National Aeronautics and Space Administration

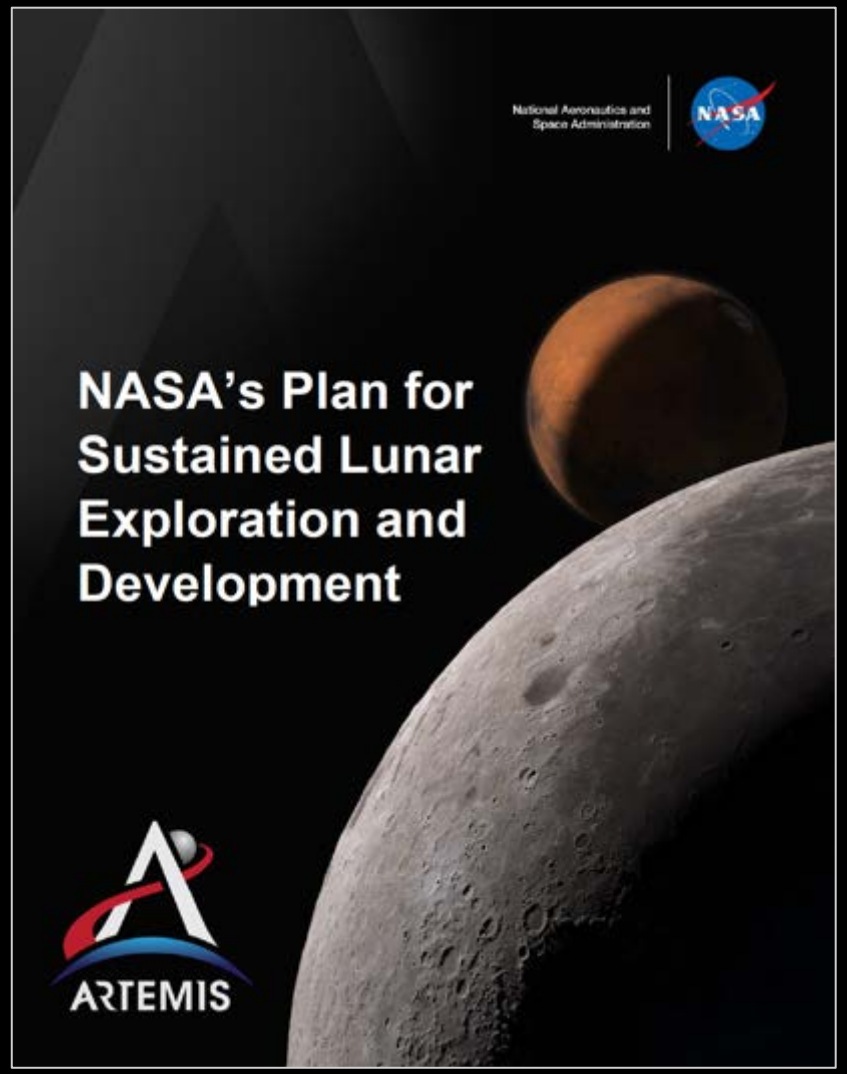
Sustained Lunar Exploration and Development Plan

NASA Advisory Council
Human Exploration and Operations Committee
May 14, 2020

TOM CREMINS
Associate Administrator for Strategy and Plans
NASA Headquarters

"The NASA Administrator shall submit a plan to the Chairman of the National Space Council for sustainable lunar surface exploration and development, including necessary technologies and capabilities to enable initial human exploration of Mars."

