National Aeronautics and Space Administration

Experimental Program to Stimulate Competitive Research (EPSCoR)

Briefing to the Committee to Evaluate EPSCoR and EPSCoR-like Programs

The National Academies

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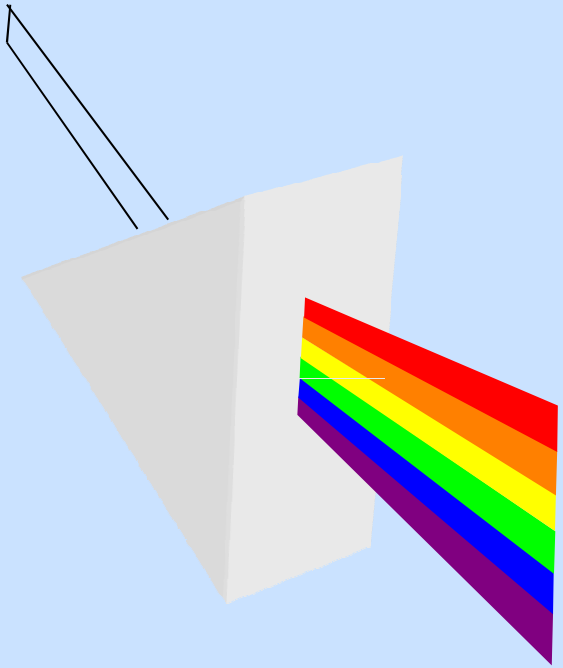
Office of Education
May 23, 2012

Agenda

- Background and Overview
- EPSCoR Life Cycle
- Funding History
- Eligible Jurisdictions
- Governance and Jurisdiction Structure
- Programmatic Components
- Results and Outcomes
- Questions

Federal and University Partnerships



1862 - USDA Land Grant
1962 - NOAA Sea Grant
1978 - NSF EPSCoR
1988 - NASA Space Grant
1992 - NASA EPSCoR

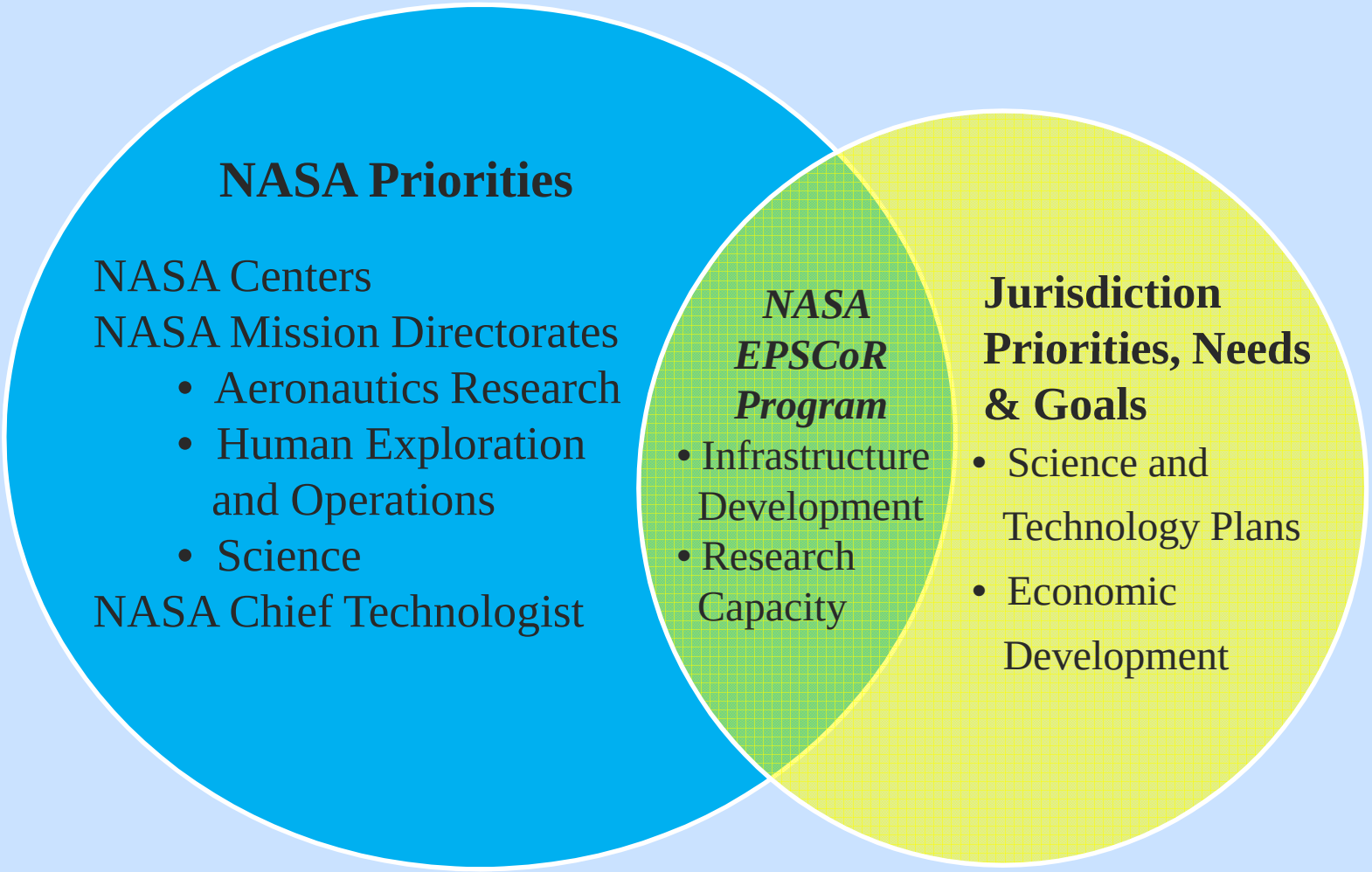
EPSCoR Legislation

- NASA EPSCoR was established by Congress in 1992 with Title III of the NASA Authorization Act for FY 1993 (Public Law 102-588).
- By this legislation, NASA EPSCoR shall:
  - address areas of research important to the mission of NASA;
  - serve as a catalyst in the eligible states to enhance the ability of researchers to become more competitive for regular NASA funding;
  - improve the environment in the eligible states for science, mathematics, and engineering education; and
  - assure the maximum distribution of grants among eligible states, consistent with merit.
- NASA EPSCoR website: http://www.nasa.gov/education/epscor

Goals and Objectives

- Goal -- provide seed funding to develop an academic research enterprise directed toward long-term, self-sustaining, nationally-competitive capabilities in aerospace and aerospace-related research.
- Objectives:
  - Contribute to and promote the development of research infrastructure in NASA EPSCoR jurisdictions in areas of strategic importance to the NASA mission;
  - Improve the capabilities of the NASA EPSCoR jurisdictions to gain support from sources outside the NASA EPSCoR program;
  - Develop partnerships between NASA research assets, academic institutions, and industry;
  - Contribute to the overall research infrastructure, science and technology capabilities, higher education, and/or economic development of the jurisdiction; and
  - Work in close coordination with Space Grant to improve the environment for science, technology, engineering and mathematics education in the jurisdiction.

