ARC Tek 2012:

OCT / STP Opportunities And Challenges

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http://www.nasa.gov/offices/oct/

OCT - Complete Technology Maturation Pipeline

- Space Technology Research Grants

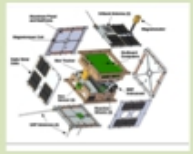
- NASA Innovative Advanced Concepts (NIAC)

- Center Innovation Fund

- Centennial Challenges Prize

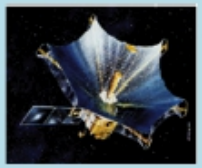
- Small Business Innovation Research & Small Business Technology Transfer (SBIR/STTR)

- Game Changing Development

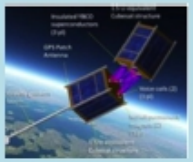


- Franklin Small Satellite Subsystem Technologies

- Flight Opportunities



- Technology Demonstration Missions



- Edison Small Satellite Demonstration Missions

Office of the Chief Technologist

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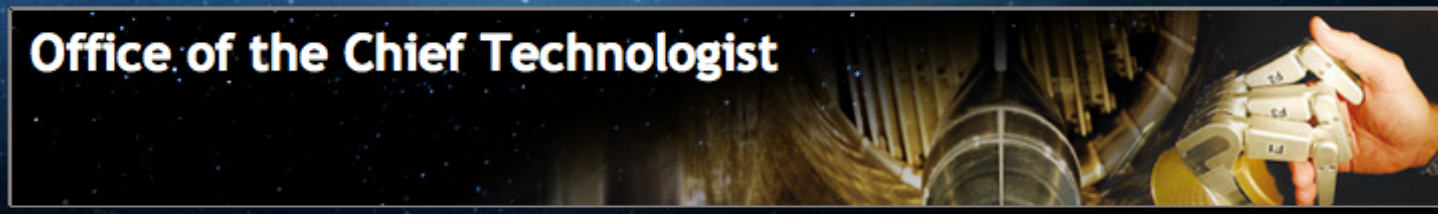


NASA Innovative Advanced Concepts (NIAC)

The FY2012 NIAC schedule is nearly final. Here are our current plans for major events:

FY 2012 Phase I NRA
The 2012 NIAC Phase I NASA Research Announcement (NRA) is currently available at NSPIRES. This year we are offering a two-step proposal process: Step A will request only a short initial description of your concept, due on February 9, 2012. Eligible and competitive Step A proposers will be invited to submit a full proposal in Step B. Details of scope and selection criteria for both Step A and Step B will be published in the NIAC NRA.

NIAC 2012 Spring Symposium
The 2012 NIAC Spring Symposium is being planned for March 27-29, 2012, at the Westin Hotel in Pasadena, CA. Current NIAC Fellows will attend and give presentations about their Phase I research. The conference will feature exciting keynote speakers and information about NIAC's program status and plans. The public is encouraged to attend. More information will be available soon.

FY 2012 Phase II NRA
The first NIAC Phase II NASA Research Announcement will be released in early April, 2012, following the NIAC Spring Conference. Phase II proposals in response to this NRA will be eligible based on either current Phase I studies, or prior NIAC studies that have not already completed Phase II.

› View the press release.
› View NIAC Solicitation page.

2011 NIAC Fellows Orientation Meeting
November 16-17, 2011
› Presentation by Jay Falker, NIAC Program Executive
› Presentation by Dava Newman, Professor of Aeronautics, Astronautics and Engineering Systems, Massachusetts Institute of Technology
› Presentation by Dr. Robert Cassanova, Chair, NIAC External Council, Former Director, NIAC

