

## Integrated List of Innovation Programs at NASA

Compiled by Center Chief Technologists  
and Updated by the Office of Human Capital Management

DRAFT as of Sept. 18, 2012 ~~July 24, 2012~~

The following is a summary of areas of innovation within NASA which have been identified and collected by the Center Chief Technologists and updated by the Office of Human Capital Management based on inputs from Center HR Directors, Mission Directorates, and the Chief Information Officer.

Center	Workforce Initiatives	Fairs, Symposia	Open Innovation Platforms, Prizes, and Challenges	Facilities and Creative Spaces
ARC	<ul style="list-style-type: none"> <li>Virtual Institutes</li> <li>Innovative Tools and Initiatives</li> <li>Disruptive Innovation</li> </ul>	<ul style="list-style-type: none"> <li>ARCTek I, II, III</li> <li>Director's Weekend Workshops, CCT Workshops</li> <li>Director's Colloquium Series</li> <li>CCT Colloquia</li> <li>SynBio Seminar Series</li> <li>Summer Student Colloquium Series</li> <li>ARC CCT Brownbags</li> </ul>	<ul style="list-style-type: none"> <li>NASA@Work</li> <li>Centennial Challenges</li> </ul>	<ul style="list-style-type: none"> <li>Mission Design Center</li> <li>Connect Labs</li> <li>Simulation Labs</li> <li>ARC Jet</li> <li>Hyperwall</li> <li>Pleiades Super Computer</li> <li>Rover Yard</li> <li>Future Flight Central</li> <li>Advanced Digital Manufacturing</li> <li>Center for Innovation and Technology Enhance</li> </ul>
DRFC	<ul style="list-style-type: none"> <li>Dryden Technology Forums</li> <li>Dryden Technology Discussions</li> </ul>	<ul style="list-style-type: none"> <li>Dryden Colloquium Series</li> </ul>	<ul style="list-style-type: none"> <li>Dryden Innovation Research Forum</li> <li>Center Innovation Fund</li> </ul>	<ul style="list-style-type: none"> <li>Dryden Collaboration Spaces</li> </ul>
GRC	<ul style="list-style-type: none"> <li>Creativity &amp; Innovation (C&amp;I) Initiative</li> <li>"Building, Leading, and Sustaining an Innovative Research Organization"</li> </ul>	<ul style="list-style-type: none"> <li>Innovation Forum</li> </ul>		<ul style="list-style-type: none"> <li>Creativity &amp; Creativity &amp; Innovation Commons</li> </ul>
GSFC	<ul style="list-style-type: none"> <li>Freecycle@Work Program</li> <li>Science Engineering Collaboration Program (SECP)</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li>Internal Research and Development Program</li> <li>Center Innovation Fund</li> <li>Wiki &amp; Collaborative Environment (AWCE)</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>
HQ	<ul style="list-style-type: none"> <li>ELaNa - Educational Launch of Nanosatellite</li> <li>Management Cohort Network</li> <li>Aeronautics Academy</li> <li>Aeronautics Scholarship</li> <li>Digital Strategy</li> <li>Open Government</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li>NASA FIRST (For Inspiration and Recognition of Science and Technology) Robotics Program</li> <li>LAUNCH sustainability innovation challenges</li> <li>MindMapr</li> <li>Destination Station</li> <li>"Spot the Station" alerts</li> <li>The Innovation Ecosystem (IE)</li> <li>ARMD SEEDLING Fund, LEARN Fund</li> <li>IT Labs</li> <li>Random Hacks of Kindness (RHoK)</li> <li>Space Apps Challenge</li> </ul>	<ul style="list-style-type: none"> <li>Columbia Café</li> <li>Conversation Pits (aka Teaming Areas)</li> <li>NASA Protective Services Training Academy</li> </ul>

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JPL	<ul style="list-style-type: none"> <li>A-Team</li> <li>Team X</li> <li>Phaeton</li> <li>Spontaneous Research and Technology (R&amp;TD) development tasks</li> <li>Topical Research and Development (R&amp;TD) program</li> <li>IMCE - Integrated Model-Centric Engineering</li> <li>The Hub:</li> <li>Visualization Lab</li> </ul>	<ul style="list-style-type: none"> <li>Foundry Frontliners Meetings</li> <li>Foundry Symposia</li> <li>Science Visitor and Colloquium</li> <li>Earth and Space Science Colloquium Program</li> <li>Science 101 Lectures</li> <li>Research and Technology Development Poster Day</li> <li>Postdoc Research Poster Day</li> <li>Workshops</li> </ul>	<ul style="list-style-type: none"> <li>Innovation Jams</li> <li>Planetary Science Summer School</li> <li>Lew Allen award</li> <li>Ed stone Award</li> <li>Spot awards for excellence</li> <li>Purple Pigeon challenges</li> </ul>	<ul style="list-style-type: none"> <li>Project Design Center</li> <li>Left Field</li> <li>Mechanical Design Center</li> <li>Earth Science Center</li> <li>Earth Science Collaboration Center</li> <li>Center for Climate Sciences</li> <li>Laboratories</li> </ul>
JSC	<ul style="list-style-type: none"> <li>Innovation Charge Account (ICA)</li> <li>JSC Inclusion and Innovation (I&amp;I) Council</li> <li>Cadre of Innovators</li> </ul>	<ul style="list-style-type: none"> <li>Innovation Day</li> <li>Innovation Lecture Series (ILS)</li> <li>Human Systems Academy (HSA)</li> </ul>	<ul style="list-style-type: none"> <li>NASA@Work</li> <li>Center of Excellence for Collaborative Innovation</li> <li>Defense Venture Catalyst Initiative (DeVenCI)</li> </ul>	<ul style="list-style-type: none"> <li>JSC's Creative Spaces</li> <li>NASA Human Health and Performance Center (NHHPC)</li> </ul>
KSC	<ul style="list-style-type: none"> <li>Rocket University</li> <li><a href="#">Student Launch System Initiative</a></li> </ul>	<ul style="list-style-type: none"> <li>Innovation Expo</li> </ul>	<ul style="list-style-type: none"> <li>The IT Innovation Forum</li> <li>Spaceport Innovators (SI)</li> <li>NE Ideas Program</li> </ul>	<ul style="list-style-type: none"> <li>KSC Swamp Works and Innovation SPACE</li> </ul>
LaRC	<ul style="list-style-type: none"> <li><a href="#">Workforce Strategy Team (WFST)</a></li> <li>LaRC 2050</li> <li>Creativity and Innovation Curriculum</li> </ul>		<ul style="list-style-type: none"> <li>InnoCentive</li> <li>Langley Internal Research and Development Program (IRAD)</li> </ul>	<ul style="list-style-type: none"> <li>Vibrant Transformation to Advance LaRC (VITAL)</li> </ul>
MSFC	<ul style="list-style-type: none"> <li>Innovation and Technology Advisory Council</li> <li>MTM Implementation</li> <li>Innovation and Technology Explornet Group</li> <li>Early Career Professionals Forum = Innovative Developments and Advancements (IDEAs)</li> </ul>	<ul style="list-style-type: none"> <li>Innovation and Technology Information Exchange (I&amp;TIE)</li> </ul>	<ul style="list-style-type: none"> <li><a href="#">Center Innovation Fund</a></li> </ul>	
SSC	<ul style="list-style-type: none"> <li>Barriers to Innovation (B2I) Survey/Study</li> <li>Dual Use Technology Development Program</li> <li><a href="#">Applied Science &amp; Technology Project Office (ASTPO) Innovation Activities</a></li> </ul>		<ul style="list-style-type: none"> <li>Center Innovation Fund</li> </ul>	
CTC	<ul style="list-style-type: none"> <li>Barriers to Innovation (B2I) Survey/Study</li> </ul>		<ul style="list-style-type: none"> <li>Center Innovation Fund (CIF) Project Cross-Coordination</li> </ul>	

