



5...4...3...2...1...

SPACE LAUNCH SYSTEM

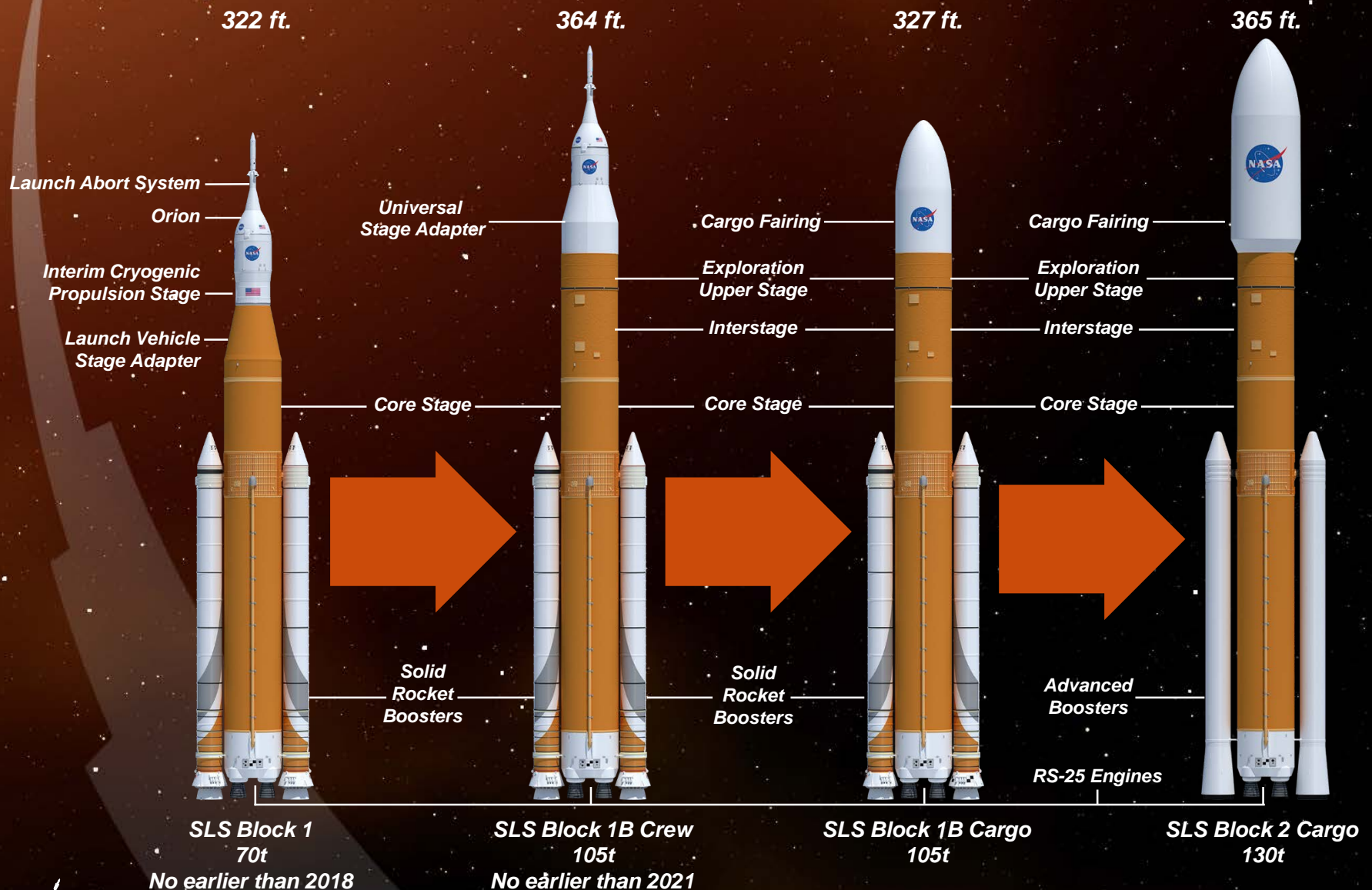
SLS Trans Lunar Payload Delivery Capability
Overview