Space Technology Research Fellows Mentored by ARC Researchers

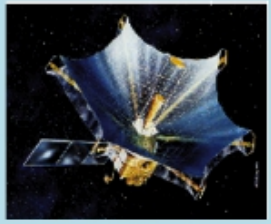
Research Topic	Student Affiliation	ARC Mentor	Code
Development of Magnetic-PlasmonicNanoparticle Sensors for the Apprehension, Removal and Treatment (ART) of Microbial Contamination in Water	Case Western Reserve University	Jing Li	TSS
Two-Stage, 20 K Pulse Tube Cryocooler for Space Studies	Georgia Institute of Technology	Jeff Feller	RE
Dynamic Stability Characterization of Rigid Deployable Aerodynamic Decelerators	Georgia Institute of Technology	Brandon Smith	TSS
Implementation and Assessment of a Time-Accurate Aeroelastic Model for Analysis of Inflatable Aerodynamic Decelerators	Georgia Institute of Technology	Michael Barnhardt	TSA
A novel highly efficient scheme for the Boltzmann equation	University of Texas at Austin	Yen Liu	TNF
Room-temperature single-photon source for secure quantum communication	University of Rochester	Vadim N. Smelyanskiy	TI
High-Fidelity Modeling of Ablation and Coupled CFD-Material Response	University of Minnesota	Michael Barnhardt	TSA
Sensory integration and decision making based on insect brain model	Case Western Reserve University	Vytas Sunspiral	TI
Mission Trade Space Evaluation through Multiphysics Design and Optimization	Carnegie Mellon University	Chad Frost	TI
Synthetic Biology for Extraterrestrial In Situ Resource Utilization (2)	California Institute of Technology	Lynn Rothschild	SGE
Robust sensing for rendezvous and docking: Fusion of vision and LIDAR in a SLAM framework	Stanford University	Terry Fong	TI

Center Innovation Fund

ID	Title	Investigator	Code
CIF11-1019	Woven TPS – A Revolutionary Approach to Tailorable TPS Design & Manufacturing for Thermal Management Systems & Entry, Descent & Landing Systems	Ellerby, Don	TSS
CIF11-1036	Manipulating the Toughness of Rocks through Electric Potentials	Freund, Minoru	D
CIF11-1067	Mars Micro-Mapping Mineralogical Spectrometer (MμMMS)	Blake,David	SSX
CIF11-1034	Game Changing Transformable Entry System Technology (TEST) Applicability to Robotic Venus Science Missions	Venkatapathy, Ethiraj	TS
CIF11-1078	Novel Photobioreactor Development for Space Applications	Prufert-Bebout, Leslie	SSX
CIF11-1033	Computational Modeling of Ablative Materials: Application to Phenolic Pyrolysis	Lawson, John	TSM
CIF11-1005	Photon-Counting Integrated Circuit (PCIC) Photodetector Arrays	Roush, Ted	SST
CIF11-1039	Miniaturized Power Processing Unit Study: A Cubesat Electric Propulsion Technology Enabler	Ghassemieh,Shakib	RE
CIF11-1006	Biologically Inspired Radiation-Reflecting Ablator (BIRRA) for Enabling Entry Descent and Landing Missions to Gas Giant Planets or Radiation-Intensive Environments	Johnson, Sylvia	TS
CIF11-1051	Synthetic Biology and Microbial Fuel Cells: Towards Self-Sustaining Life Support Systems	Hogan,John	SCB
CIF11-1063	High energy density additives for Hybrid Fuel Rockets to Improve Performance and Enhance Safety	Jaffe, Richard	TSA
CIF11-1046	A Synthetic Biology Tool Kit for Manned Missions Outside Low Earth Orbit	Rothschild, Lynn	SGE
CIF11-1100	Encapsulation Technology for Delivery of Medical Therapeutics	Loftus, David	SCR
CIF11-1022	Dragon Deep Drilling Platform for Mars Exploration	Stoker, Carol	SST
CIF11-1092	Synthetic biology assemblies for sustainable space exploration	Paavola, Chad	SCB
CIF11-1054	Collapsible Space Telescope (CST) for Nanosatellite Imaging and Observation	Agasid, Elwood	RD
CIF11-1025	NanoSatellite Thermal Overload Protection System (nSTOPS)	Ricco, Tony	RD
CIF11-1052	Micro-atmospheric Microwell Plate Technology	Flynn, Michael	SCB
CIF11-1086	A Framework for telerobotics across the time delays of space	Soloway, Don	TI
CIF11-1012	A Radiation Nose for monitoring radiation in space missions	Meyyappan, Meyya	T

Small Spacecraft in the Space Technology Program

Crosscutting Capabilities



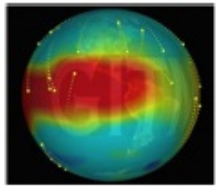
Technology Demonstration Missions

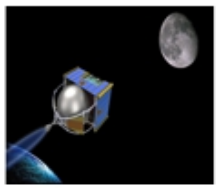
EdisonSmall Satellite Demonstration Missions

Flight Opportunities

EDISON SMALL SATELLITE FLIGHT DEMONSTRATION MISSIONS

Synopsis - Jan 08, 2012 --- http://prod.nais.nasa.gov/cgi-bin/eps/synopsis.cgi?acqid=149680





Two Ongoing Studies in FY11, Ethersat active project in 2012.