### Category 1 – Workforce Initiatives

- **Virtual Institutes** – developing innovative tools for virtual collaboration and virtual communication (ARC)
  - NASA Astrobiology Institute: <http://astrobiology.nasa.gov/nai/>
  - NASA Lunar Science Institute: <http://lunarscience.nasa.gov/>
  - NASA Aeronautics Research Institute:  
[http://www.aeronautics.nasa.gov/pdf/nari\\_factsheet\\_05\\_11\\_12.pdf](http://www.aeronautics.nasa.gov/pdf/nari_factsheet_05_11_12.pdf)
  - NASA Mars Climate Modeling Center: <http://spacescience.arc.nasa.gov/mars-climate-modeling-group/>
- **Innovative Tools and Initiatives (ARC)**
  - Ames Technology-Science/Research-Facilities Catalog: under development
  - Special Studies: CCT-sponsored multidisciplinary teams to pursue the development of key technologies relevant to the Agency
  - Small Spacecraft Launch Opportunities Portal: link under construction
- **Disruptive Innovation (ARC)**
  - Synthetic Biology: <http://syntheticbiology.arc.nasa.gov/>
  - Quantum Computing: <http://www.nasa.gov/centers/ames/research/qpl/index.html>
  - Advanced Digital Manufacturing – 3D-Printing: link under construction
- **Dryden Technology Forums** – The Technology Forum is where the center employees can participate in discussions of a general nature. The last Tech forum had center management discuss technology strategy and direction for the center. (DFRC)
- **Dryden Technology Discussions** – Technology Discussions are smaller groups of Dryden employees that get together to discuss a technology of common interest. One example is Tech Discussions we have on Autonomous Systems. (DFRC)
- **Creativity and Innovation Initiative** – A Creativity & Innovation (C&I) Initiative was launched in 2011 at Glenn Research Center. The goals of the C&I Initiative are: (a) to educate the workforce in modern creativity and innovation methods that enable new solutions for the increasingly challenging problems – whether technical or institutional -- facing the Center & Agency and (b) to develop a framework and infrastructure to ensure that the new creative methods are embraced, utilized, and become part of the GRC culture. To date over thirty GRC employees have been trained as facilitators in the Edward deBono parallel thinking and lateral thinking creativity tools. In addition, over twenty GRC employees have been trained in the NASA Langley “Enhancing your Creative Genius” class. Over the last six months a number of “Ideation” sessions have been facilitated by trained GRC personnel on topics ranging from identifying novel all electric aircraft technologies to enhancing communication and collaboration between organizations.  
[http://rifle.grc.nasa.gov/wiki117/index.php/Creativity\\_and\\_Innovation\\_Ideation\\_Squad](http://rifle.grc.nasa.gov/wiki117/index.php/Creativity_and_Innovation_Ideation_Squad) POC's: Dr. Bruce Steinetz and Jim Zakrajsek, [bruce.m.steinetz@nasa.gov](mailto:bruce.m.steinetz@nasa.gov), [james.j.zakrajsek@nasa.gov](mailto:james.j.zakrajsek@nasa.gov). (GRC)
- **A new course in Building an Innovative Organization** – A new, customized course entitled “Building, Leading, and Sustaining an Innovative Research Organization” was solicited and then taught by Prof. Ralph Katz from M.I.T. initially for 40-50 GRC research supervisors, and then the course was held again for the center chief technologists (CCTs) from across all ten centers as well as a few people from HQ/OCT. The course was considered so informative that the CCT's from Johnson Space Center and from Marshall Space Flight Center decided to repeat the course at their own centers for center

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personnel. GRC's human capital experts helped the training personnel at JSC and MSFC with the logistics of bringing Prof. Katz to their centers. (GRC)

- **Freecycle@Work Program** - The Freecycle@Work (F@W) program was first rolled out to the Goddard Space Flight Center in November 2010. GSFC was the first NASA Center and the first Federal facility to pilot this program. F@W promotes sustainable work practices through the reuse of common office items, such as binders, whiteboards and printer cartridges to reduce Goddard's environmental footprint and to conserve both financial and natural resources consumed in the purchase of office supplies. Since F@W began at GSFC, we've had over 550 employees register for the service with 200 of these going on to become active users. Our users also include 13 employees from Wallops and five from the Johnson Space Center. NASA HQs is now interested in making F@W available agency-wide; it is expected that the F@W program will soon expand to other NASA Centers beyond GSFC, WFF and JSC. Through the first year and a half of the program, over 250 items have been posted, over 135 "offered" items have been taken, and 16 "wanted" items have been received. This has resulted in over 2000 pounds of materials diverted from the Maryland and Virginia landfills to be reused due to F@W. The number of GSFC employees participating in the program continues to increase each month. The success of the program at GSFC has been advertised through social media to the greater NASA community. F@W is assisting GSFC in achieving the sustainability and recycling goals established for Federal Agencies in Executive Orders 13423 and 13514. GSFC was able to implement this initiative at no cost to the government through a partnership with private industry. Website: <http://freecycle.gsfc.nasa.gov> (POC: Ray Rubilotta; [Raymond.J.Rubilotta@nasa.gov](mailto:Raymond.J.Rubilotta@nasa.gov); 301-286-8214) (GSFC)
- **Science Engineering Collaboration Program (SECP)** - Fosters collaboration between NASA GSFC scientists and engineers, and is designed to help bridge the cultural gaps between these two professional communities. The SECP operates by providing a developmental detail opportunity for discipline engineers in the Applied Engineering and Technology Directorate (AETD) to work with scientists in the Science and Exploration Directorate (SED). The detail assignment is focused on instrument or mission concept development for a period of one year. SECP is a residential program in which the engineers are fully immersed with the scientists at the SED, and co-located at one or more SED laboratories. This program also benefits junior engineers as they are moving up in their career path at GSFC by providing an opportunity to develop into a premier discipline engineer or future systems engineer. The SECP detail opportunity is for a GSFC Full-Time Permanent Civil Service Employee who is at the GS-12 or GS-13 level. About 4 positions are available annually. The opportunity is announced via the Goddard Opportunity Bulletin Board (GOBBS) and successful applicants are competitively selected via a formal application and interview process. (POC: Azita Valinia; [Azita.Valinia-1@nasa.gov](mailto:Azita.Valinia-1@nasa.gov); 301-286-5039) (GSFC)
- **ELaNa - Educational Launch of Nanosatellite** - Project ELaNa was developed to provide flight opportunities for educational CubeSats. These CubeSat are developed by Universities and High Schools to introduce students to the design and development of spacecraft. ELaNa Missions will mainly consist of 1 P-POD (Poly-Picosatellite Orbital Deployer) with 3 1U CubeSats that will be manifested as an auxiliary payload on NASA primary missions. Once the primary mission has been released, the CubeSats in the PPOD will be released to start their mission Garrett.Skrobot@nasa.gov (HQ).
- **Management CohortNetwork** - The Management CohortNetwork provides an innovative forum for supervisors, managers, and team leads to share management best practices and discuss current issues. The overall goals for the program are to:
  - Encourage innovative solutions to current management issues

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- Provide a forum for sharing best practices
  - Help participants identify specific actions they can take to improve their management skills
  - Dispel common myths related to performance management
  - Support NASA's mission and achievement of strategic goals through enhanced management skills.
- **NASA Aeronautics Scholarship Program** - The NASA Aeronautics Scholarship Program sponsored by NASA's Aeronautics Research Mission Directorate (ARMD) annually awards 20 two-year undergraduate scholarships plus summer internships, and five two- or three-year graduate scholarships plus summer internships. Scholars receive tuition support and paid summer internships at NASA Centers, working with NASA researchers on developing technologies for managing air traffic more efficiently; reducing aircraft noise, fuel consumption and emissions; and improving safety. Students collaborate with NASA employees on research topics related to ARMD research projects, infusing innovative ideas and perspectives into NASA research while providing students with practical, hands on experience and technical education. <http://nasa.asee.org/>
  - **NASA Aeronautics Academy** - The Aeronautics Academy is a summer learning experience for high-performing college and university students funded by NASA's Aeronautics Research Mission Directorate (ARMD). The Academy curriculum balances direct contact with science and engineering R & D with an awareness of the managerial, political, financial, social and human issues faced by aeronautics professionals. Students work in teams with NASA employees on research topics related to ARMD research projects, infusing innovative ideas and perspectives into NASA research while providing students with practical, hands on experience and technical education. The Academy was expanded in 2012 to include all four NASA aeronautics centers (Ames, Dryden, Glenn, and Langley.) <https://www.academyapp.com/>
  - **Digital Strategy** - On May 23, 2012, President Obama released a Memorandum calling for all government agencies to "identify ways to use innovative technologies to streamline their delivery of services to lower costs, decrease service delivery times, and improve the customer experience." In response to this directive, the Federal CIO released a strategy entitled "Digital Government: Building a 21st Century Platform to Better Serve the American People", which aims to deliver the general public and our government workforce access to government information and services, on demand and on any device. NASA HQ has embraced this federal strategy by committing to expand access to its information in a customer-centric manner, and will continue to develop the agency strategy, found at <http://www.nasa.gov/agency/digitalstrategy/index.html> .
  - **Open Government** - The key principles of Open Government – participation, collaboration and transparency – have been embedded in NASA operations for more than 50 years. NASA continues to implement the Open Government Directive and released version 2.0 of our Open Government Plan in April 2012 to serve as a model – not a manual – for what a more open NASA might look like today. The Plan collects the many new activities that exemplify the evolution of openness in NASA's policy, technology, and culture, and provides citizens the opportunity to respond and engage. The plan can be found at <http://open.nasa.gov/plan/>. In addition to the plan website, three additional Open Government projects include <http://open.nasa.gov> (a collaborative platform for sharing success stories about open government), <http://data.nasa.gov> (a directory of NASA's open data sets), and <http://code.nasa.gov> (a directory of NASA's open-source software).
  - **Concurrent Engineering Design Teams (JPL)**
    - A-Team (early concept development)
    - Team X: <http://teamx.jpl.nasa.gov>

