Coordinating Innovative Technology Development at NASA

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Office of Technology, Policy, and Strategy

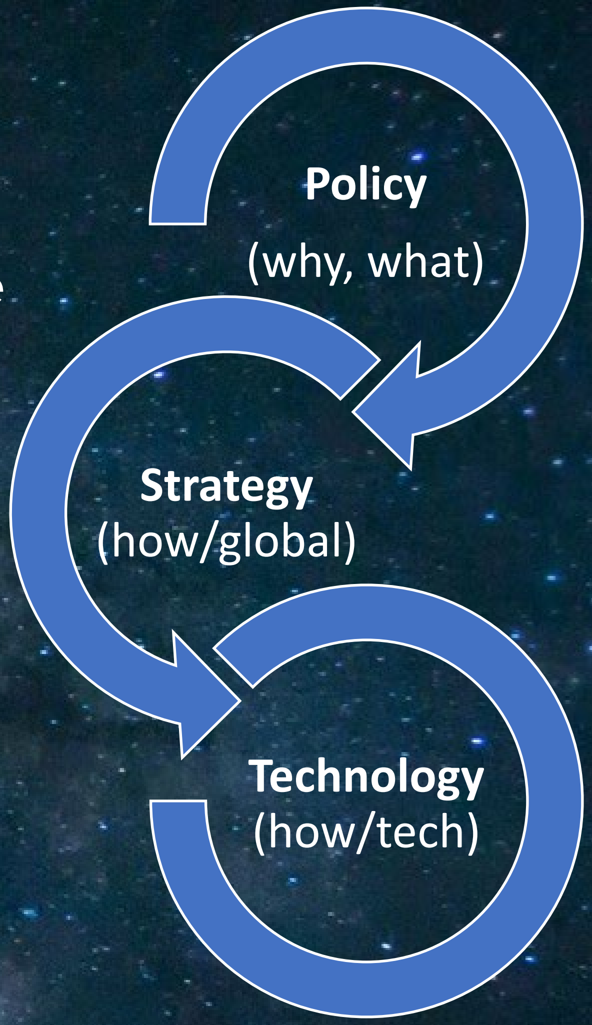
Office of Technology, Policy and Strategy (OTPS)

Overarching Goal – Help Support the *Why*, *What*, and *How* of NASA

Working in collaboration across NASA and the broader space community…

…Provide NASA leadership with data- and evidence-driven advice to develop and shape

- policy (what NASA should do and why),
- strategy (how should NASA do what it does), and
- technology (how to best develop/leverage the right technology)



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Office of Technology, Policy, and Strategy (OTPS) Stakeholders

NASA Centers

NASA Mission Directorate

Other Offices

Other Liaisons

Office of the Administrator

Administrator, Deputy Administrator, Associate Administrator

Office of Technology, Policy, and Strategy
Associate Administrator,
Deputy Administrator,
Agency Chief Technologist,
Center Chief Technologists,
OTPS Team

External Stakeholders (e.g., White House Councils, Interagency Working Groups, Other Government Agencies)

Every activity has technology, innovation, policy, and strategy components

Smart innovation at NASA

- NASA missions span decades
  - ISS: Presidential policy (1984), first modules launched (1998), crewed ops began (2000)
  - JWST: Next Generation Space Telescope Workshop (1989), formal recommendation for next-gen infrared telescope (1996), construction began (2004), launched (2021)
- Innovation has a unique role in NASA missions
  - New technologies are critical to enable inspiring missions in science, exploration, and aeronautics
  - However, innovation cycles in industry can be months to years
  - Smart innovation is necessary to leverage emerging technologies or disruptive breakthroughs
- Smart innovation is a key element of sustainability at NASA
  - Programs proactively plan technological on-ramps to remain resilient to unanticipated challenges
  - Improves coordination throughout the full program lifecycle

