# Space Technology Overview
## NAC TI&E Briefing

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# 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

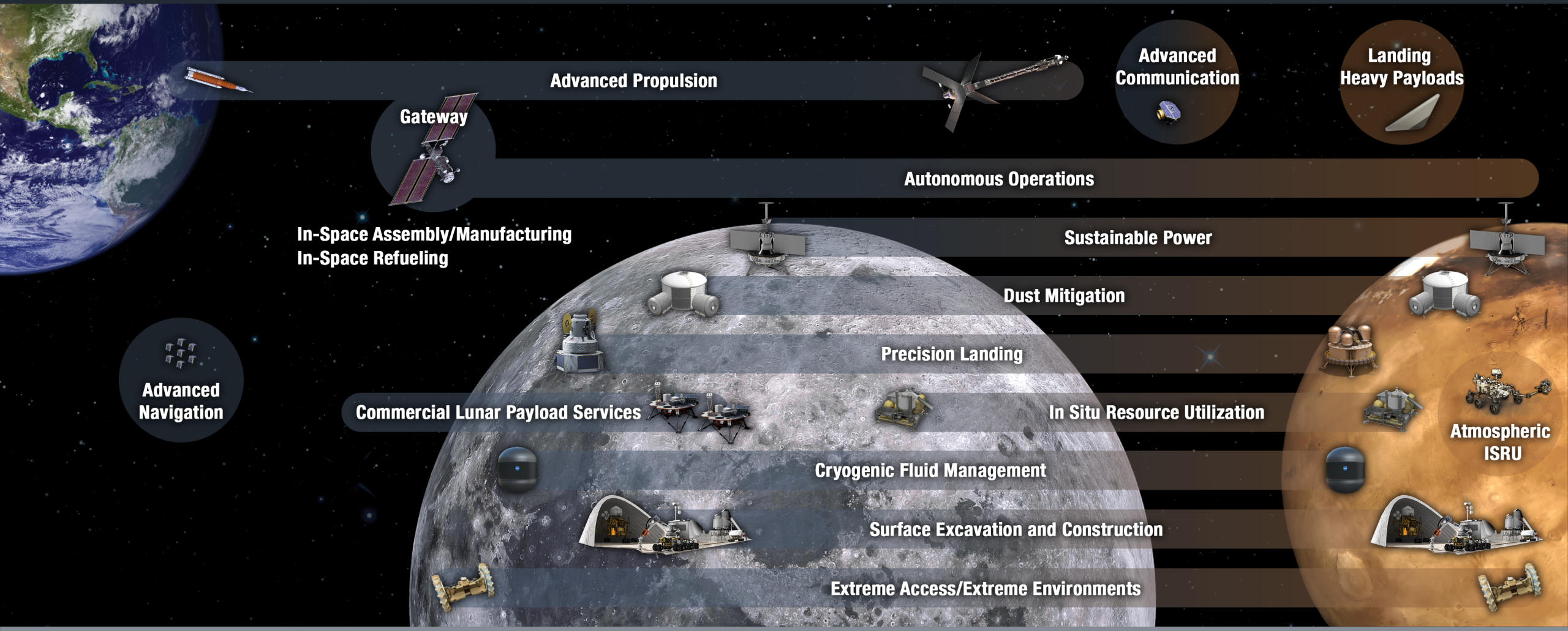
LOW

MID

HIGH

Technology Readiness Level

# Technology Drives Exploration




2020 GO | LAND | LIVE | EXPLORE 203X

# Exploration Technology FY 2021 Budget Request

| Exploration Technology FY21 Budget Request ($M) | FY 2019 | FY 2020 Op Plan | FY 2021 | FY 2022 | FY 2023 | FY 2024 | FY 2025 |
|---|---|---|---|---|---|---|---|
| **SBIR and STTR** | **207.2** | **225.5** | **402.8** | **478.7** | **542.6** | **544.8** | **481.1** |
| **Early Stage Innovation and Partnerships** | **101.7** | **119.8** | **169.2** | **179.2** | **196.2** | **196.2** | **196.2** |
| Agency Technology and Innovation | 8.8 | 9.4 | 9.4 | 9.4 | 9.4 | 9.4 | 9.4 |
| Early Stage Innovation (NIAC, STRG, CIF/ECI) | 66.5 | 80.6 | 123.4 | 133.4 | 150.4 | 150.4 | 150.4 |
| Partnerships and Technology Transfer (CP&C, Tech Transfer, iTech) | 26.4 | 29.9 | 36.4 | 36.4 | 36.4 | 36.4 | 36.4 |
| **Technology Maturation** | **201.2** | **179.2** | **469.1** | **551.5** | **654.1** | **748.4** | **835.8** |
| *Go: Rapid, Safe & Efficient Space Transport* | *75.9* | *19.9* | *19.1* | *19.5* | *20.5* | *38.1* | *43.9* |
| *Land: Expanded Access to Diverse Surface Destination* | *34.3* | *36.6* | *52.2* | *67.8* | *78.5* | *88.0* | *100.0* |
| *Live: Sustainable Living & Work Far From Earth* | *45.7* | *69.0* | *247.3* | *285.0* | *336.4* | *388.7* | *438.2* |
| *Explore: Transformative Missions & Discoveries* | *24.6* | *28.5* | *43.6* | *44.8* | *47.1* | *52.1* | *62.7* |
| *Lunar Payload, ACO/TP* | *1.9* | *3.0* | *77.4* | *101.1* | *135.0* | *144.0* | *150.0* |
| **Technology Demonstration** | **416.8** | **575.5** | **537.2** | **556.0** | **513.4** | **464.8** | **525.1** |
| OSAM-1 (Satellite Serv & SPIDER) | 192.8 | 227.2 | 133.5 | 117.2 | 59.4 | 14.6 | - |
| Laser Communications Relay Demonstration | 17.2 | 28.5 | 13.6 | - | - | - | - |
| Solar Electric Propulsion | 48.1 | 67.0 | 48.7 | 25.4 | 9.0 | 5.8 | - |
| Small Spacecraft, Flight Opps & Other Tech Demo | 158.7 | 252.8 | 341.4 | 413.4 | 445.0 | 444.5 | 525.1 |
| *Flight Opportunities* | *20.0* | *25.0* | *20.0* | *20.0* | *20.0* | *20.0* | *20.0* |
| *Small Spacecraft* | *25.5* | *44.7* | *46.0* | *46.2* | *48.2* | *52.7* | *57.7* |
| *Deep Space Optical Communications* | *39.4* | *21.8* | *10.5* | *4.6* | *1.1* | *0.1* | *-* |
| *Archinaut (OSAM-2)* | *14.7* | *28.2* | *20.5* | *13.6* | *3.6* | *-* | *-* |
| *Low-Earth Orbit Flight Test Inflatable Decelerator* | *20.0* | *23.7* | *20.1* | *10.6* | *-* | *-* | *-* |
| *Cryogenic Fluid Management* | *13.8* | *36.4* | *104.2* | *137.0* | *160.1* | *137.3* | *145.5* |