EPSCoR Implementation



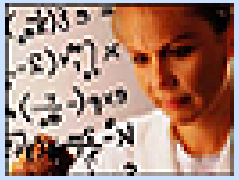
Mission Directorates & OCT

Aeronautics Research

Enable a safer, more secure, efficient, and environmentally friendly air transportation system

Human Exploration & Operations

Focus is on International Space Station operations and human exploration beyond low Earth orbit



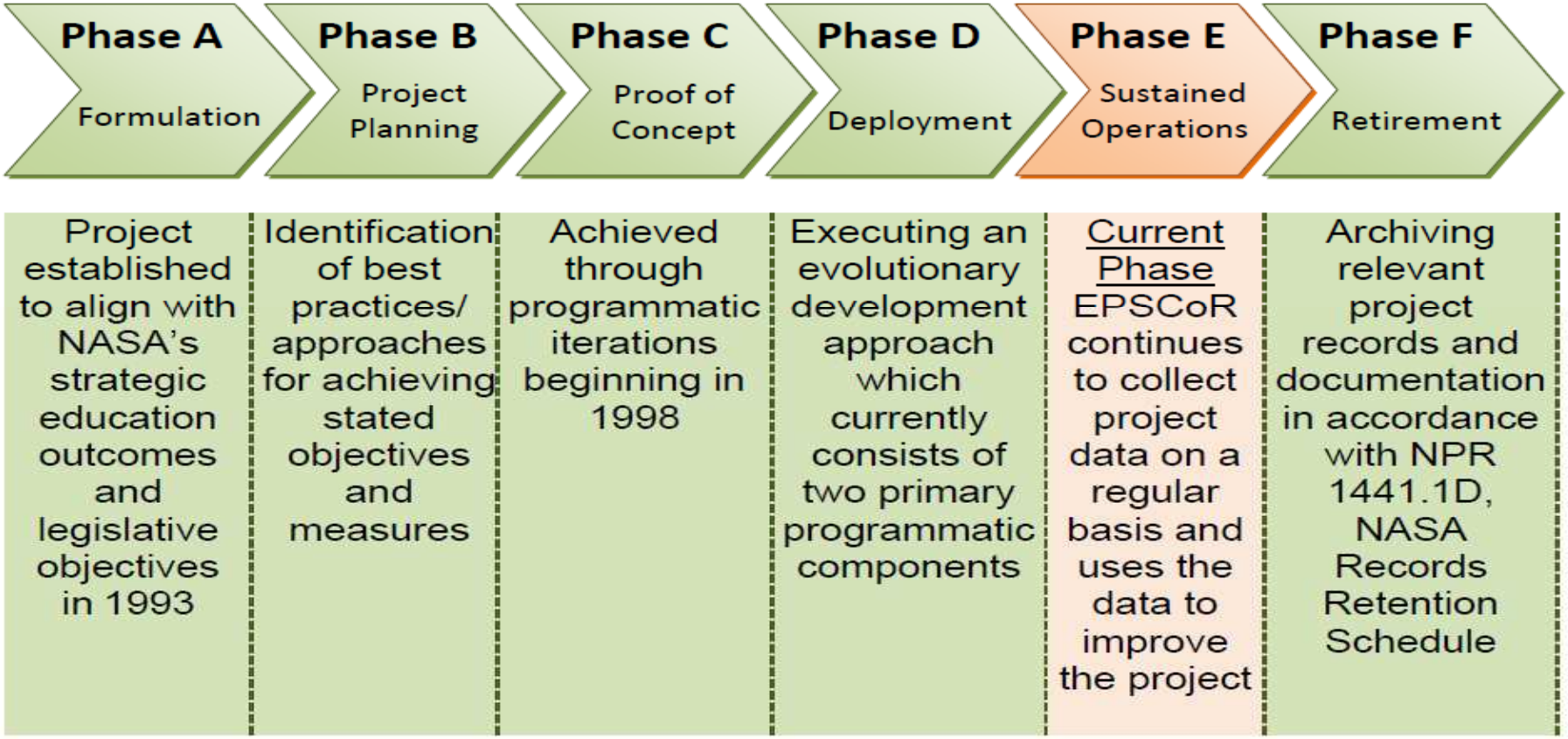
Science

Exploring the Earth-Sun system, our own planet and solar system, and the universe beyond

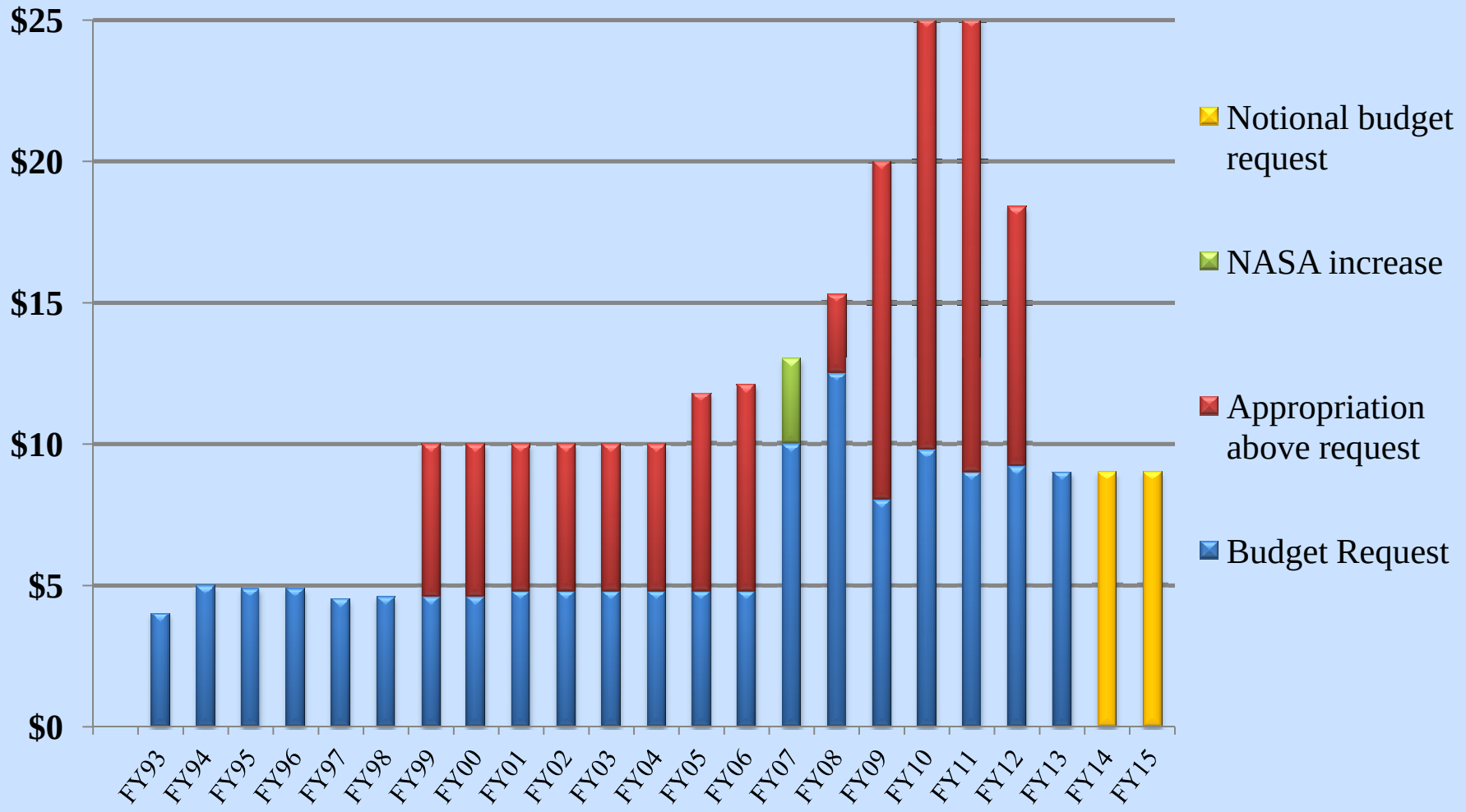
Office of Chief Technologist (OCT)