ISS, (Oct 4, 2018)
Credit: NASA

JWST Deep Infrared Image
Credit: NASA, ESA, CSA, STScI

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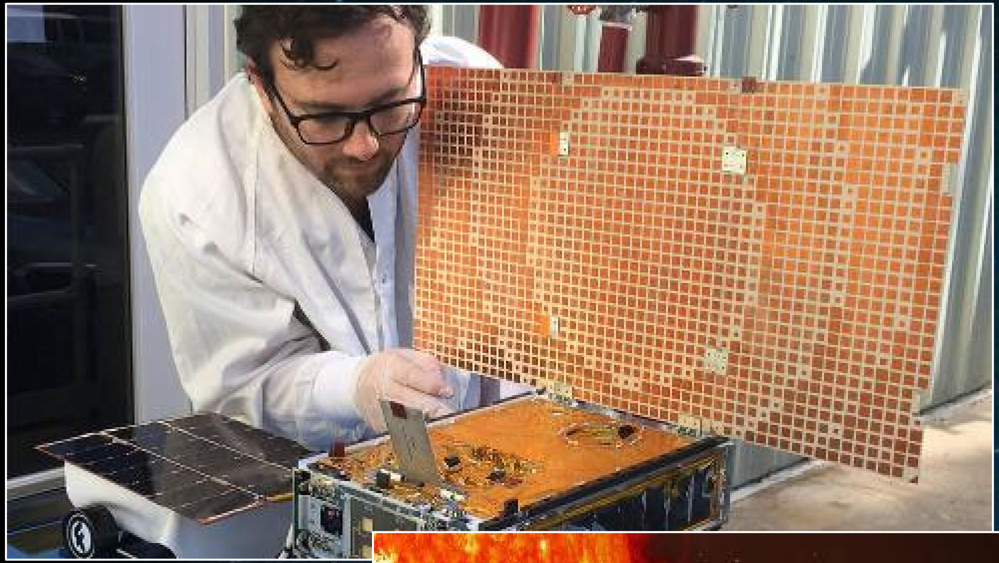
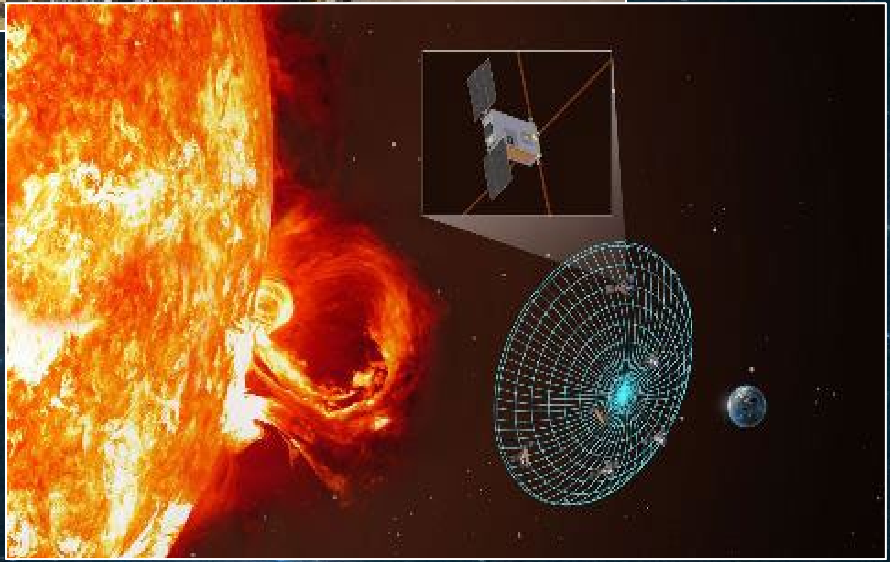
Hitching a ride to Mars

- 2018: Mars Cube One
  - Technology demonstration of interplanetary CubeSats
  - Rapid process
- Pathfinder for other interplanetary CubeSats
  - Sun Radio Interferometer Space Experiment (SunRISE) – Expected launch 2024-2025



