

Gateway Update

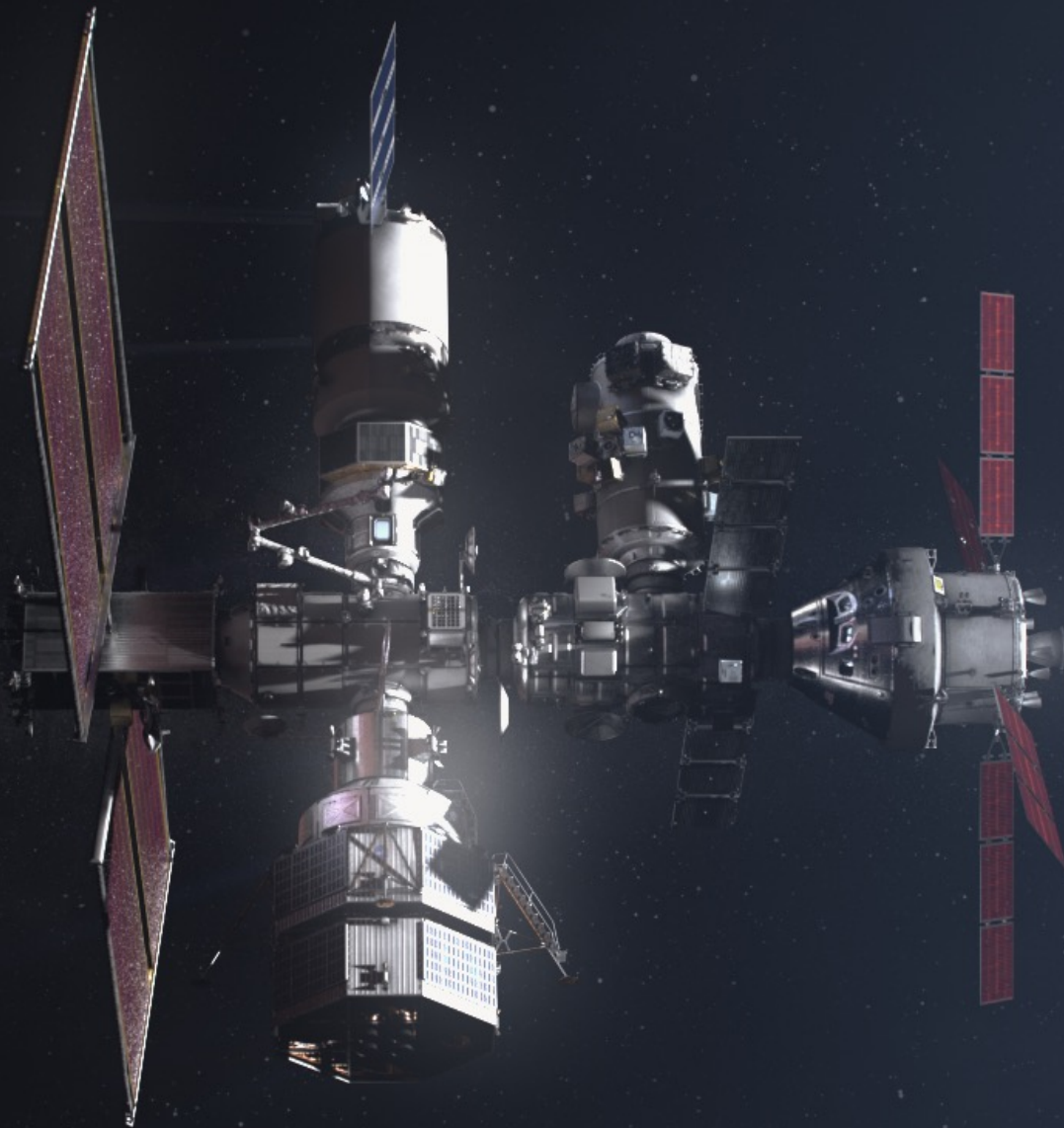
JSC Small Business Council Virtual Outreach Event

