



NASA Glenn Research Center Strategic Action Plan

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Message From the Center Director



NASA stands at a great inflection point in its history as we prepare for a measured, sustainable return to the Moon. There we will gain experience essential for our journeys to farther destinations while continuing our cutting-edge work in aviation that will usher in an aviation renaissance and help America lead a global economy.

The NASA Strategic Plan embraces this bold direction for the Agency's activities in space while reaffirming our commitment to the advancement of science and aeronautics. It promotes accountability and transparency, and it highlights the technological and scientific benefits NASA brings to the American people and humankind.

Emphasized within NASA's Strategic Plan are four main themes: **Discover, Explore, Develop, and Enable**. We at NASA Glenn Research Center will support these themes through our own set of diverse goals and objectives, which highlight how the research leadership, technology development, and critical mission-support work that is being done here will drive the future of NASA and help accomplish its goals.

The NASA Glenn Strategic Action Plan outlines how our Center will support and further NASA's mission. It is the foundation on which we establish our direction, guide our activities, align our priorities and resources, and measure our success. It also makes clear our unified vision for the future while emphasizing the important role our staff and partners will play moving forward.

This document focuses on how NASA Glenn is helping to **Discover** new science essential for our journeys to farther destinations in space, **Explore** the Moon and beyond, and **Develop** revolutionary technologies for aeronautics while **Enabling** future aerospace opportunities and capabilities for Northeast Ohio and our Nation.

To be successful, we must focus not only on what we are doing today, but on the challenges and opportunities that lie ahead. This document will be revisited every 3 years to confirm our direction, goals, and objectives are aligned with those of our Nation, the Agency, and our many partners; and our core values—Glenn's 7 Expected Behaviors—will guide our individual and organizational conduct in the successful accomplishment of these goals.

I am proud of the work that is being done here at NASA Glenn, and this Strategic Action Plan sets us on a path to ensure our Center continues to play a leading role in NASA's future exploration, technology, science, and aeronautics missions.

A handwritten signature in black ink that reads "Janet Kavandi". The signature is fluid and cursive, with a large initial "J".

Janet L. Kavandi, Ph.D.
Center Director

NASA Strategic Direction, Vision, Mission, and Goals

NASA Strategic Direction

NASA's vision, mission, and goals serve to define the Agency's strategic direction.

NASA Vision

To discover and expand knowledge for the benefit of humanity.

NASA Mission

Lead an innovative and sustainable program of exploration with commercial and international partners to enable human expansion across the solar system and bring new knowledge and opportunities back to Earth. Support growth of the Nation's economy in space and aeronautics, increase understanding of the universe and our place in it, work with industry to improve America's aerospace technologies, and advance American leadership.

NASA Strategic Goals

NASA's historic and enduring purpose is aligned to four major themes, each characterized by a single word, that are reflected throughout the Agency's activities.

