

The background of the entire slide is a space-themed illustration. On the left, a large, detailed grey moon with various craters and shadows is the central focus. To its upper left, the reddish-orange planet Mars is visible. A small rocket ship is shown in the distance, moving from the right towards the moon, with a bright blue and white trail behind it. The sky is a deep, dark blue filled with numerous white stars. In the bottom right corner, the silhouette of a person's head and shoulders is shown in profile, looking towards the left. The bottom of the image shows a dark, silhouetted horizon line, possibly representing a landscape or a spacecraft's interior.



# EXPLORESPACE TECH

TECHNOLOGY DRIVES EXPLORATION

## LEAD Outcome 2

NASA's Space Technology Mission Directorate | Strategic Technology Framework | August 2023

# STMD Strategic Framework

THRUSTS		OUTCOMES		CAPABILITIES
 <p><b>LEAD</b> Ensuring American global leadership in space technology</p> <ul style="list-style-type: none"> <li>• Advance US space technology innovation and competitiveness in a global context</li> <li>• Encourage technology driven economic growth with an emphasis on the expanding space economy</li> <li>• Inspire and develop a diverse and powerful US aerospace technology community</li> </ul>	 <p><b>GO</b> Rapid, Safe, &amp; Efficient Space Transportation</p>	<ul style="list-style-type: none"> <li>• Develop nuclear technologies enabling fast in-space transits.</li> <li>• Develop cryogenic storage, transport, and fluid management technologies for surface and in-space applications.</li> <li>• Develop advanced propulsion technologies that enable future science/exploration missions.</li> </ul>	<ul style="list-style-type: none"> <li>• Nuclear Systems</li> <li>• Cryogenic Fluid Management</li> <li>• Advanced Propulsion</li> </ul>	
	 <p><b>LAND</b> Expanded Access to Diverse Surface Destinations</p>	<ul style="list-style-type: none"> <li>• Enable Lunar/Mars global access with ~20t payloads to support human missions.</li> <li>• Enable science missions entering/transiting planetary atmospheres and landing on planetary bodies.</li> <li>• Develop technologies to land payloads within 50 meters accuracy and avoid landing hazards.</li> </ul>	<ul style="list-style-type: none"> <li>• Entry, Descent, Landing, &amp; Precision Landing</li> </ul>	
	 <p><b>LIVE</b> Sustainable Living and Working Farther from Earth</p>	<ul style="list-style-type: none"> <li>• Develop exploration technologies and enable a vibrant space economy with supporting utilities and commodities                             <ul style="list-style-type: none"> <li>• Sustainable power sources and other surface utilities to enable continuous lunar and Mars surface operations.</li> <li>• Scalable ISRU production/utilization capabilities including sustainable commodities on the lunar &amp; Mars surface.</li> <li>• Technologies that enable surviving the extreme lunar and Mars environments.</li> <li>• Autonomous excavation, construction &amp; outfitting capabilities targeting landing pads/structures/habitable buildings utilizing in situ resources.</li> </ul> </li> <li>• Enable long duration human exploration missions with Advanced Habitation System technologies.</li> </ul>	<ul style="list-style-type: none"> <li>• Advanced Power</li> <li>• In-Situ Resource Utilization</li> <li>• Advanced Thermal</li> <li>• Advanced Materials, Structures, &amp; Construction</li> <li>• Advanced Habitation Systems</li> </ul>	
	 <p><b>EXPLORE</b> Transformative Missions and Discoveries</p>	<ul style="list-style-type: none"> <li>• Develop next generation high performance computing, communications, and navigation.</li> <li>• Develop advanced robotics and spacecraft autonomy technologies to enable and augment science/exploration missions.</li> <li>• Develop technologies supporting emerging space industries, including: Satellite Servicing &amp; Assembly, In Space/Surface Manufacturing, and Small Spacecraft technologies.</li> <li>• Develop vehicle platform technologies supporting new discoveries.</li> <li>• Develop technologies for science instrumentation supporting new discoveries.</li> <li>• Develop transformative technologies that enable future NASA or commercial missions and discoveries</li> </ul>	<ul style="list-style-type: none"> <li>• Advanced Avionics Systems</li> <li>• Advanced Communications &amp; Navigation</li> <li>• Advanced Robotics</li> <li>• Autonomous Systems</li> <li>• Satellite Servicing &amp; Assembly</li> <li>• Advanced Manufacturing</li> <li>• Small Spacecraft</li> <li>• Rendezvous, Proximity Operations &amp; Capture</li> <li>• Sensor &amp; Instrumentation</li> </ul>	



