

National Aeronautics and  
Space Administration



# Technology & Innovation Committee

NAC Advisory Council

Dr. Bill Ballhaus, Chair  
March 9, 2012



# Technology & Innovation Committee

---

**“The scope of the Committee includes all NASA programs that could benefit from technology research and innovation.”**



## Questions for NASA Administrator

---

- What is the appropriate percentage of NASA's budget that should be devoted to technology investment?
- What fraction of that allocation should be organizationally fenced off as "seed corn" and crosscutting investment?
- How is NASA managing its technical, critical core competencies?



# T&I Committee Participants

## March 6, 2012 Meeting

---

- Dr. William Ballhaus, Chair
- Dr. Matt Mountain, HST Institute
- Mr. Gordon Eichhorst, Aperios Partners, LLP
- Dr. Susan Ying, The Boeing Company
- Dr. Dava Newman (call-in), MIT
- Committee will have an additional four members joining in Spring 2012



# T&I Committee Meeting Presentations

---

- Office of Chief Technologist Update – Dr. Mason Peck, NASA Chief Technologist
- Update and Discussion of NASA's FY 2013 Budget Request for Space Technology Program – Dr. Michael Gazarik, Director, NASA Space Technology Program
- NRC's NASA Technology Roadmap Report – Dr. Raymond Colladay, National Research Council
- NASA Response Plan to NRC Report and Discussion – Dr. Mason Peck, NASA Chief Technologist
- Update on HAT Technology Planning – Mr. Chris Culbert, NASA Johnson Space Center
- Technology and the JWST program – Mr. Rick Howard, Program Director, JWST
- Annual Ethics Briefing – Ms. Kathleen Teale, NASA OGC
- Remarks by NAC Chair Dr. Steve Squyres



# National Research Council Report

## NASA SPACE TECHNOLOGY ROADMAPS AND PRIORITIES

*Restoring NASA's  
Technological Edge  
and Paving the  
Way for a New  
Era in Space*





## T&I Committee OCT Observations

---

**Major positive progress has been made within the Space Technology Program and OCT over the past two years.**

- Space Technology Program budget appropriated \$575 million in FY2012
- Over 1,000 technology projects underway
- Five Space Technology Solicitations in FY2012
  - Space Technology Research Grants
  - Game Changing Technology
  - Technology Demonstration Missions
  - Edison Small Satellites
  - NASA Innovative Advanced Concepts