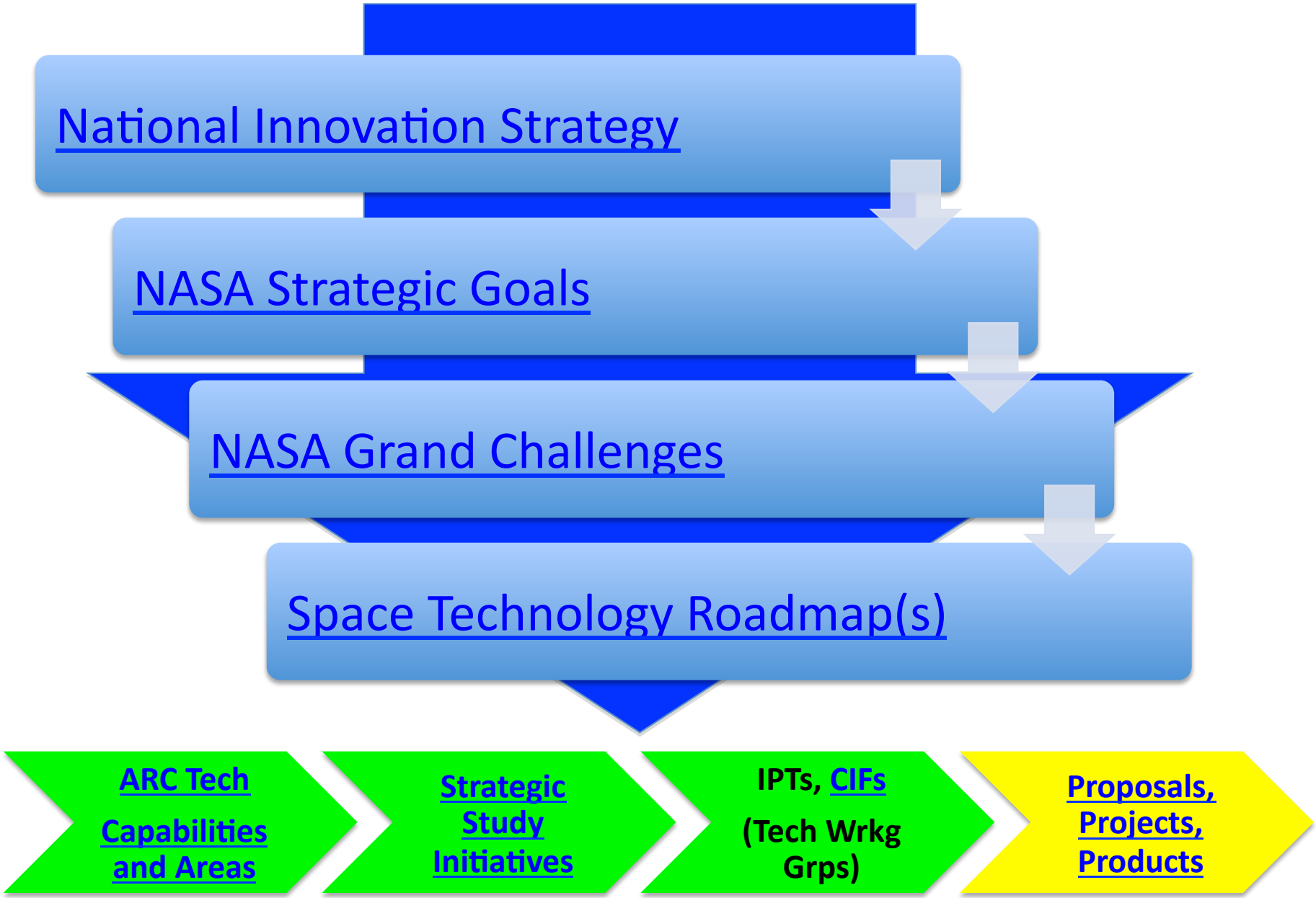
EtherSat

- ~10-100 Element, SmartPhone-Based Nanosatellite Swarm With Intra-/Extraswarm Links
- Set New Cost/Tech Paradigm, Enable Emergent Behaviors/Apps, Tech for Future Swarms
- Multipoint Space Physics Measurements, Comm/Timing in Underserved Areas