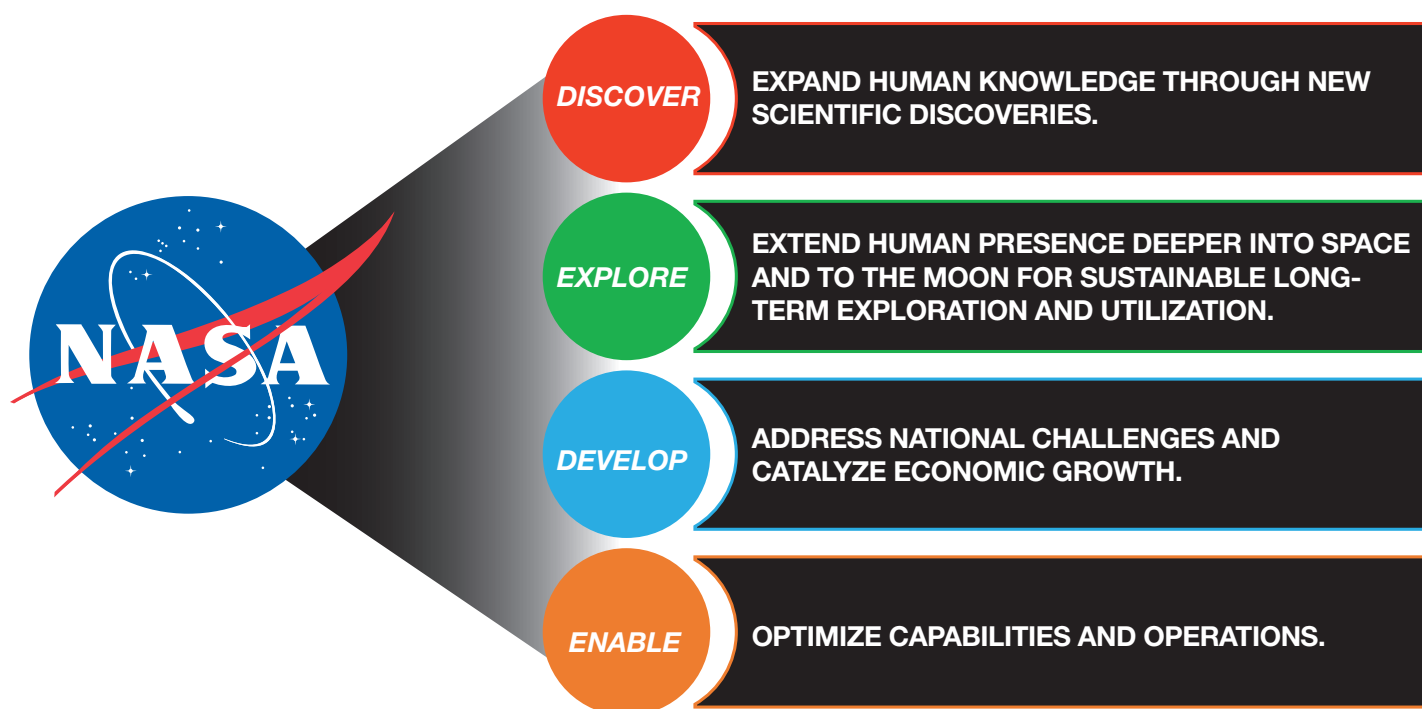
Discover—NASA's enduring purpose of scientific discovery

Explore—NASA's push to expand the boundaries of human presence in space

Develop—NASA's broad mandate to promote the technologies of tomorrow

Enable—The capabilities, workforce, and facilities that allow NASA to achieve its Mission

These four themes and their corresponding strategic goals are outlined in the Agency's 2018 Strategic Plan:



NASA Glenn Strategic Direction, Mission, and Goals

NASA Glenn Strategic Direction

NASA Glenn's mission, goals, and objectives align with the NASA Strategic Plan and outline the Center's strategic direction to provide mission-enabling capabilities for the Agency.

NASA Glenn Mission

We drive research, technology, and systems to advance aviation, expand human presence across the solar system, enable exploration of the universe, and improve life on Earth.

NASA Glenn Strategic Goals

NASA Glenn's unique roles and competencies allow the Center to directly support the implementation of the goals outlined in the NASA Strategic Plan:

Goal 1: Expand Human Knowledge Through New Scientific Discoveries

NASA Glenn provides cutting-edge, in-space propulsion and power systems for exploration and science missions while serving as a global leader in microgravity and fluid physics research and in advancing materials and electronics for extreme planetary environments.



Goal 2: Extend Human Presence Deeper Into Space and to the Moon for Sustainable Long-Term Exploration and Utilization

NASA Glenn plays a critical role in the development and testing of new deep space human exploration systems, including the European Service Module (ESM) for the Orion spacecraft, the Universal Stage Adapter (USA) for the Space Launch System (SLS) rocket, and the power and propulsion element (PPE) for the Gateway.

As NASA's lead for electric propulsion (EP) and power, NASA Glenn leads the development of EP from early-phase research through flight systems development and technology transfer to enable commercialization, and is responsible for power system development for spacecraft, the International Space Station (ISS), and planetary surface operations.

NASA Glenn leads in-situ resource utilization (ISRU) for the Agency to enable future prospecting and use of natural resources found in space. The Center also develops and validates cryogenic fluid management technologies and applies its physical science expertise to the development of astronaut exercise equipment, compact diagnostic tools, and digital simulations of in-space physiological responses.

NASA Glenn Strategic Direction, Mission, and Goals

Goal 3: Address National Challenges and Catalyze Economic Growth

NASA Glenn collaborates with industry and academia to develop advanced technologies related to air-breathing and electric propulsion (aeronautics and space), cryogenic fluids management, power and energy, communications technologies, physical sciences and biomedical technologies, and materials and structures.