Develop and demonstrate cross-cutting advanced space systems concepts and technologies

EPSCoR Life Cycle

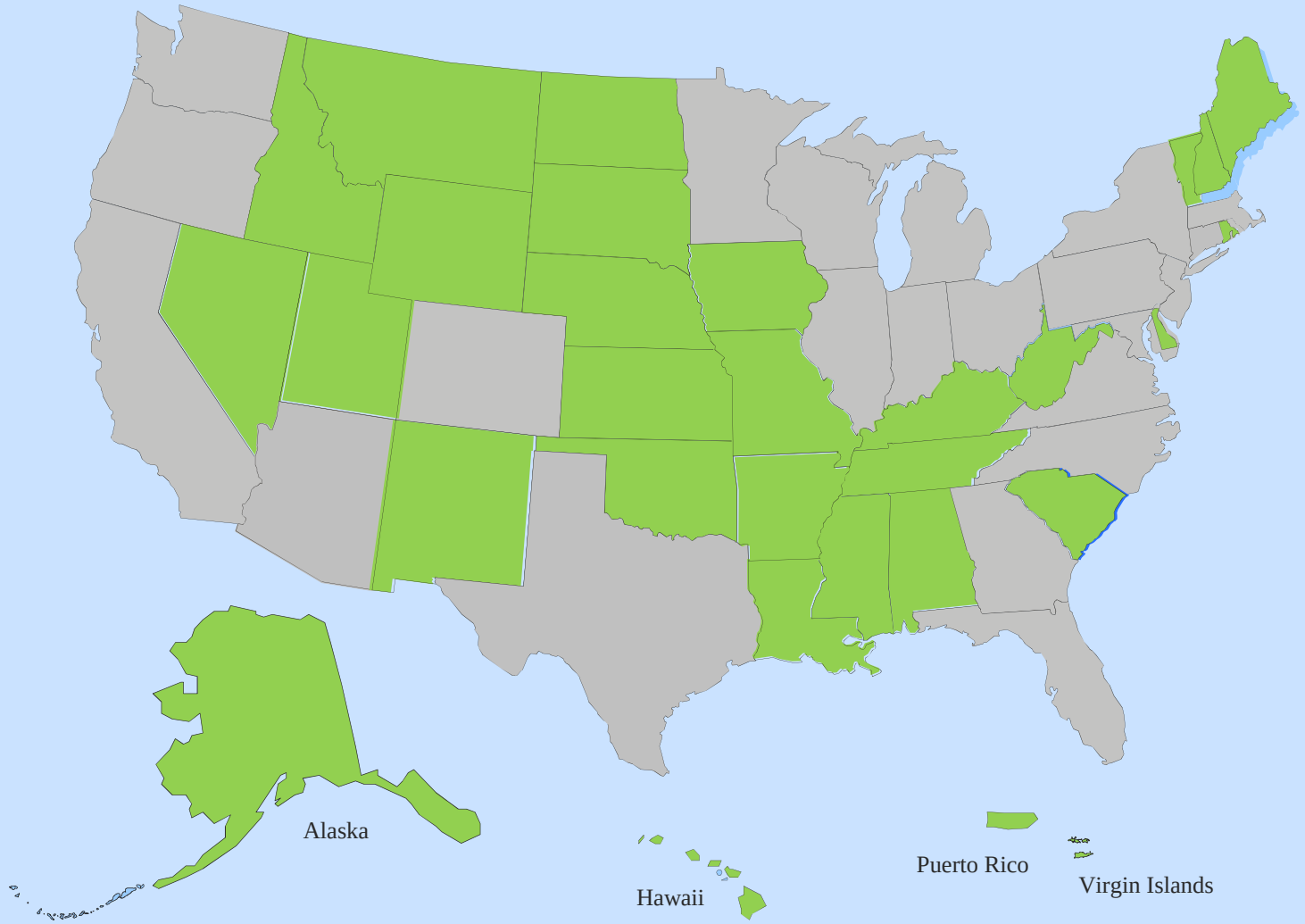


Funding Profile



in Millions of dollars

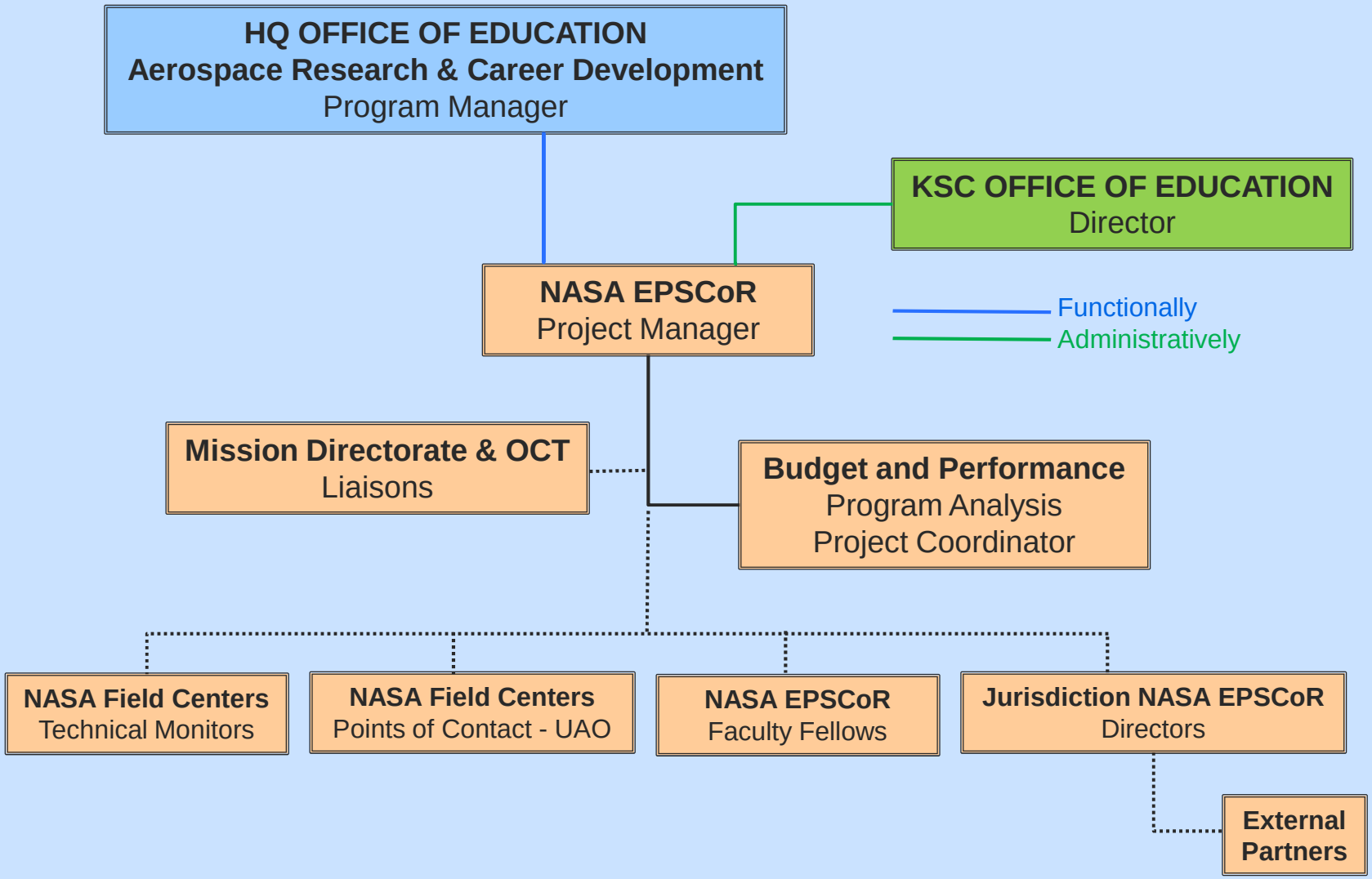
