Innovation @ NASA

Dr. Juan A. Román
NASA/GSFC
About NASA

The National Aeronautics and Space Administration (NASA) was established in 1958 by President Dwight D. Eisenhower encouraging peaceful applications in space science. It’s the United States government agency that is responsible for the civilian space program as well as for aeronautics and aerospace research.

Since its inception, NASA has accomplished many great scientific and technological feats in air and space. NASA technology also has been adapted for many none-aerospace uses by the private sector.

NASA remains a leading force in scientific research and in stimulating public interest in aerospace exploration, as well as science and technology in general.
The Best Places to Work
IN THE FEDERAL GOVERNMENT 2013

2012

Congratulations to
National Aeronautics and Space Administration
Ranked First: Large Federal Agency

PARTNERSHIP FOR PUBLIC SERVICE
Our Mission

Innovate
Explore
Discover
Inspire

www.nasa.gov
“NASA's missions of the future are going to depend on new technologies that will be evolvable and applicable across a broad range of missions. We are dedicated to extending human presence into the solar system and to the surface of Mars, and new technologies and advanced capabilities are essential to safely taking us from Earth-reliant to Earth-independent missions, and the surest path to an eventual crewed landing on Mars. Sustained investment in these technologies advances the agency's exploration capabilities and supports the innovation economy.” June 3, 2014
NASA’s Culture

- Recognizing and Rewarding Innovative Performance
- Building Model Supervisors and Leaders
- Engaging and Connecting the Workforce

CULTURE OF INNOVATION
Recognizing & Rewarding Innovative Performance

• Lean Forward; Fail Smart Award
  – Dare to Try
  – Perseverance
  – Learning
  – Collaboration

• Champion of Innovation Award
  – Leadership
  – Visionary
  – Relationship Builder
  – Role Model
Recognizing and Rewarding Innovative Performance

Reward and appreciate employees for their innovative performance and contributions to their workplace.

Index Trend Line (% Positive Responses)

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<tbody>
<tr>
<td>Employees are recognized for providing high quality products and services.</td>
<td>61.9</td>
<td>61.9</td>
<td>63.5</td>
<td>65.0</td>
<td>70.8</td>
<td>70.4</td>
<td>71.0</td>
<td>69.8</td>
<td>7.9</td>
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<td>Employees are given a sense of personal empowerment with respect to work processes.</td>
<td>56.3</td>
<td>58.7</td>
<td>58.4</td>
<td>60.4</td>
<td>63.2</td>
<td>62.4</td>
<td>62.1</td>
<td>63.3</td>
<td>7.0</td>
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<td>I feel encouraged to come up with new and better ways of doing things.</td>
<td>72.0</td>
<td>75.2</td>
<td>76.3</td>
<td>75.1</td>
<td>75.4</td>
<td>74.3</td>
<td>76.5</td>
<td>76.8</td>
<td>4.8</td>
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<td>Creativity and innovation are rewarded.</td>
<td>58.6</td>
<td>57.8</td>
<td>60.3</td>
<td>62.0</td>
<td>62.3</td>
<td>61.3</td>
<td>62.9</td>
<td>61.6</td>
<td>3.0</td>
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<td><strong>Trend Line</strong></td>
<td><strong>62.2</strong></td>
<td><strong>63.4</strong></td>
<td><strong>64.6</strong></td>
<td><strong>65.6</strong></td>
<td><strong>67.9</strong></td>
<td><strong>67.1</strong></td>
<td><strong>68.1</strong></td>
<td><strong>67.9</strong></td>
<td><strong>5.7</strong></td>
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Supervisors and Leaders take an active role fostering innovation by:

- Engaging with employees and getting to know their strengths
- Tailoring employees’ projects to their strengths
- Building trust with employees and giving them autonomy
- Providing opportunities for collaboration and cross-pollination
- Advocating for and lifting employees whose projects aren’t successful
Building Model
Supervisors and Leaders

Develop supervisors and leaders who view developing employees as an important and productive use of time

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<tr>
<td>My supervisor/team leader provides me with the opportunities to demonstrate my leadership skills.</td>
<td>70.5</td>
<td>73.7</td>
<td>74.2</td>
<td>74.0</td>
<td>77.5</td>
<td>78.0</td>
<td>79.6</td>
<td>79.8</td>
<td>9.3</td>
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<td>Supervisors/team leaders in my work unit support employee development.</td>
<td>72.0</td>
<td>80.6</td>
<td>80.4</td>
<td>79.5</td>
<td>79.9</td>
<td>80.7</td>
<td>80.8</td>
<td>80.8</td>
<td>8.8</td>
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<td>Overall, how good a job do you feel is being done by your immediate supervisor/team leader?</td>
<td>72.1</td>
<td>75.2</td>
<td>75.2</td>
<td>75.6</td>
<td>78.8</td>
<td>79.0</td>
<td>80.1</td>
<td>81.1</td>
<td>9.0</td>
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<td>Discussions with my supervisor/team leader about my performance are worthwhile.</td>
<td>67.8</td>
<td>68.9</td>
<td>66.3</td>
<td>66.6</td>
<td>71.6</td>
<td>71.6</td>
<td>73.1</td>
<td>73.3</td>
<td>5.5</td>
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| Trend Line | 70.1 | 74.4 | 73.6 | 73.4 | 76.3 | 76.8 | 77.8 | 78.0 | 7.9 |
Engaging & Connecting the Workforce

• Workforce Initiatives
  – Creativity and Innovation Initiatives
  – Science Engineering Collaboration Program (SECP) & Research Engineering Program

• Fairs and Symposia
  – Innovation Forum/Innovation Day/Innovation Expo
  – Internal Research & Development Poster/Networking

• Open Innovation Platforms, Prizes, and Challenges
  – Centennial Challenges
  – Mars Challenge

• Facilities and Creative Spaces
  – Concurrent Engineering Design Teams & Facilities
Dr. Stephanie Getty
GSFC Innovator of the Year!