NASA Glenn applies its aeronautics expertise in addressing the challenges of aircraft noise, efficiency, emissions, and flight safety. It ensures U.S. leadership in the advancement of electrified aircraft propulsion for next-generation single-aisle transport, enhances safety by improving aircraft communications technologies, advances intelligent propulsion and power systems, and helps predict and prevent engine and airframe icing.

NASA Glenn catalyzes economic development by engaging with and transferring technology to the private sector and employing public-private partnership wherever possible for optimal use of resources. It also supports science, technology, engineering, and mathematics (STEM) engagement by partnering with academia to accelerate the development of aerospace technologies.



Goal 4: Optimize Capabilities and Operations

NASA Glenn's test facilities provide unparalleled capabilities to assess in-space systems, conduct evaluations of aircraft and spacecraft components in simulated environments, and simulate flight envelopes ranging from subsonic through hypersonic. The Center develops and maintains administrative, technical, and leadership skills to deliver high-quality products in a timely and efficient manner.



NASA Glenn Strategic Action Plan Framework

Goal 1: Expand Human Knowledge Through New Scientific Discoveries

1.1

Demonstrate and fly advanced solar electric propulsion (EP) systems, such as the NEXT-C gridded-ion EP system, on the DART and future New Frontiers and Discovery missions.

1.2

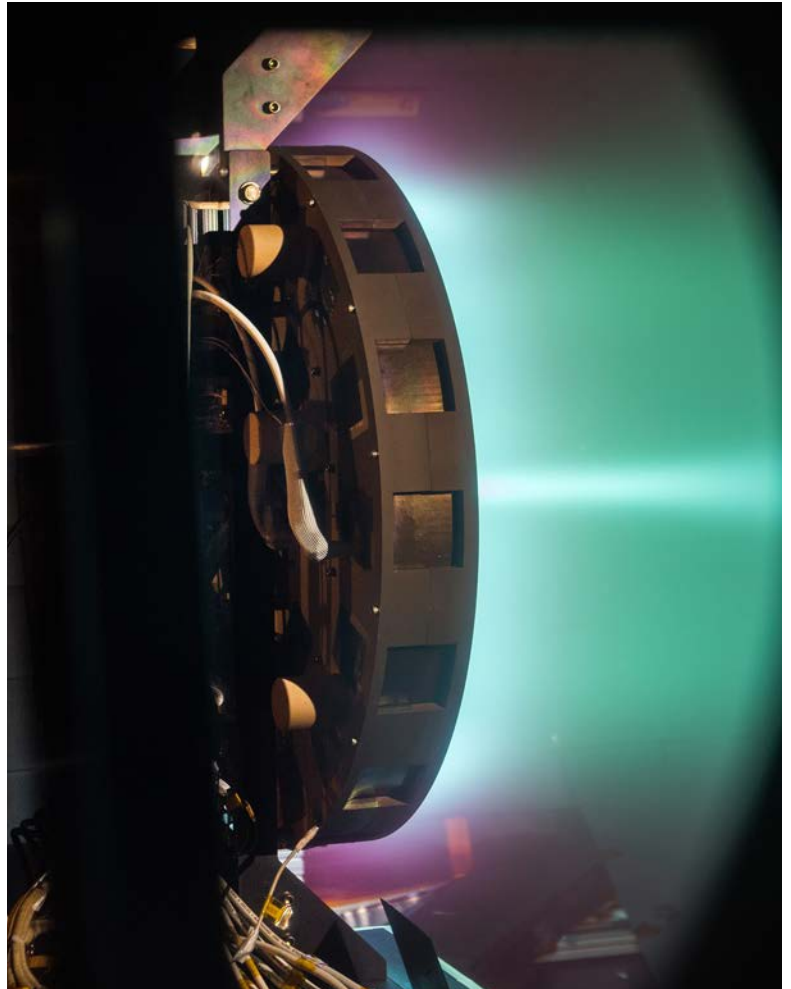
Develop and conduct world-class fluids and combustion research in microgravity by developing the ACME, SoFIE, ZBOT, FBCE, Saffire, and Microgravity Science Glovebox payloads, pioneering U.S. scientific research and enabling human exploration.

1.3

Develop next-generation, flight-qualified radioisotope power systems, including dynamic power conversion, and fission power systems for planetary surface and spacecraft applications.

1.4

Demonstrate Venus environment conditions on Earth for testing at NASA Glenn's unique facilities, and develop payloads and instruments for Venus exploration.