Planetary Hitch Hiker

- Green Propulsive Microspacecraft Deployed from GTO Comsat or ESPA
- Demo Non-Toxic Propellant, Maximize Rideshare Flexibility, Access Deep Space at Low Cost
- Solar L1 Monitor, Lunar Obs, NEO Exploration, Rad Exposure, Cubesat Deploy/Ride-Along

OCT/STP TECHNOLOGY & INNOVATION DEFINITION FLOWDOWN



Space Technology Grand Challenges

Space Technology Grand Challenges: a set of important space-related problems that must be solved to efficiently and economically achieve our missions.

We will use the Space Technology Grand Challenges with the Space Technology Roadmaps to prioritize our technology portfolio with an eye towards the Agency's future.

More Information at http://www.nasa.gov/offices/oct/strategic_integration/grand_challenges_detail.html

NASA Space Technology Roadmap (STR)
Technology Area Breakdown Structure!

TA01 

• LAUNCH PROPULSION SYSTEMS

TA02 

• IN-SPACE PROPULSION TECHNOLOGIES

TA03 

• SPACE POWER & ENERGY STORAGE

TA04 

• ROBOTICS, TELE-ROBOTICS & AUTONOMOUS SYSTEMS

TA05 

• COMMUNICATION & NAVIGATION

TA06 

• HUMAN HEALTH, LIFE SUPPORT & HABITATION SYSTEMS

TA07 

• HUMAN EXPLORATION DESTINATION SYSTEMS

TA08 

• SCIENCE INSTRUMENTS, OBSERVATORIES & SENSOR SYSTEMS

TA09 