– *Vice President Pence,6th Public Meeting of the National Space Council, August 20, 2019*

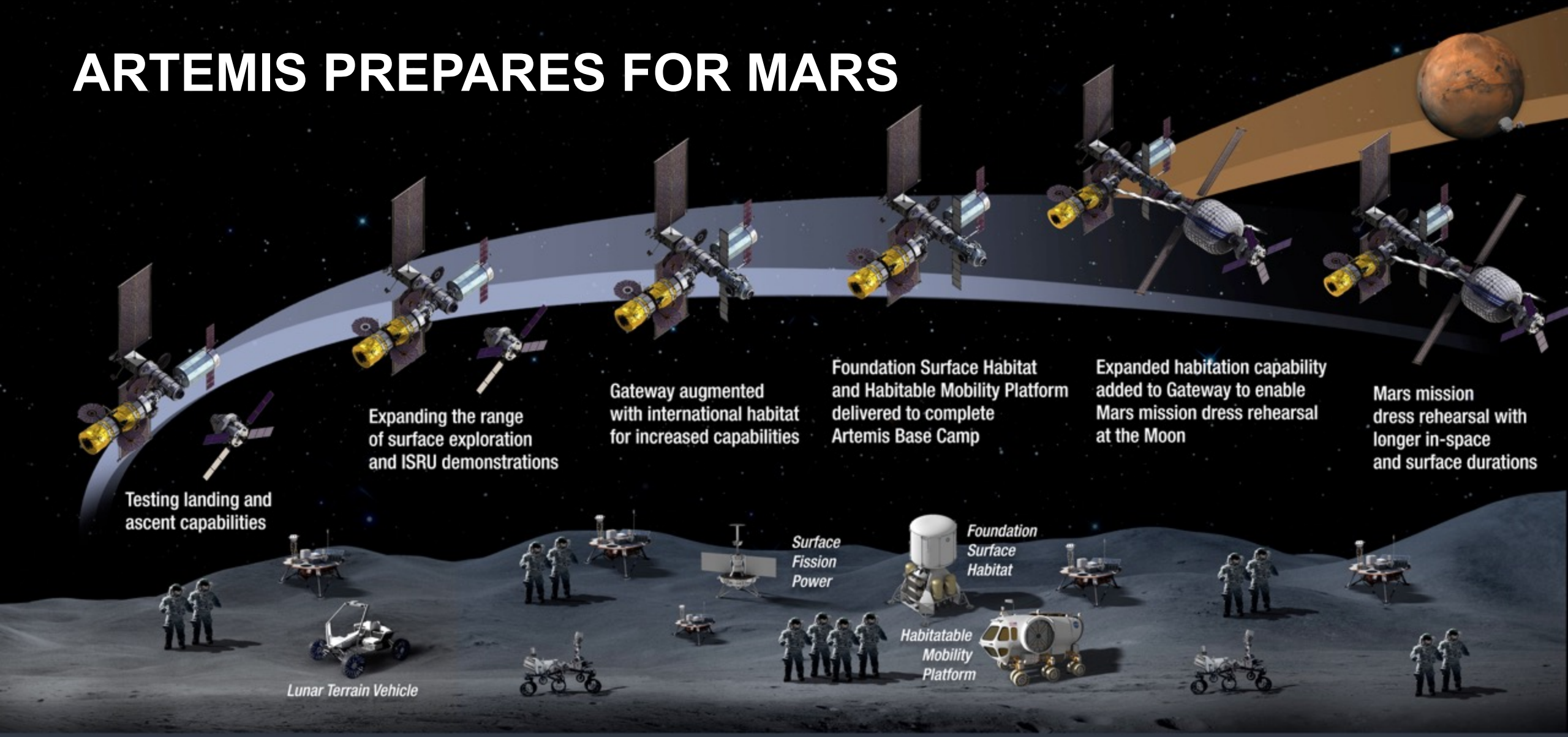


Cover for the Sustained Lunar Exploration Development Report, submitted to the National Space Council April 2, 2020

Overview:
Artemis Lunar Sustained Plan

- Artemis 2024 is the key first step of a long-term American space strategy.
- A critical component of this strategy is to tie together capabilities and partnerships across the areas of space closest to Earth, the Moon and Mars.
- In this manner, America will lead the establishment of a sustained presence at the Moon, and the first human mission to Mars.
- This strategy covers the present through a mid to late 2030s first human Mars mission – with Level Zero goals and resiliency built in (i.e. an “accordion”).
- Overall, it provides a constancy of purpose to America’s space effort.

