

GATEWAY



The Gateway as a Building Block for Space Exploration and Development 2022 International Astronautical Congress

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Session: Strategies & Architectures as the Framework for Future Building Blocks in Space Exploration and Development

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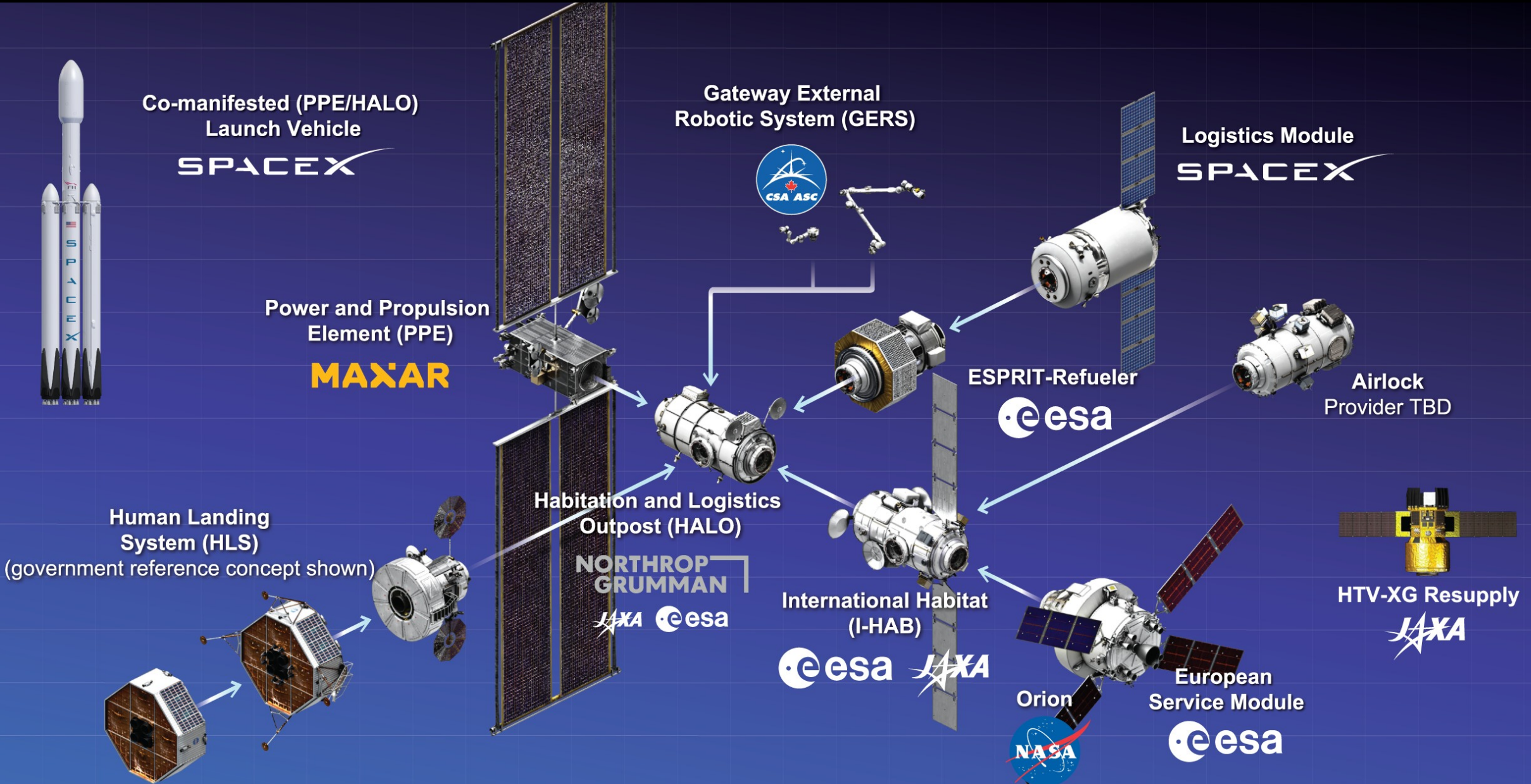
Introduction

- **This presentation provides:**
 - A brief Introduction and Overview of Gateway (the Program, and the integrated spacecraft)
 - A short discussion of Gateway's elements, International Partnerships, and current assembly sequence
 - Outline Gateway as a building block for space exploration and development