• ENTRY, DESCENT & LANDING SYSTEMS

TA10 

• NANOTECHNOLOGY

TA11 

• MODELING, SIMULATION, INFORMATION TECHNOLOGY & PROCESSING

TA12 

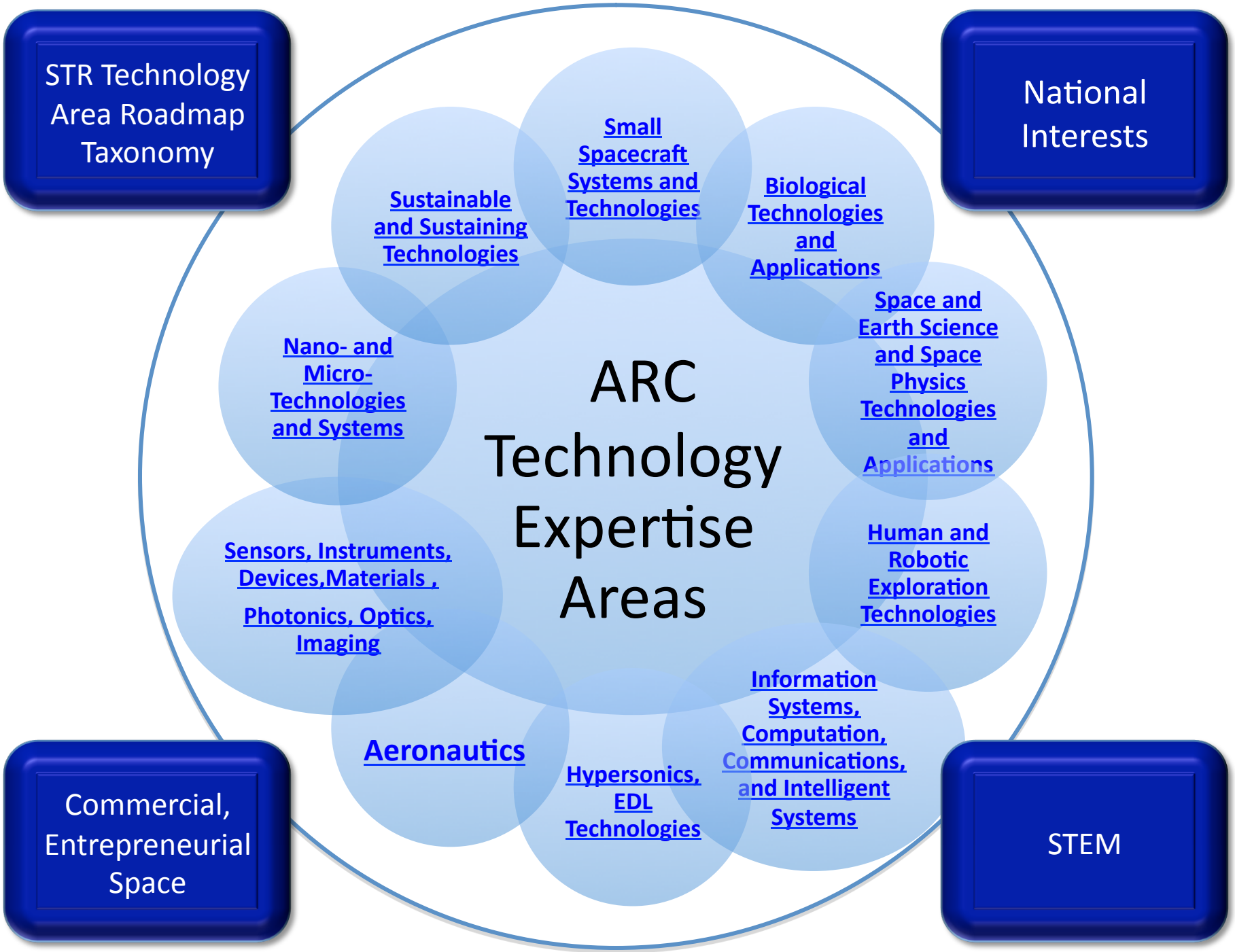
• MATERIALS, STRUCTURES, MECHANICAL SYSTEMS & MANUFACTURING

TA13 

• GROUND & LAUNCH SYSTEMS PROCESSING

TA14 

• THERMAL MANAGEMENT SYSTEMS


STR Technology Area Roadmap Taxonomy
National Interests
Commercial, Entrepreneurial Space
STEM
ARC Technology Expertise Areas
Small Spacecraft Systems and Technologies
Biological Technologies and Applications
Sustainable and Sustaining Technologies
Space and Earth Science and Space Physics Technologies and Applications
Nano- and Micro-Technologies and Systems
Human and Robotic Exploration Technologies
Sensors, Instruments, Devices,Materials ,
Photonics, Optics, Imaging
Information Systems, Computation, Communications, and Intelligent Systems
Aeronautics
Hypersonics, EDL Technologies

ARC Strategic Technology Studies v3

Selected Studies

1. Biological Technologies for Life Beyond Low Earth Orbit (BT4LBLEO)
2. Small Spacecraft and Missions Enterprise
3. Designing High-Confidence Software and Systems (DHCSS)
4. Science Instruments for Small Missions (SISM)
5. Cyber-Physical Systems Modeling and Analysis (CPSMA)