ARTEMIS PREPARES FOR MARS



SUSTAINABLE LUNAR ORBIT STAGING CAPABILITY AND SURFACE EXPLORATION

MULTIPLE SCIENCE AND CARGO PAYLOADS | INTERNATIONAL PARTNERSHIP OPPORTUNITIES | TECHNOLOGY AND OPERATIONS DEMONSTRATIONS FOR MARS

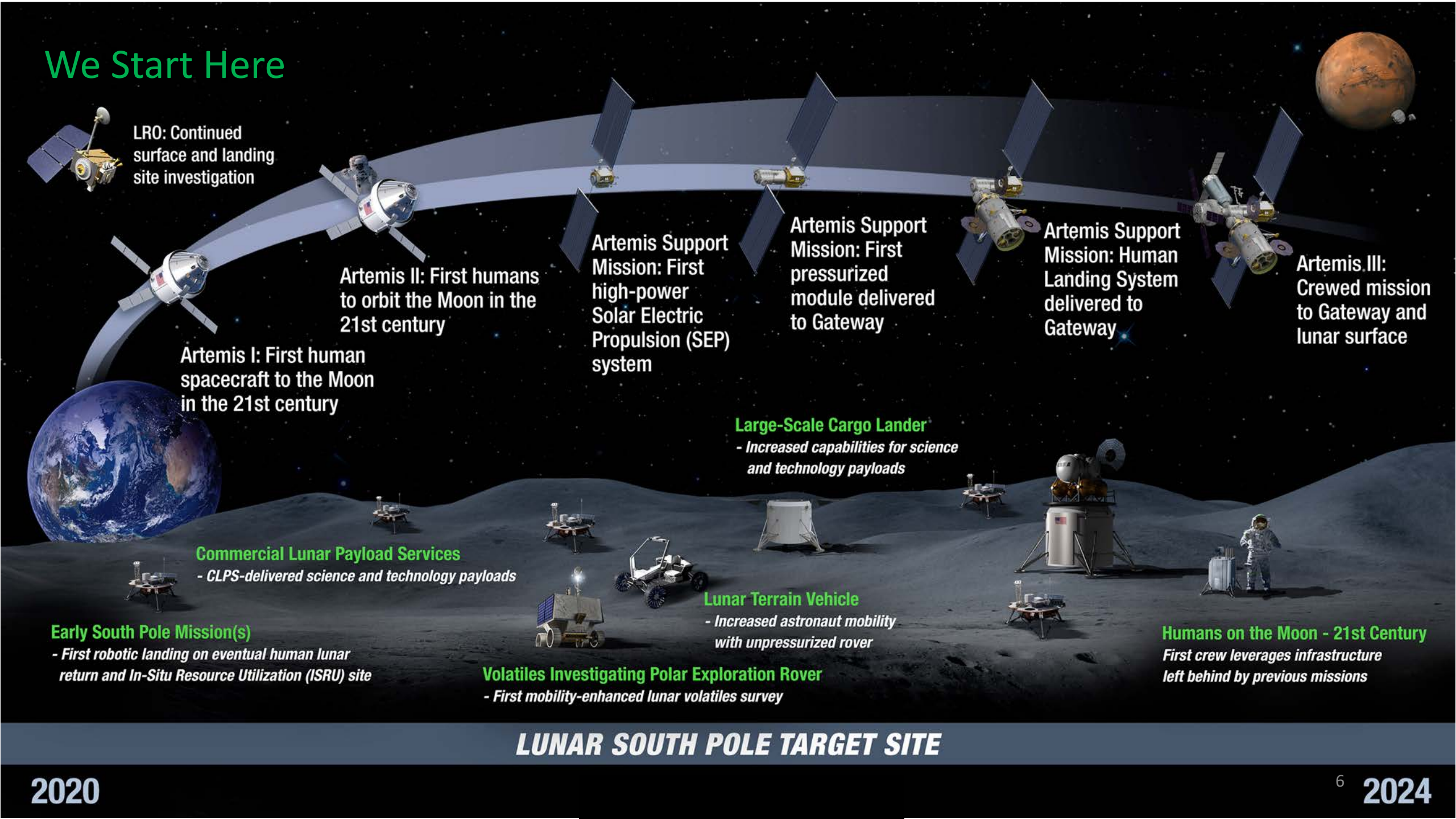
Emergence of Cislunar Space

Why Cislunar Space?