Eligible Jurisdictions



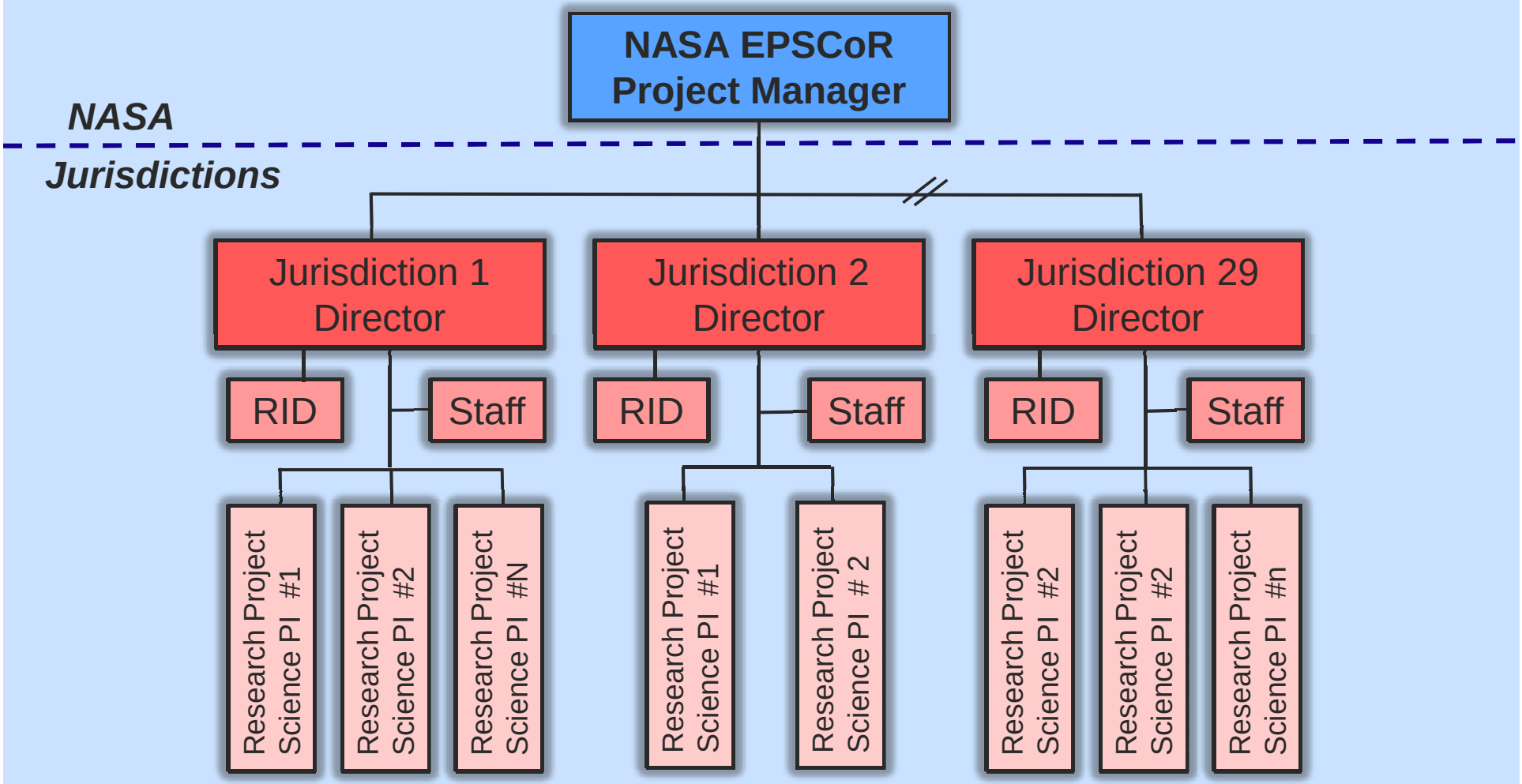
Eligible NASA EPSCoR Jurisdictions 2012

Eligibility determined by National Science Foundation EPSCoR per NASA EPSCoR legislation