• Stephanie Getty was in SECP-1 group
• Selected as 2012 Goddard’s Innovator of the Year for her trailblazing work in the area of advanced mass spectrometer instrumentation
• Won $1.2 million from NASA’s Astrobiology Science and Technology Instrument Development to advance the Organics Analyzer for Sampling Icy Surfaces (OASIS) to study the chirality of amino acids on the icy moons of the outer planets, asteroids, and Kuiper Belt Objects
• Serves as mentor to other SECP participants
Don Wegel (SECP-2) featured in NASA Tech Briefs on his Sample Collecting Comet Harpoon work

Popular Science Magazine Publishes Comet Harpoon Story

Comet Nucleus Sample Return II featured on Ripley’s Believe it or Not
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GSFC FY13 IRAD Investments

- 20% Earth Science
- 1% Education
- 2% Human Exploration & Operations
- 2% interdisciplinary Science
- 3% Suborbital Platforms & Range Services
- 7% Communications & Navigation
- 12% Heliophysics
- 19% Planetary & Lunar Science
- 16% Crosscutting Technology & Capabilities
- 18% Astrophysics
Over the course of three hours, this year’s IRAD Poster Session attracted hundreds of visitors, as evidenced by this photo taken from the audio/visual skybox overlooking the Building 8 auditorium.

The theme of this year’s annual IRAD Poster Session — Goddard Technology: Enabling Science Through Innovation — captured in just a few words the principal goal of the center’s Internal Research and Development program. Principal Investigator Semon Kizhner is in the background.

Students from Montgomery County’s Bethesda-Chevy Chase High School talk with Principal Investigator Fred Minetto, who has created a novel way to clean mirrors and lenses in clean rooms using an electron gun whose prototype hardware is displayed on the table.
Engaging & Connecting the Workforce

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  - Creativity and Innovation Initiatives
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  - Mars Challenge

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  - Concurrent Engineering Design Teams & Facilities
Engaging & Connecting the Workforce

- Workforce Initiatives
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  - Mars Challenge

- Facilities and Creative Spaces
  - Concurrent Engineering Design Teams & Facilities
Concurrent Engineering Design Teams

An environment that facilitates multi-disciplinary, concurrent, collaborative, space system engineering design and analysis activities, to enable innovation and rapid development of science instrumentation, mission, and mission architecture concepts.
Facilities

State-of-the-art engineering workstations, software and information technology to ensure engineering excellence.

Mission Design Lab (MDL)

Comfortable, well-equipped workspaces to facilitate dynamic interaction within team

Instrument Design Lab (IDL)
Engaging and Connecting the Workforce

Engage employees in the NASA mission and enable them to cooperate, collaborate, and network with one another.

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<td>Managers promote communication among different work units.</td>
<td>63.6</td>
<td>66.4</td>
<td>67.5</td>
<td>69.4</td>
<td>69.9</td>
<td>69.0</td>
<td>69.4</td>
<td>70.4</td>
<td>6.8</td>
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<tr>
<td>Employees in my work unit share job knowledge with each other.</td>
<td>77.8</td>
<td>79.4</td>
<td>78.5</td>
<td>80.6</td>
<td>78.7</td>
<td>79.3</td>
<td>81.2</td>
<td>81.4</td>
<td>3.6</td>
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<td>The people I work with cooperate to get the job done.*</td>
<td>87.3</td>
<td>91.4</td>
<td>90.3</td>
<td>91.3</td>
<td>85.8</td>
<td>85.0</td>
<td>85.6</td>
<td>85.3</td>
<td>-2.0</td>
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<td>80.4</td>
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<td>77.8</td>
<td>78.7</td>
<td>79.1</td>
<td>2.8</td>
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<td>Managers support collaboration across work objectives.**</td>
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<td>--</td>
<td>74.4</td>
<td>74.1</td>
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<td>77.2</td>
<td>76.9</td>
<td>77.8</td>
<td>78.3</td>
<td>1.1</td>
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</table>

* Wording change in 2013; previous surveys were worded "The people I work with cooperate to do my job well."
** Question first introduced in 2010 EVS.
Styles of Innovation

• Innovation through Discovery and Invention
• Innovation in Assigned Work
• Program Innovation
“Developing the capabilities to land humans on Mars will require considerable resources and technological innovation in many disciplines to accommodate the environments to be encountered in space and during surface operations.”
Curiosity: Seven Minutes of Terror
JWST Technology Milestones

- Mirror Phasing Algorithms
- Beryllium Primary Mirror Segment
- Sunshield Membrane
- Cryocooler
- Cryogenic ASICs
- ISIM
- Near-Infrared Detector
- μShutters
- Mid-Infrared Detector
Space Technology Innovation

Game Changing Development

Technology Demonstration Missions

Small Spacecraft Technology

Space Technology Research Grants

NASA Innovative Advanced Concepts (NIAC)

Center Innovation Fund

Centennial Challenges

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

Flight Opportunities