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- **Innovative Research Programs (JPL-Funded)**
  - Phaeton (training early career personnel via innovative projects)
  - <http://phaeton.jpl.nasa.gov/internal/index.cfm>
  - JPL Spontaneous Research and Technology (R&TD) development tasks (small focused innovative tasks) <http://rtd.jpl.nasa.gov/index.cfm?fuseaction=SpontaneousConcepts>
  - JPL Topical Research and Development (R&TD) program ( Low-TRL innovative tasks) <http://rtd.jpl.nasa.gov/index.cfm?fuseaction=TopicAreas>
  - JPL Strategic Research and Technology Development (R&TD) tasks (mid-TRL innovation maturation tasks)
  - IMCE - Integrated Model-Centric Engineering: an innovative program to advance the practice of engineering
  - The Hub: a cross-functional collaborative workspace:
    - <http://beacon.jpl.nasa.gov/hub>
    - Visualization Lab: coming in September 2012
- **Training (JPL)**
  - Mission Development Workshop: <http://foundry.jpl.nasa.gov/index.cfm>
  - deBono Focus on Facilitation
- **Innovation Charge Account (ICA)** – ICA was developed to address the need for “innovation time” which was recommended by several ad hoc employee engagement teams to the JSC Innovation & Inclusion Council in 2009. The ICA provides a small amount of funding (between \$2K -\$10K) to determine initial merit of innovative ideas. It fosters a cross-Center environment of ingenuity and creativity by removing “filters” of oversight/control that sometimes inhibit promising ideas from being developed. Semi-annual “calls for ideas” are developed by the JSC Chief Technologist and then communicated to the JSC workforce. A three member “panel of recognized innovators” reviews and prioritizes submitted ideas in a two-step process before submitting to the JSC Deputy Center Director for approval. Part of the process involves a 60-second “elevator pitch” competition conducted at the JSC Collaboration Center. The JSC workforce is invited to attend and learn about emerging ideas and cheer on their colleagues! Over 60 idea submittals were authorized in 2012. Funding is provided through the JSC Chief Technologist. Website: <http://ica.jsc.nasa.gov> POC: John Saiz ([john.r.saiz@nasa.gov](mailto:john.r.saiz@nasa.gov)) (JSC)
- **JSC Inclusion and Innovation (I&I) Council** – JSC Center Director, Mike Coats, chartered the I&I Council in July 2007 to increase workforce creativity and innovation through diversity and inclusion. The council is made up of director and deputy director level leaders who define the Center’s I&I strategy and initiatives; and serve as advocates, role models, and facilitators of open mindedness, collaboration and creativity. To ensure employee involvement they establish ‘employee engagement teams’, on an ad hoc basis, for specific I&I related tasks. Recent I&I projects include several training initiatives (example topics include creativity, D&I, and innovation), the establishment of five Employee Resource Groups, and the development and implementation of the Status Card (an accountability tool). Funding for the training courses is provided through the training budget and support to develop the Status Card was provided by the Information Resources Directorate. Website: <http://inclusionandinnovation.jsc.nasa.gov/index.cfm> POC: Debbie Denton-Misfeldt, ([deborah.l.denton@nasa.gov](mailto:deborah.l.denton@nasa.gov)) (JSC)
- **Cadre of Innovators (coming in October, 2012)** – An informal poll of members of JSC’s R&D community reveals a general frustration with the time spent hustling for resources throughout the year (“we spend too much time on proposal development and not enough time creating”). One way to address this problem is to identify a group of JSC’s most prolific “inventors” – and then nurture them

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with a labor code and a small stipend. Plans are being developed to identify an initial cadre of 6-12 civil servants using criteria that suggest a consistent creative ability (e.g., history of new technology reports / patent applications, Directors Innovation Award and other recognition, recent R&D assignments, etc.). Cadre candidates will be approved by the JSC Technology Working Group [JTWG] for a one year term. The JTWG will have the discretion to extend the initial “contract” up to two additional years. Each member of the Cadre will be obligated to spend a few hours a month consulting with the JTWG to suggest strategic direction, R&D priorities, etc. In addition, they will be encouraged to share recent developments in their technical area, as well as their perspectives on what it takes to be “innovative”. Funding will be provided through the JSC Chief Technologist. No website yet. POC: John Saiz ([john.r.saiz@nasa.gov](mailto:john.r.saiz@nasa.gov)) (JSC)

- **Rocket University** – Rocket University (RU) is a HOPE-style (Hands-On Project Experience) program that promotes agency wide collaboration, technical skill development, and technical team building while simultaneously fostering systems engineering skills. The main goal of RU classes and labs is to provide valuable experiences similar to those gained during long-term, large-scale flight projects, but on a smaller, short-term, low-cost scale. An important goal of the RU curriculum is to incorporate the teachings of NASA's well-respected APPEL (Academy of Program/Project and Engineering Leadership) training into its program. By incorporating a technical curriculum to compliment the APPEL program, RU focuses on teaching systems engineering of the integrated project as well as within each discipline. RU students take classes that combine APPEL's broad systems engineering training with technical training in unfamiliar disciplines. Once trained, the students are then are challenged to use their new skills as part of a project team tasked to conduct a lab flight project or experiment. They must work on this project from its inception to its completion, immediately demonstrating their new technical skills as they simultaneously apply their systems engineering training throughout a complete project life cycle. POC Chris Iannello and Steve Sullivan ([chris.iannello@nasa.gov](mailto:chris.iannello@nasa.gov), [Steven.J.Sullivan@nasa.gov](mailto:Steven.J.Sullivan@nasa.gov)) (KSC)
- **Student Launch System Initiative** - The Launch Services Program (LSP) at KSC is seeking to support Science, Technology, Engineering, and Mathematics (STEM) educational research and development for Nano-Satellite class launch vehicles. There is currently a gap between CubeSat satellites launch mass and Launch Vehicle system cost and lift capability. Throughout the United States, there is a very strong educational satellite development program utilizing CubeSats, but not yet an educational development program for Nano-Satellite class launch vehicles. In order to replenish the pool of scientists, engineers, and mathematicians who will lead launch vehicle development into the future, LSP has developed this initiative that will pursue STEM activities as they relate to Nano-Satellite class launch system development in the 21st century [Garrett.Skrobot@nasa.gov](mailto:Garrett.Skrobot@nasa.gov) (KSC).
- **LaRC Workforce Strategy Team** - In June 2012, Langley Center Director established a Workforce Strategy Team (WFST) to develop a workforce revitalization strategy for the Center and to create a comprehensive and implementable multi-year workforce transformation strategic plan. The workforce being considered in this strategy is inclusive of civil service, contractor, academia, and others. The workforce plan will include the following deliverables:
  - Context for the workforce strategy
  - A strategic decision making framework to align workforce skills with current and future mission needs
  - Current and future skills
  - Strategic hiring plan
  - Enhancements and revised guiding principles for Center operational model
  - Workforce education/training/development plan
  - Implementation plan

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This project is ongoing with a notional completion date of November, 2012. Ajay Kumar [ajay.kumar-1@nasa.gov](mailto:ajay.kumar-1@nasa.gov) and Karen Koch [karen.a.koch@nasa.gov](mailto:karen.a.koch@nasa.gov) are the points of contact for this effort. (LaRC)

- **LaRC 2050** – The Langley Chief Technology Officer for the OCIO, Ed McLarney, is leading LaRC 2050, which includes summer interns, seasoned leaders / thinkers, and a variety of other future-leaning enthusiasts. LaRC 2050 helps to envision the methods we will use to conduct our work on a 40 year time horizon. We are focused on work methods and culture, while letting other efforts define the work areas. Future planning is an enduring task. Having a solid future vision helps align current strategies toward the long term goal. Currently, several products contribute to LaRC 2050, to include informal discussions, a white paper, and community challenge problems. Two interns are working in the OCIO this summer to interview interested parties and draft an updated 21st Century Lab White Paper, which will describe many aspects of the long-term vision. We have begun monthly lunchtime far-future brown bag discussions. In addition, we have used the Agency Innocentive program to gather thoughts on telepresence from around the agency. We also engage in frequent dialog with other Chief Technology Officers for IT across the Agency. Edward McClarny ([Edward.I.mclarney@nasa.gov](mailto:Edward.I.mclarney@nasa.gov)) is the point of contact for the Langley 2050 initiative. (LaRC)
- **Creativity and Innovation Curriculum (Enhancing Your Creative Genius)** – Lead by Karen Freidt (LaRC Navigation Center Manager), NASA Langley’s Creativity and Innovation Design Team used a collaborative approach to develop the first course designed to serve as the foundation of a Creativity and Innovation curriculum. “Enhancing Your Creative Genius” (EYCG) was designed to accomplish three objectives: to establish a baseline understanding of the basic principles and tenants of creativity; to create a common or pattern language around creativity and innovation; and to facilitate foundational knowledge of the mindset necessary for enhanced creativity. The LaRC creativity team is populated with a diversity of staff members, volunteering numerous hours to achieve the team’s objectives. Team members networked with world-renowned creativity thought leaders and authors, conducted extensive literature reviews, created new and exciting collaboration spaces within the Navigation Center facility, completed proof-of-concept prototype training modules, and wrote almost a dozen white papers focused on how creativity is affected by environment, sleep, health and nutrition, and similar topics. Initial metrics indicate the course is being well received, and senior leadership support has indicated an increase in the perceived level of creativity at Langley. The course has also gained Agency-wide recognition, and the first intra-agency sessions were presented at Glenn in September 2011. Additional sessions are scheduled for 2012 at Dryden and Johnson, and course instructors are developing a “train-the-trainer” curriculum for instructor candidates at other NASA Centers. Karen Freidt is the point of contact for Langley Research Center Navigation Center. (LaRC)
- **Innovation and Technology Advisory Council** – A chartered advisory council to the MSFC’s Strategic Planning Council. Chaired by the Center Chief Technologist. Responsible for advisorship roles and reviewing and recommending Center Innovation Fund proposals for award. (MSFC)
- **MTM Implementation** – The MSFC Technology Management (MTM) system is a structured system of commercial software tools to provide a collaborative environment in which MSFC’s workforce (managers and technologists) can propose, plan, develop, mature, track, and implement innovative ideas and concepts. (<https://idealab.ndc.nasa.gov>) (MSFC)
- **Innovation and Technology Explornet Group** – Virtual collaboration site used to announce solicitation opportunities, post news-worthy and technology-related items, meeting notices, etc. Also used for social networking within the MSFC technology and development communities. MSFC intranet: <https://explornet.msfc.nasa.gov/groups/innovation-and-technology?view=overview> (MSFC)

