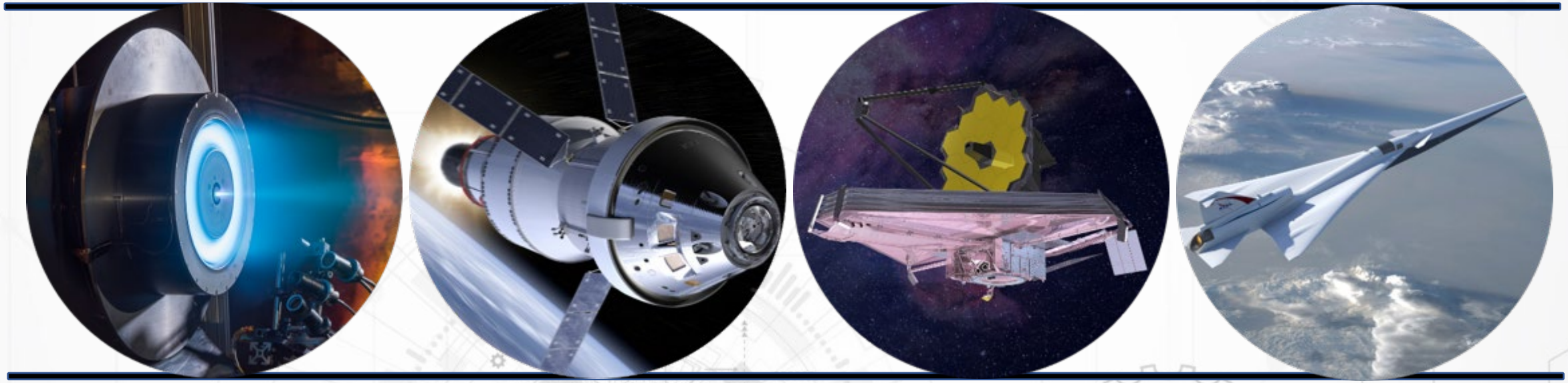
Office of the Chief Technologist

National Aeronautics and Space Administration



Dr. Douglas Terrier

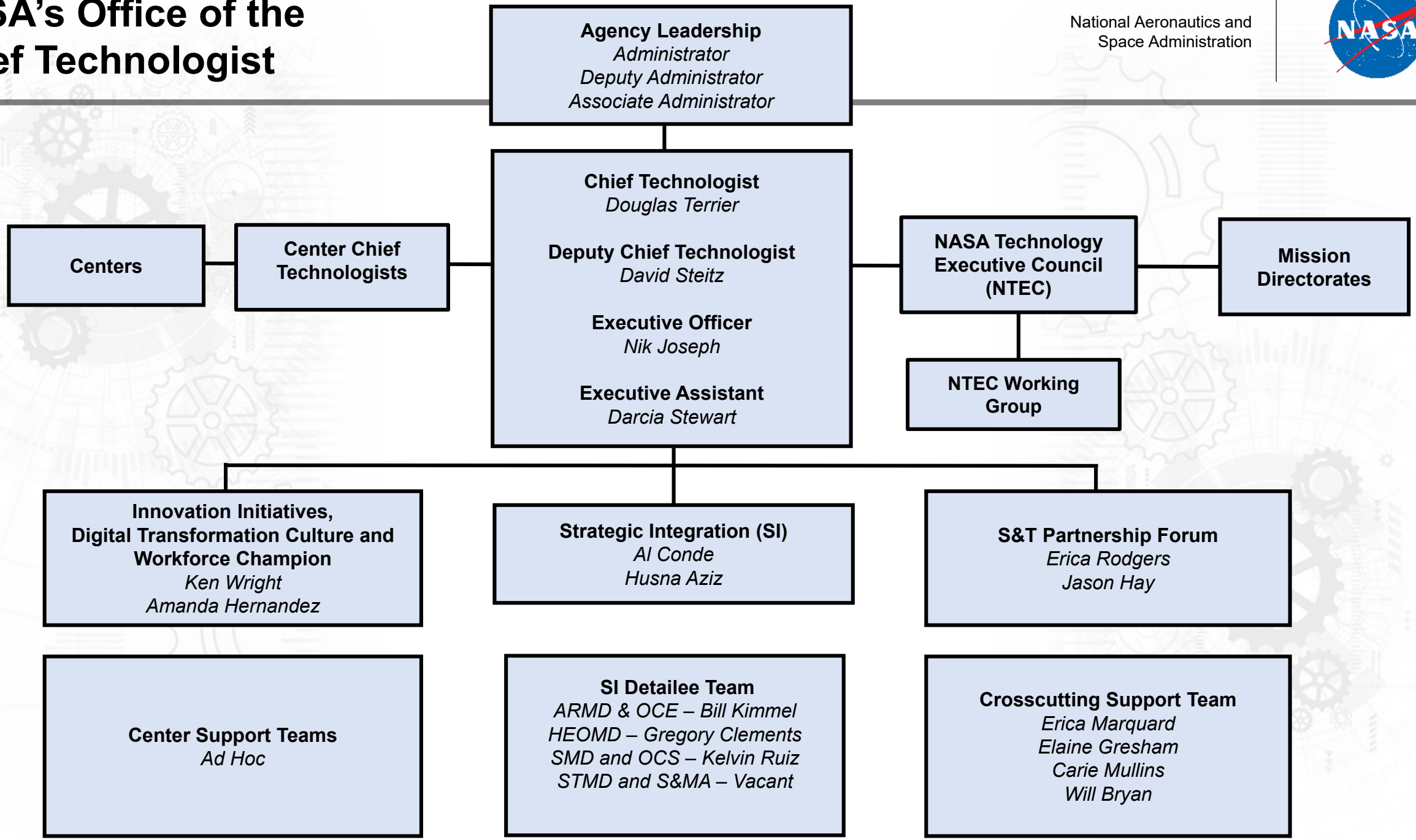
NASA Advisory Council:

Technology, Innovation and Engineering Committee

January 27, 2021

NASA's Office of the Chief Technologist

National Aeronautics and Space Administration



Strategic Technology Integration Framework (STIF)

National Aeronautics and Space Administration

Goal: ***To Provide NASA insight in Integrated approach for Agency Technology Investments***

"Why"
Mission Directorate
Strategic Goals

"What"
Mission Directorate
Technical Challenges
(Quantified)

"When"
Mission Directorate
***Strategies* for Development**

"How"
Mission Directorate Technology Investments

NASA Technology: From Biotech to Space

National Aeronautics and Space Administration

Avionics

Robotics

Deployable Sensors

Energy Storage

Human Performance

Advanced Materials

Thermal Management

Computational Fluid Dynamics

Communications

Simulation and Testing

Quantum Sensors

High Performance Computing

PNT

Aeronautics

Autonomous Systems

Innovation Framework and Activities

National Aeronautics and Space Administration

Innovation at NASA: transforming *diverse* ideas into value

What We've Done (2019-2020)

Developed Innovation Framework

Grassroots Listening and Engagement

- NASA Leadership Retreat
- Innovation workshops with all Centers, Mission Directorates, and HQ Organizations
- Digital Transformation Culture & Workforce initiative

Where We're Going (2021+)

Ongoing Activities

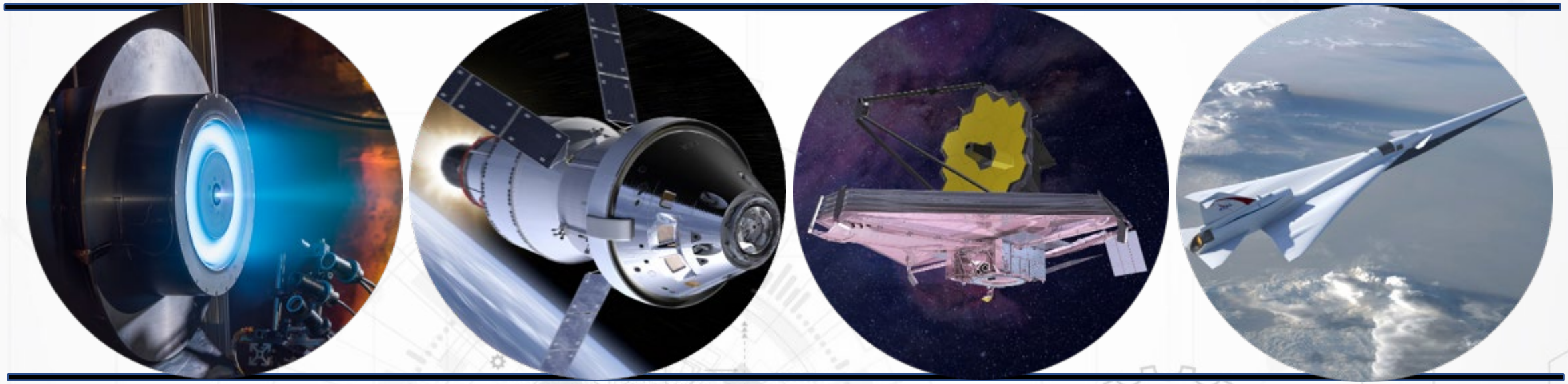
- Continued grassroots engagement
- Community building on shared platforms
- Idea2Value sessions (widespread engagement)
- Innovation experiments (culture shifts)
- Digital Transformation Culture & Workforce
- Identify and train Innovation Champions
- Promote Agency-wide collaboration tools