NASA Glenn Strategic Action Plan Framework

Goal 2: Extend Human Presence Into Space and to the Moon for Sustainable Long-Term Exploration and Utilization

2.1

Deliver the European Service Module to the Orion Program.

2.2

Conduct environmental qualification testing of the Orion Exploration Mission-1 (EM-1) Spacecraft at Plum Brook Station's Space Environments Complex.

2.3

Manage the development and public-private partnership flight demonstration of the power and propulsion element (PPE) for Gateway, NASA's orbiting lunar outpost.

2.4

Deliver the advanced electric propulsion (EP) Hall thruster systems for the PPE and higher power EP systems for future missions.

2.5

Develop and deliver Universal Stage Adapter (USA) and payload fairing flight hardware to the Space Launch System (SLS) Program.

2.6

Develop nuclear surface-power generation, storage, and distribution systems to enable lunar surface operations.



2.7

Advance communications network architectures and cognitive communication systems for enabling secure and reconfigurable space communication systems with capability for high-data-rate transmission.

2.8

Utilize Glenn expertise in propulsion, power, communications, and cryogenic fluid management to advance lunar lander technologies for NASA and commercial use.

2.9

Design and implement NASA's plan for lunar regolith in-situ resource utilization (ISRU).

2.10

Develop technologies for cryogenic fluids management for liquid oxygen/methane, liquid oxygen/hydrogen, and nuclear thermal propulsion hydrogen fuel systems.

2.11

Develop and deliver innovative astronaut exercise equipment, such as the Advanced Twin Lifting and Aerobic System (ATLAS), for ISS demonstration as a precursor for use in deep space systems.

NASA Glenn Strategic Action Plan Framework

Goal 3: Address National Challenges and Catalyze Economic Growth

3.1

Improve and develop energy storage systems with 3 to 5 times higher specific energy and specific power for electrified aircraft and space power systems.

3.2

Advance materials, components, and manufacturing technologies to increase the power density of electrical machines by a factor of 3 to 5 to enable 100-plus passenger aircraft with electrified propulsion.

3.3

Develop options for public-private partnerships for next-generation space communications, such as optical relays.

3.4

Enable commercial development of new space transportation and human spaceflight vehicles by providing unique environmental testing capabilities.

3.5

Develop and demonstrate a megawatt-scale integrated power-propulsion system for next-generation electrified aircraft.

3.6

Develop integrated power, propulsion, and thermal management analytical tools with an increasing degree of fidelity to enable design and analysis of a wide range of electrified aircraft, including urban air mobility (UAM), thin-haul, and large transport aircraft.

3.7

Design and develop advanced air-breathing propulsion system technologies to dramatically increase gas turbine engine efficiencies and enable high-speed systems (e.g., supersonic and hypersonic).

3.8

Advance technologies to remove environmental barriers for wide-scale introduction of UAM vehicles.



3.9

Continue to grow the number of patents and licensing technologies to industry while collaborating with industry to jointly develop advanced technologies and accelerate transition for commercial applications.

3.10

Collaborate with external partners and stakeholders to inspire the next generation and drive awareness of Glenn's role in the local community and across the Nation.

NASA Glenn Strategic Action Plan Framework

Goal 4: Optimize Capabilities and Operations

4.1

Improve and maintain institutional and testing capabilities to ensure facility alignment with NASA missions while shrinking the physical footprint and reducing costs of maintenance and operations.