Mars Cube One (MarCO) spacecraft
Credit: NASA



SunRISE Artist Concept
Credit: NASA JPL

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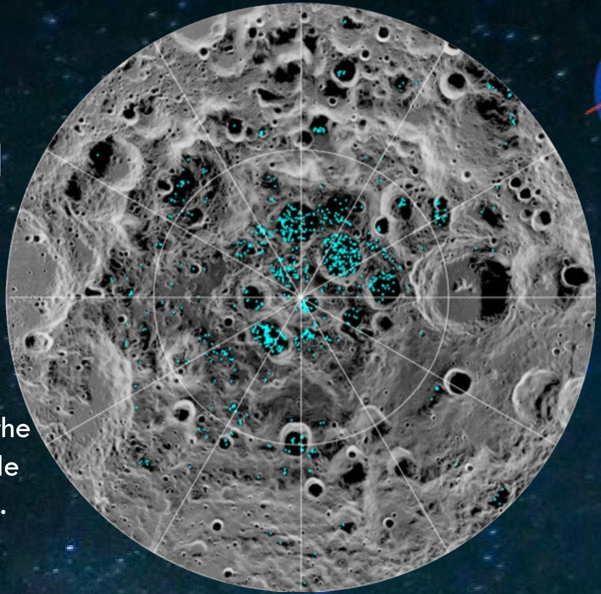
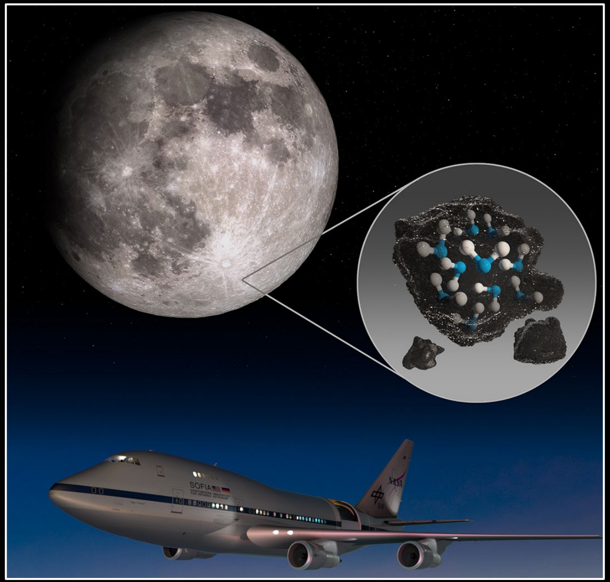
Prospecting for water on the Moon

- 2018: NASA's Moon Mineralogy Mapper (M3) on ISRO Chandrayaan-1showed promise of south pole