Implementation of Prioritized Agency-Wide Innovation Workshop Findings

- Prioritize implementations with Agency-wide reach
- Actions are broken down into the four key areas (right) of People, Partnerships, Practices/Processes, and Portfolio

S&T Partnership Forum

National Aeronautics and Space Administration



2020-21 Overview

Dr. Erica Rodgers

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Science & Technology Partnership Forum

National Aeronautics and Space Administration

S&T Topic Areas

Prior

- Small Satellite Technology
- Big Data Analytics
- In-Space Assembly
- Cyber Resilient Space Systems
- Cis-lunar Capabilities
- Radiation-Hardened, High-Performance Electronics for Space Assets

Ongoing

- Space Trusted Autonomy
- Cyber Space Mission Assurance eXperiment
- Resilient Cis-lunar Architectures through On-Demand Spacecraft

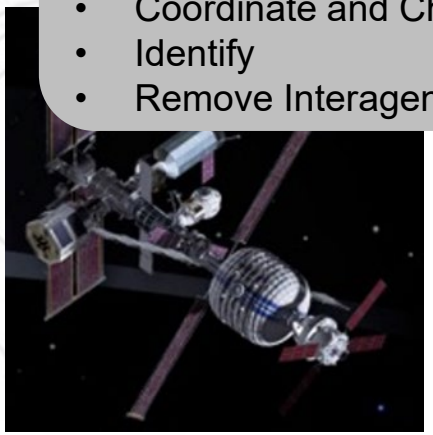
Vision: Technology solutions to joint problems. Multi-agency collaboration on cross-cutting S&T solutions to benefit the Nation.

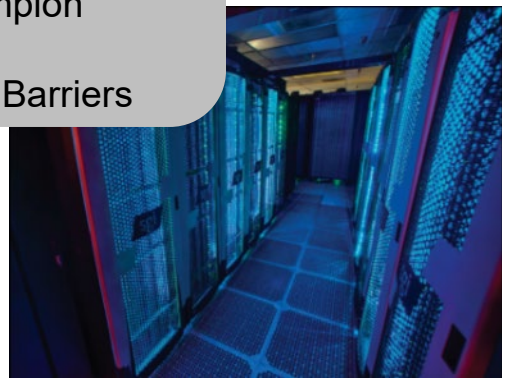
S&T Partnership Goals

- Enable interagency collaboration
- Leverage synergies
- Influence agency portfolios

S&T Partnership Objectives:

- Leverage
- Encourage
- Connect
- Coordinate and Champion
- Identify
- Remove Interagency Barriers





Established in 2015

Strategic forum established to identify synergistic efforts and technologies.

Focus on key pervasive and game-changing technologies across government space

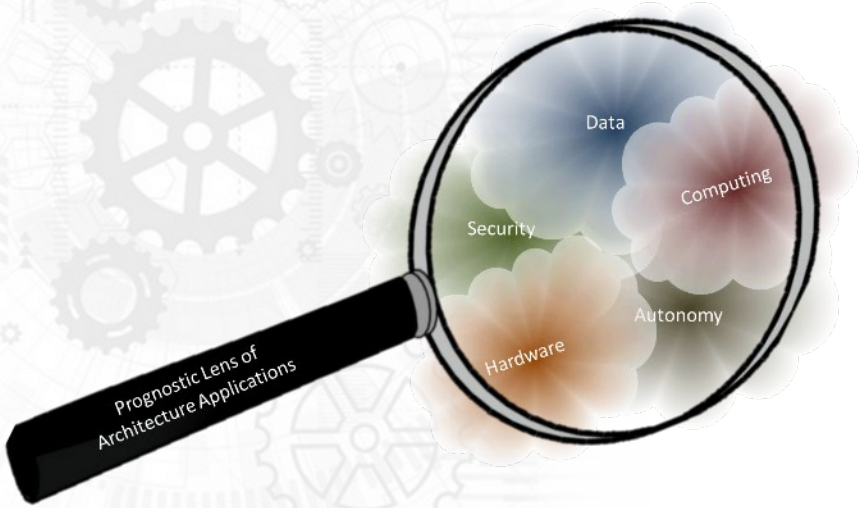
Customers

- NASA Mission Directorates
- NASA Centers
- Technology Transition and Mission Support Offices
- Service Laboratories
- Research and Engineering Centers
- Other Technology Centers of Excellence

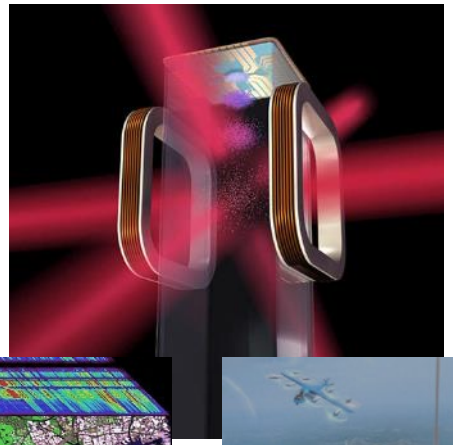
https://www.nasa.gov/offices/oct/science-and-technology-partnership-forum.html