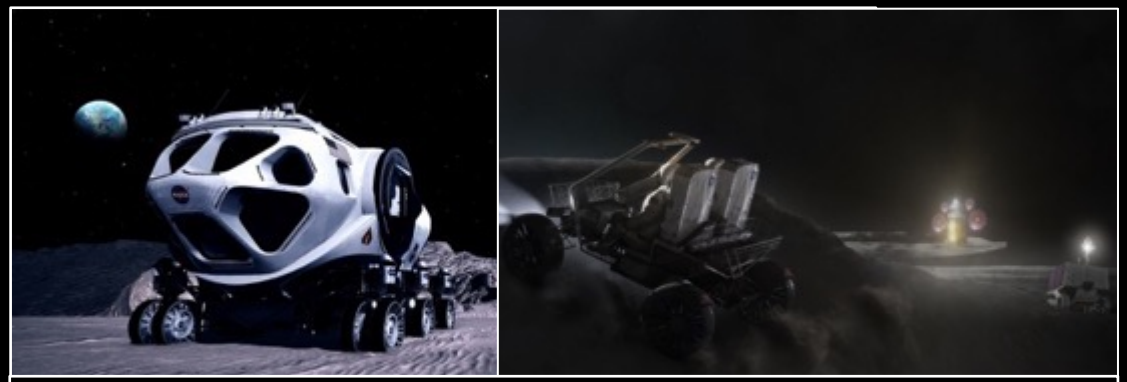
A Strategic High Ground

-U.S. national interests and leadership
-Geopolitical competition at cislunar/lunar
-National security considerations beyond GEO
-Expand current LEO human presence
-Economic opportunities
-Gateway for exploration of the solar system
-Possible lunar and other resources for future exploration

We Start Here



Commonality and Interoperability



MOBILITY

SUITS

ASCENT SYSTEMS

PROPULSION

HABITATION SYSTEMS

DEEP SPACE AGGREGATION

- Orbiting outpost with landing system
- Scientific exploration of a planetary surface
- Automation and robotics to assist/maximize human-led science
- End-to-end dust mitigation
- Physical and behavioral health operations
- Communications and navigation
- Power systems

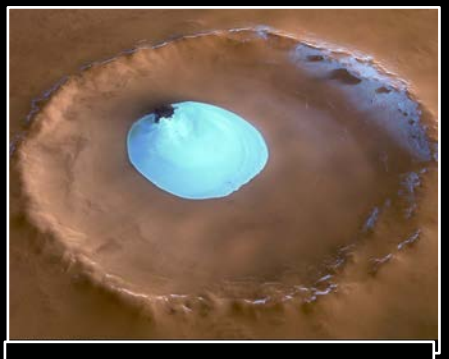
Elements for First Human Mars Mission

LUNAR SURFACE ANALOG SYSTEMS (Mobile Hab, Suits, Access Systems)