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- **Early Career Professionals Forum = Innovative Developments and Advancements (IDEAs)** – Targeted meeting for early career professionals looking to develop proposals and collaborations on “hands-on” development activities and discuss ideas for proposals. (MSFC)
- **Dual Use Technology Development Program** – An SSC originated program sponsored by the SSC Chief Technologist Office to encourage innovation and technology transfer between SSC and external partners. NASA/SSC encourage collaborative partnerships with external parties (e.g., small and/or large businesses and universities) to exchange (combination of transfer out and transfer in) technology towards further development that has mutual benefits to both parties; for both value to NASA mission related uses/interests and to the uses/interests of the external parties such as commercialization and profit making. Both parties invest in the R&D and both parties receive value from the joint R&D effort. A competitive proposal process is implemented using a Notice of Intent phase and a Full proposal phase submission process. Matching funding is expected from the external party so as to expect their investment into the joint activity. A Cooperative Agreement mechanism is used to put the formalized partnership in place. Reports and in some cases tangible deliverables in the form of assorted hardware and software are required. NASA funding can be provided to the external party and/or kept on-site for NASA use in the cooperative agreement to conduct the R&D. Additionally, the external party is expected to match (at least in-kind) the NASA funding invested in the cooperative agreement, though typically the external funding is expended by the external party for its role in the cooperative agreement. POC: Ramona Pelletier Travis, Ph.D./ [Ramona.E.Travis@nasa.gov](mailto:Ramona.E.Travis@nasa.gov) (SSC)
- **SSC Applied Science & Technology Project Office (ASTPO) Innovation Activities** - The SSC Applied Science & Technology Project Office (ASTPO) creates and evaluates innovative methods to acquire and analyze Earth science data, and applies that expertise to address societal and strategic issues. Some examples of recent innovations include applications such as:
  - ForWarn (<http://forwarn.forestthreats.org/>) - ASTPO worked with the U.S. Forest Service to develop ForWarn, a satellite-based forest disturbance monitoring system for the conterminous United States. Leveraging capabilities developed by ASTPO ROSES projects, it detects changes in forests and provides tools that can help determine if the abnormalities are due to insects, disease, wildfires, storms, human development or unusual weather. New and archived data spanning 2000-present are available to the public via interactive maps. It provides a powerful tool for resource managers in state and federal agencies as well as educators and private landowners.
  - Forecast Mekong (<http://deltas.usgs.gov/fm/>).- Forecast Mekong is part of the U.S. Department of State's Lower Mekong Initiative, which was launched in 2008 by Secretary Clinton and the Foreign Ministers of Cambodia, Laos, Thailand and Vietnam to enhance U.S. engagement with the Lower Mekong countries in the areas of environment, health, education and infrastructure. ASTPO worked with the USGS National Wetlands Research Center (NWRC) to enhance the Forecast Mekong tool. Leveraging expertise developed in ROSES projects and ForWarn, ASTPO developed robust techniques to monitor tropical vegetation and detect flooding and drought that occur as part of the seasonal monsoons. Forecast Mekong provides people in the region with additional information to establish effective policies, respond to crises and manage this vital resource.

ASTPO pursues funding through a variety of competitive proposal processes such as NASA ROSES, OCT/CIF, and HOPE. ASTPO innovation is also supported by Reimbursable Space Act Agreements with external customers. This process is continuous and resources are distributed. POC: Duane Armstrong, Chief, ASTPO, ([Curtis.D.Armstrong@nasa.gov](mailto:Curtis.D.Armstrong@nasa.gov)), <http://science.ssc.nasa.gov> (SSC)

## Integrated List of Innovation Programs at NASA

- **Barriers to Innovation Survey/Study** – A study initiated by the NASA Chief Technologists' Council (CTC) in FY 12 to investigate the barriers to innovation in the agency through independent Center surveys and combined agency analyses and recommendations. The purpose of the study is to better understand the perceived barriers to innovation at the center(s) and across the agency and to make recommendations to remove or mitigate those barriers. A center based survey approach was initially used by a cross-agency team made of center representatives followed by the cross-agency team assessment of inputs, analyses and recommendation reporting to OCT and agency leadership. This activity was initiated in late FY11 and the final report is expected by the end of FYF12. Funding is through FTE and WYE coverage by each of the Center Chief Technologist funds to work the survey and team activity. POC: Center Chief Technologists. (CTC)

## Category 2– Fairs and Symposia

- **Fairs at NASA Ames Research Center**
  - ARCTek I: A centerwide gathering aimed at communicating management's strategic vision and obtaining staff responses, with the goal of achieving a better common understanding of the Center's strategic goals within the Agency context: <https://arctek2012vm.arc.nasa.gov>
  - ARCTek II: A centerwide gathering aimed at communicating the results of Center Innovation Fund research via lightning talks and posters, plus presentation of Center success stories: <https://arctek2012vm.arc.nasa.gov>
  - ARCTek III: A planned Centerwide gathering focusing on presentation and review of employees' innovative concepts through lightning talks and poster sessions, plus presentation of Center success stories: <https://arctek2012vm.arc.nasa.gov>
  - Future ARCTeks (quarterly) (ARC)
- **Workshops at NASA Ames Research Center**
  - Director's Weekend Workshops: occasional gatherings on a variety of topics, some innovation-oriented (e.g., quantum computing); participation extends beyond Ames (and NASA).
  - CCT Workshops: occasional Center workshops on innovative topics (ARC)
- **Colloquia at NASA Ames Research Center**
  - Director's Colloquium Series: cover a variety of topics, some innovation-oriented
  - CCT Colloquia: Occasional speakers on innovative technologies
  - SynBio Seminar Series: <http://syntheticbiology.arc.nasa.gov/node/5>
  - Summer Student Colloquium Series
  - CCT Brownbags: Small, informal monthly Center meetings to discuss specific innovation topics. (ARC)
- **Dryden Colloquium Series** – This is a colloquium where invited speakers are brought out to Dryden to discuss innovation and projects of interest to Dryden employees. Past speakers include Capt Robert Crippen, *STS1 and 30 years of Space Shuttle Flight*, Dr. Roger Launius: *Sputnik, Eisenhower, and the founding of NASA*; Dorothy Cochran, Curator National Air and Space Museum: *Ann Morrow Lindberg, wife, pilot, and Literary Light*. On August 2, 2012, Major General Joe Engle: *X-15 Heritage and Legacy*. (DFRC)
- **Innovation Forum** – A series of lectures were held on-site under the banner of Innovation Forum. The Innovation Forum was created to host distinguished speakers from outside NASA to expose the Glenn workforce to a variety of diverse innovation experiences and concepts. Research has shown that creativity and innovation is enhanced through constant exposure to new ideas and approaches. Presentations by Dr. G. Scott Hubbard (Consulting Professor, Stanford University), Dr.-Ing. Anko Borner (Head of Optical Information Systems Department, German Aerospace Center (DLR), Berlin, Germany), Ms. Elena Seran (Project Manager, LATMOS Research Lab, Paris, France), and Dr. David A. Weitz (Professor of Physics and Applied Physics, Harvard University) are among the dozen Innovation Forum lectures that were held at GRC over the past year. (GRC)
- **Fair and Symposia at the Jet Propulsion Laboratory (JPL)**
  - Foundry Frontliners Meetings: <http://foundry.jpl.nasa.gov/index.cfm>
  - Foundry Symposia
  - Science Visitor and Colloquium Program
  - Earth and Space Science Colloquium Program
  - Science 101 Lectures by senior scientists to describe work to non-specialists