Emma Lehnhardt

Gateway Program PP&C Manager



G A T E W A Y





LUNAR MISSIONS

2021-2025

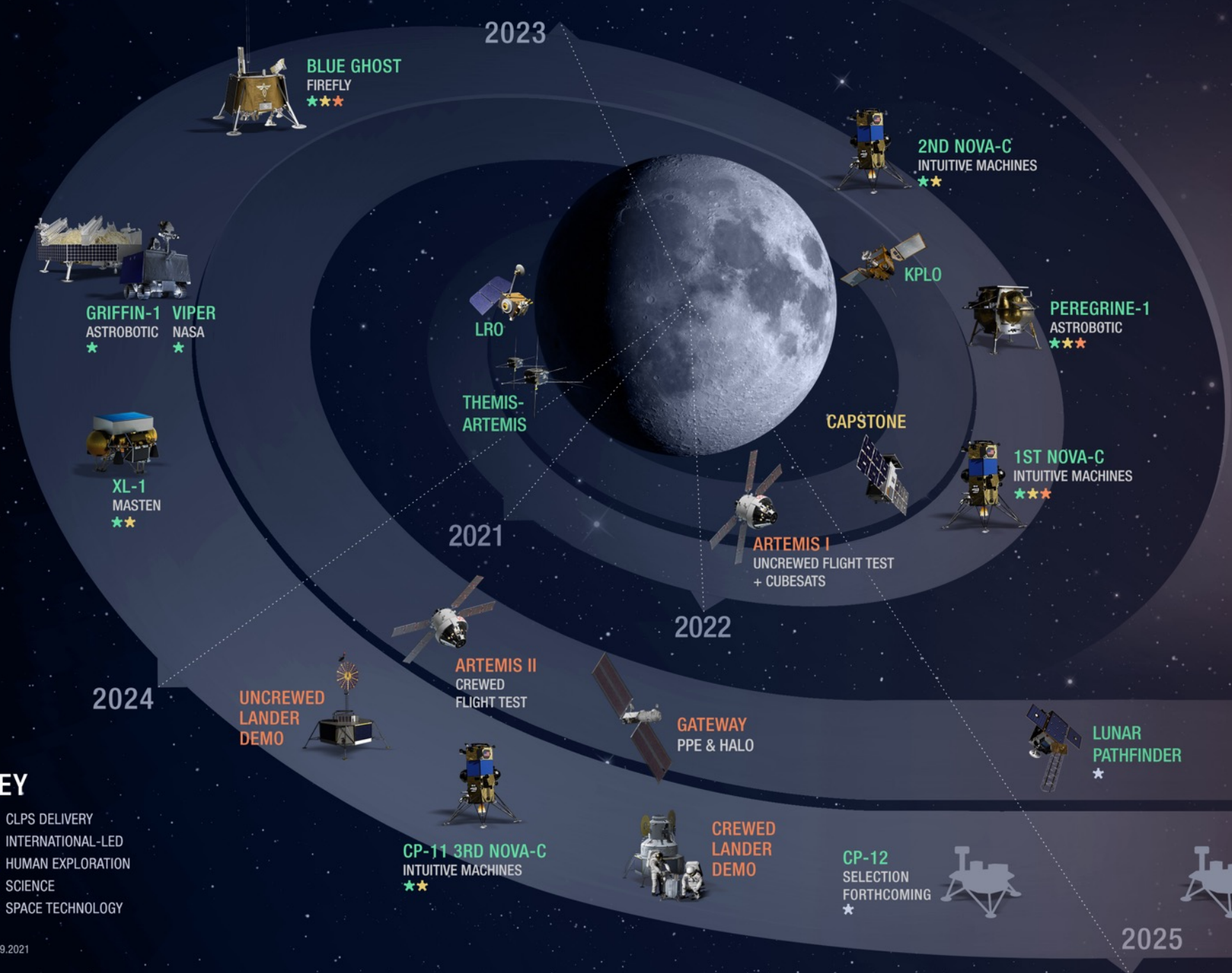
NASA CLPS DELIVERY GOALS

- | | |
|--|---|
| PEREGRINE-1
<ul style="list-style-type: none"> • Regolith volatiles composition • Local radiation environment | GRIFFIN-1 & VIPER
<ul style="list-style-type: none"> • Search for volatiles, below surface and in shadowed regions |
| 1ST NOVA-C
<ul style="list-style-type: none"> • Plume/surface interactions, charged particles near surface • Lander prop tank gauge test | 2ND NOVA-C
<ul style="list-style-type: none"> • Drilling for volatiles |
| XL-1
<ul style="list-style-type: none"> • Regolith volatiles composition • Surface terrain & mineralogy | BLUE GHOST
<ul style="list-style-type: none"> • Characterize Earth's magnetosphere and Moon's interior |

ORBITAL MISSIONS

SURFACE MISSIONS

- KEY**
- ★ CLPS DELIVERY
 - 🌐 INTERNATIONAL-LED
 - 👤 HUMAN EXPLORATION
 - 🔬 SCIENCE
 - 🚀 SPACE TECHNOLOGY





What is Artemis?

- Space Launch System Rocket
- Orion Crew Spacecraft
- Exploration Ground Systems
- Commercial Lunar Payload Services
- First Woman and First Person of Color on the Lunar Surface
- The Gateway in Lunar Orbit
- Artemis Base Camp
- Global Community on Earth, in Low-Earth Orbit, and in the Lunar Environment

GATEWAY



Vision

A Vibrant and Lasting Human Presence in Deep Space

Mission

Creating the cislunar springboard for cooperative and sustainable human deep space exploration

Values

Catalyze

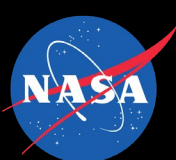
We drive innovation to enable exploration together

