR services**
  - Flight vehicles with operating parameters and regimes
  - Available payload equipment
- **Encourage industry standards**

To be Successful, We Must Leverage & Catalyze…

- **Catalyze STEM education** by providing lesson plans, teacher training, materials, standardized flight hardware, and flights needed by middle and high schools to fly very small ("canister") satellites.
- **Catalyze research on Mesosphere/Lower-Thermosphere (MLT) that addresses unanswered "climate change"** questions by identifying and flying off-the-shelf hardware
- **Help leverage research dollars,** by providing flights and common payload equipment that will greatly reduce the researchers costs.
- **Be an industry advocate** to leverage other NASA resources to provide direct assistance to industry and its users
- Provide access to **NASA facilities and expertise**
- **Catalyze innovation by providing "fair broker" information** to the research community, and to the suborbital providers of the needs of diverse user communities.

And Develop Partnerships

- **Establish strategic partnerships**
  - FAA-AST
  - National Governors Association (NGA)
  - Aerospace States Association (ASA).
  - Spaceports
  - Commercial Spaceflight Federation's (CSF) Suborbital Applications Researchers Group (SARG)
  - National Space Grant Directors
- **Stimulate non-traditional partnerships**
  - Fund prizes for business plan competitions
  - Sponsor meetings/workshops to inform key stakeholders

Conclusion

- CRuSR's proposed program will directly address the following national policy objectives:
  1. Inspire the next generation to study STEM
  2. Advance technology and scientific research, with an early focus on critical climate change research
  3. Broadly stimulate innovation by leveraging partnerships with industry, federal agencies, academia and user communities
  4. "(F)oster the development of the commercial reusable suborbital transportation industry … to provide the Nation with much lower-cost and much more reliable access to orbital space."

CRuSR

"Do what you can, with what you have, where you are"
Theodore Roosevelt

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