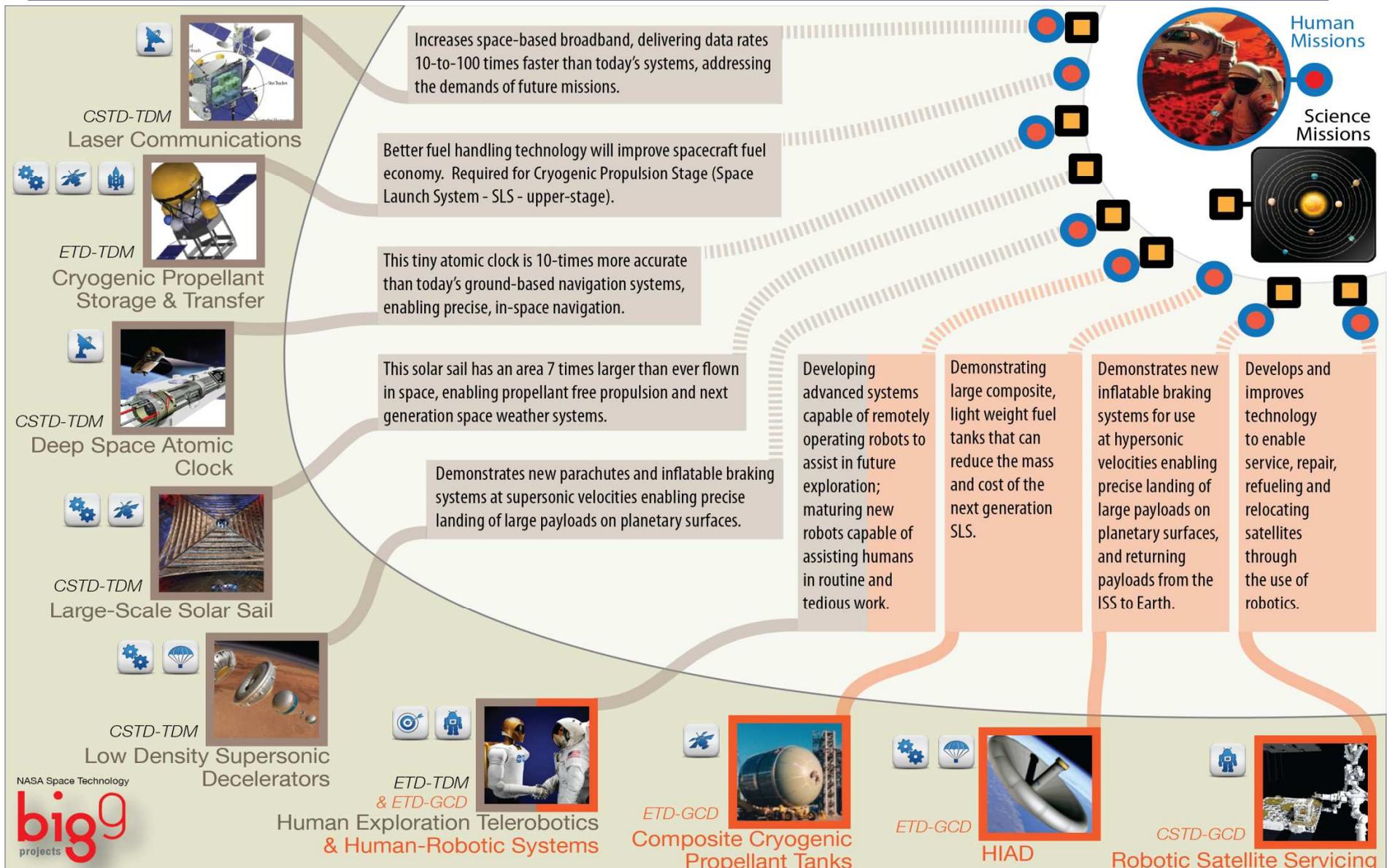


# Space Technology FY 2013 President's Budget Request

Budget Authority (\$M)	FY 2012	FY 2013	Notional			
	Appropriation		FY 2014	FY 2015	FY 2016	FY 2017
<b>FY 2013 President's Budget Request</b>	<b>573.7</b>	<b>699.0</b>	<b>699.0</b>	<b>699.0</b>	<b>699.0</b>	<b>699.0</b>
<u>Partnership Development and Strategic Integration</u>	<u>29.5</u>	<u>29.5</u>	<u>29.5</u>	<u>29.5</u>	<u>29.5</u>	<u>29.5</u>
<u>SBIR/STTR</u>	<u>166.7</u>	<u>173.7</u>	<u>181.9</u>	<u>187.2</u>	<u>195.3</u>	<u>206.0</u>
<u>Crosscutting Space Technology Development</u>	<u>187.7</u>	<u>293.8</u>	<u>272.1</u>	<u>266.6</u>	<u>259.7</u>	<u>247.0</u>
Early Stage Innovation	39.8	59.0	61.0	61.0	61.0	61.0
CSTD Game Changing Technology	61.5	66.7	73.7	69.1	58.4	58.4
CSTD Technology Demonstration Missions	65.3	128.9	103.4	102.5	106.3	93.6
Edison/Franklin Small Satellites	11.2	24.2	19.0	19.0	19.0	19.0
Flight Opportunities	10.0	15.0	15.0	15.0	15.0	15.0
<u>Exploration Technology Development</u>	<u>189.9</u>	<u>202.0</u>	<u>215.5</u>	<u>215.7</u>	<u>214.5</u>	<u>216.5</u>
ETD Game Changing Technology	111.2	104.0	70.5	79.8	85.9	90.9
ETD Technology Demonstration Missions	78.7	98.0	145.0	135.9	128.6	125.6