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- Research and Technology Development (R&TD) Poster Day
- Postdoc Research Poster Day
- **Workshops at the Jet Propulsion Laboratory (JPL)**
  - GALCIT Seminar Series: <http://www.galcit.caltech.edu>
  - Keck Institute for Space Studies (KISS) with Caltech: <http://kiss.caltech.edu/index.html>
  - OCT Center Innovation Funds (CIF) Workshops
  - JPL Visiting Lectureship at Caltech
- **Innovation Day** – For the past three years JSC has hosted an “Innovation Day” site-wide stand-down event in late April/early May to foster greater creativity, innovation, and collaboration. The events, sponsored by the I&I Council, are designed to move JSC employees outside their normal circles of associates and expose them to new ideas, issues, and perspectives. Each year, an ad hoc employee engagement team is assembled to plan the event. Previous events have featured the following core activities:
  - Innovation Exhibits - "show and tell" displays highlighting technology and process initiatives from across the Center
  - “Rap Forums” - open discussions engaging multiple levels of employees across disciplines on a diverse range of topics proposed by the workforce
  - External speakers – discussing the inventive process and emerging technologies, past speakers have come from Google, IBM, GE and DARPAFunding has been provided by Center Operations for facilities support and Information Resources Directorate for A/V and related support. Most speakers have volunteered their time or asked for travel reimbursement. Website: <http://inclusionandinnovation.jsc.nasa.gov/index.cfm> POC: Debbie Denton-Misfeldt, ([deborah.l.denton@nasa.gov](mailto:deborah.l.denton@nasa.gov)) (JSC)
- **Innovation Lecture Series (ILS)** – The Human Health and Performance Directorate (HH&P) (formerly the Space Life Sciences Directorate) established the ILS in April 2009 as a forum for experts in industry, academia, and government to share their experiences and successes with new business models for driving innovation. What started as a Directorate forum has turned into an event open to anyone within the Agency as well as members of the NASA Human Health and Performance Center (NHHPC). To date, 11 presenters have discussed topics ranging from collaborative/open innovation to commercial space. Website: <http://www.nasa.gov/centers/johnson/slsd/innovation/ils.html> POC: Dr. Jeffrey R. Davis ([jeffrey.r.davis@nasa.gov](mailto:jeffrey.r.davis@nasa.gov)) (JSC)
- **Human Systems Academy (HSA)** – Developed by JSC’s Human Health and Performance (HH&P) Directorate along with support from Human Resources, the goals of the HSA are to enable HH&P workforce to adapt and grow through a human system-centric philosophy and to enhance workforce flexibility and technical competence to complement disciplines and programs across the Agency, external commercial entities, and the international community. In addition to certificate programs to train personnel in Human Systems Integration, Research and Operations Integration, and Science Management, the development of an Innovation Certificate is underway that includes three courses on innovation, two on technology transfer (supported by the Tech Transfer Office), the Center-provided Innovation & Inclusion course, and a management course provided by Human Resources. Course registration is through SATERN and available to both civil servant and contractor personnel. Website: <http://sashare.jsc.nasa.gov/hsa/default.aspx> POC: Dr. Helen Lane ([helen.w.lane@nasa.gov](mailto:helen.w.lane@nasa.gov)) (JSC)
- **Innovation Expo** – Planned for September 6, 2012, this event for all KSC employees is led by the KSC Chief Technologist and organized by Spaceport Innovators to show the Center’s support for innovation

## Integrated List of Innovation Programs at NASA

and communicate the innovative, diverse work being done on Center. (KSC)

- **Innovation and Technology Information Exchange (I&TIE)** – Open format innovation & collaboration discussions. Each meeting features a review of current solicitation opportunities, a technology talk from a MSFC technologist or researcher, and an opportunity to hold Q&A sessions with MSFC's Center Chief Technologist. (MSFC)

### Category 3 – Open Innovation Platforms, Prizes and Challenges

- NASA@Work (ARC): <http://www.nasa.gov/offices/oct/home/nasa@work.html>  
<https://nasa.innocentive.com/>
- Centennial Challenges (HQ/OCT):  
[http://www.nasa.gov/offices/oct/early\\_stage\\_innovation/centennial\\_challenges/index.html](http://www.nasa.gov/offices/oct/early_stage_innovation/centennial_challenges/index.html)
- **Dryden Innovation Research Forum** – The Dryden Innovation Research Forum is an online database where employees can submit technology and research ideas. The ideas are open for others to comment and collaborate. (DFRC)
- **Internal Research and Development Program** - Technology development projects administered through the GSFC Office of Chief Technologist that provide leveraged support for a variety of new business activities in the GSFC line of business organizations. Project funding is awarded through a yearly, two-step competitive proposal process, with project start dates aligned with the fiscal year, and biannual status reports to the program management. Website:  
<http://gsfctechnology.gsfc.nasa.gov/Funding.html> (POC: Peter Hughes; [Peter.M.Hughes@nasa.gov](mailto:Peter.M.Hughes@nasa.gov); 301-286-2342) (GSFC)
- **Wiki & Collaborative Environment (AWCE)** - A collaborative web-based system sponsored by Goddard's Applied Engineering and Technology Directorate (AETD), has promoted improvements in efficiency and innovation in fulfilling our mission since its introduction in 2009. The system is the intranet for all of AETD, and supports the HQ Office of Chief Engineer (for the agency-wide Software Engineering Handbook), the Space Science Mission Operations project (which operates over 15 satellites, including SDO & LRO), a proposal team, and all 40 engineering branches at GSFC. Since inception, over 200,000 articles have been viewed and 50,000 site visits. There are over 200 active, weekly users and 700 monthly users. It has enabled easier exchange of information and knowledge with discipline branches and project teams by allowing any team member to contribute any type of content to the shared repository of information. It supersedes email and file repositories by allowing our engineers to contribute rich media content and appropriate context resulting in an ever evolving rich knowledge database. Engineers spend less time searching for information and spend more time applying their creativity to technical challenges. This system has helped project managers promote better communication within their teams, and enabled engineers to collaboratively document the results of their work. Websites:  
[http://www.nasa.gov/offices/oce/appel/ask/issues/44/44i\\_wikis\\_at\\_nasa.html](http://www.nasa.gov/offices/oce/appel/ask/issues/44/44i_wikis_at_nasa.html)  
<https://swehb.nasa.gov> (NASA only) (POC: Jon Verville; [Jonathan.P.Verville@nasa.gov](mailto:Jonathan.P.Verville@nasa.gov); 301-286-8741) (GSFC)
- **NASA FIRST (For Inspiration and Recognition of Science and Technology) Robotics Program** – The FIRST Robotics Competition is an exciting, nationwide competition that teams professionals and young people to solve an engineering design problem in an intense and competitive way. For many years, the NASA Robotics Alliance Project has been supporting participation in the FIRST Robotics Competition by providing grants to high school teams as well as sponsoring FIRST regional competitions. Providing support to competitions like FIRST Robotics is one way the NASA Robotics Alliance Project strives to create a human, technical and programmatic resource of robotics capabilities to aid future robotic space exploration missions. Website:  
<http://www.nasa.gov/audience/forstudents/9-12/features/first-2012-index.html>
- **LAUNCH sustainability innovation challenges** - LAUNCH is a unique public-private partnership focused on showcasing and supporting breakthrough innovations that address humanity's most pressing sustainability challenges. NASA, USAID, NIKE and the Department of State are the founding

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partners who developed the LAUNCH concept. The Office of Naval Research, IDEO, Architecture for Humanity, Vestergaard Frandsen have joined the partnership over the last four years. The LAUNCH program was formed to address large, sustainability-related challenges that no single government or commercial entity can solve alone. The LAUNCH team searches for transformative innovations and connects LAUNCH Innovators to thought leaders and experts from around the world, who serve as the LAUNCH Council. Most importantly, LAUNCH Innovators have the unique opportunity to accelerate their innovations for greater impact and scale by leveraging the advice, networks, and resources of LAUNCH and its partners through a six-month "Accelerator" program led by USAID. The current LAUNCH: Beyond Waste challenge is the fourth in a series of challenges, following Water, Health, and Energy. LAUNCH is creating a model for others to follow in creating non-traditional government partnerships, as well as innovative processes that can be used within NASA and other government entities. NASA receives \$500k in funding from USAID and the Office of Naval Research to administer the program. <http://launch.org> POCs: HQ/Beth Beck, Human Exploration and Operations [beth.beck@nasa.gov](mailto:beth.beck@nasa.gov) and Diane Powell, Office of Chief Technologist [dpowell@hq.nasa.gov](mailto:dpowell@hq.nasa.gov)