NASA Governance Structure



EPSCoR Jurisdictions' Structure



Primary Components

- **Research Infrastructure Development (RID) Awards**
  - Enable jurisdictions to build and strengthen relationships and improve contacts with NASA researchers; develop ideas for future proposals
  - Eligibility: One per jurisdiction
  - $125,000/year, 3-year award
  - Cost Share (100%)

- **Research Awards**
  - Topic-specific proposals targeted at high-priority NASA research and technology development needs as determined by Mission Directorates and Office of the Chief Technologist
  - Annual solicitation
  - Max $750,000 for a 36-month award
  - Number of awards based on proposal merit and dollar amount available
  - Cost Share (50%)

RID Awards

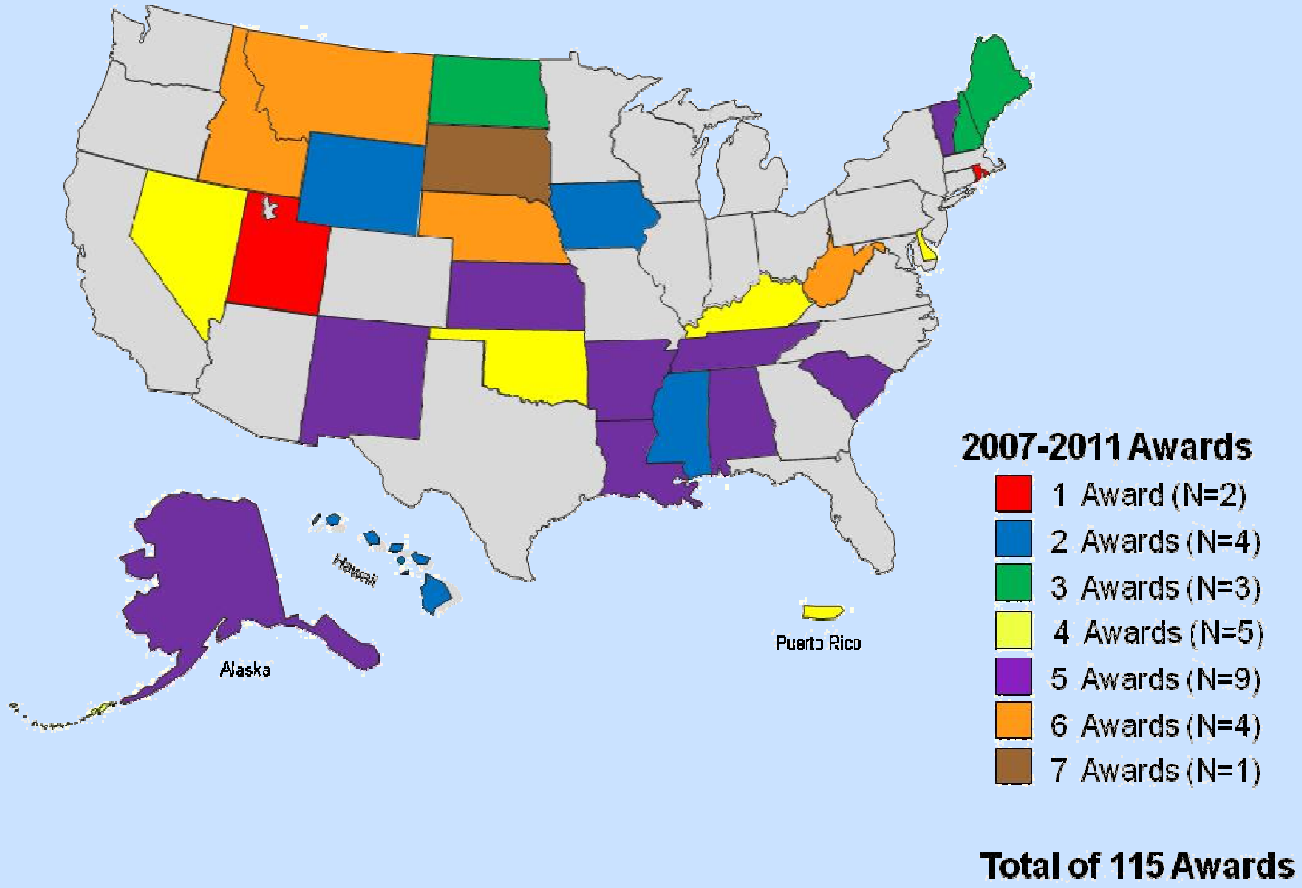
28 Active Research Infrastructure Development (RID) awards

- Funded through FY 2012
- New Solicitation pending in 2012 with proposal review process performed in-house by NASA personnel
- Within the Jurisdiction, RIDs are managed by the NASA EPSCoR Director
- Jurisdiction Directors use RID funding for small research projects (seed grants), collaboration meetings, development of ideas for future proposals in order to obtain additional funding from sources other than NASA