4.2

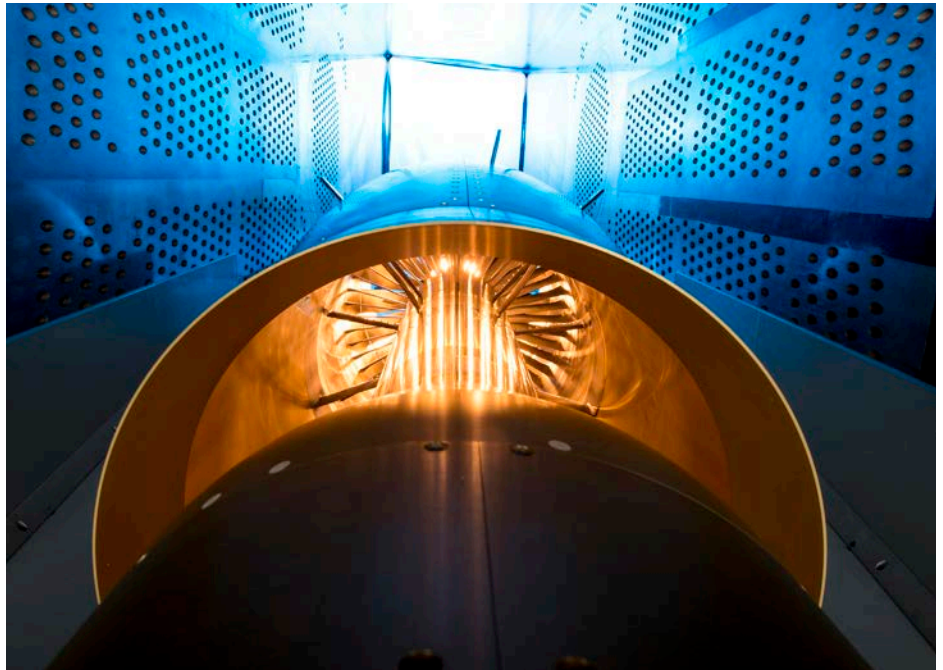
Utilize information technology and computational tools (e.g., big data, machine learning, and artificial intelligence) to enhance productivity and create new knowledge.

4.3

Cultivate and grow a cadre of technical and administrative leaders who can manage interdisciplinary projects and have the skills to lead complex projects and programs, involving multiple centers and/or organizations to enable successful missions.

4.4

Provide timely, high-quality, customer-focused institutional services that support Center-wide projects and programs and contribute to mission success.



4.5

Attract, retain, and maintain a highly skilled, diverse workforce through a robust recruitment program and an emphasis on performance management, coaching and mentoring, and flexible work-life programs, while developing a workforce of the future by exposing students to exciting STEM engagement and innovative activities.

