



Langley Research Center

NASA Commercial Space Transportation Workshop Overview

**Presented at
COMSTAC RLV Working Group Meeting
October 10, 2007**

Long Yip
NASA Langley Research Center
Hampton, VA

Commercial Space Transportation Workshop: Developing Space Vehicle Technologies

August 1-2, 2007
Hampton, VA

Workshop at a Glance

- Attendance => capacity (65) at National Institute of Aerospace
- Participation from:
 - NASA (ARC, GRC, MSFC, GSFC/WFF, KSC, JSC, LaRC, and HQ)
 - Industry (21)
 - Other entities (8)
- Unified/Common message => NASA ready to support this industry
- 1st day => COTS and IPP overview talks, industry perspectives/interests, NASA center capabilities, and technical challenges
- 2nd day => a panel discussion on public-private partnerships followed by private meetings and Langley facility tours



Workshop Objectives

- Workshop Purpose: to bring together the commercial space community and NASA center representatives
- Workshop Focus: space vehicle technologies - challenges and opportunities
- Desired outcomes include:
 - Better understanding of industry needs
 - Better understanding of NASA center capabilities and services
 - Defining common technical barriers for the community
 - Better communication between NASA centers and the community
 - Initial discussions of potential SAAs between NASA centers and industry wrt collaboration on technology developments (cost-shared, partial-, or fully-reimbursable efforts)



Morning Speakers





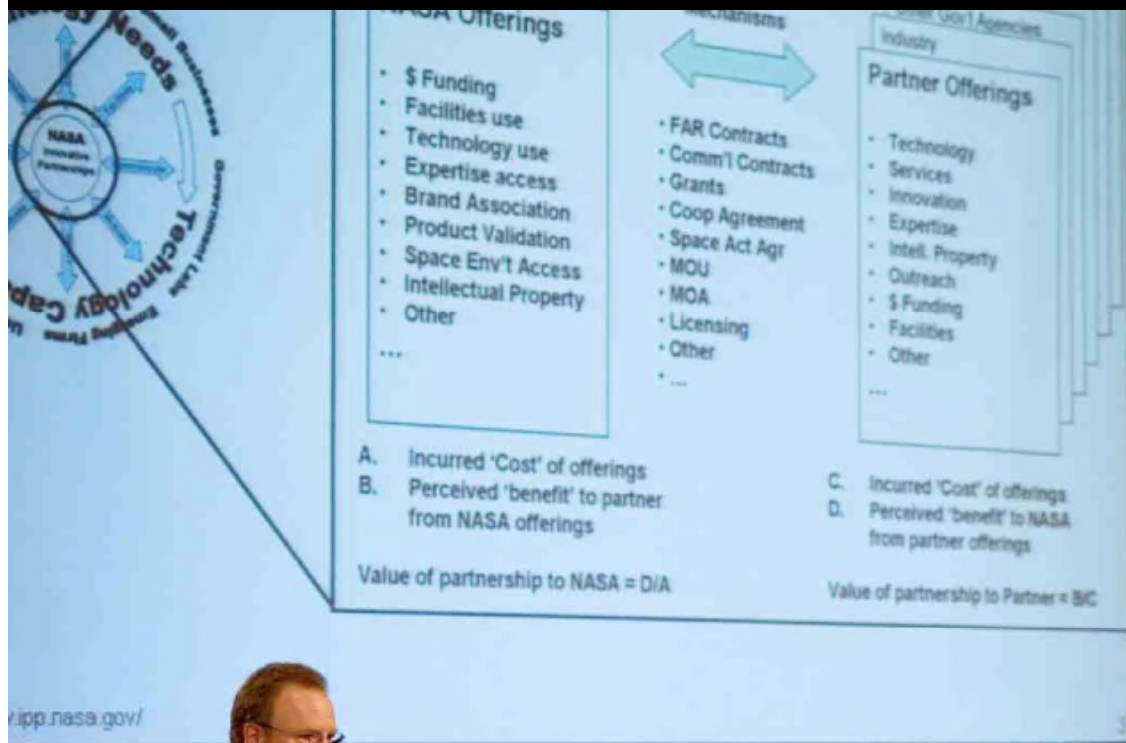
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Audience - Day 1





Public Private Partnership Panel - Day 2





Billie Reed Stirring Things Up

Anecdotal Lessons

- "Government can't act like a business and business can't act like the Government"
(colleague, 1999)
- "Commercial Space - that is an oxymoron"
(Board Member, 2000)
- "...if you weren't here, I wouldn't have to deal with this" (NASA HQ Attorney, 1997)
- "I'm part of the reason that change is impossible and I know it" (NASA Manager, 2004)





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Wallops Team Relaxing at the Hampton Convention Center Terrace Reception





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Good Workshop Interactions





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NASA's Odd Couple from Glenn and Marshall





Private Meetings with Industry (Example)

