National Aeronautics and Space Administration

Office of the Chief Technologist Update

NASA Advisory Council

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Office of the Chief Technologist
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Advanced Technology at NASA

- NASA pursues **breakthrough technologies** to expand our frontiers in aeronautics and space
- **Advanced technologies are critical** for accomplishing NASA's current missions, and today's **technology investments are required** for the bold missions of NASA's future
- These same investments **benefit the United States economy** through creation of new industries, products, services, scientific discoveries, and societal benefits
- NASA's basic and applied research programs **span all of NASA's mission areas**
- NASA is implementing a portfolio of broadly applicable Space Technology programs to take the **best ideas** of our nation's innovators **from concept to flight**

Space Technology Grand Challenges

EXPAND HUMAN PRESENCE IN SPACE

Economical Space Access

Space Health & Medicine

Telepresence in Space

Space Colonization

MANAGE IN-SPACE RESOURCES

Affordable Abundant Power

Space Way Station

Space Debris Hazard Mitigation

Near-Earth Object Detection & Mitigation

ENABLE TRANSFORMATIONAL SPACE EXPLORATION & SCIENTIFICE DISCOVERY

Efficient In-Space Transportation

High-Mass Planetary Surface Access

All Access Mobility

Surviving Extreme Space Environments

New Tools of Discovery

NASA Space Technology Roadmaps

The NASA Space Technology roadmaps, drafted by NASA, and reviewed and vetted for technology investment identification and prioritization by the NRC, will serve NASA as a decadal-like survey, to provide sustained technology investment goals**.**

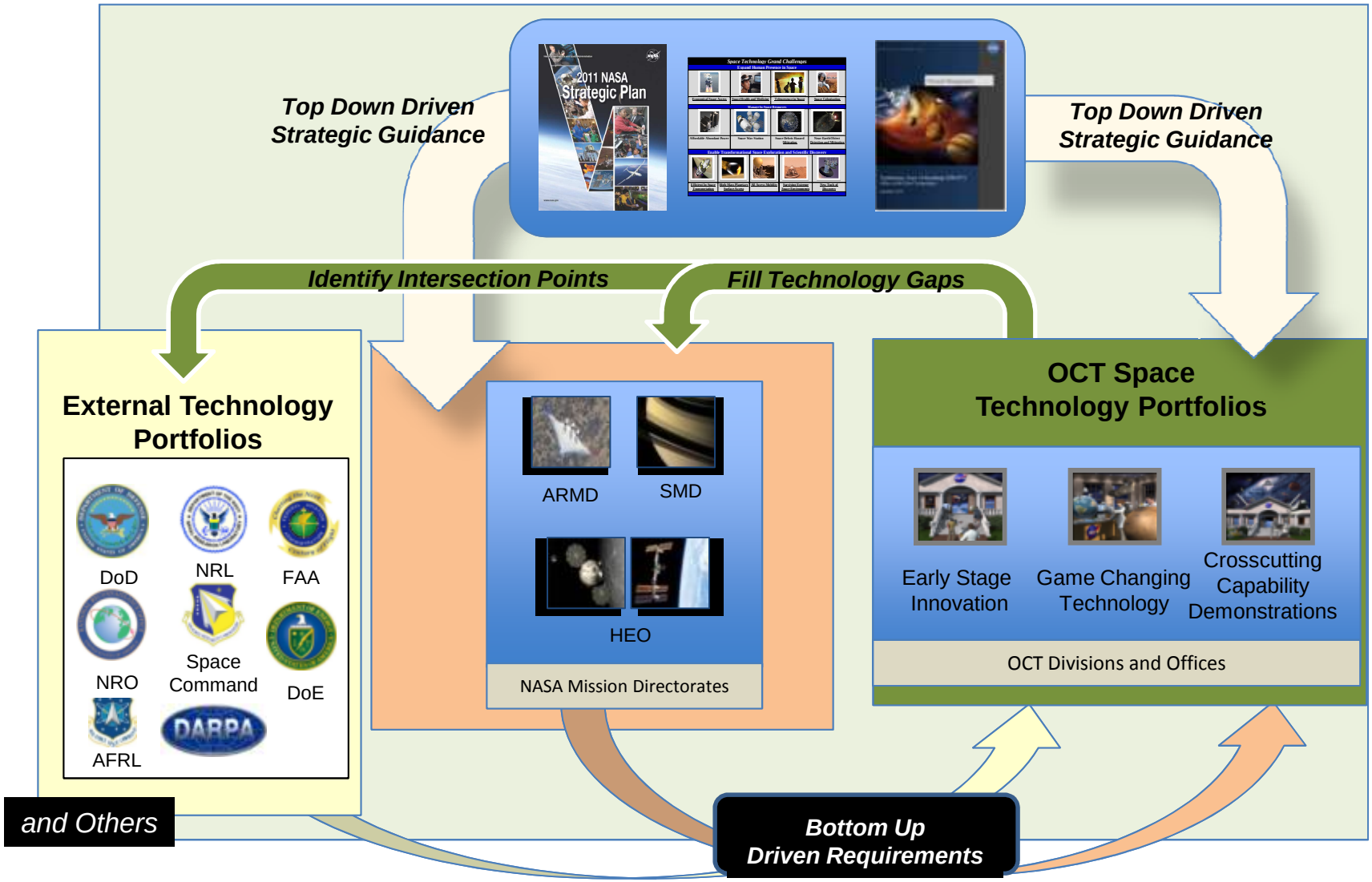
- *Interim report: Sept 2011*
- *Final Report: Jan 2012*