- **MindMapr** - MindMapr is a Beta interactive notetaking tool to digitally collect, sort, display, archive, and engage internal and external participation in conversations around topics of interest. MindMapr is an innovative tool to facilitate and capture multiple conversations in a Twitter-stream format occurring at the same time, to be displayed live on large screens during events, and on the web. U-stream video can be embedded in the host page, as well as a stream of live notes from the event. Virtual participants can sign in and contribute to the conversation. MindMapr was created for the LAUNCH sustainability forums to capture recommendations the LAUNCH Council provide to the LAUNCH innovators during interactive group sessions. MindMapr archives the conversation and can be sorted by participant, to track commitments, actions, or questions to individual Innovators by Council members. This platform has potential for note taking in internal meetings with the privacy setting on, or for external conferences to capture proceedings. <http://mindmapr.nasa.gov>. POC: Beth Beck, Human Exploration and Operations [beth.beck@nasa.gov](mailto:beth.beck@nasa.gov)
- **Destination Station** - Destination Station is NASA's International Space Station Program national awareness campaign that promotes research opportunities and other innovative uses of ISS.
- **"Spot the Station" Alerts** - In November anyone can sign up for text or email alerts when the ISS is going to be visible overhead in your city.
- **The Innovation Ecosystem (IE)** - The HQ Information Technology and Communications Division (ITCD) is launching NASA's new Innovation Ecosystem (IE) to promote agency-wide technology innovation. Conducted in collaboration with stakeholders across Agency Offices and with an emphasis on meeting mission needs, the IE will result in a robust technology innovation pipeline for future NASA missions. The components of the Innovation Ecosystem include the virtual showcase and collaboration platform found at [innovate.nasa.gov](http://innovate.nasa.gov). Several supporting components—including strategic partnerships and a governance program—also enable the Innovation Ecosystem to encourage cross-cutting technology innovation.
- **ARMD Seedling Fund/LEARN Fund** - NASA's Aeronautics Research Mission Directorate (ARMD) is sponsoring innovation in aeronautics research through the Seedling Fund and LEARN fund. The Seedling Fund annually provides NASA civil servants the opportunity to perform research, analysis, and proof-of-concept development of their novel ideas that have the potential to meet national aeronautics needs. Funding is competitively awarded for early-stage efforts not currently supported by ARMD programs and projects, with the goal of infusing promising concepts into the ARMD research portfolio or into NASA's Small Business Innovation Research program for further development. The Leading Edge Aeronautics Research for NASA (LEARN) Fund is complementary to the Seedling Fund and has similar goals, but it invests in innovative ideas from outside NASA. These aeronautical research solicitations

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are issued and managed through the NASA Aeronautics Research Institute (NARI) based at ARC.  
[http://www.aeronautics.nasa.gov/pdf/nari\\_factsheet\\_05\\_11\\_12.pdf](http://www.aeronautics.nasa.gov/pdf/nari_factsheet_05_11_12.pdf)

- **IT Labs** - The IT Labs program was established under the Office of the Chief Technology Officer for Information Technology (CTO-IT) in May 2011 with the goal of engaging the brightest minds across the Agency to guide NASA's IT strategy and investment decisions, and identify IT capabilities that can best support NASA's needs by providing a streamlined approach for evaluating new information technologies and processes for Agency integration in support of the Office of the Chief Information Officer (OCIO) and the Information Resources Management Strategic Plan. IT Labs held its first annual Project Call in May 2012. Working with the OCIO Communication Office, the Program solicited project proposals from across the Agency. Thirty-six (36) proposals were submitted Agency-wide and assessed by a diverse group of reviewers including the Center CTO-IT's, OCIO Service Executives, and Mission Partners. Based on reviewer feedback and an overall assessment of the IT Labs portfolio, 16 research projects were funded. Since its inception, IT Labs has funded roughly 40 projects across 8 Centers, and established precedence for its concept-to-operations model by fostering one of its projects from the Idea phase to an OCIO-offered operational service.
- **International Space Apps Challenge** - The International Space Apps Challenge is an annual, two-day "mass collaboration" event during which citizens from around the world work together to solve current challenges relevant to both space exploration and social needs. The International Space Apps Challenge took place on all seven continents (and in space) on 21-22 April 2012. A "mass collaboration" is a unique event that brings together interested citizens to develop hardware and software solutions that address critical challenges. This approach uses minimal resources and maximum brainpower to create outside-the-box solutions. Solutions created with this innovative method can have immediate impact for NASA's missions and citizens of Earth. For more information visit <http://spaceappschallenge.org>
- **Random Hacks of Kindness** - NASA has contributed as a core member of the Random Hacks of Kindness (RHoK) partnership since its inception in 2008. RHoK's focus has been to enable local action on a global stage: at first very specifically in disaster relief and recovery; and eventually more broadly to any challenges facing the field of global development. NASA's contributions have included significant strategic guidance, as well as constant diligence to expose NASA's ever increasing collection of Earth observation data and open technology. Bi-annual events across the globe are primarily community-driven and locally-funded, and the numerous solutions developed in the weekend of marathon hacking venues provide a constant reminder of how the work done at our space agency affects life on Earth in a very real way. For more information visit <http://www.rhok.org>.
- **Open Innovation Platforms, Prizes, and Challenges at the Jet Propulsion Laboratory (JPL)**
  - Innovation Jams – both internal (e.g. Mars Exploration LPI Workshop Innovation Jam: <https://jplwiki.jpl.nasa.gov:8443/display/LPIWorkshop>) and external
  - Planetary Science Summer School <https://pscischool.jpl.nasa.gov/>
  - Lew Allen award for early career scientists and technologists
  - Ed stone Award for outstanding research papers
  - Explorer, Magellan, Ranger, Mariner, Team and Spot awards for excellence
  - Purple Pigeon challenges
- **NASA@Work** – Hosted and supported by the Human Health and Performance (HH&P) Directorate, NASA@Work is an agency-wide, virtual platform intended to increase innovation by fostering collaboration within the NASA community through the contribution of interactive discussions and the submission of solutions to posted challenges. After a highly successful pilot that included integrating the platform with NASA's simplified log-in system, a contract was awarded to InnoCentive for the production NASA@Work implementation in November 2011. Since full operations began in November, 8,050 participants registered as solvers. With a total of 34 challenges (including the pilot), there have been over 65 winners from across the Agency. Representatives from 9 of the NASA Centers have served as Challenge Owners and there are currently several active challenges in the queue. Funding

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sources include the Office of the Chief Technologist (OCT), the Human Exploration and Operations Mission Directorate (HEOMD) (FY12 only), HH&P, and the Centers choosing to run challenges inclusive of InnoCentive support. Website: <https://innocentive.nasa.com>. POC's – Lynn Buquo ([lynn.buquo@nasa.gov](mailto:lynn.buquo@nasa.gov)) and Kathryn Keeton ([kathryn.keeton@nasa.gov](mailto:kathryn.keeton@nasa.gov)) (JSC)

- **Center of Excellence for Collaborative Innovation (CoECI)** – The CoECI is a virtual center designed to advance the use of open and distributed innovation methodologies to improve government missions. Established in November 2011, with support from the White House Office of Science and Technology Policy (OSTP), the CoECI is actively leveraging NASA's success with these methodologies to harness and redistribute the collective experience and best practices in collaborative and distributed innovation in the government. Through best practices sharing, the three primary functions of the CoECI are education, providing implementation guidance, and development of metrics to measure Agency-focused performance. Located in the Human Exploration and Operations Mission Directorate (HEOMD), the CoECI is supported by a distributed team that includes dedicated staff in the Human Health and Performance Directorate (HH&P) at the Johnson Space Center. Jason Crusan ([jason.crusan@nasa.gov](mailto:jason.crusan@nasa.gov)) serves as the CoECI Director; Dr. Jeffrey R. Davis (JSC) ([jeffrey.r.davis@nasa.gov](mailto:jeffrey.r.davis@nasa.gov)) serves as Deputy Director. Funding is distributed among HEOMD, HH&P, and Office of Chief Technologist (OCT). The CoECI has in-place four contract vehicles to provide expertise and infrastructure to assist other Agencies in constructing pilots and accelerating the use of incentive prize methods as well as access to the NASA open innovation experience base. With the highly effective support of Headquarters Legal, Procurement, and Resource Management Offices, the CoECI currently has six active interagency agreements either approved or in work. If all agreements are successfully executed, reimbursable funding will total approximately \$8M for those efforts initiated in FY12 alone. The CoECI works in close collaboration with the Program Executive for Prizes and Design Challenges in the OCT, representatives of the OSTP, and the Government Services Agency to facilitate and ensure a coordinated effort in advancing the use of open innovation across the Federal Government. Website: <http://www.nasa.gov/offices/COECI/index.html> POC: Lynn Buquo ([lynn.buquo@nasa.gov](mailto:lynn.buquo@nasa.gov)) (JSC)
- **Defense Venture Catalyst Initiative (DeVenCI)** – NASA's efforts with the Defense Venture Catalyst Initiative (DeVenCI) began after the Director, Human Health and Performance (HH&P) and a representative of the Department of Defense (DoD), Rapid Reaction Technology Office connected at an official speaking engagement. The DoD Rapid Reaction Technology Office oversees DeVenCI which utilizes private sector Venture Capital expertise to accelerate the identification and adoption of emerging commercial technologies to meet DoD needs/challenges. Venture Capitalist participation is voluntary. DeVenCI is allowed to work with any DoD or Federal group to identify both needs and relevant emerging private solutions. Their process involves a series of workshops to identify the customer needs and present potential options. In summary, needs were solicited from JSC organizations and presented to the Venture Capitalists; results were summarized in a Needs Document which was then distributed to the potential Venture Capitalists and posted on FedBizOps. Companies responded with technologies that could potentially meet JSC's needs. The DeVenCI team and JSC subsystem experts met on July 28, 2011, to select the most promising companies/products for presentation. From the down select, 36 companies were invited to present at the Solution Workshop held in Houston, Texas, September 13-15, 2011. At the September event, 27 solutions were presented: 17 Mission Operations Directorate (MOD) and 10 HH&P. Please note that subsystem experts acquire products for testing or experimentation using the Center procurement process. After the Solutions Workshop, HH&P received approval from DeVenCI for \$833K to test 2 point-of-care lab analysis capabilities devices. MOD received approval for \$36K to test an active management network tool. Funds were transferred and work initiated in FY12. No new DeVenCI engagements are currently in work although a request for interest in another