Industry/Contact	Area of Interest / Requests	Follow Action(s)
<ul style="list-style-type: none">• ILC Dover - Cliff Willey, Program Manager, Space Inflatables	<ul style="list-style-type: none">• Working many technology partnership opportunities at Langley• Desired single POC to help coordinate activities, develop strategic plans and technology roadmap	<ul style="list-style-type: none">• Damodar Ambur will work with action with SED, SACD, and RTD orgs at Langley

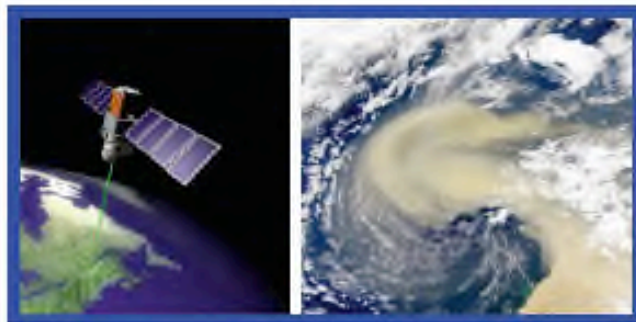


Langley's Core Competencies



Aerosciences

Research for Flight in All Atmospheres
(Includes Entry, Descent & Landing)



Characterization of all Atmospheres
(Agency = Lasers & LIDAR)



Engineering & Safety
(One NASA)



Aerospace Systems Analysis



**Aerospace Structural and
Material Concepts**



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Major LaRC Wind Tunnels and Facilities



14 x 22 Foot Subsonic Tunnel
Subsonic, Alternate Uses



National Transonic Facility
High Reynolds Number Flow
Nationally Unique



LaRC Unitary Plan Wind Tunnel
Supersonic Speed Range



Aerothermodynamic Complex
Exploration Workhorse

Subsonic

Transonic

Supersonic

Hypersonic

National Assets needed to meet the needs of the Agency, DoD, and Industry



Electromagnetics Labs



20-Foot Vertical Spin Tunnel
Spin Characteristics & Dynamic Stability
Nationally Unique



Transonic Dynamics Tunnel
Aeroelasticity & Flutter
World Unique



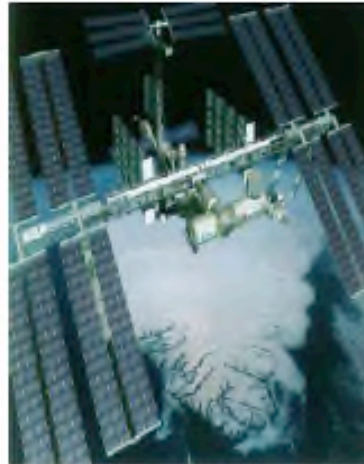
8-Ft High Temperature Tunnel
Large-scale Hypersonics & Propulsion

Specialty Facilities



Collaboration Opportunities

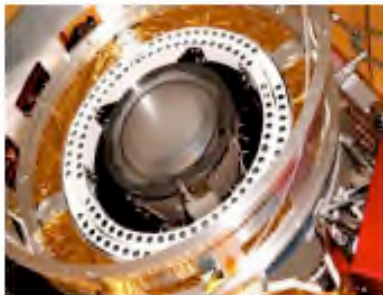
Robert J. Shaw
Chief, New Business and
Partnership Office
NASA Glenn Research Center



Space Station



Advanced Communication
Technology Satellite



Ion Thruster - Deep Space 1



Aeronautics

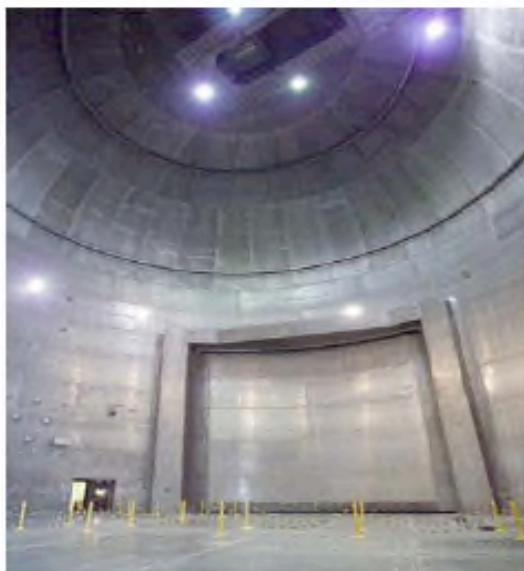


Launch Vehicles

**Demonstrated excellence in power, propulsion and communications
Science, technology and engineering products of excellence**



Premier Facilities Available for Testing and Evaluation



Space Vacuum Facility



Microgravity Testing: Drop Towers



Wind Tunnel Testing



Communications



MISSION: Promote the vision of the President, Congress, and NASA to establish a self-sustaining commercial space economy and infuse entrepreneurial practices into the civil space program