- NRC Interim Report on NASA'S Draft Space Technology Roadmaps, August 29, 2011
  - Success in executing future NASA space missions will depend on advanced technology developments that should already be underway.
  - NASA's technology base is largely depleted.
  - Currently, available technology is insufficient to accomplish many intended space missions in Earth orbit and to the Moon, Mars, and beyond.
  - Future U.S. leadership in space requires a foundation of sustained technology advances.
- NASA will utilize the NRC's final report recommendations in refining the Space Technology Roadmaps in FY 2012 and as a guide in developing FY 2013 and beyond space technology investment priorities.

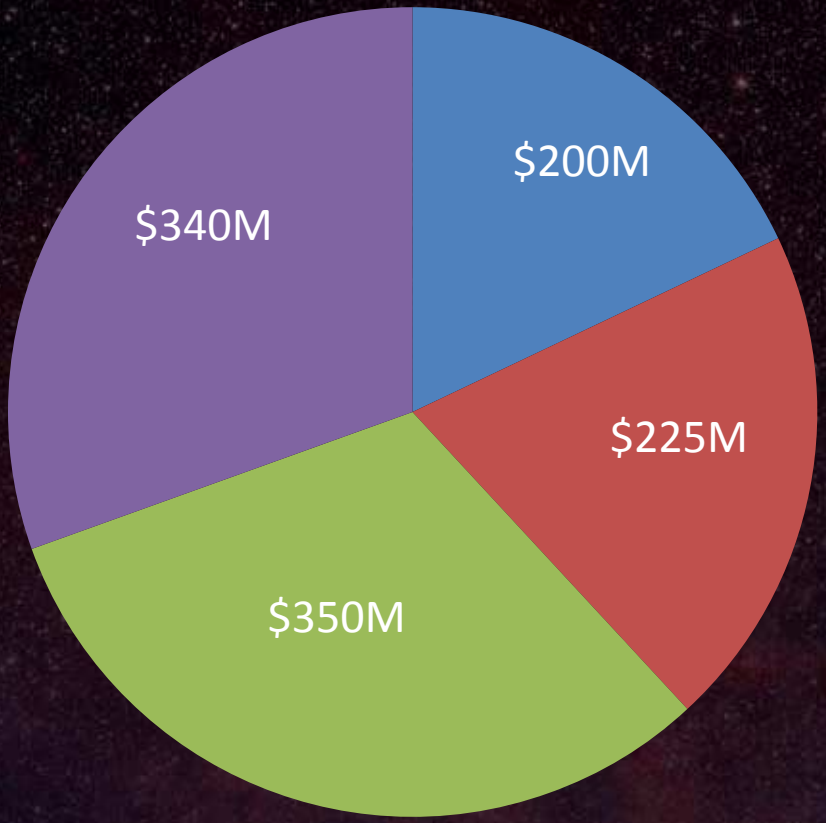
NASA SPACE TECHNOLOGY ROADMAP
TECHNICAL AREA BREAKDOWN STRUCTURE

More information at http://www.nasa.gov/offices/oct/home/roadmaps/index.html

NASA Technology Portfolio Development



FY 2011 Basic and Applied Research Funding at NASA



Programs

- Science R&D*
- Fundamental Aeronautics
- Space Technology
- Human Explortaion Office

Agency Total = $1115M
(plus $300-500M in SMD mission-focused technology)

Office of the Chief Technologist
Roles and Responsibilities

NASA Chief Technologist:

- Serves the Administrator as the principal NASA advisor on matters concerning Agency-wide technology policy and programs
- Advocates externally for NASA's research and technology programs

Delegated to NASA Deputy Chief Technologist:

- Integrates, coordinates and tracks the technology investments across the Agency working to infuse technologies into future NASA missions and facilitating Agency technology governance (e.g., risk acceptance, reporting)
- Documents, demonstrates, and communicates the societal impact of NASA technology investments
- Leads technology transfer and technology commercialization activities across the Agency, facilitating internal creativity and innovation efforts

Delegated to Space Technology Program Director:

- Directs management and budget authority of the Space Technology Programs

High-Level Emphasis Areas and Initiatives for FY 2012

1. **Execution of Space Technology Program**
   - Comprehensive execution of all ten ST programs (over 1000 projects)
   - Emphasis on FY 2012 "Big Nine" projects
2. **Strengthen cross-agency view (SMD, HEOMD, ARMD)**
   - Ensure appropriate coverage – minimize gaps and overlaps
   - Increase infusion of technologies into missions
