

NASA's Preparation for Human Missions to Mars

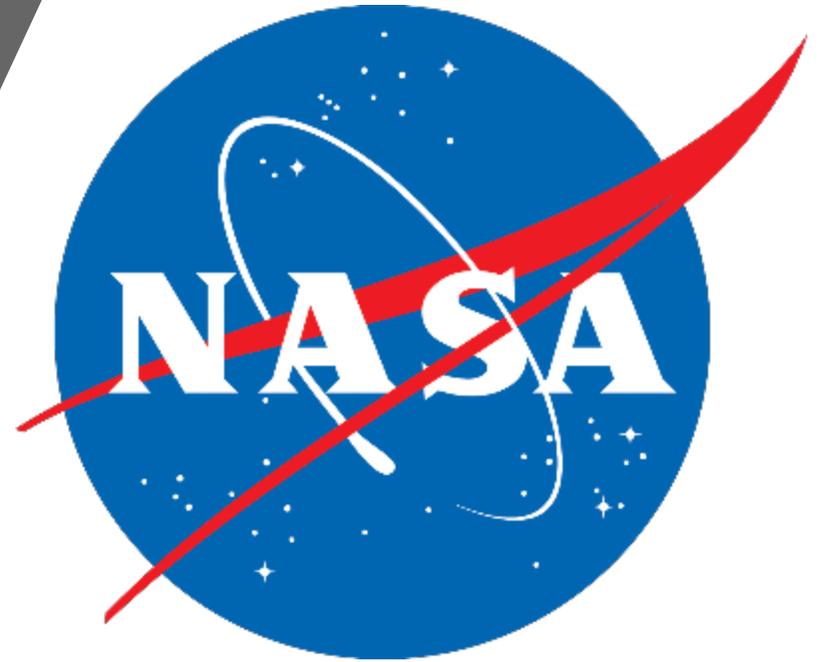
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The background of the slide is a composite image of space. On the left, a portion of the Earth's blue and white atmosphere is visible. In the lower-left corner, the International Space Station (ISS) is shown in orbit. On the right side, the Moon is prominently displayed in the foreground, with the reddish-orange planet Mars visible in the background behind it.

HEOMD'S Vision for Exploration

Maximize use of the International Space Station to reach its fullest potential

Make commercial human spaceflight to low-Earth orbit a robust, sustainable enterprise with many providers and a wide range of users

Build a coalition of public/private partnerships that will help us send astronauts to the Moon quickly and sustainably, together

Deliver more missions, more science, more technology, and more innovation at a better value to the American taxpayer

Make new discoveries, expand human knowledge, and push human presence deeper into the solar system