| *Space Nuclear Technologies (includes Nuclear Fission Power and Nuclear Propulsion)* | *-* | *57.9* | *100.0* | *142.4* | *168.1* | *190.0* | *256.8* |
| **Total Exploration Technology** | **926.9** | **1,100.0** | **1,578.3** | **1,765.4** | **1,906.2** | **1,954.2** | **2,038.2** |

# Summary of FY 2021 Report Language

| Bill Language | **House** ($1,100M for Space Technology, which is equal to the fiscal year 2020 appropriation and $478.3M below the requested level). Of which $227M is for OSAM-1 (Restore/SPIDER) and $110M for NTP ($80M of which is for flight demonstration systems) | Senate (TBD) |
|---|---|---|
| **OSAM-1 (RESTORE-L/ SPace Infrastructure DExterous Robot)** | $227M, which is $93,500,000 greater than the requested level, for the RESTORE–L/SPace Infrastructure DExterous Robot to conduct an orbital refueling mission in 2022 | Highly likely to follow the House |
| **Nuclear Thermal Propulsion (NTP)** | $110M shall be for the development, production and demonstration of a nuclear thermal propulsion system, of which $80M shall be for the design of a flight demonstration system | Highly likely to follow the House |
| **Solar Electric Propulsion** | $60M to efficiently propel more ambitious robotic science and human exploration missions beyond the Earth and into deep space, as well as, to enable more efficient orbit transfer of spacecraft and accommodate the increasing power demands for government and commercial satellites. | TBD |
| **OSAM-2 (Archinaut)** | $20.5M develops and demonstrates technologies required to manufacture, assemble, and aggregate large and/or complex systems in space utilizing robotic and additive manufacturing technology | TBD |
| **Flight Opportunities** | $30M to partner with commercial industry to advance technologies for sub-orbital and orbital launch vehicles for small payloads, with the aim to increase affordability of those technologies and to allow for more frequent access to relevant launch environments, including low-Earth orbit. Of this amount, not less than $5M is dedicated for competitively selected opportunities in support of payload development and flight of K-12 and collegiate educational payloads. | Highly likely to follow the House |
| **Regional Economic Development** | $8M focuses on partnerships with State and regional economic development organizations as they expand space related commercial opportunities designed to address NASA mission needs | Could potentially follow the House – similar to FY20 and prior |
| **Nano & Additive Manufacturing** | | Very highly likely to include $35M for Additive Manufacturing, and $5M for large scale production and use of innovative nanomaterials– similar to FY20 and prior directions |

EXPLORESPACE TECH
TECHNOLOGY DRIVES EXPLORATION