MARS SAMPLE RETURN

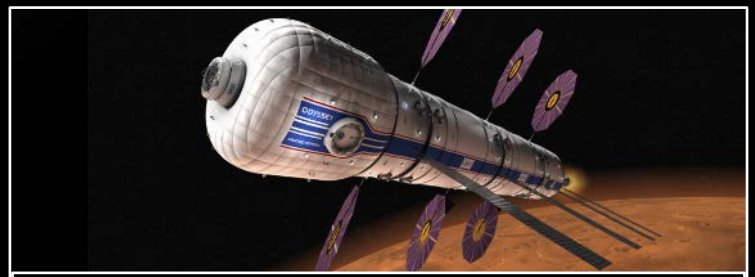
EVOLVED GATEWAY HABITATION

DEEP SPACE AGGREGATION

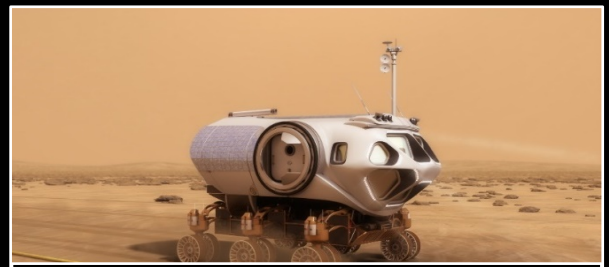


MARS ICE MAPPER

ENTRY DESCENT & LANDING



NUCLEAR PROPULSION



CREW SCIENCE AT MARS

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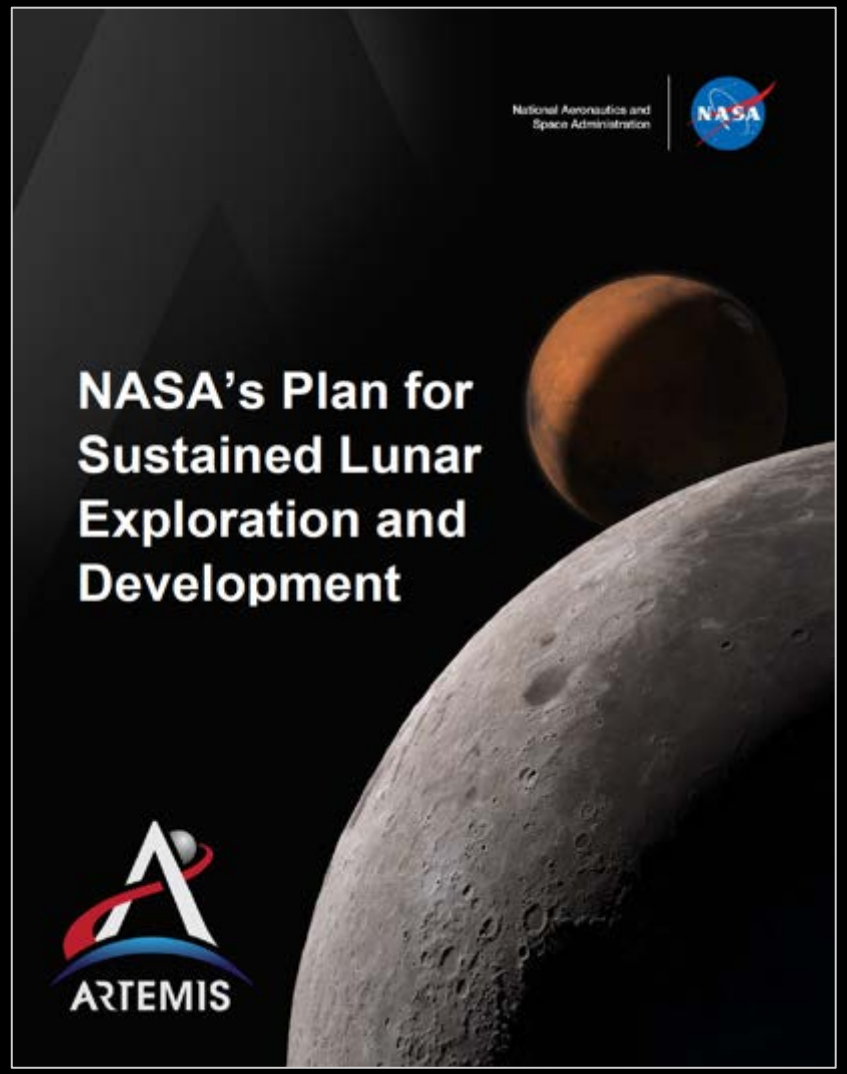

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