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workshop will be solicited before the end of FY 12. Website: <http://devenci.dtic.mil/events.htm> POC: Bobbie Gail Swan, ([bobbie.g.swan@nasa.gov](mailto:bobbie.g.swan@nasa.gov)) (JSC)

- **The IT Innovation Forum** – A site designed to help capture innovative ideas from across the Center in the area of IT and to encourage open and constructive discussion from all interested parties on ideas and their ability to increase efficiency at KSC. The goal is to obtain ideas that are able to investigate through discussion, analysis, testing and prototyping. Also, our goal is to collaborate on our innovative ideas with other Center and Agency IT CTOs in order to share knowledge, pool resources, eliminate duplication, and to obtain funding. Through the sharing of our ideas we also hope to gain insight into innovative ideas coming out of the other Centers. Our mission is to promote innovation and demonstrate its value to both the Center and the Agency. POC Joy Squires ([joy.squires@nasa.gov](mailto:joy.squires@nasa.gov)) <https://sp.ksc.nasa.gov/sites/itiforum/default.aspx> (KSC)
  - One of the innovation initiatives championed under this is the **Bring Your Own Device (BYOD)** project is looking is to develop a strategy that will allow NASA employees to access and store NASA data on their personal smartphone or other device in a way that does not compromise the confidentiality of NASA data. The use of personally owned smartphones, tablet PCs, and notebook computers is increasing. Today, approximately 65% of the smartphones that are accessing and/or storing NASA data across the agency are personally owned devices.
- **The Spaceport Innovators (SI)** – SI is a group at Kennedy Space Center (KSC) that started from a cryptic and, yet, enticing email sent to a couple dozen KSC civil servants. In the email, they were challenged to brainstorm a new and different way to think about our Center. From the facilities, organizations, partnerships, geography, launch vehicles, and market competition: everything was on the table. How could we make the best space center today, for the next program and for the next 50 years, as our budget and programs fluctuated? Membership is open to everyone on center and includes both civil servants and contractors from nearly every directorate). <http://open.nasa.gov/blog/2011/09/06/spaceport-innovators-at-ksc/> (KSC)
- **NE Ideas Program** – NASA Engineering & Technology Directorate has established this program which will award to a winner with an innovative proposal, for them to spend 6 months pursuing that project. The only criterion is that the proposal needs to be innovative and related to a NASA or KSC goal. Your proposal can be about a process (fixing one, streamlining one, creating a new one), an engineering product, a technology development, research the feasibility of an idea, a manual, a new app – ANYTHING! POC Johnny Nguyen ([johnny.t.nguyen@nasa.gov](mailto:johnny.t.nguyen@nasa.gov)) (KSC)
- **InnoCentive** – NASA's Innovation Pavilion provides problem-solvers the opportunity to develop innovative solutions to the unique challenges faced by NASA in achieving its mission to pioneer the future of space exploration, scientific discovery, and aeronautics research through a web-based tool called InnoCentive. Melvin Ferebee (Project Manager) is leading two InnoCentive activities in which Langley is participating: the External Platform at InnoCentive.com and the internal platform named NASA@Work. Previous activities on the External Platform centered on piloting challenge-based innovation by issuing the \$20K challenge titled "Coordination of Sensor Swarms for Extraterrestrial Research". The challenge yielded 23 proposed solutions from 14 countries of which three solutions were awarded to solvers in Italy (2 solvers) and California. Resources expended were \$43.2K (\$18K posting fee, \$18K awards, \$7.2K success fee). We are also currently developing an external challenge with a proposed \$20K award seeking solutions to measuring strain in 1-inch wide Vectran and Kevlar webbing. If all the prize funds are awarded the cost to NASA is \$46K. On the internal platform, Langley has posted more challenges than any other Center except JSC. The titles of Langley's challenges are:
  - Tele-possibilities: Understanding and Enhancing our Mobile Work and Telepresence Technologies (Owner: B7/Ed McLarney; Posted 9/1/11)

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- If and When Life Is Discovered on Mars, How Can We Determine If It is Truly Indigenous Mars Life? (Owner: E303/Joel Levine; Posted 9/15/10)
- Adjusting the Cultural Paradigm to Enable the Proliferation of Web 2.0 Tools (Owner: B402/Gamaliel Cherry)
- Determining the Outer Mold Line (OML) of an Inflatable Aerodynamic Decelerator (IAD) (Owner: D205/Michelle Munk; Posted 9/7/10)
- Coordination of Sensor Swarms for Extraterrestrial Research (Owner: D319/Kennie Jones; Posted: 8/23/10)

These 30-45 day internal challenges have been issued to the Agency and have been completed. Each internal challenge awarded solvers accepts the “Life Discovered on Mars” challenge and the “Outer Mold line on an IAD” challenge. There have been no costs associated with the above challenges. LaRC is also developing two internal challenges. One challenge is seeking an online archival and reference system for geographically dispersed secondary, undergraduate and graduate design teams. The other challenge centers have identified very low cost instruments to measure constituents in the atmosphere. Melvin Ferebee ([Melvin.j.ferebee@nasa.gov](mailto:Melvin.j.ferebee@nasa.gov)) is the Center Champion for the Challenge-Based Innovation. (LaRC)

- **Langley Internal Research and Development Program (IRAD)** – The Langley Technology Council (LTC), chaired by the Center Chief Technologist (Keith Belvin), issues an integrated call for proposals to support the objectives of the Langley Strategic Technology Investment Plan (LSTIP). The LSTIP includes mid- and long-term technology needs of the Agency and early stage (potentially game changing) engineering science research. The LSTIP integrates technology investments across the center’s lines of business (aeronautics, exploration, earth science, and space technology). Proposal calls annually emphasize a prioritized subset of the LSTIP goals and capabilities. Proposals are evaluated by Langley subject matter expert peer review panels for technical merit and innovation. IRAD projects are monitored by the LTC and reviewed annually. Langley’s IRAD investments support new approaches to solving today’s challenges and provide the much needed exploration of emerging discipline and interdisciplinary research to create future technology enabled capabilities. There are currently about \$3M in IRAD (Full Cost) and about 10 FTE spread over a total of 20 projects. Keith Belvin ([w.k.belvin@nasa.gov](mailto:w.k.belvin@nasa.gov)) is the point of contact for Langley IRAD projects. (LaRC)
- **Center Innovation Fund (CIF)** – This Agency-wide OCT funded program encourages innovative research to support Space Technology, but is administered at the Center level separately by each of the Centers. The purpose of the program is to provide funding to center personnel and in some cases to center personnel in collaboration with outside parties to encourage cutting edge innovative ideas to support Space Technology and to conduct concept research and development. This program is meant to engage employees in thinking innovatively and to push the envelope with new ideas and conduct conceptual research and development activities with the hope that the idea may prove appropriate to move forward for consideration of funding and further R&D within another program. The program consists of relatively short term projects (typically a year or less in duration) and at the discretion of the Center Chief Technologist (CCT) as to dollar value award size through a competitive proposal process. Basic criteria for the program have been outlined by HQ/OCT with fair latitude at CCT discretion. Reports and in some cases tangible deliverables in the form of assorted hardware and software are required. Funding is provided in part for FTE coverage and necessary procurements for WYE supplies and possible external collaborators. (All)
- **Center Innovation Fund (CIF) Project Cross-Coordination** – An effort initiated by the NASA Chief Technologists’ Council (CTC) in FY12 to share the topics of the technology areas which were selected by the individuals Centers as part of the OCT CIF program. The purpose of the study is to identify common technology development areas and investigate the potential for sharing information between

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Centers. (CTC)

## Category 4 – Facilities and Creative Spaces

- **Facilities and Creative Spaces (ARC)**

- Mission Design Center
- Connect Labs – <http://connectlab.org/>
- Simulation Labs – <http://www.simlabs.arc.nasa.gov/>
- ARC Jet – <http://www.nasa.gov/centers/ames/research/technology-onepagers/arcjetcomplex.html>
- Hyperwall – [http://www.nas.nasa.gov/hecc/resources/viz\\_systems.html](http://www.nas.nasa.gov/hecc/resources/viz_systems.html)
- Pleiades Super Computer – <http://www.nas.nasa.gov/hecc/resources/pleiades.html>
- Rover Yard – <http://www.cs.cmu.edu/~myrover/PER/yards.html>
- Future Flight Central – <http://www.aviationsystemsdivision.arc.nasa.gov/facilities/ffc/index.shtml>
- Advanced Digital Manufacturing – 3D-Printing (link under construction)
- NASA-Ames Center for Innovation and Technology Enhancement (N-CITE) – Designed to facilitate communication and enable collaborations between Ames and the residents of the NASA Research Park (NRP) in order to transfer technologies of mutual interest to and from the government and the commercial sector.