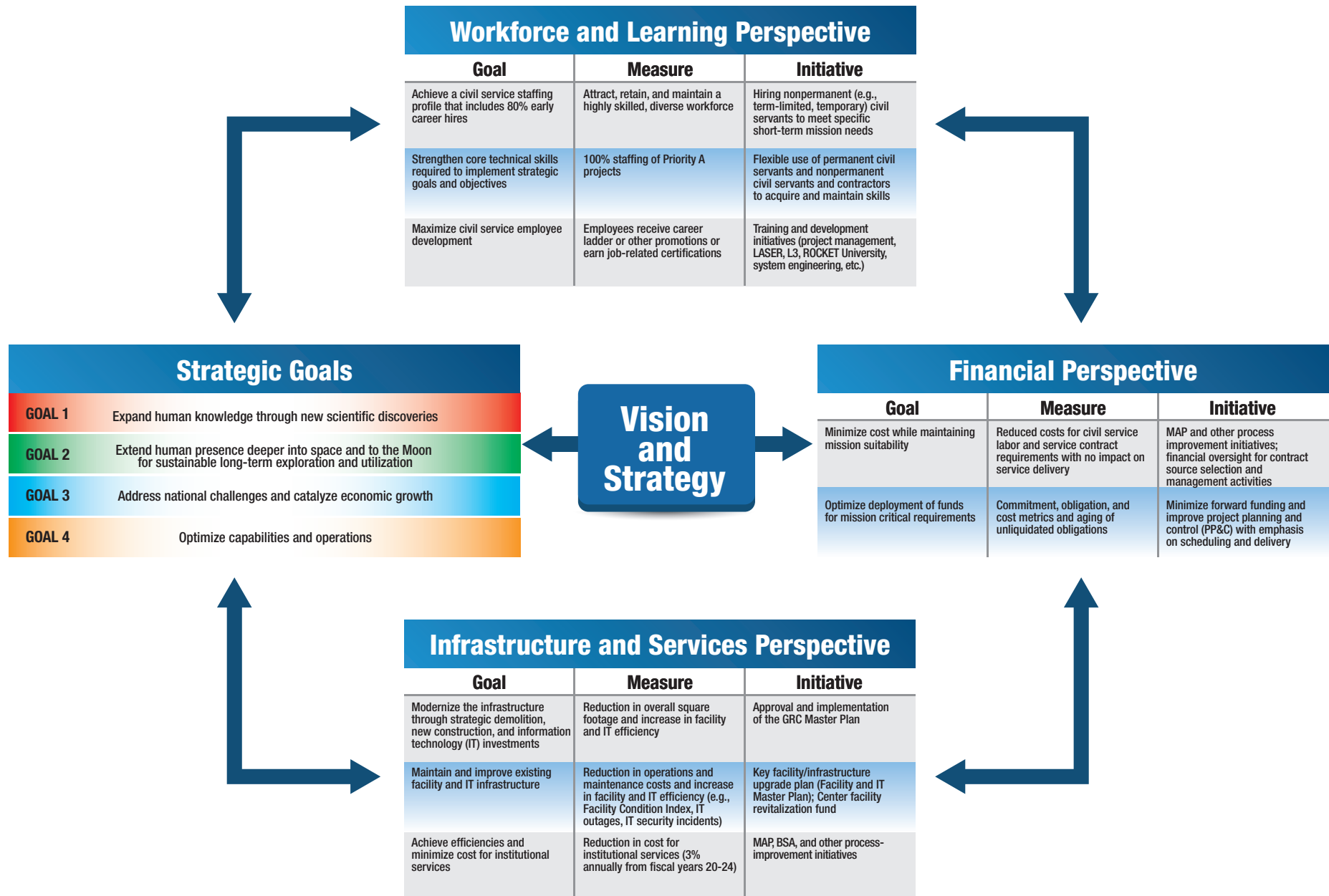
4.6

Provide excellence in engineering and safety and mission assurance technical authority to deliver independent risk and reliability assessments for safe and successful missions.

4.7

Ensure a strong Glenn safety culture through an engaged workforce and effective safety and health programs.