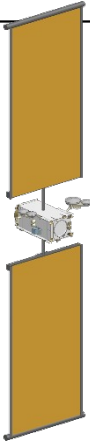
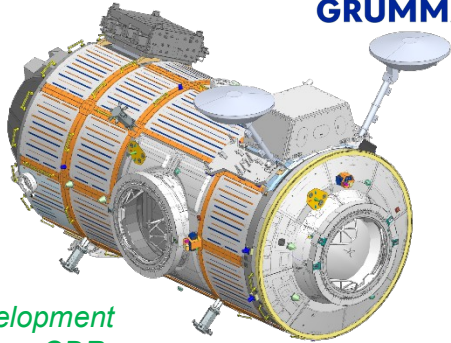
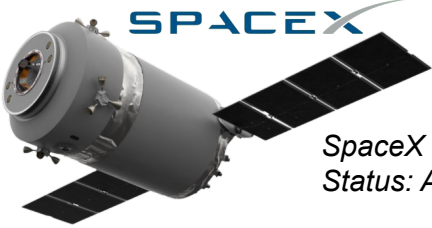
- **Gateway Program is hosted at the Johnson Space Center (JSC) in Houston, Texas with additional project offices at different NASA Centers**
 - Glenn Research Center (GRC) in Cleveland, Ohio
 - Marshall Space Flight Center (MSFC) in Huntsville, Alabama
 - Kennedy Space Center (KSC) in Cape Canaveral, Florida
- **Gateway partnerships with agencies around the world**
 - Canadian Space Agency (CSA)
 - European Space Agency (ESA)
 - Japan Aerospace Exploration Agency (JAXA)

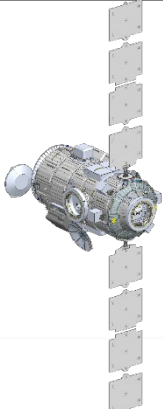
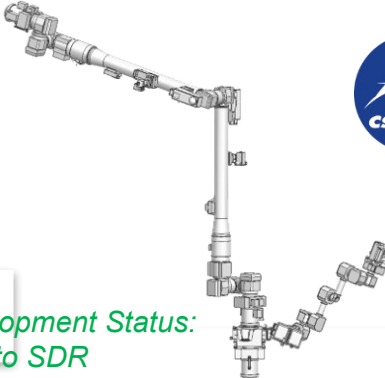
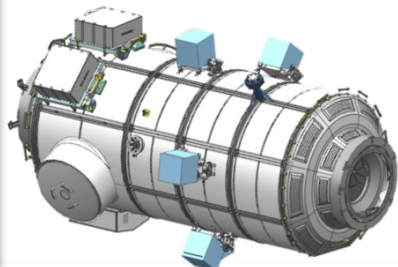
Gateway Integrated Spacecraft





Gateway Elements, Acquisition Strategy, and Status

Name: Power and Propulsion Element	Name: Habitation and Logistics Outpost (HALO)	Name: Commercial launch service	Name: Deep Space Logistics
Acq Strategy: Buy – on contract - FFP	Acq Strategy: Buy – on contract – FFP	Acq Strategy: Buy – on contract - FFP	Acq Strategy: Partner and Buy – on contract - FFP
Managed by: GRC	Managed by: JSC	Managed by: KSC - LSP	Managed by: KSC
  <i>Development Status: PDR to CDR</i>	  <i>Development Status: CDR</i>	 	  SpaceX Development Status: Awaiting ATP HTV-XG development status: Derivative of HTV-X1, planned to ISS in 2023

Name: International Hab (I-HAB)	Name: Gateway External Robotics System	Name: ESPRIT Refueler Module (ESPRIT-RM)	Name: Airlock
Acq Strategy: Partner (TASI) – on contract	Acq Strategy: Partner (MDA) – on contract	Acq Strategy: Partner (TAS-F) – on contract	Acq Strategy: Partner (TBD)
Managed by: European Space Agency with JAXA	Managed by: Canadian Space Agency	Managed by: European Space Agency	Managed by: TBD
   <i>Development Status: PDR to CDR</i>	  <i>Development Status: SRR to SDR</i>	  <i>Development Status: SRR</i>	 <i>Development Status: Awaiting partnership; SRD near finalized</i> USG reference graphic



Gateway – New approaches, applying lessons learned, ensuring mission success

- **Applying Lessons Learned from other Programs and Leveraging Heritage Hardware**

- Enhancement of proven spaceflight hardware
 - Cygnus ⇨ HALO and both ESA I-HAB/ERM
 - Maxar 1300 bus ⇨ IROSA ⇨ PPE
 - ISS Cargo Resupply ⇨ GLS
 - CSA robotics from Shuttle ⇨ ISS ⇨ Canadarm3
 - ESA ISS Columbus Module ⇨ I-HAB
 - JAXA ISS JEM ITCS and ECLS ⇨ I-HAB
 - JAXA HTV ⇨ HTV-XG
- Leveraging investments from other Programs
- Acquisition strategy centered on Firm Fixed Price contracts