# LEAD

## Ensuring American global leadership in space technology

*Outcome 2: Encourage technology-driven economic growth with an emphasis on the expanding space economy.*

- Foster the creation and growth of the space economy.
- Increase the commercialization of NASA-supported technologies throughout the US economy.
- Partner in innovative ways for research and development to expand the aerospace sector.
- Collaborate with stakeholders in geographic communities across the country to leverage NASA resources in order to catalyze innovation for the benefit of the US economy.

# Objective 1: Foster the creation and growth of the space economy.

## Approach

- ✓ Measure, where possible, STMD's impact on the space economy in order to inform future programmatic decisions.

## Potential Metrics

- Businesses/jobs/revenue created following engagement with an STMD Program.
- Amount of external investment (capital raised or corporate acquisition) industry partners receive following engagement with STMD.
- The % of STMD's program funding that is associated with a commercial need or use case.
- Number of activities that are intended to serve as a catalyst for growth of the aerospace industry (establishing/leading consortiums, supporting standards development, providing data sets, etc.).
- Connections enabled within geographic ecosystems.

## Example Activities

- ✓ [Lunar Surface Innovation Consortium \(LSIC\)](#)
- ✓ [Consortium for Space Mobility and ISAM Capabilities \(COSMIC\)](#)
- ✓ [SmallSat Parts on Orbit Now \(SPOON\) database](#)



## **Objective 2: Increase the commercialization of NASA-supported technologies throughout the US economy.**

### **Approach**

- ✓ Track the commercialization of NASA-supported technologies in order to increase the economic impact of NASA's research and development investments.

### **Potential Metrics**

- Technology Transfer Licensing fees and the number of Commercial Licenses
- The number of Technology Transfer Software Usage Agreements
- Amount of co-funding or cost sharing industry partners contribute for STMD R&D awards.
- Number of patents filed by industry partners for technologies related to the work performed in partnership with STMD.

### **Example Activities**

- ✓ [Technology Transfer Program](#)
- ✓ [I-Corps Program](#)
- ✓ [SBIR IGNITE](#)
- ✓ [SBIR Civilian Commercialization Readiness Pilot Program \(CCRPP\)](#)

## **Objective 3:** Partner in innovative ways for research and development to expand the aerospace sector

### **Approach**

- ✓ Leverage partnering mechanisms and approaches that can support commercial needs and industry growth.

### **Potential Metrics**

- The % of STMD's extramural budget that utilizes mechanisms other than cost reimbursement contracts.
- The number of 'resource use agreements' (such as Announcements of Collaborative Opportunities and Space Act Agreements) used to access NASA capabilities, facilities, expertise).
- The number of Prizes, Challenges, and Crowd Sourcing competitions with an identified external need or use case.

### **Example Activities**

- ✓ [Announcement of Collaborative Opportunities \(ACO\)](#)
- ✓ [Tipping Point Solicitations](#)
- ✓ [NASA TechFlights](#)
- ✓ [Prizes, Challenges and Crowdsourcing](#)



**Objective 4: Collaborate with stakeholders in geographic communities across the country to leverage NASA resources in order to catalyze innovation for the benefit of the US economy.**

**Approach**

- ✓ Partner with entities and participate in events that specifically focus on economic development and business creation and growth.

**Potential Metrics**

- The number of community-based events STMD participates in that include a component/topic on leveraging NASA resources to catalyze innovation.
- The number of Space Act Agreements with entities focused on community-based economic development or business creation/support.

**Example Activities**

- ✓ [NASA Technology Transfer Expansion \(T2X\)](#)