

Agency Priority Goal | Action Plan | FY 2022 – Q3

Space Technology Leadership

Goal Leader:

Michael Green, Deputy Associate Administrator for Management,
Space Technology Mission Directorate

Goal Overview

Goal statement

Ensure American global leadership in space technology innovations through increased partnering with industry and demonstrating key lunar surface and deep space technologies. *By September 30, 2023: NASA will demonstrate leadership in space technology by:*

- *Enhancing partnerships with industry through delivery or completion of milestones for at least 4 Tipping Point opportunities, and at least 3 critical small business technology transitions to develop capabilities that support NASA and commercial needs;*
- *Delivering at least 3 new technologies that will be demonstrated on the lunar surface or in lunar orbit; and*
- *Completing at least 2 major milestones for projects that increase the Nation's capabilities in deep space.*

Problem to Be Solved

- Through industry partnerships, transferring technologies beyond NASA, facilitating the commercialization of space technologies, and stimulating growth of the U.S. space economy. Laying the groundwork for the aerospace breakthroughs of tomorrow through demonstration of new technologies on the lunar surface and in deep space.

What Success Looks Like

- Complete at least 4 milestones for Tipping Point opportunities, which supports space technology development through public-private partnerships with industry
- Deliver at least 3 critical small business transitions through NASA's SBIR/STTR Program, which funds the research, development, and demonstration of innovative technologies, with the goal of infusing the technologies into NASA missions and commercialization
- Deliver at least 3 new technologies that will be demonstrated on the lunar surface or in lunar orbit. This includes completing the testing in preparation for shipment.
- Complete at least 2 major milestones for deep space projects to support future robotic and human space exploration missions

Goal target(s)

In the table below, please repeat the key metrics included in the goal statement (previous slide) that will be used to track progress.

Please update this column each quarter.

Achievement statement		Key indicator(s)	Quantify progress			Frequency
Repeat the achievement statement from the goal statement on the previous slide		A “key performance indicator” measures progress toward a goal target	These values enable us (and you!) to calculate % complete for <u>any</u> type of target*			When is there new data?
By...	We will...	Name of indicator	Target value	Starting value**	Current value	Update cycle
09/30/2023	Complete milestones for at least 4 Tipping Point opportunities: <ul style="list-style-type: none"> • 3 CFM Tipping Points projects • LTE Proximity Communications Tipping Point 	Tipping Point	100%	0%	75%	quarterly
09/30/2023	Deliver at least 3 critical small business technology transfers <ul style="list-style-type: none"> • 3 STTR sequentials (1/3 completed) 	STTR	100%	0%	33%	quarterly
09/30/2023	Deliver at least 3 new technologies that will be demonstrated on the lunar surface or in lunar orbit <ul style="list-style-type: none"> • CAPSTONE (completed) • PRIME-1 (delayed) • CADRE 	Lunar Technology	100%	0%	33%	quarterly
09/30/2023	Complete at least 2 major milestones for deep space projects <ul style="list-style-type: none"> • SEP (completed) • DSOC (delayed) 	Deep Space Projects	100%	0%	50%	quarterly

* Even qualitative targets! If the target is to achieve a qualitative outcome, quantify progress this way: 1=“Yes, we achieved it”, 0=“No, not yet”