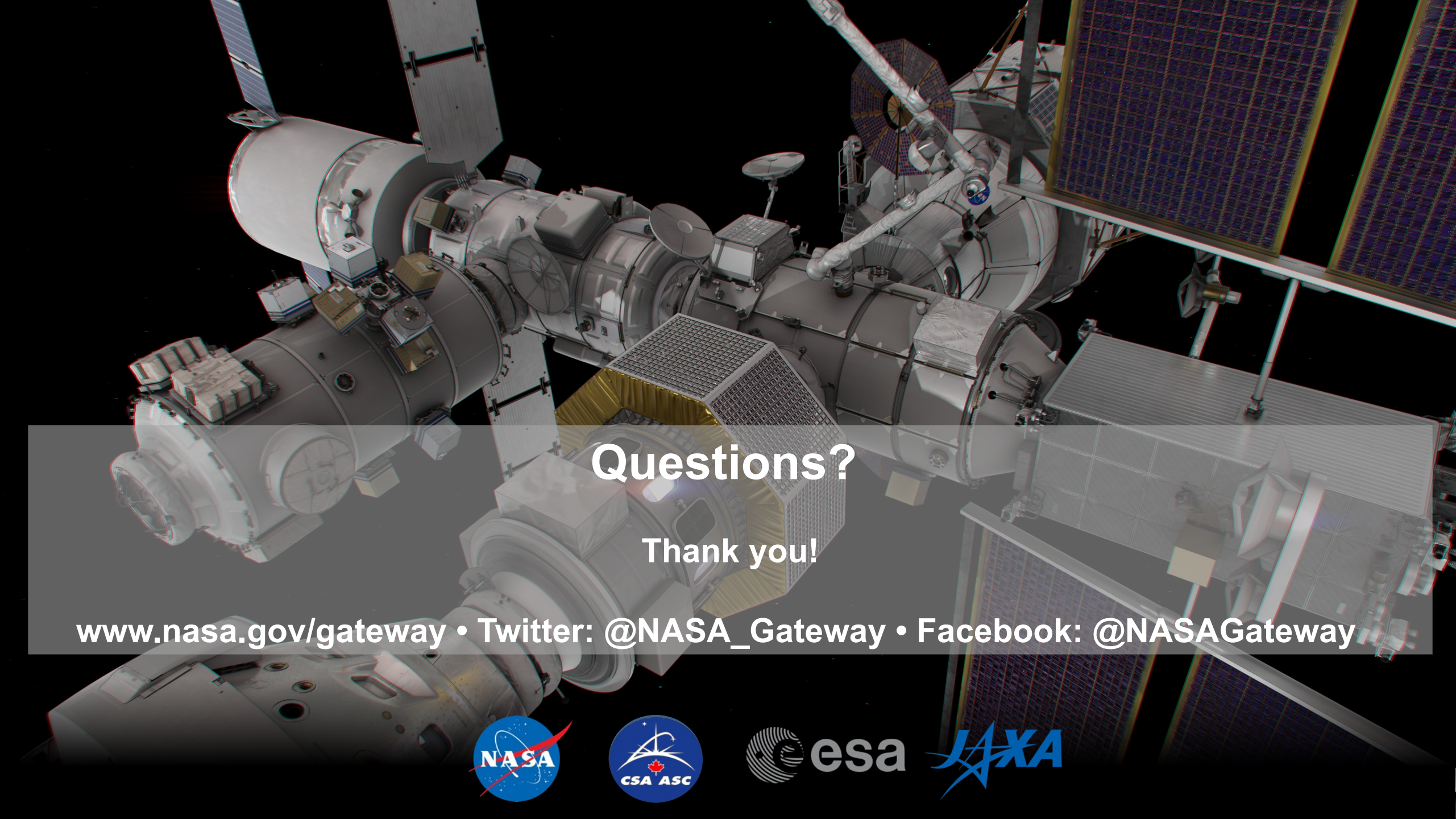
- **New and/or Different**

- Small program office
- Bringing in new industry partners (and subs) into human space flight (example: Maxar)
- IPs are embedded partners, involved in Gateway day-to-day technical integration and management
- Delegation of safety – to projects, to Partners
- Application of Model-Based Systems Engineering
- Solar Electric Propulsion (12 kW AEPS), Refueling
 - Xenon and RCS transfer
- Quiescent & uncrewed operations (autonomy, Mars-forward capability)
- Unique orbit – stable and constant view of Earth, near-constant communications
- Emphasis on reliability
- Ability to access entire lunar surface



Gateway and Exploration Building Blocks

- **“Building blocks” for the future incorporated/demonstrated with Gateway – examples:**
 - Interoperability Standards
 - Solar Electric Propulsion
 - Small, lightweight, stowable solar arrays
 - Autonomy and uncrewed operations
 - Research of deep space radiation environment
- **Discussion of future opportunities and building blocks**



Questions?

Thank you!

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