Research Awards

115 Research Awards during 2007 - 2011

- 24 in FY 2007
- 12 in FY 2008
- 28 in FY 2009
- 24 in FY 2010
- 27 in FY 2011



New Solicitation Pending for FY 2012

Research Proposal Review Process

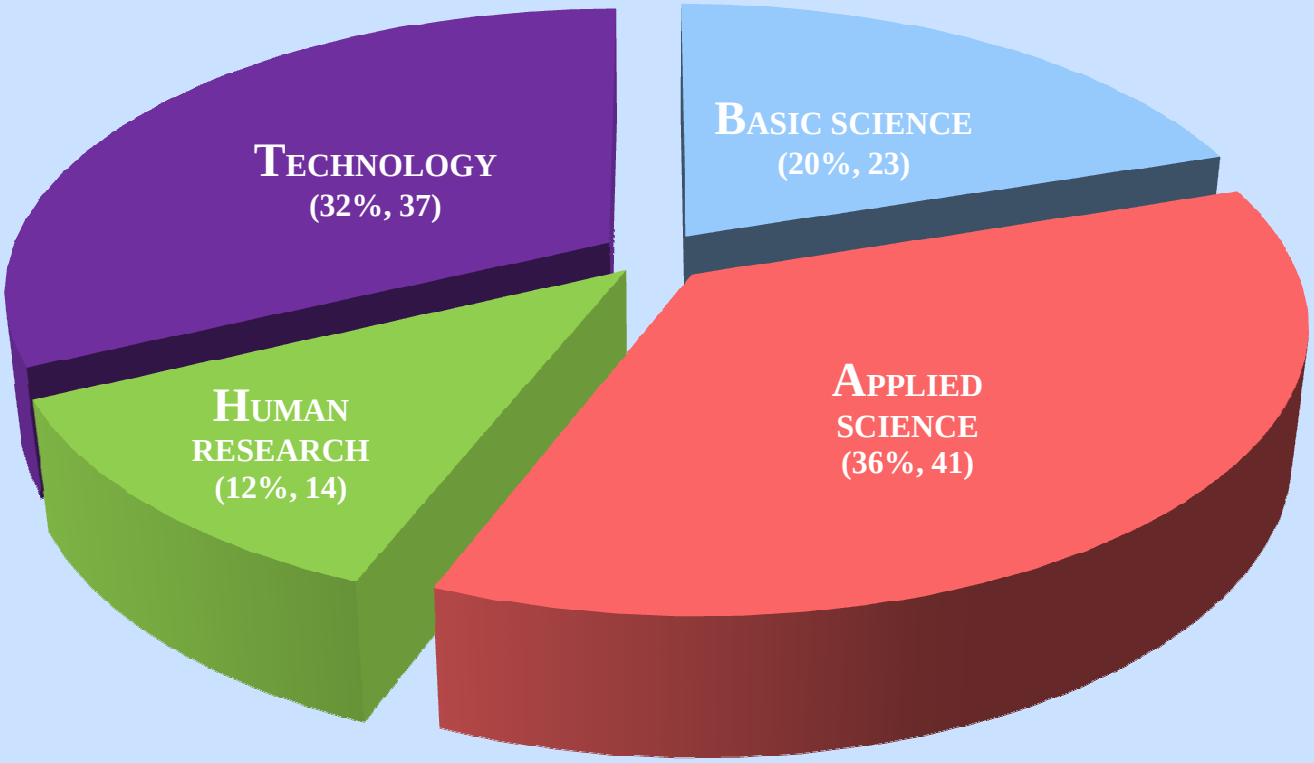
Online Peer Review

All proposals are evaluated by a minimum of four reviewers for technical merit and relevance to NASA research and technical development needs and priorities. The selected reviewers are nationally recognized professionals and/or NASA subject area experts.

Internal Panel Review

A HQ NASA panel composed of representatives from the three Mission Directorates and the Office of the Chief Technologist evaluate the online peer review inputs. They then categorize the proposals using prioritization system from which proposals are then selected for funding.

Categorization of 2007-2011 Research Awards



Research Awards
Technical Monitors/Oversight

NASA science and engineering personnel are associated with all NASA EPSCoR Research Awards.

Each award has a Technical Monitor (TM) who performs the following:

- provides guidance and technical advice/assistance,
- reviews annual reports,
- provides feedback to the EPSCoR staff.

Additional activities may include:

- integrating the EPSCoR research into ongoing NASA activities or research efforts
- increasing the P.I. and his/her team's awareness of other related or relevant research in NASA to help develop the capability to compete for future awards

TM’s are nominated by the Education Liaison of the appropriate Mission Directorate/Office of Chief Technologist.

Data Collection

- Personnel
  - Faculty/Research Participants
    - Gender, race, ethnicity, institution
  - Student Participants
    - Gender, race, ethnicity
    - Thesis or dissertation defense
- Publications – directly attributable to the EPSCoR project work
  - Published (peer-reviewed)
  - Submitted but not yet published
  - Author type (faculty, post-doc, student), number published, type of publication
- Presentations
  - Invited papers presented
  - Self-submitted papers to conference with peer-review process

Data Collection (con't)

- Patents
  - Applied For
  - Granted
  - Patent licenses
- Technology Transfer activities
- Collaborations/partnerships
  - NASA
  - Other
- Proposals for new grants ("Follow-on funding") – directly attributable to the EPSCoR project work
  - Number submitted, dollar amounts requested
  - Number won, dollar amounts awarded
  - NASA non-EPSCoR, other federal agencies, other

RID Outcomes

RID Awards – FY 2011 reporting

Cooperative Agreements Reporting	27
Faculty/Post-docs	374
Students	542
Peer Reviewed Publications Accepted / Published	140
Other Publications Accepted / Published	77
Number of Talks/Presentations at Professional Meetings	338
Number of Patents Applied For (or pending)	11
Patents Awarded	3
Collaborations (NASA)	130
Collaborations (Other)	294
Number of New Grants Awarded	103
Value of New Grants Awarded	$26,601,917

Research Outcomes

Research Awards – FY 2011 reporting

Cooperative Agreements Reporting	70
Faculty/Post-docs	440
Students	581
Peer Reviewed Publications Accepted / Published	227
Other Publications Accepted / Published	157
Number of Talks/Presentations at Professional Meetings	454
Number of Patents Applied For (or pending)	18
Patents Awarded	2
Collaborations (NASA)	95
Collaborations (Other)	286
Number of New Grants Awarded	140
Value of New Grants Awarded	$42,001,259

Human Exploration and Operations

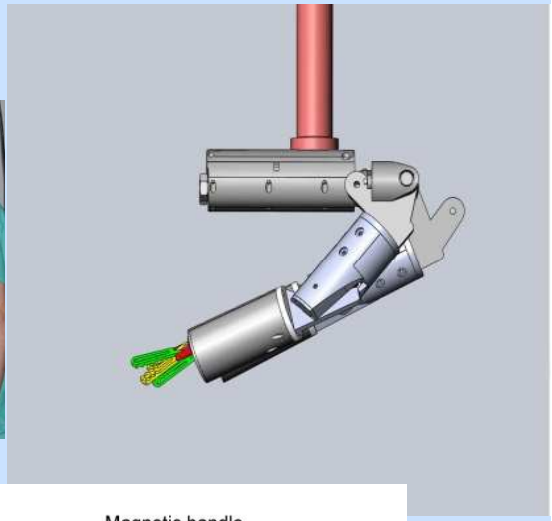
Miniature In Vivo Surgical Robotics for Long-Term Space Flight (2010-2013)

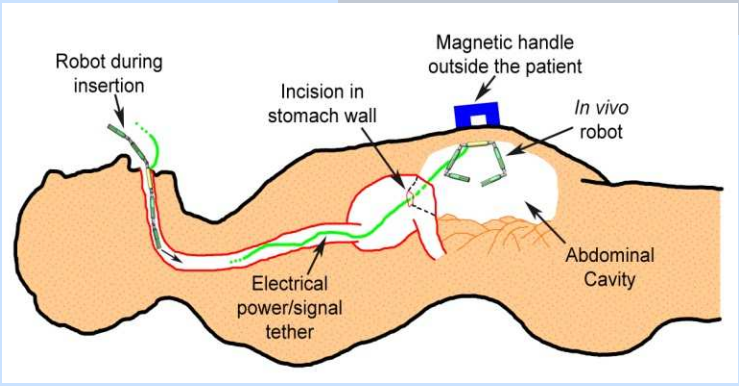
Research:

- ***In vivo*** **robots to support surgery during long-duration space missions.**
- **Natural Orifice Transluminal Endoscopic Surgery.**

Current Achievements:

- **Start-up company Virtual Incision Corporation (VIC).**
- **$2.1 M investment from two venture capital groups.**
- **$2.7 M grant from Human Research Program at JSC.**
- **It is expected to be used in humans in early 2012.**

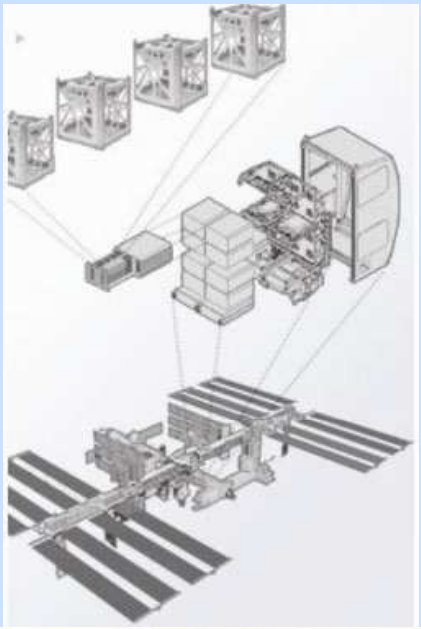




NEBRASKA
University of Nebraska

Human Exploration and Operations

CubeLab Standard for Improved Access to the ISS for Science Payloads (2010-2013)



CubeLab Status

- **Utilizes the CubeSat form factor to provide accessible, standard experiment platform on the ISS**
- **Currently installed and operating in EXPRESS Rack 4 in the JEM**
- **Manifested to fly on all current launch vehicles (Progress, Soyuz, HTV, ATV, & DragonLab)**
- **Low-cost, repeatable access to ISS National Lab**

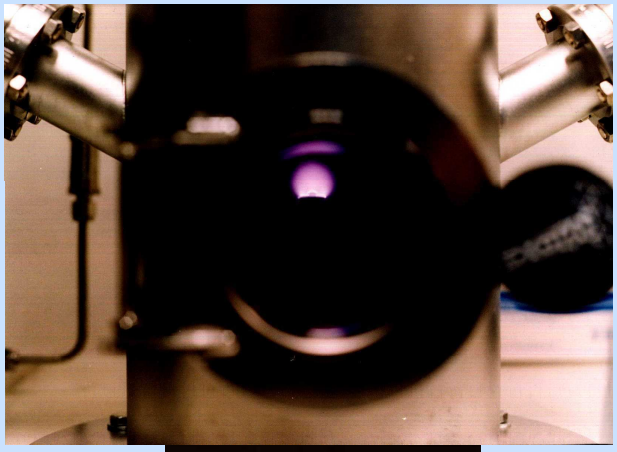
CubeLab Elements

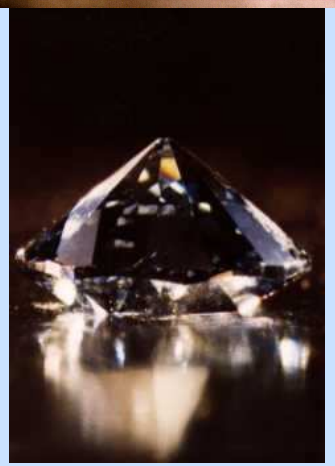
KENTUCKY
University of Kentucky

Example Success Stories

Space Operations/Aeronautics

Microwave Plasma Processing of Nano-Structural Diamond Coatings (1997-2003)





ALABAMA
University of Alabama at Birmingham

Innovation/Patent:

- **US patent 2001, "Process of Ultra Smooth Diamond Coating on Metals and Uses Thereof"**
- **Nanostructure diamond coating for NASA and aerospace cutting tools**
- **Wear-resistant coating of biomedical implants**

Venture Projects:

- **Vista Engineering, Applied NanoCarbon, and Integrated Medical Systems Inc.**

Additional Funding:

- **$1.35M NSF-NIRT award**
- **$2M NIH award**

Human Exploration and Operations

Radio Frequency Identification (RFID) and Real-Time Location System (RTLS) Enhancement for Inventory Management and Logistics of Space Transportation Systems (2010-2013)

- **RFID retrieves data stored on tags**
- **RTLS are wireless systems that provide the location of objects in real time.**
- **Integration of RFID & RTLS will allow NASA to make automatic and locate misplaced equipment.**

Results: **RFID technology undergoing upgrade testing and is currently being used on ISS.**

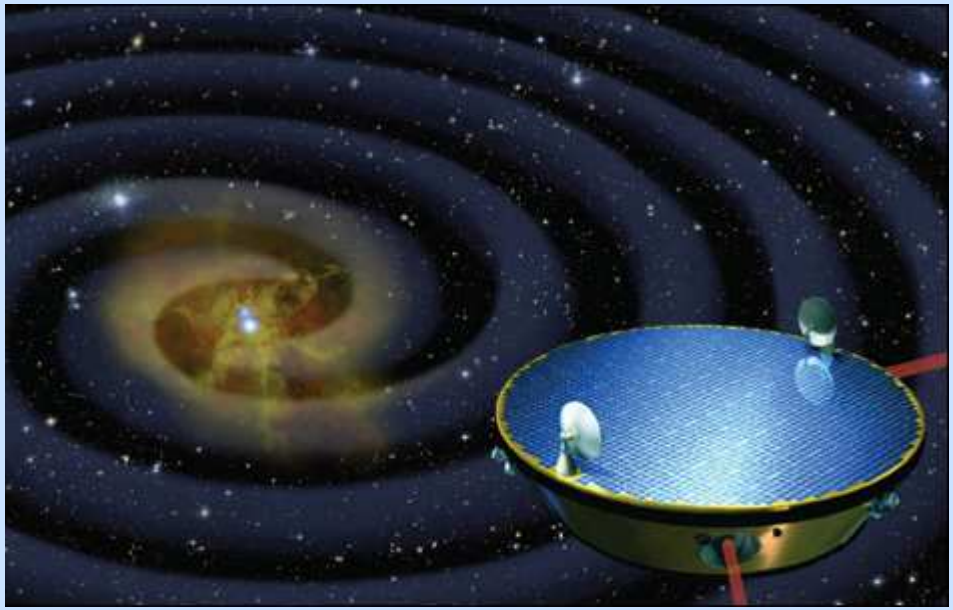
Next Goal: **Tag and track individual medication doses.**

NEBRASKA
University of Nebraska

Science

Gravitational Wave Astronomy

(1997-2003)



Individual Achievement:

Dr. Neil Cornish

- Appointed Chair of the U.S. Data Analysis team for the LISA mission (2005)
- Appointed member of the Astrophysics Subcommittee of the NASA Advisory Council (2005)
- Received subsequent competitive funding from Science Mission Directorate for LISA
- Member of the WMAP Science Team

MONTANA
Montana State University

Impact on Underserved Communities: Native Americans

"Biomolecular Substrates of Extraterrestrial Life: Revealing Secrets of Extremophilic Archaea and their Viruses"

Native American Research Laboratory(NARL)

- **Established at the University of Montana and directed by a Native American Scientist, Professor Michael Ceballos (Tepehuan/Tsalagi/Choctaw), a research Assistant Professor.**
- **Provides "hands-on" research experiences to Native American undergraduates, graduate students, and high school students in an interdisciplinary research environment.**

MONTANA
University of Montana

How has NASA EPSCoR influenced and responded to the research and development priorities in the jurisdictions (states)?