3. **Increase engagement with external entities for collaborative technology development**
   - Other Government Agencies (e.g., DARPA, AFRL, NRO)
   - International partners (e.g., ESA, DLR, CSA)
4. **New approach ("co-development") for simultaneous development of technologies to meet NASA mission objectives and provide broader societal benefit**
   - Co-development strategy involves identification of key requirements, partnership at outset of project (parallel development)
   - Results in faster, less expensive development than if done serially

OCT Technology Transfer and Commercialization Efforts

FY 11 Highlights and Accomplishments:

- 1,257 new inventions
- 129 new patent applications filed
- 221 new copyright licenses executed
- 34 new invention licenses executed
- 44 new technology transfer success, including:

Time-saving software derived from a suite of NASA-invented tools for improving the efficiency of air traffic control, now allowing commercial airlines to take the most direct possible flight paths and potentially save millions of gallons of fuel

A health and fitness monitoring technology rendered into a simple strap or even a t-shirt, capable of measuring and recording the vital signs of soldiers, first responders, professional athletes, and consumers seeking to get in shape—developed with help from NASA physiologists.

A manufacturing process, devised for fabricating unique components for NASA deep space science missions, that now creates enabling parts for advanced medical imaging machines and gas turbine engines at a greatly reduced cost.

OCT Technology Transfer and Commercialization Efforts

In FY 2012, NASA will count among its primary Agency-level goals an increase in the amount and quality of its technology transfer activities. Accordingly, the Agency will:

- Engage external entities in co-development of technologies that simultaneously serve NASA mission needs while offering an expedient path to the transfer of technology and ultimately societal/public benefit.
- Release a public online portal, improving public access to federally-owned inventions
- Revise and streamline Agency procedures for execution of Cooperative Research and Development Agreements (CRADAs)
- Increase Agency engagement with existing regional technology innovation clusters
- Continue development and implementation of new metrics to measure the quantitative benefit of NASA technology transfer successes