SPACE TECHNOLOGY PORTFOLIO

EARLY STAGE INNOVATION
- NASA Innovative Advanced Concepts
- Space Tech Research Grants
- Center Innovation Fund/Early Career Initiative

PARTNERSHIPS AND TECHNOLOGY TRANSFER
- Technology Transfer
- Prizes and Challenges
- iTech

SBIR/STTR PROGRAMS
- Small Business Innovation Research
- Small Business Technology Transfer

TECHNOLOGY MATURATION
- Game Changing Development
- Lunar Surface Innovation Initiative

TECHNOLOGY DEMONSTRATIONS
- Technology Demonstration Missions
- Small Spacecraft Technology
- Flight Opportunities

Technology Drives Exploration
Technology Readiness Level
LOW
MID
HIGH
Reaching the Moon and Mars Faster with NASA Technology

Rapid, Safe, and Efficient Space Transportation
- Advanced Navigation
- Gateway
- In-Space Assembly/Manufacturing
- In-Space Refueling

Expanded Access to Diverse Surface Destinations
- Advanced Propulsion
- Autonomous Operations
- Commercial Lunar Payload Services

Sustainable Living and Working Farther from Earth
- Sustainable Power
- Dust Mitigation
- Precision Landing
- In Situ Resource Utilization
- Surface Excavation and Construction
- Cryogenic Fluid Management
- Extreme Access/Extreme Environments

Transformative Missions and Discoveries
- Advanced Communication
- Landing Heavy Payloads
- Atmospheric ISRU

STMD Budget:
- FY19 ($927M)
- FY20 ($1,100M)
- FY21 ($1,578M proposed)
• Enable Human Earth-to-Mars Round Trip mission durations less than 750 days.
• Enable rapid, low cost delivery of robotic payloads to Moon, Mars and beyond.
• Enable reusable, safe launch and in-space propulsion systems that reduce launch and operational costs/complexity and leverage potential destination based ISRU for propellants.
Land

Expanded Access to Diverse Surface Destinations

- Enable Lunar and Mars Global Access to land large (on the order of 20 metric tons) payloads to support human missions.
- Land Payloads within 50 meters accuracy while also avoiding local landing hazards.
Live Sustainable Living and Working Farther from Earth

- Conduct Human/Robotic Lunar Surface Missions in excess of 28 days without resupply.
- Conduct Human Mars Missions in excess of 800 days including transit without resupply.
- Provide greater than 75% of propellant and water/air consumables from local resources for Lunar and Mars missions.
- Enable Surface habitats that utilize local construction resources.
- Enable Intelligent robotic systems augmenting operations during crewed and un-crewed mission segments.

Note: Mid TRL and High TRL Technology Development for Life Support and EVA suits are HEOMD Responsibility.
LUNAR SURFACE INNOVATION INITIATIVE

**In-situ Resource Utilization**
Collection, processing, storing and use of material found or manufactured on other astronomical objects

**Sustainable Power**
Enable continuous power throughout lunar day and night

**Extreme Access**
Access, navigate, and explore surface/subsurface areas

**Surface Excavation/Construction**
Enable affordable, autonomous manufacturing or construction

**Lunar Dust Mitigation**
Mitigate lunar dust hazards

**Extreme Environments**
Enable systems to operate throughout the full range of lunar surface conditions
Explore Transformative Missions and Discoveries

- Enable new discoveries at the Moon, Mars and other extreme locations.
- Enable new architectures that are more rapid, affordable, or capable than previously achievable.
- Enable new approaches for in-space servicing, assembly and manufacturing.
- Enable next generation space data processing with higher performance computing, communications and navigation in harsh deep space environments.

- Archinaut
- Bulk Metallic Glass Gears
- Surface Robotic Scouts
- In Space Manufacturing
- Laser and Optical Communications
- CAPSTONE
- SPIDER
- Restore-L
- Atomic Clock
MOXIE *(Mars Oxygen In-Situ Resource Utilization Experiment)*
MOXIE will demonstrate a way that future explorers might produce oxygen from the Martian atmosphere for propellant and for breathing.

MEDA *(Mars Environmental Dynamics Analyzer)*
A set of sensors that will provide measurements of temperature, wind speed and direction, pressure, relative humidity and dust size and shape in the Martian atmosphere.

MEDLI2 *(Mars Entry, Descent and Landing Instrumentation 2)*
MEDLI2 is a next-generation sensor suite for entry, descent and landing (EDL). It collects temperature and pressure measurements on the heat shield and afterbody during EDL.

TRN *(Terrain Relative Navigation)*
TRN gives a spacecraft the ability to autonomously avoid hazards we already know about and can land in more (and more interesting) landing sites with far less risk.
STMD Opportunities for Academia and Industry

STMD Tipping Point Multiple Awards: Jan – Mar 2020

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Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR) Phases I, II, II-E, Civilian Commercialization Readiness Pilot Program (CCRPP), Sequential: Phase I Solicitation Jan – Apr 2020

Announcement of Collaborative Opportunity (ACO): Jan – Mar 2020

Flight Opportunities Tech Flights: Feb – May 2020

Early Career Faculty (ECF): Feb – Apr 2020

Early Stage Innovations (ESI): Apr – Jun 2020


Space Technology Research Institutes (STRI): Jun – Aug 2020

NASA Space Technology Graduate Research Opportunities (NSTGRO): Sep – Nov 2020

SmallSat Technology Partnerships (STP): Sep – Nov 2021

Centennial Challenges: Varied release dates

NextSTEP Broad Agency Announcements (BAAs): Varied release dates

Lunar Surface Technology Research (LuSTR) Opportunities: Coming soon!!!

STMD anticipates awarding ~$600M to academia and industry supporting 2020 solicitations & awards

Note: Funding awards are approximate and subject to change

Open Solicitations as of June 5, 2020
Solicitations were/will be open in the timeframe specified in italics

STMD anticipates awarding ~$600M to academia and industry supporting 2020 solicitations & awards

$8M Open Solicitations as of June 5, 2020
Solicitations were/will be open in the timeframe specified in italics

STMD anticipates awarding ~$600M to academia and industry supporting 2020 solicitations & awards

$250M

$212M

Varies

$30M
STMD BY THE NUMBERS (FY 2019)

- Proposals evaluated: >3,500
- Proposals selected: >700
- University partnerships with >100 universities: >350
- Projects leading to flight demonstrations: >50
- Active technology projects: >1,000
- Software releases: >2,300
- Industry collaborators: >400
- Transitions since 2011: >900