Impact

We create results that matter

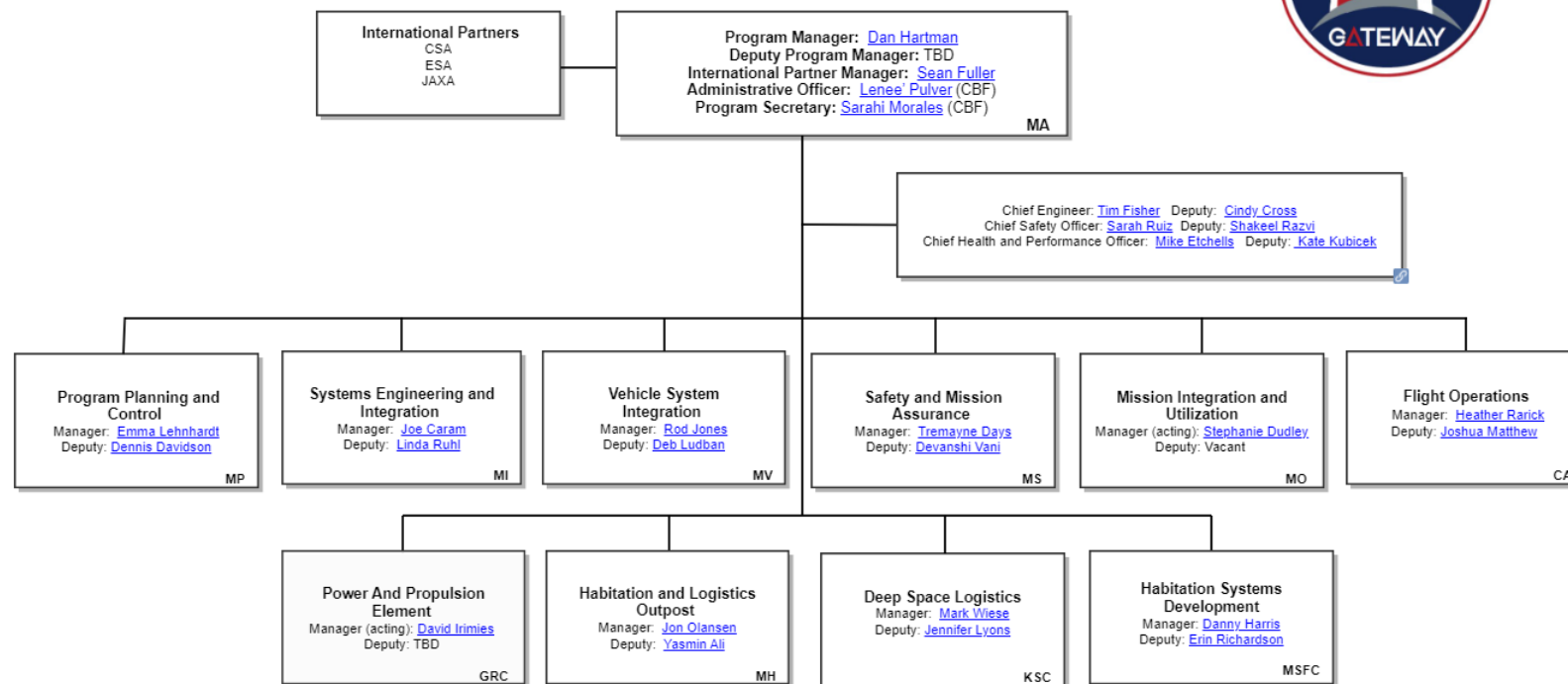
Focus

We remain aligned on our collective goals

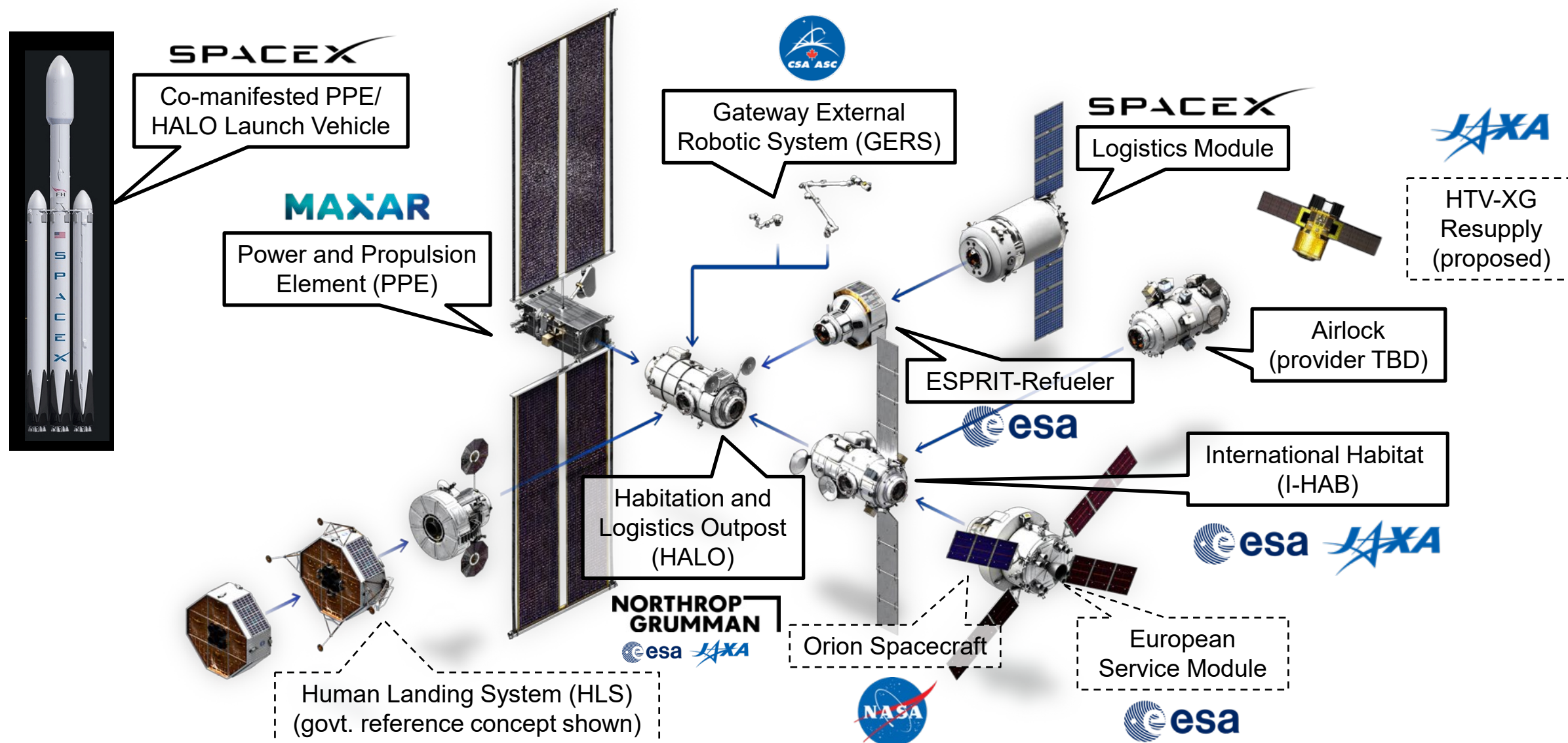


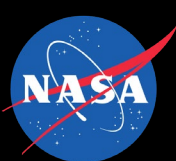
- The Gateway Program Office was established at JSC in Feb 2019