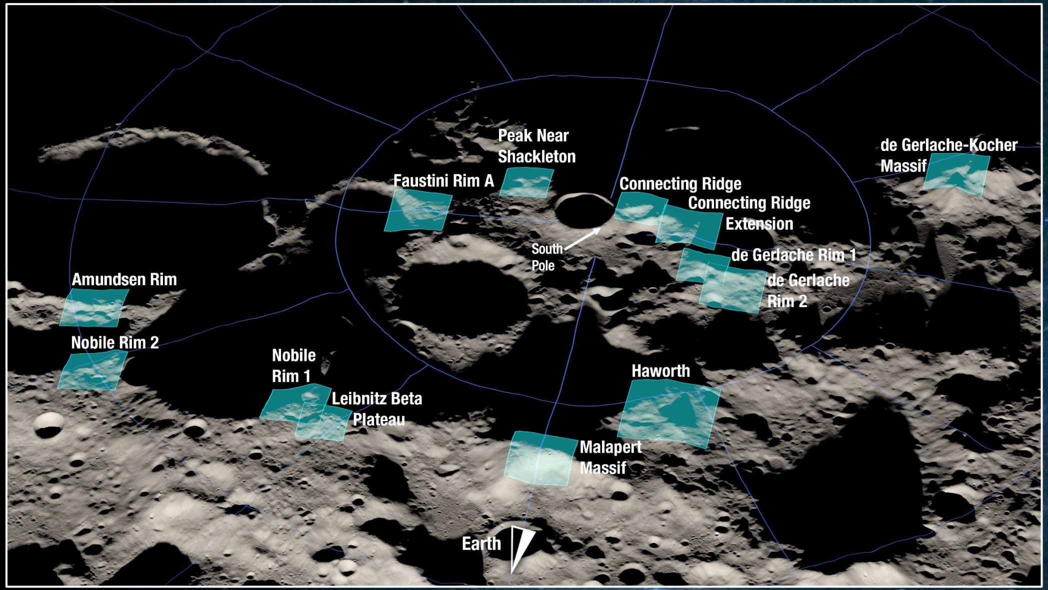


Ice locations at the Moon's south pole detected by M3. Credit: NASA

- 2020: SOFIA captured lunar water cycle, informs future ISRU



SOFIA and illustration of H2O molecules on the lunar surface. Credit: NASA



Rendering of 13 candidate landing regions for Artemis III. Credit: NASA

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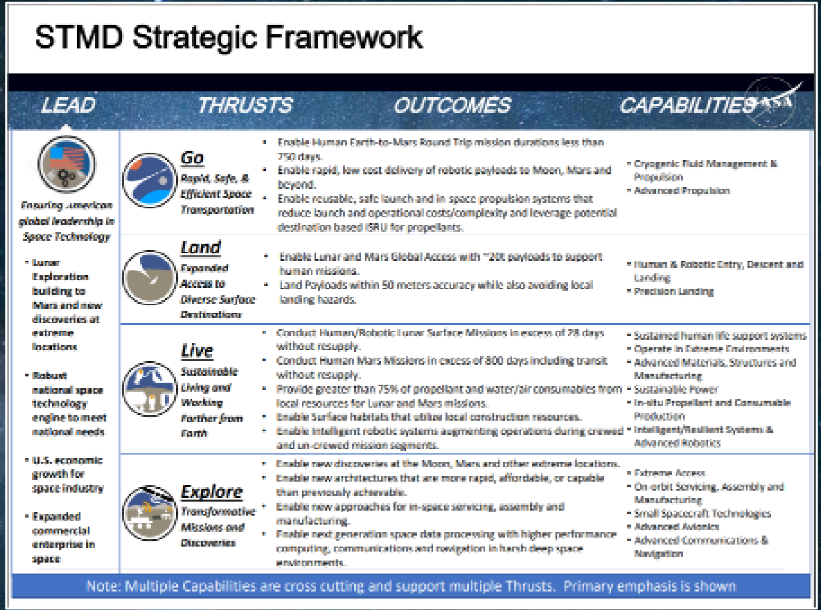
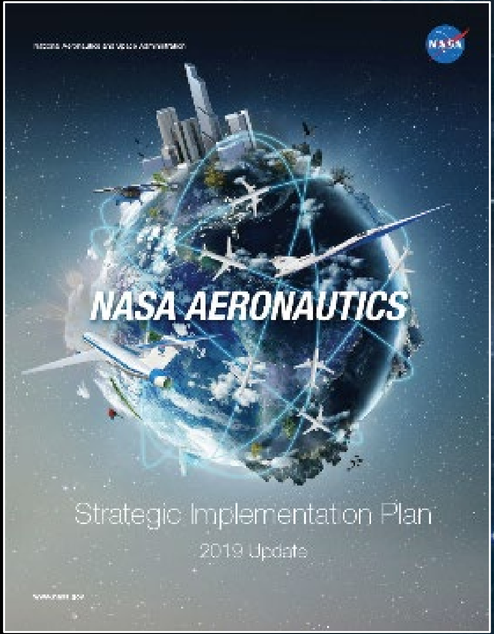
Challenge: Connecting knowledge to future objectives and opportunities

- Challenge: NASA is planning today for missions that will be enabled by technologies we may not be able to envision
- NASA connects experience and vision to NASA programs
- NASA relies on expert input from a broad community of stakeholders
- To leverage expert input NASA mission directorates have created coordinated processes to inform future programs.



Credit: NASA



Credit: NASA

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Technology Taxonomy

- NASA's 2020 Technology Taxonomy provides a standard framework for communicating about technologies
- Incorporates input from across NASA centers, internal experts, and external review
- Taxonomy is updated over time to include new technologies relevant to NASA and to re-align technology areas

https://www.nasa.gov/offices/oct/taxonomy/index.html

https://techport.nasa.gov/

Credit: NASA

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Science and Technology Partnership Forum

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

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

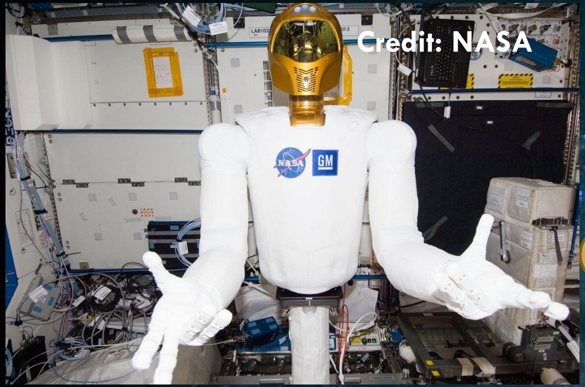
- Space Trusted Autonomy
- Cyber Space Mission Assurance