- **Dryden Collaboration Spaces** – This is a new project at the center where we are developing collaboration and open work spaces around the center where employees can come together discuss and collaborate on technology and Dryden issues and projects. (DFRC)

- **Creativity & Innovation Commons** – Through the collaborative efforts of several organizations at Glenn Research Center, a new space was developed and equipped this year with unique décor and electronic and mechanical equipment ideal for the purpose of fostering creativity and collaboration. The new and unique space, named the C&I Commons, now serves as a focal point for all Ideation events as well as continued training in Creativity & Innovation methods and tools. POC: Irebert Delgado, [Irebert.r.delgado@nasa.gov](mailto:Irebert.r.delgado@nasa.gov) (GRC)

- **Columbia Café** – A comfortable and inviting space in the HQ building, providing a place for employees to gather and exchange ideas.

- **Conversation Pits (aka Teaming Areas)** - Creation of a teaming, conversation, and gathering area which facilitates comfortable human conversation and the sharing of ideas in a relaxed setting, which brings people closer together than free standing tables and chairs normally would.

- **NASA Protective Services Training Academy** - The NASA Protective Services Training Academy (NPSTA) is a combination of academic and realistic scenario based training. The OPS has oversight of the Academy of which is located at KSC. The core training program is accredited by the Federal Law Enforcement Training Accreditation (FLETA) Board. Yearly workshops are conducted to encourage innovated means for conducting training through the use of technology and/or physical resources in order to meet the needs of its diverse population of students. The objective of training is to prepare students to operate effectively within legal guidelines under potentially stressful conditions. Students are expected to develop and demonstrate a high degree of mental and physical discipline. Instructors observe and evaluate student behavior throughout the course of instruction, especially under stressful conditions. The staff of the NPST Academy prides itself on the quality of our graduates. Scholastic excellence, mental toughness and physical strength are key ingredients towards attaining graduate status.

- **Facilities and Creative Spaces at the Jet Propulsion Lab (JPL)**

- Project Design Center: <http://teamx.jpl.nasa.gov/facility>

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- Left Field – Innovative Concept Development Center
- Mechanical Design Center:  
<https://jplwiki.jpl.nasa.gov:8443/display/wired/Mechanical+Design+Center+%28MDC%29>
- Earth Science Center (Bldg 264)
- Earth Science Collaboration Center (Bldg 233)
- Center for Climate Sciences
- **Laboratories at the Jet Propulsion Lab (JPL)**
  - Micro Devices Laboratory (MDL) broad research in innovative micro devices, sensors, and nanotechnology
  - Mars Surface Science Laboratories
    - Radiogenic Isotope Geochemistry Lab
    - Geology/Astrobiology Lab
    - Geochemistry Lab
  - Icy Solar Bodies Science Laboratories
    - Ice Spectroscopy Lab
    - Ice Physics Lab – Building 79
    - Spectral Characterization Ices Lab
  - Astrobiology Lab
    - Hydrothermal Vent Simulation Lab
  - Formation Flying Lab: <http://dst.jpl.nasa.gov>
  - Electrochemical Energy Storage Lab –super capacitors and fuel cell chemistry innovation
  - Computer Vision Lab – autonomous visual based robotics
  - Planetary Robotics Lab – sample handling and caching
  - Mars Yard – robotic vehicles development
  - Athlete Lab – Athlete
  - Robotic Vehicles Lab – currently developing extreme environment electronics for motor control and robotic gripping and manipulation technologies
  - Advanced Optics Laboratories:
    - The High Contrast Imaging Testbed (HCIT), home to experiments in exoplanet imaging for both JPL and external investigators
    - Palomar Adaptive Optics (PALAO), where we demonstrate some of the latest AO technologies in conjunction with Caltech Observatories
    - Keck Interferometer, where we've developed and demonstrated some of the most advanced ground-based interferometry technologies
- **JSC's Creative Spaces** – The Center Operations Directorate (COD) has created several "Creative Spaces" across the JSC campus. The spaces vary in size from areas that accommodate seating for a small group to areas that seat several small groups at once. Spaces are equipped with collaboration enhancing capabilities (wireless internet capability, electrical outlets, screens/monitors, etc.), are easily accessible (no locked doors, no unnecessary layers of security) and have community buy-in. Funding has flowed from COD's budget. Website: <http://spaces.jsc.nasa.gov/> POC: Leah Galindo ([leah.a.galindo@nasa.gov](mailto:leah.a.galindo@nasa.gov)) (JSC)
- **NASA Human Health and Performance Center (NHHPC)** – The NHHPC is a joint effort between JSC and ARC. It was established in October 2010 as a virtual forum to connect organizations worldwide interested in collaborating and advancing human health and performance innovations for spaceflight, commercial aviation, and challenging environments on Earth. Members include NASA Centers and partners, industry, government agencies, academic institutions, and other organizations interested in

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fostering collaborative innovation. NHHPC membership has grown to more than 110 government, industry, academic, and non-profit organizations. Innovation is facilitated through information sharing at workshops, community of practice working groups, webcasts, and an e-newsletter. The Human Health and Performance Directorate is the primary funding source, with a small contribution from Crew Health and Safety. Website: <http://www.nasa.gov/offices/NHHPC/index.html> POCs: Dr. Jeffrey R. Davis/JSC ([jeffrey.r.davis@nasa.gov](mailto:jeffrey.r.davis@nasa.gov)) serves as NHHPC Director; Carol W. Carroll/ARC ([carol.w.carroll@nasa.gov](mailto:carol.w.carroll@nasa.gov)) serves as the Deputy Director (JSC)

- **KSC Swamp Works and Innovation SPACE** – Establishment of a lean development environment, “KSC Swamp Works,” is underway in the Engineering Development Laboratory (EDL) Annex (M7-409) behind the Space Station Processing Facility (SSPF) for rapid, innovative and cost effective exploration mission solutions. The hands-on approach is start small and build up fast with concept testing performed in early stages. Failures are allowed and are used to drive design improvements. Processes will be right-sized and safety-oriented. This approach is inspired by philosophies used in Kelly Johnson’s Skunk Works and Werner von Braun’s developmental shops. KSC Swamp Works will leverage partnerships across NASA, industry & academia. Innovation SPACE is a unique, reconfigurable environment to foster collaborative innovation by KSC employees. POC – Jack Fox ([jack.j.fox@nasa.gov](mailto:jack.j.fox@nasa.gov)) (KSC)
- **Vibrant Transformation to Advance LaRC (VITAL)** – Langley Research Center developed and has begun to implement a major 20-year revitalization strategy which includes six new, state-of-the-art facilities, renovation of critical infrastructure, and demolition of non-essential assets all of which enable LaRC to respond to the strategic and infrastructure challenges of the Agency while making the Center more efficient to operate under the direction of Erik Weiser (Project Manager). Execution of this 20-year revitalization strategy will result in over \$100M in maintenance and utility (M&U) savings (over the 20-year period), a deferred maintenance (DM) reduction in excess of \$135M, and the elimination of 1.21M sq. ft. of space with an associated CRV of approximately \$1.1B. The M&U savings can then be applied to critical assets that are currently underfunded. In addition to the proposed new construction, the strategy identifies twelve facilities for various degrees of renovation and repurposing. The successful implementation of the center 20-year revitalization plan requires funding from multiple sources; but primarily, the annual construction of facilities (CoF) and recapitalization (Recap) appropriations from Congress will be required to support the timely execution of the plan. LaRC has strategically developed a plan that fits within our reasonable expectations of funds from the CoF and Recap programs. Finally, the 20-year revitalization plan has been institutionalized in the center and agency Master Plan. Erik Weiser ([Erik.s.weiser@nasa.gov](mailto:Erik.s.weiser@nasa.gov)) is the point of contact at Langley for the VITAL project. (LaRC)