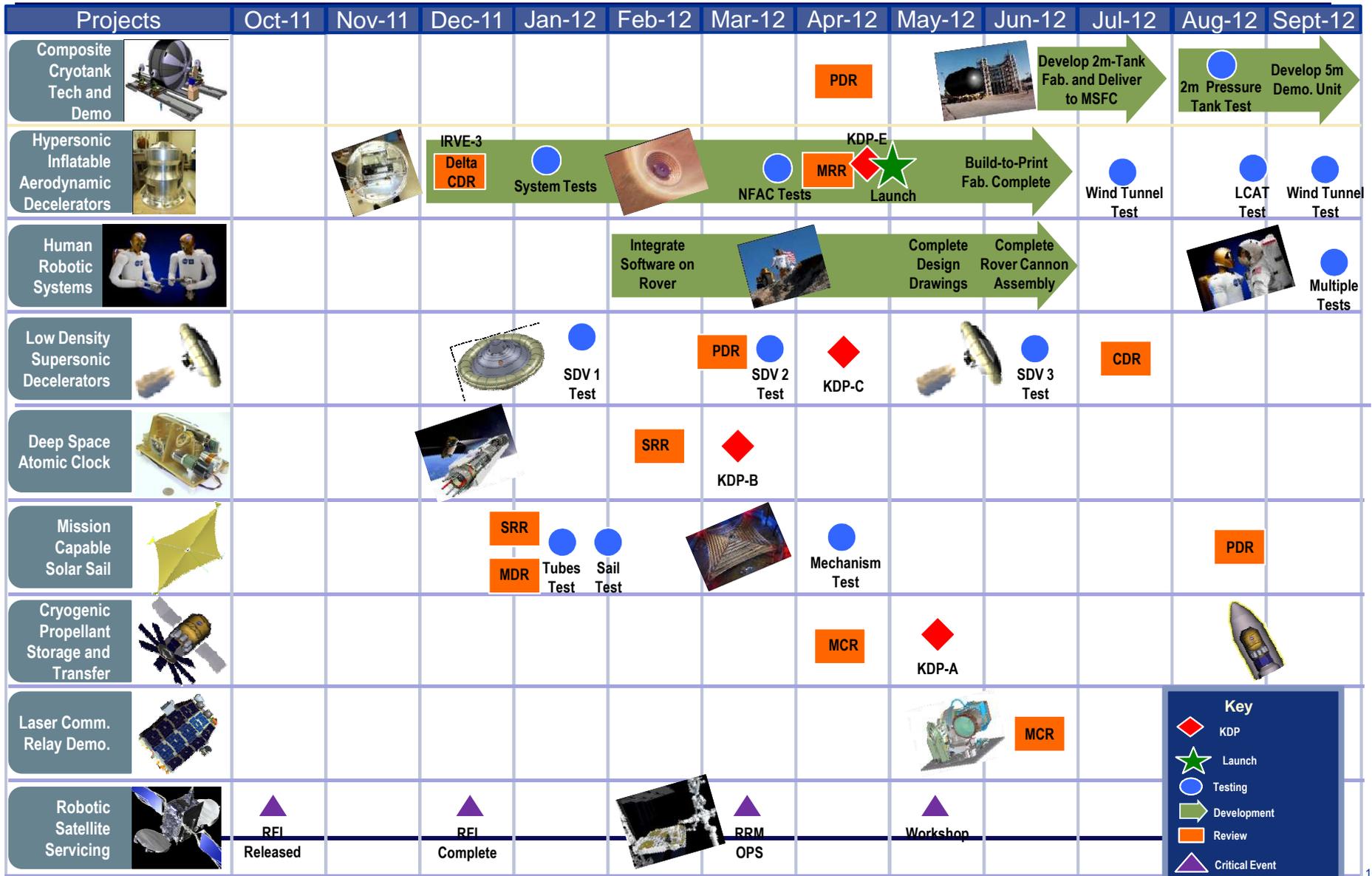


# “Big 9” Projects





# “Big 9” FY 2012 Milestones



**Key**

-  KDP
-  Launch
-  Testing
-  Development
-  Review
-  Critical Event



# T&I Committee OCT Observations

---

## OCT Actions in Process

- Finishing accounting process of Agency-wide technology investments portfolio
- Analyzing NRC Report
  - Already investing in all 16 highest priority technologies
  - Some adjustments will be necessary as a result of NRC Report findings (under-investing in some areas)
- Preparing Strategic Technology Investment Plan



# NASA Strategic Technology-Investment Plan





# Creating the 4-Year NASA Strategic Technology-Investment Plan

---

OCT SI will coordinate development of NASA Strategic Technology-Investment Plan with support from MD and Center Chief Technologists.

- Finalize MD Technology priorities
- Generate list of current Agency technologies development activities/projects
- Identify budget constraints
- Identify Center technology capabilities/facilities
- Identify (OGA, commercial) partners with interest in gap areas
- Identifying gap areas
- Integrate roadmaps, NRC priorities and recommendations
- Prepare 4-year plan to fund technologies in gap areas



# T&I Committee Agency-Level Observations

---

NASA “grand” missions are technology-enabled.

- JWST, MSL, ISS—type of work NASA should be doing
- Demonstrates NASA/U.S. technical leadership

*“Future U.S. leadership in space requires a foundation of sustained technology advances...NASA’s technology base is largely depleted.” –NRC Report*



# T&I Committee Agency-Level Observations

---

## What is the appropriate percentage of NASA's budget that should be devoted to technology investment? Ten percent?

- We couldn't find accounting that told us what percentage of NASA budget is technology investment. *(Although effort under way by OCT to determine this.)*
- Three Categories
  - Mission Support/Pull (mission specific or vehicle/architecture specific, mid-high TRL)
  - Crosscutting (mid-high TRL)
    - e.g. cryogenic fluid management in space, solar electric propulsion
  - "Seed Corn" (low-mid TRL)
    - Disruptive
    - Developing people, as well as ideas/maintaining core competencies



# T&I Committee Agency-Level Observations

---

- A number of astute administrators, including present, have organizationally fenced off the budget for “seed corn” and crosscutting investments that includes research and technology and system-level demonstrations to preserve options for the future.
  - When “seed corn” investment isn’t organizationally fenced off, it gets eaten!
  - e.g. Constellation eating tech budget to fix development issues
- What fraction of the technology budget should be set aside for “seed corn”?



# T&I Committee Agency-Level Observations

---

*“NASA needs a disciplined system analysis for management of the space technology portfolio.”  
–NRC Report*

- Systems analysis is critical for assessing the value of particular technologies on overall future systems’ performance.



# T&I Committee Agency-Level Observations

---

**Challenging missions require that NASA maintain an essential set of technical core competencies.**

- Technology
- Technically educated/experienced people
- Facilities
- Labs (e.g. NRC Report on NASA labs)
- Who is accountable for maintaining these core competencies? Is this a governance issue?



## Questions for NASA Administrator

---

- What is the appropriate percentage of NASA's budget that should be devoted to technology investment?
- What fraction of that allocation should be organizationally fenced off as "seed corn" and crosscutting investment?
- How is NASA managing its critical core competencies?