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



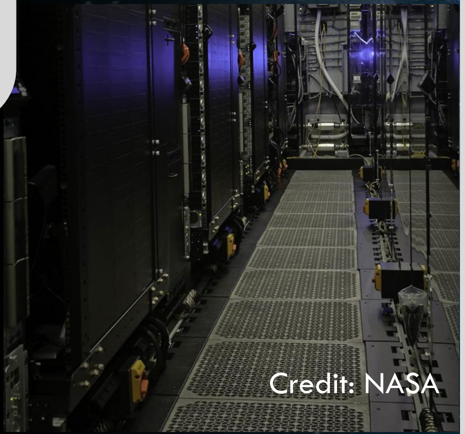
Credit: NASA

Established in 2015

Strategic forum established to identify synergistic efforts and technologies.

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


Credit: NASA


Credit: NASA

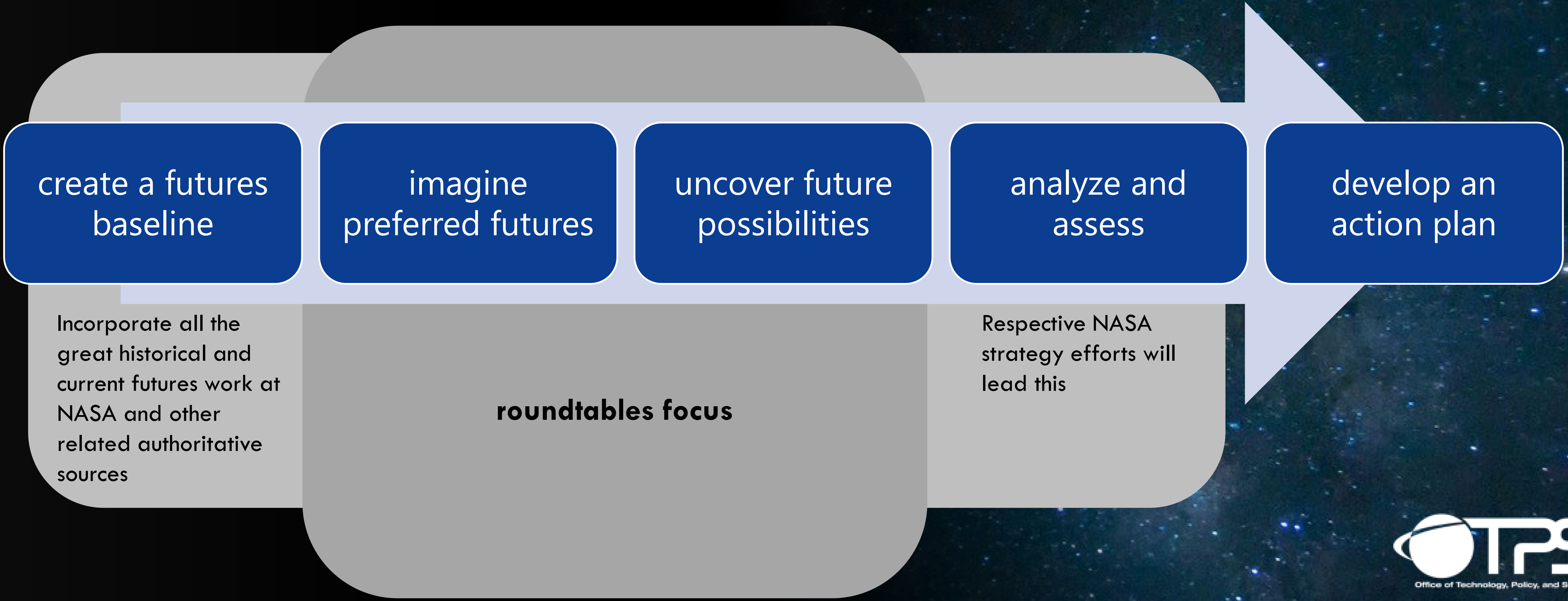
Customers

- 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/otps/st_partnership.html

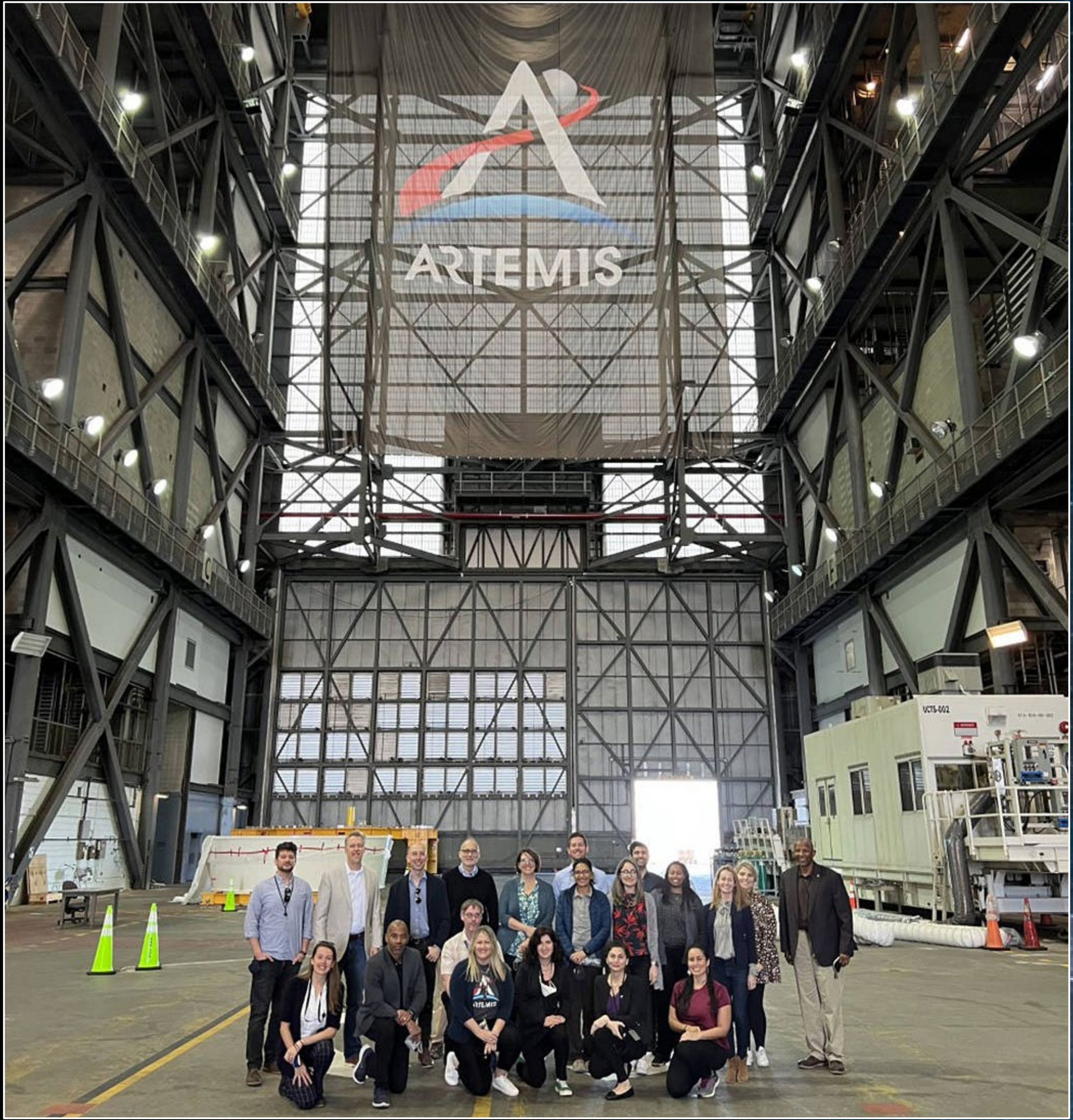
Envisioning the aeronautics and space enterprise for the next 20-50 years: NASA futures study

Goal: Inspire and prepare NASA leadership to move towards achieving its preferred futures and to be prepared for a variety of future states that could come to realization.



Conclusions

- NASA relies on coordinated processes to enable smart innovation
  - Each mission directorate develops tailored processes
  - These processes incorporate technology onramps across long mission timelines
- Expert input is critical to smart innovation at NASA
  - NASA relies on expert input to help anticipate and respond to unanticipated challenges
  - Input is critical to enabling sustainability and resiliency across the agency
- As an independent office, OTPS helps enable coordinated innovation



Thank you!

Questions, Comments, Feedback

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