Space Portal Staff

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www.alliancespace.net



Ames Research Center

August 2nd, 2007

Entrepreneurial Space Partners

AIR LAUNCH

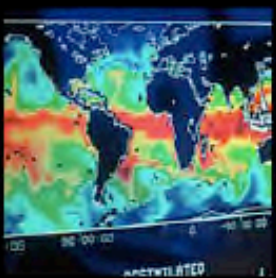
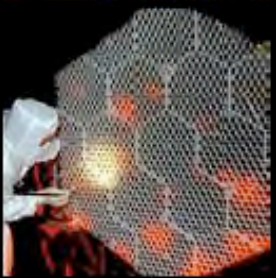


CISCO SYSTEMS



Virtue Arts





Marshall Space Flight Center

A Gateway to the Moon

**Commercial Space Transportation Workshop:
Developing Space Vehicle Technologies**

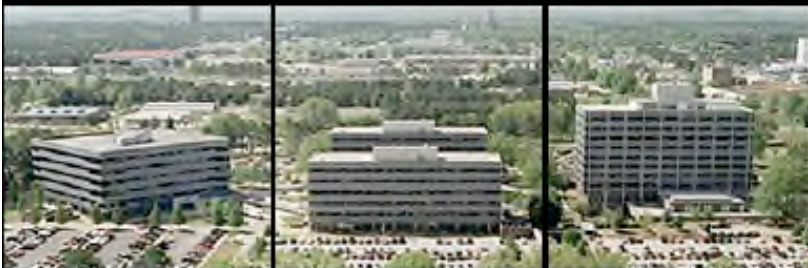
K. Bruce Morris
**Exploration Programs and
Projects Manager**
August 1, 2007

Marshall Space Flight Center at a Glance

- **Employees: 7,000** (2,600 Civil Service; 4,400 contractor)
- **Location: 1,841 acres on Redstone Arsenal in Huntsville, AL**
- **Buildings: 237 with 4.5M sq ft of space**
- **One-of-a-kind facilities: 50**
- **Nearby resources:**
 - National Space Science & Technology Center**
 - Cummings Research Park**
 - Alabama A & M University**
 - University of Alabama in Huntsville**
 - U.S. Space & Rocket Center**
 - Von Braun Center for Science and Innovation**



- **\$2.7B budget (FY07)**
- **Part of NASA's nearly \$1B annual Alabama impact**
- **Payroll since 1960: \$6.1B**
- **Engages 20,800 people in 47 states**
- **Manages Michoud Assembly Facility near New Orleans**





Kennedy Space Center Spaceport Operations & Technology

Commercial Space
Transportation Workshop

National Institute of Aerospace
Hampton, Virginia
August 1-2, 2007

Jim Ball
Spaceport Development Manager
NASA Kennedy Space Center

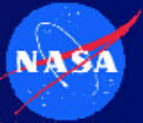


Kennedy Space Center - Offering Spaceport Operations & Technology



- Sites are being assessed and identified for commercial launch, recovery, processing, & support operations
- Underutilized facilities are available at market-based rates
- Technical expertise and test facilities available to support industry in areas such as:
 - Cryogenic propellant systems
 - Vehicle health management
 - Launch facility design
 - Operating procedures
 - Payload processing





GSFC/Wallops
Flight Facility

Commercial Space Flight Opportunities at Wallops Flight Facility

***Bruce Underwood
Chief, Advance Projects Office
NASA/Wallops Flight Facility***



Collaboration Opportunities

- ***Launch Range Operations***
- ***Engineering & Testing Labs***
- ***Advanced Range Technologies***





NASA Points of Contact

NASA Center / POC	Areas of Interest for Follow Up Contact
NASA HQ Rheal Turcotte Rheal.P.Turcotte@nasa.gov 202-358-1514	
Langley Long Yip Long.P.Yip@nasa.gov 757-864-3866	
Glenn Joe Shaw Robert.J.Shaw@nasa.gov 216-977-7135	
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Kennedy Jim Ball James.E.Ball@nasa.gov 321-867-2998	
Goddard/Wallops Bruce Underwood Bruce.E.Underwood@nasa.gov 757-824-1479	



Concluding Remarks

- Workshop Positives
 - Langley and NIA worked well together to conduct this workshop
 - Convention Center/Embassy Suites provided an excellent venue for reception/dinner
 - Better communications including inter-center networking
 - Tours provided good venue for our guests
 - Other centers are engaging with this industry
- Next steps
 - Follow up discussions with industry
 - Glenn Research Center is planning to host the next NASA Commercial Space Transportation workshop. It's major themes will be:
 - NASA-DoD/AFRL-Commercial Space partnership building
 - NACA model and other commercial space transportation alliance strategies
 - Technology areas of mutual interest
 - Glenn Research Center facilities and tours
 - Industry meetings with NASA centers



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At the End of the Day