** As of 10/1/2021

Goal Team

Space Technology Mission Directorate

Associate Administrator: James Reuter

Deputy Associate Administrator: Prasun Desai

Goal Leader: G. Michael Green, Deputy Associate Administrator for Management

Early Stage
Innovations &
Partnerships
Director: Jenn Gustetic

Technology
Demonstrations
Director: Trudy Kortez

Technology
Maturation
Director: Niki
Werkheiser

Small Spacecraft
Technology
Director: Chris Baker

SBIR/STTR
Program Executive:
Jason Kessler

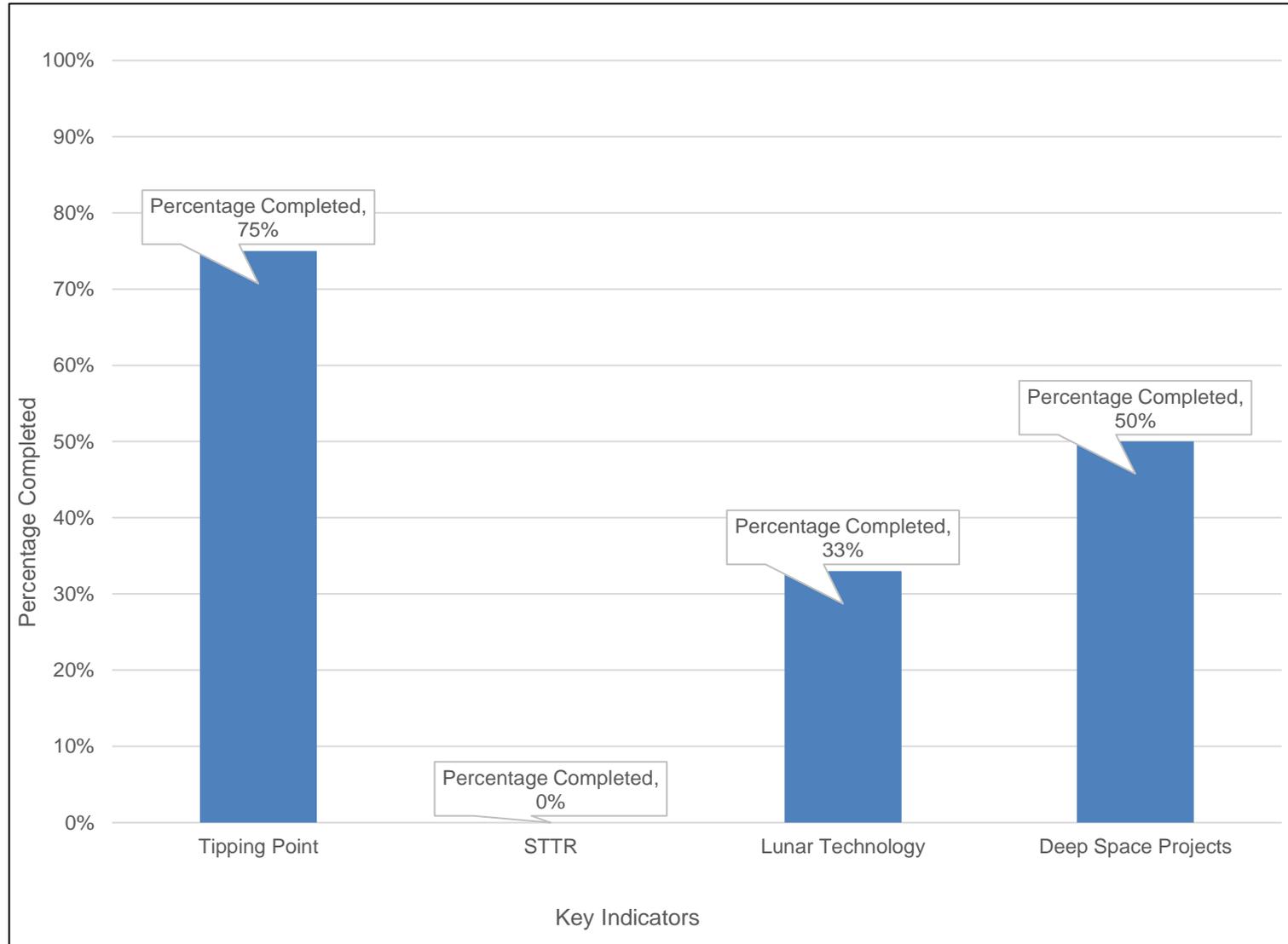
Goal Strategies

Achievement of this APG will require working closely with stakeholders, enlisting partnerships, utilizing evidence-based decision making, and promoting diversity, equity, inclusion, and accessibility. Specific strategies to support these efforts include:

- Employing a merit-based competition model, with a portfolio approach spanning a range of discipline areas and technology readiness levels.
- Integration across programs to identify and successfully transition and transfer new capabilities.
- Working with potential stakeholders up front and continuously engaging with them as we go through conception, maturation, and demonstration.
- Focusing on evidence-based decision making with continuous improvement of data management and analysis capabilities. This includes focused, outcome-based requirements and documentation that will inform future investments.
- Increasing the diversity of our innovation community to broaden our base of innovators, ensuring new perspectives and more comprehensive capture of promising ideas.

Key indicators

Percentage of Indicators Completed as of FY 2022 Q2



Key milestones

Milestone Summary			
Key Milestone	Milestone Due Date	Milestone Status	Comments
Final assembly of the Cislunar Autonomous Positioning System Technology Operations and Navigation Experiment (CAPSTONE) spacecraft in preparation for pre-shipment testing	FY 2022 Q1	Completed during Q2	The CAPSTONE spacecraft completed final assembly on 2/15 in preparation for pre-shipment testing.
Complete Solar Electric Propulsion (SEP) Critical Design Review (CDR)	FY 2022 Q2	Completed as planned	The SEP CDR was completed 3/8-3/10, 2022.
Deliver the Polar Resources Ice Mining Experiment (PRIME)-1 to Intuitive Machines for integration with their Commercial Lunar Payload Services (CLPS) lander, in preparation for their mission	FY 2022 Q3	Delayed	New delivery date planned for December 2022
Complete 3 early design milestones for Cryogenic Fluid Management (CFM) Tipping Point projects	FY 2022 Q4	Completed during Q2	<ul style="list-style-type: none"> • SpaceX TDR – 11/18/2021 • Eta Space PDR – 2/23/2022 • ULA SRR – 3/21/2022
Transition 3 SBIR/STTR sequentials planned to be completed in CY 2022 to stakeholder programs for planned follow-on use/development and integration into future systems and demonstrations	FY 2023 Q1	1 milestone completed during Q3	<ul style="list-style-type: none"> • Rover Slip Estimation and Traction Control for Optimal Mobility in Lunar Environments signed a Phase III VIPER May 13, 2022
Deliver the LTE Proximity Communications Tipping Point with Nokia to Intuitive Machines for integration to their CLPS Lander	FY 2023 Q2		
Deliver the Cooperative Autonomous Distributed Robotic Explorers (CADRE) to the CLPS vendor for integration to their lander	FY2023 Q3		
Initiate primary mission operations of the Deep Space Optical Communications (DSOC)	FY 2023 Q4	Delayed	Due to the delay of the Psyche launch, DSOC will not launch in time to complete this milestone as planned (at no fault of STMD or the DSOC project)