- International Partner MOUs with ESA, CSA, and JAXA signed in Dec 2020 - defining agency roles with contributions and benefits
- Business rhythm and governance established
 - Control boards, monthly element reviews, program quarterly reviews, risk boards
 - Relationships/Integration with International Partners, Prime contractors, Orion, and HLS well defined
- All early element contracts in place (less airlock)

Gateway Program Office

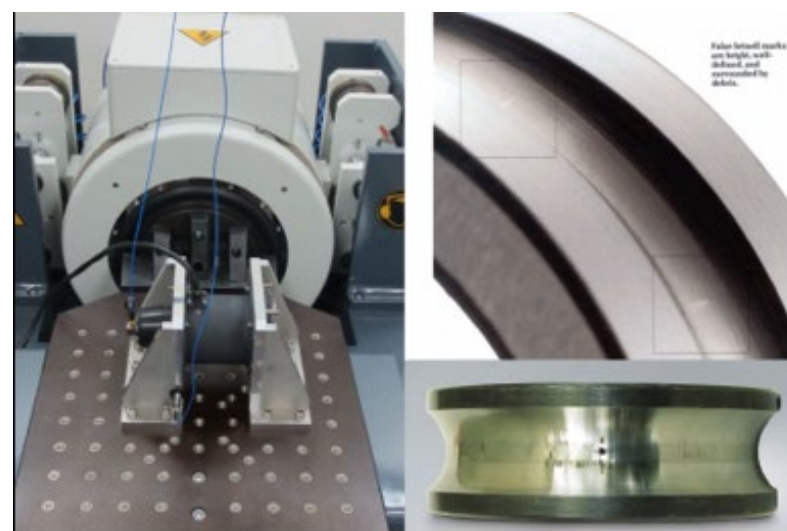
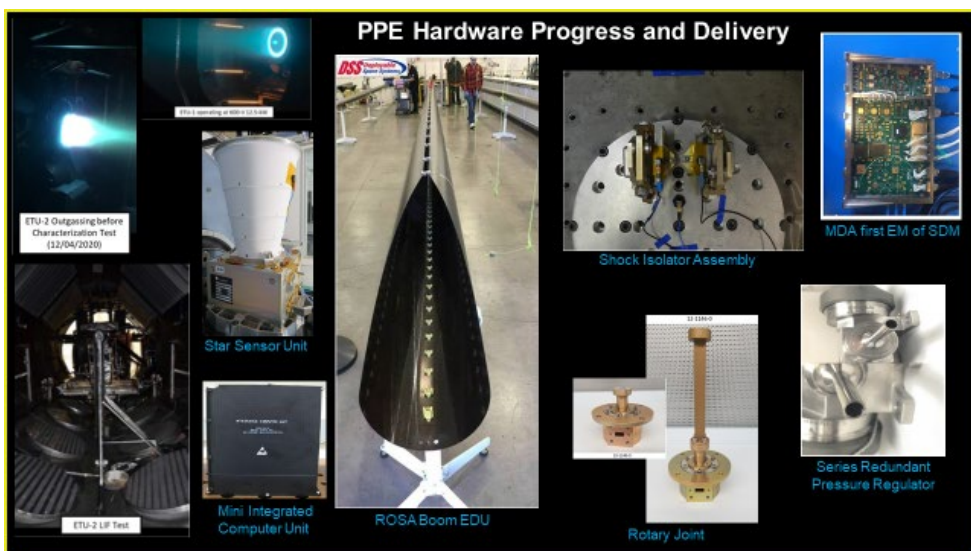