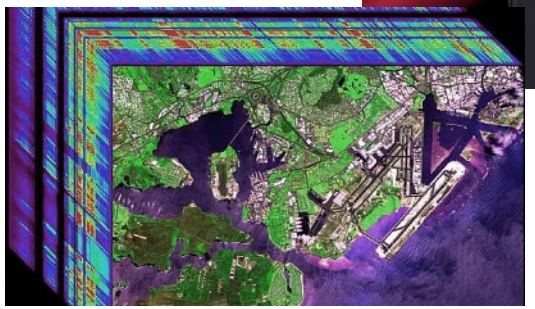
Strategic Thrusts

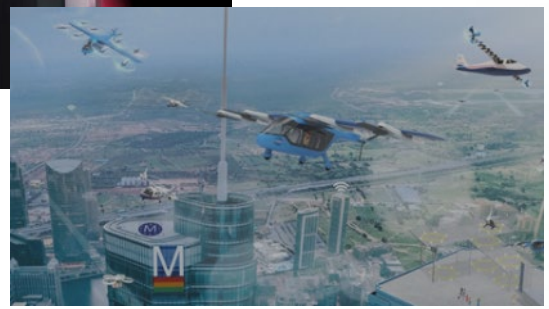
National Aeronautics and Space Administration



Data-driven, Coordinated Investments

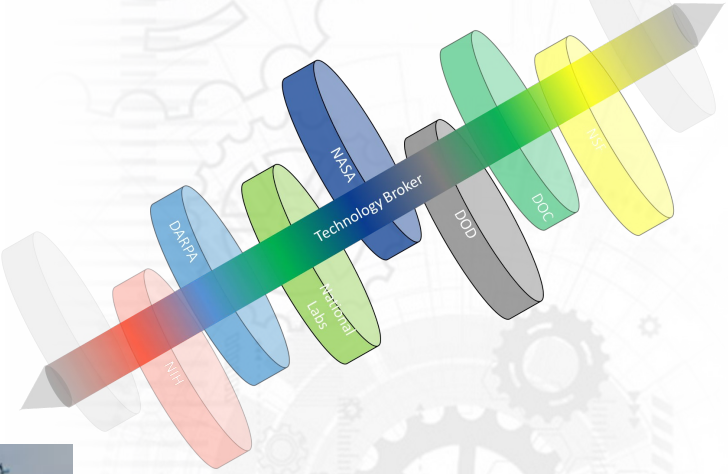






Curated Forums for Exchange of Ideas

Technology Broker



Space Trusted Autonomy

National Aeronautics and Space Administration

Efficient monitoring and control

Human machine teaming

Anomaly prediction and detection

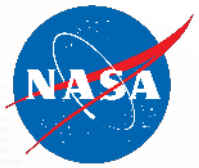
- Futures-based analysis effort
  - Conducted cross-agency workshop to explore initial vision for 2035
  - Focused on the barriers and opportunities for space trusted autonomy
  - Tapped innovation ecosystem to ensure a holistic analysis
  - Goal: Provide actionable recommendations targeting preferred future
- Codified five “Future States”
  - Each representing an aspect of the STA vision
  - Partner agencies provided example use cases that inform and enhance the future states, including:
    - Resource mapping
    - Anomaly detection and spacecraft management
    - On orbit manufacturing, et. al.
- Prioritized 11 aggregated gaps
- Resulted in recommendations approved by customer agencies

Information infrastructure for autonomy

Venus mission as an autonomy stressor

Key Accomplishments

National Aeronautics and Space Administration



- **2020 Products**
  - Conclusion of Space Trusted Autonomy Study/Prepublication drafts for AIAA ASCEND
  - Establishment of the Cyber Space Mission Assurance eXperiment
  - Rapid topic assessment papers
  - Final paper of In-Space Assembly presented at SciTech

- **Prior Successes**
  - Facilitated government-industry in-space assembly TIM leading to NASA's On-Orbit Servicing, Assembly and Manufacturing initiative
  - Cross-agency validation of Strategic Space Technology Investment Plan
  - Published six inter-agency papers
  - Informed OSTP Harnessing Small Satellite Revolution Initiative
  - Catalyzed the creation of the Space Information Sharing and Analysis Center

Thank You!

National Aeronautics and Space Administration


Credit: NRL

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Next Steps

- Focused investigations on topics that inform National and Agency priorities
- Identify opportunities for cross-agency technology development
- Expand impact through inter- and intra-Agency alignment
- Feedback and refinement: Seeking regular feedback to ensure benefit to NASA