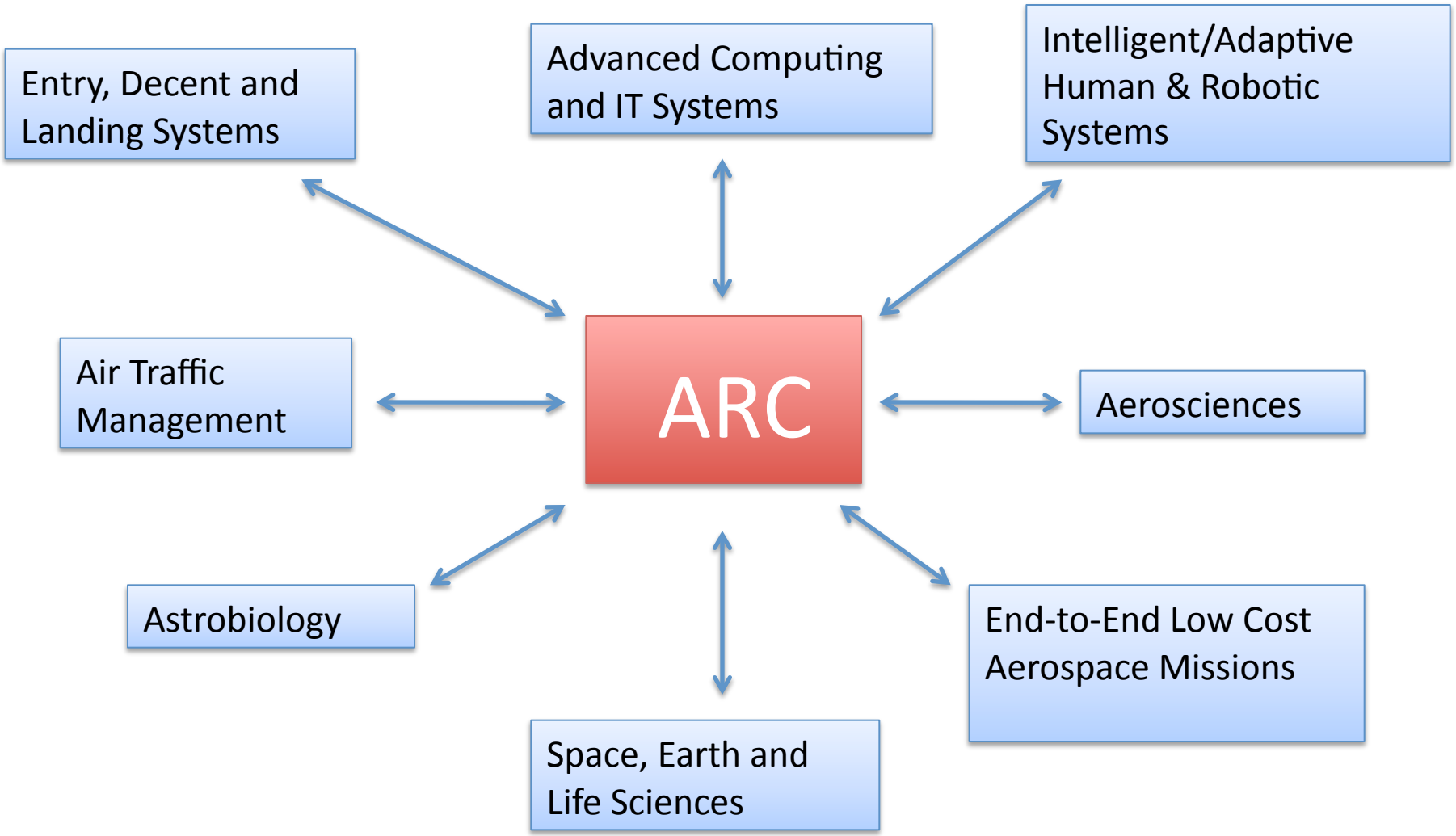
Studies in Transition

1. Synthetic Biology (SynBio)
2. Active Debris Retrieval
3. Quantum Computing (QuC)
4. Low Cost, Off-the-Shelf Space Technologies (LCOSST) [PhoneSat]
5. Beamed Energy Propulsion (Microwave thermal Rocket)

Other Suggested Initiatives

1. Emerging Aeronautics Systems and Technologies (EAST)
2. GREEN Technologies (Technologies for Sustainability)
3. Disaster/Homeland Security Monitoring, Mitigation, Training (DHSMMT)

ARC CORE COMPETENCIES



Technology Matrix (example scenario)

		1	2	3	4	5	6	7	8	9	10
		Spacecraft Systems and Technologies	Sustainable and Sustaining Technologies	Nano/Micro Technologies	Sensors, Instruments, Devices, mat'ls, Photonics, Optical Imaging	Aeronautics	Hypersonics, and Entry Descent and Landing	Information Technologies	Exploration Technologies	Space and Earth Science Technologies and Applications	Biological technologies and Applications
1	Entry, Descent and Landing										
2	Advanced Computing and IT Systems										
3	Intelligent Adaptive Human and Robotic Systems										
4	Air Traffic Management										
5	Aerosciences										
6	Astrobiology										
7	Space, Earth and Life Sciences										
8	End-to-End Low Cost Aerospace Missions										

High Medium Low None