Daniel W. Hartman
Manager
1/15/22
Date





Gateway Hardware Development



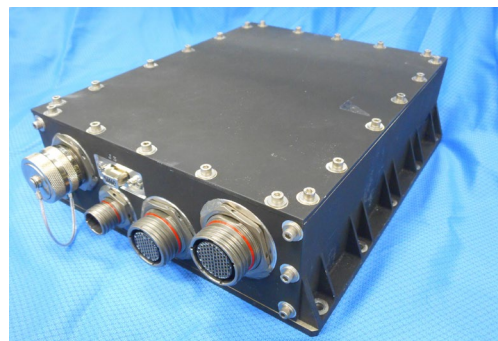
HALO Cabin Fan Bearing Vibe Testing



PPE/HALO/ESPRIT Refueling Breadboard



PPE ROSA Development Testing



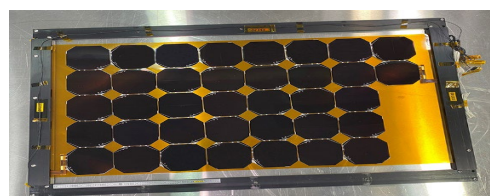
Flight Baseband Processor



Transponder EDU



HALO Mockup



PPE Flight Solar Cells



PPE Flight 144 Ah Li-Ion Battery



GSVL



GATEWAY



Initial capability

The two foundational elements of Gateway will launch together, establishing a platform where astronauts can live and work in lunar orbit

Power and Propulsion Element (PPE)

- High-power solar electric propulsion spacecraft
- Transfers the initial capability to lunar orbit
- Establishes a communications relay with Earth
- Maintains the Gateway's orbit

Habitation and Logistics Outpost (HALO)

- Houses up to 4 crew for up to 30 days (with Orion)
- Provides high-rate lunar communication relay to support lunar surface activities and command and control systems for Gateway
- Docking port for visiting spacecraft and future modules





Initial Gateway Science Payloads



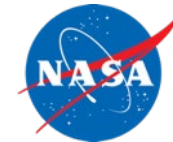
Gateway's orbit will offer unique opportunities for heliophysics, human health research, space biology and life sciences, astrophysics, and fundamental physics investigations. As new modules are added, science capability will increase.

Heliophysics Environmental Radiation Measurement Experiment Suite (HERMES): NASA's space weather instrument suite will observe lower energy solar particles critical to scientific investigations of the Sun including the solar winds

European Radiation Sensors Array (ERSA): The European Space Agency's (ESA) radiation instrument package will help provide an understanding of how to keep astronauts safe by monitoring the radiation at higher energies with a focus on space weather

ESA's Internal Dosimeter Array (IDA): Instruments including those provided by Japan Aerospace Exploration Agency (JAXA) will inform for improvements in radiation physics models for cancer, cardiovascular, and central nervous system effects, helping assess crew risk on exploration missions

GATEWAY



Expanded Capability

NASA and its international partners will add modules and capabilities, evolving a robust orbiting laboratory and a home away from home for astronauts on their way to and from the lunar surface. The Gateway will serve as a test bed and staging point for future human exploration into deep space.



Canadian Space Agency (CSA):

External robotics system, robotic interfaces, and end-to-end robotic operations



European Space Agency (ESA):

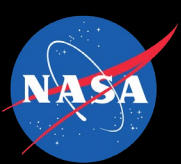
Provision of the International Habitat (I-HAB) and refueling modules, along with enhanced lunar communications



The Japan Aerospace Exploration Agency (JAXA):

I-HAB's environmental control and life support system, batteries, thermal control, and imagery components





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