Examples

South Dakota

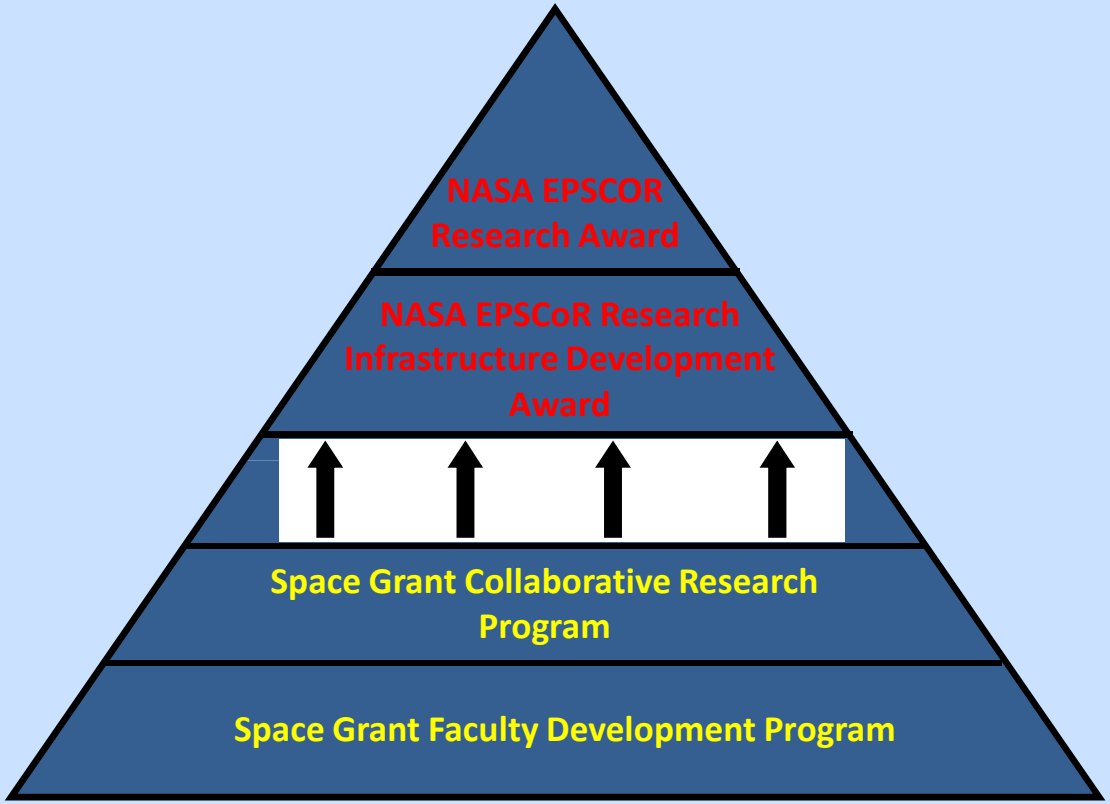
- All projects supported by South Dakota NASA EPSCoR must address state research priorities.
  - Goal 3 of the Governor's 2010 Initiative and the accompanying Implementation plan, *The Future of Research and Technology in South Dakota, A State Plan (2006).*
- South Dakota NASA EPSCoR director appointed to the state Research Excellence: A Critical Hallmark (REACH) Committee, which oversees all research enhancement programs in the state and assists the Governor in developing the State's strategic plan for research and development, ensures that this alignment with state priorities will be maintained.

Alaska

- Alaska has a defined need to both to develop and manage Alaska's natural resources while diversifying Alaska's economy. NASA EPSCoR supports both of these needs with four Research Awards that strengthen Alaska's nascent aerospace industry and resource management in development of satellite data products and model calibrations.

What is the nature and extent of the interaction and cooperation between NASA EPSCoR and the Space Grant Consortium?

One Example



Arkansas EPSCoR and Space Grant Research Capability Progression

Achieving NASA EPSCoR Objectives

- Contribute to and promote the development of research infrastructure in NASA EPSCoR jurisdictions in areas of strategic importance to the NASA mission
  - NASA Mission Directorates, Office of Chief Technologist, and Centers are contacted by proposers in the proposal-writing process
  - NASA personnel serve as proposal reviewers
  - NASA MD and OCT representatives comprise the Research Award Selection Committee
  - NASA personnel serve as Technical Monitors

- Improve the capabilities of the NASA EPSCoR jurisdictions to gain support from sources outside the NASA EPSCoR program
  - RID (27 reports): 103 "follow-on" awards averaging $285K in 2010
  - Research (70 reports): 140 "follow-on" awards averaging $300K in FY 2010

Achieving NASA EPSCoR Objectives

- Develop partnerships between NASA research assets, academic institutions, and industry
  - Collaborations/partnerships/contacts reported in FY 2011
    - RID (27 reports): NASA – 130 Other – 294
    - Research (70 reports): NASA – 95 Other – 286

- Contribute to the overall research infrastructure, science and technology capabilities, higher education, and/or economic development of the jurisdiction
  - Proposal evaluation criteria include state research and development contribution
  - NASA EPSCoR Directors serve on state science and technology advisory committees
  - NASA EPSCoR Directors serve on state EPSCoR Committees
  - Industry and state agency representatives serve on NASA EPSCoR Technical Advisory Committees

Achieving NASA EPSCoR Objectives

- Work in close coordination with Space Grant to improve the environment for science, technology, engineering and mathematics education in the jurisdiction
  - Space Grant Programs have “stepping stone” faculty development, research collaboration, and research infrastructure seed grant projects
  - Space Grant Fellowship programs fund students on NASA EPSCoR Research projects
  - Some common members of Space Grant and NASA EPSCoR advisory committees
  - Same individual serves as NASA EPSCoR Jurisdiction Director and Space Grant Consortium Director

End of presentation

Questions?