NASA Glenn Balanced Scorecard



NASA Glenn Roles

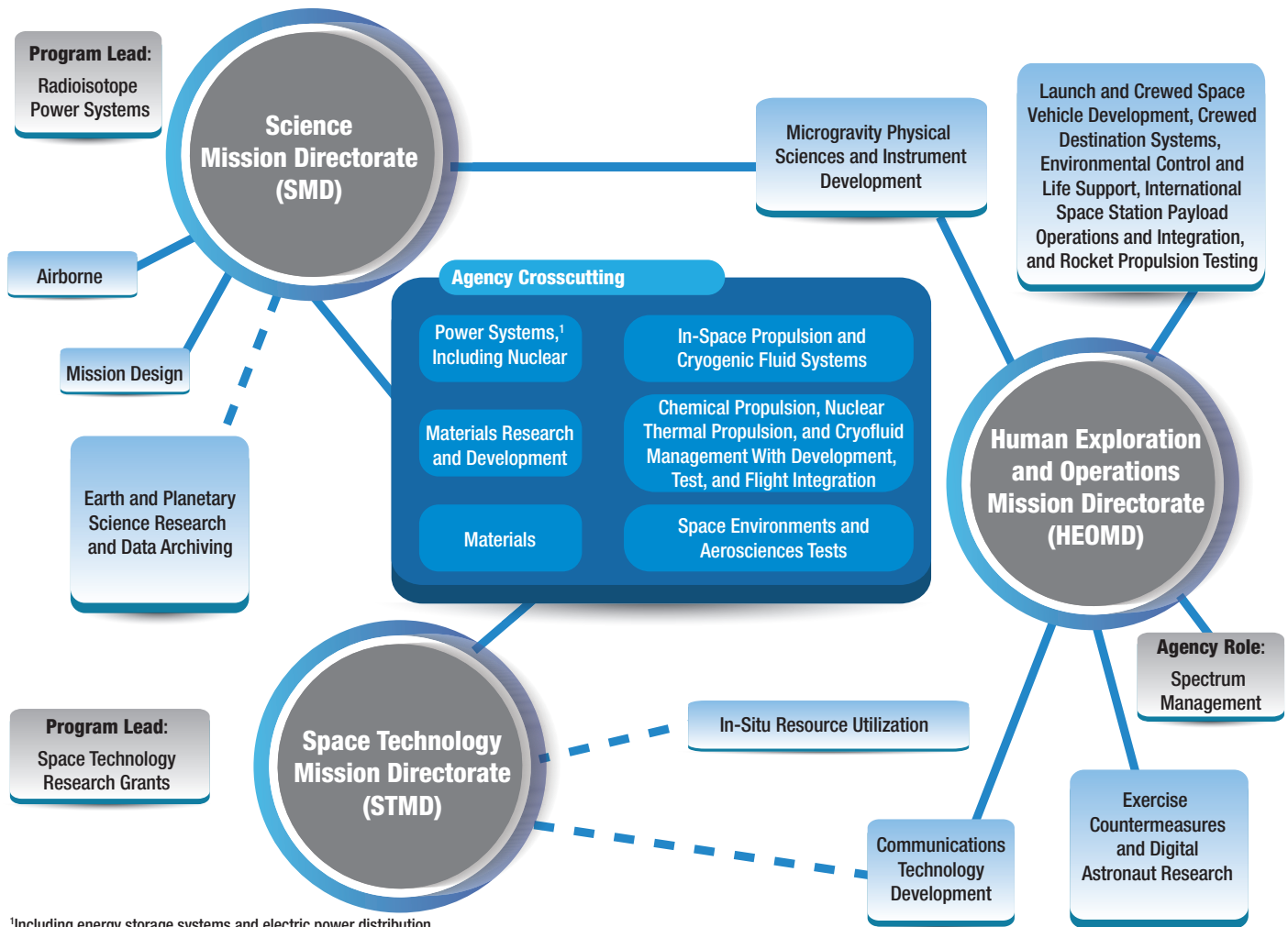
AERONAUTICS

THRUST AREA 1 Safe, Efficient Growth in Global Operations	THRUST AREA 2 Innovation in Commercial Supersonic Aircraft	THRUST AREA 3 Ultra-Efficient Commercial Vehicles	THRUST AREA 4 Transition to Alternative Propulsion and Energy	THRUST AREA 5 Real-Time System-Wide Safety Assurance	THRUST AREA 6 Assured Autonomy for Aviation Transformation
Advanced Operational Concepts, Technology, and Automation	Elimination of Environmental Barriers to Commercial Supersonic Aircraft	Propulsion, including Vertical Lift Propulsion	Alternative Power, Propulsion, and Vehicle Architectures	Communications for UAV Command and Control, Modeling, Simulation, and Testing	Autonomous Systems Technology, Methods for Design, Assurance, and Verification and Validation
Airspace Operations Performance Enablers		Vehicle Systems Integration, including Hypersonic Propulsion	Emission Characterization and Environmental Impact	Continuous System-Wide Safety Awareness	
Integrated Modeling, Simulation, and Testing		Safety, Comfort, and Accessibility of Vertical Lift Aircraft	Electrified Propulsion Components and Technology		
	Propulsion System Modeling, Simulation, and Testing				
	Air Vehicle System and Component Modeling, Simulation, and Testing				



NASA Glenn Roles

SPACE



NASA Glenn 7 Expected Behaviors

Helping All To Succeed

Embracing diversity and innovation and being inclusive of others in the execution of our goals and objectives. Identifying opportunities and assisting others to succeed.

Excellence

Being the best technically; producing results that exceed objectives and deliverables and continually learning and improving personally and professionally.

Respect

Demonstrating esteem, admiration, and appreciation toward others and ourselves. Suggestions are respectfully acknowledged and considered for incorporation.

Openness

Providing access to knowledge and information about our mission, organizations, facilities, workforce, and programs and projects.

Integrity

Knowing the right thing to do and committing to do the right thing.

Cooperation

Seeking first to understand; proactively partnering and supporting our peers for the benefit of the Agency and the Center.

Safety

Demonstrating a vigilant commitment to a safe work environment through good situational awareness and communication.



Appendix

Acronym Guide

ACME	Advanced Combustion via Microgravity Experiments
ATLAS	Advanced Twin Lifting and Aerobic System
BSA	Business Services Assessment
CFM	cryogenic fluid management
DART	Double Asteroid Redirection Test
EM	Exploration Mission series (EM-1, EM-2, etc.)
EP	electric propulsion
ESM	European Service Module
FBCE	Flow Boiling and Condensation Experiment
HEOMD	Human Exploration and Operations Mission Directorate
ISRU	in-situ resource utilization
ISS	International Space Station
IT	information technology
LASER	Leveraging Agency Supervisory Excellence and Resilience
MAP	Mission Support Future Architecture Program
NEXT-C	NASA's Evolutionary Xenon Thruster-Commercial
NTP	nuclear thermal propulsion
PPE	power and propulsion element
RPS	radioisotope power system
Saffire	Spacecraft Fire Experiment
SLS	Space Launch System
SMD	Science Mission Directorate
SoFIE	solid fuel ignition and extinction
STEM	science, technology, engineering, and mathematics
STMD	Space Technology Mission Directorate
UAM	urban air mobility
USA	Universal Stage Adapter
ZBOT	zero boil-off tank



National Aeronautics and Space Administration

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