Narrative – FY 2022 Q3

While delayed beyond Q1 as originally planned, NASA achieved the FY 2022 Q1 milestone on 2/15/2022 to complete assembly of the Cislunar Autonomous Positioning System Technology Operations and Navigation Experiment (CAPSTONE) spacecraft in preparation for pre-shipment testing. Due to delays with launch vehicle readiness, the spacecraft team decided to perform a firmware update on a radio and fix a wire harnessing issue that effected the camera system. Both updates were in support of tertiary mission objectives and would not have been required for the primary mission. Given the projected launch vehicle slip, the team delayed the final build to make the updates.

NASA met the FY 2022 Q2 milestone by successfully completing the Solar Electric Propulsion (SEP) Critical Design Review (CDR) on 3/8/2022-3/10/2022. A post-CDR out-brief occurred at an STMD Directorate Program Management Council meeting May 31, 2022.

NASA's FY 2022 Q3 milestone has been delayed by 6 months due to a delay in the Intuitive Machines (IM)-2 launch date. The PRIME-1 integration with the IM Commercial Lunar Payload Services (CLPS) lander is on track for a new delivery date of December 2022. There is a margin of approximately 10 days with the new schedule. The project is conducting vibration testing and verification of hardware.

NASA met the FY 2022 Q4 milestone during Q2 by completing the Technical Design Review for the SpaceX Cryogenic Fluid Management (CFM) Tipping Point on November 18, 2021, the Preliminary Design Review for the Eta Space CFM Tipping Point on February 23, 2022, and the Systems Readiness Review for the United Launch Alliance (ULA) CFM Tipping Point on March 21, 2022. (See the 2020 Tipping Point announcement for more information about the demonstrations.)

NASA is also making progress towards its FY 2023 Q1 milestone for this APG. A Phase 3 contract was signed with a period of performance beginning May 13, 2022. It will focus on extending and adapting SBIR innovations developed by ProtoInnovations to support the NASA Volatiles Investigating Polar Exploration Rover (VIPER) mission. These technologies are needed by VIPER to improve the mission's rover locomotion performance, particularly for traversing terrain with uncertain terramechanical properties and hazards.

During Q3, the Space Technology Mission Directorate also learned of a delay in the launch to the Psyche mission. This will cause an unmet milestone for the FY 2023 Q4 Deep Space Optical Communications (DSOC) mission operations. DSOC planned to launch as a secondary payload with Psyche, attached to the Janus spacecraft as a separate technical demonstration.

Data accuracy & reliability

Verification and Validation:

- NASA monitors and tracks its progress towards this goal using various Agency documents and reports.

Data Source(s):

- Mission Directorate-level documentation (e.g., DPMC Decision Memos and Minutes, meeting documentation, monthly program review assessments).
- Program-level documentation.
- Data systems (e.g., SPAR, SMART, TechPort).

Level of Accuracy Required for Intended Use:

- Using the documents and reports referenced above.

Data Limitations:

- Materials from the industry partners may include company proprietary information; such information cannot be released publicly.

How the Agency Compensates for Data Limitations:

- NASA has not identified any data limitations that would preclude it from reporting accurate, reliable, and timely performance information.

Additional information

Contributing Programs

- Early-Stage Innovation and Partnerships; SBIR and STTR; Technology Demonstration; Technology Maturation

Organizations:

- Space Technology Mission Directorate

Program Activities:

- Early-Stage Innovation and Partnerships; SBIR and STTR; Technology Demonstration; Technology Maturation; Small Spacecraft Technology

Policies:

- STMD complies with all relevant federal regulations and NASA policies.

Other Federal Activities:

- Activity – contribution

Stakeholder / Congressional Consultations

- NASA provides updates to Congress on the status of required milestones, in addition to quarterly updates to the Office of Management and Budget (OMB) and the Office of Science and Technology Policy (OSTP). NASA also routinely provides status to the Government Accountability Office (GAO).