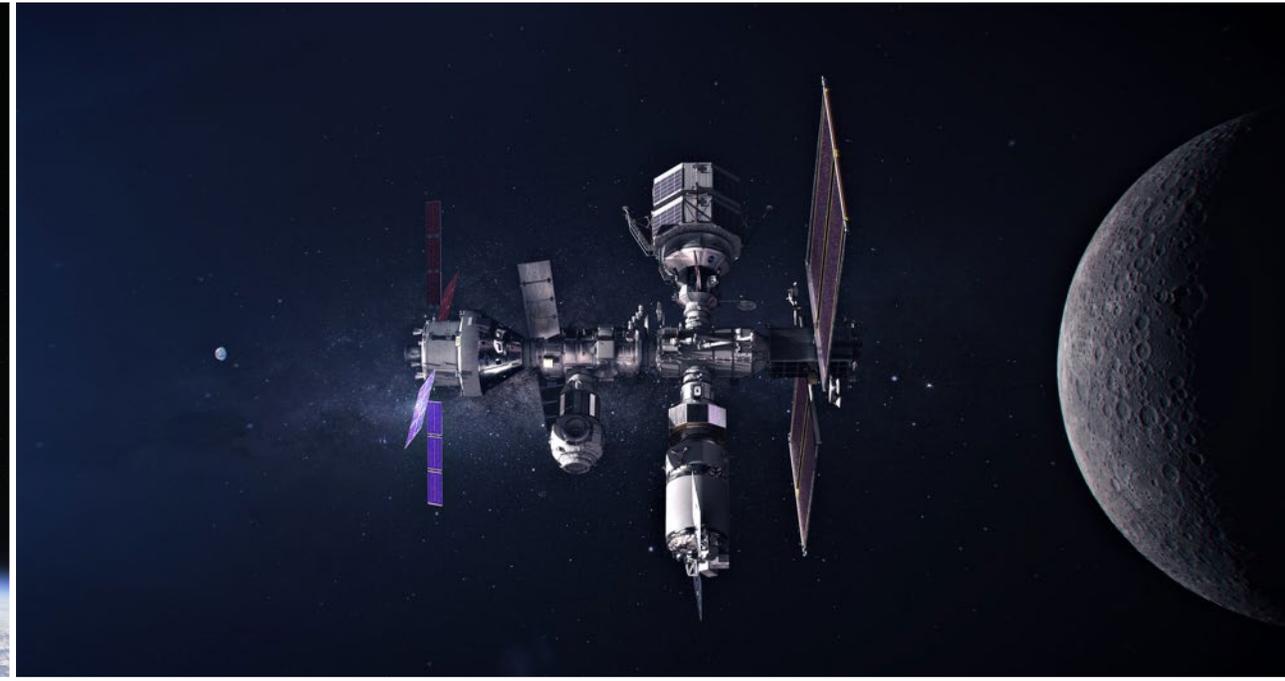
Return benefit to Earth

Continuity of Purpose



Low-Earth Orbit

Maintaining a strategic foothold in low-Earth orbit with the International Space Station and commercial partners



Lunar Orbit

Building an infrastructure for long-term exploration on and around the Moon with Artemis

Artemis: a Foundation for Deep Space Exploration



Space Launch System



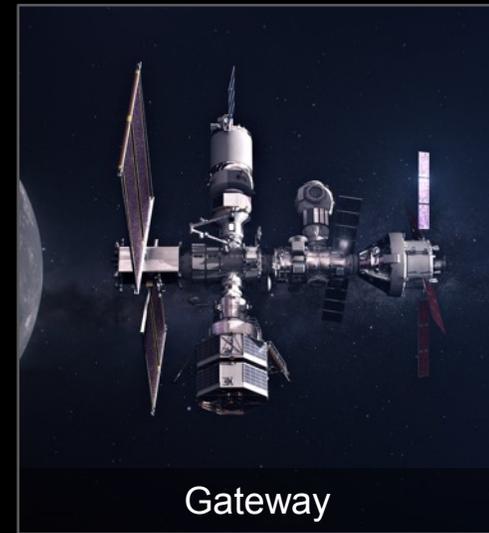
Orion spacecraft



Human Landing System



Surface Operations



Gateway



Exploration Ground Systems



Space Communications
& Navigation



Surface Mobility



Space Suits



Artemis Base Camp

Lunar Missions Prepare us for Mars

IN ORBIT



DEEP SPACE AGGREGATION

Assembling a complex ship in deep space



MARS TRANSIT HABITAT

Round the clock, years-long operations of a Mars-class habitat and life support system



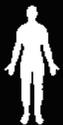
ORBIT TO SURFACE OPERATIONS

Operating an orbiting outpost that deploys a lander and its crew to a planetary surface



COMMERCIAL RESUPPLY AND REFUELING

Leveraging the space logistics supply chain for industry provided cargo deliveries



CREW HEALTH & PERFORMANCE

Studying how the human body and mind adapt to deep space hazards

A roundtrip mission to Mars will take about two years—and once the ship's course is set, there's no turning back.

As much as is possible, lunar systems will be designed for dual Moon-Mars operations.

Integrated missions in the lunar vicinity prepare us for successful Mars missions.

ON THE SURFACE



SPACESUIT ADVANCEMENTS

Improving spacesuit design across Artemis missions with astronaut input and private sector innovation



MOBILE OPERATIONS

Living and working 'on the go' inside a mobile habitat for weeks at a time



PLANETARY PROTECTION

Mitigating dust transfer and establishing pristine sample curation protocols



HUMAN ROBOTIC EXPLORATION

Robots pre-positioning surface assets and conducting reconnaissance for astronauts



HUMAN RESILIENCE

Learning how humans can survive and thrive in a partial gravity environment

Taking the Next Giant Leap

Humans on Mars

← Earth

THANK YOU