David Alan Smith
Space Launch System

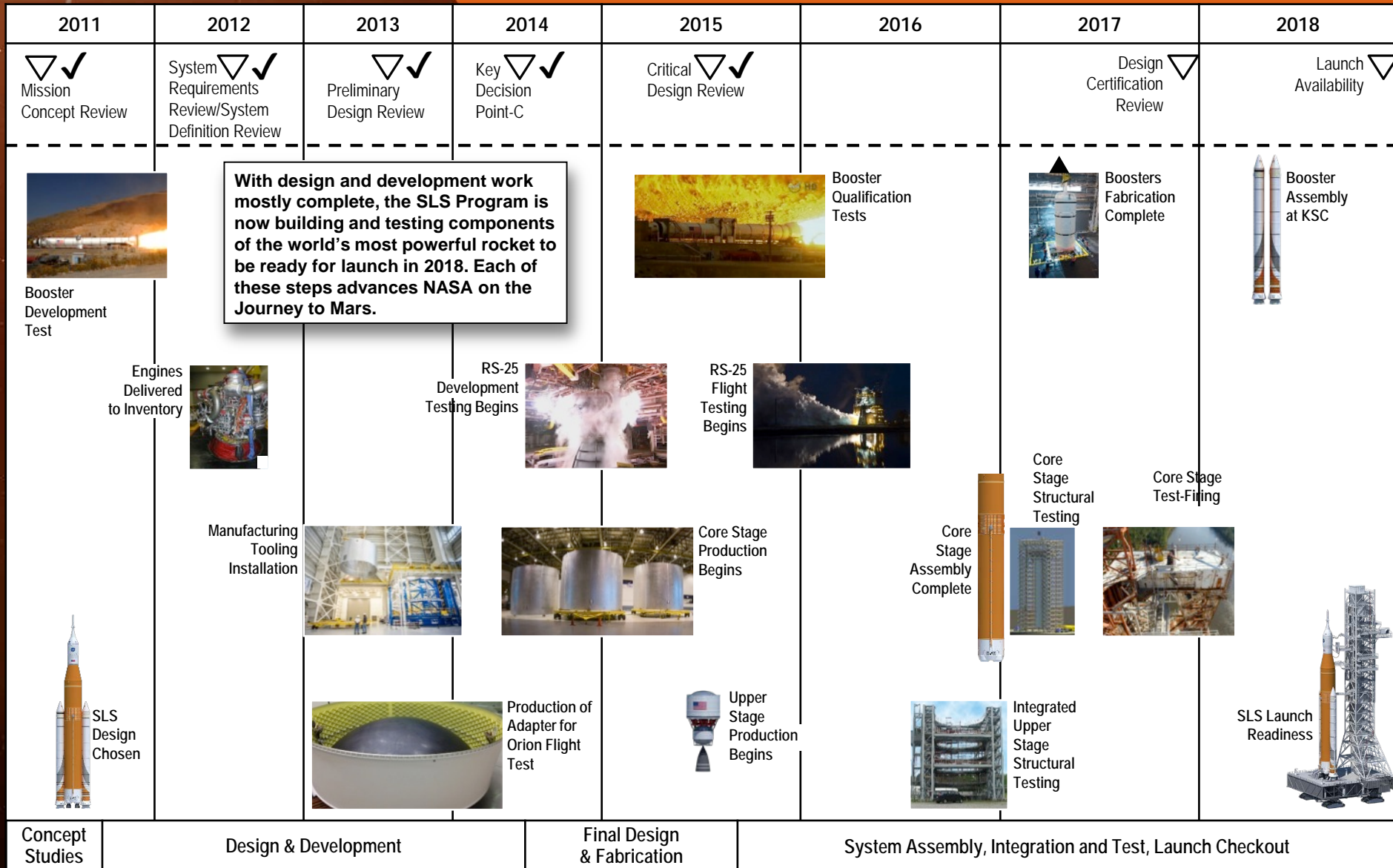
1 November 2016
david.a.smith-3@nasa.gov
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SLS Evolution Overview



Space Launch System Path to the Pad



With design and development work mostly complete, the SLS Program is now building and testing components of the world's most powerful rocket to be ready for launch in 2018. Each of these steps advances NASA on the Journey to Mars.

Recent Progress Toward Launch



Core Stage production at Michoud



Booster testing at Orbital ATK



Engine testing at Stennis Space Center



Test stand construction at Marshall



Stage adapter welding at Marshall

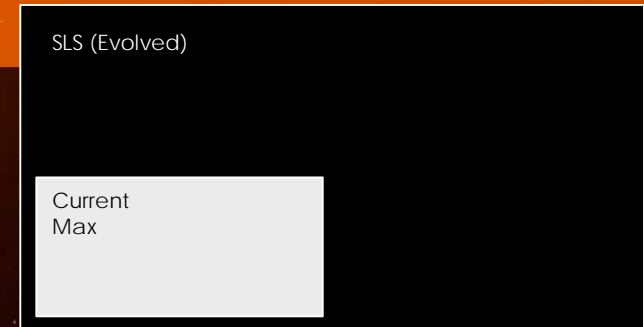


Upper stage production at ULA

Benefits of Space Launch System

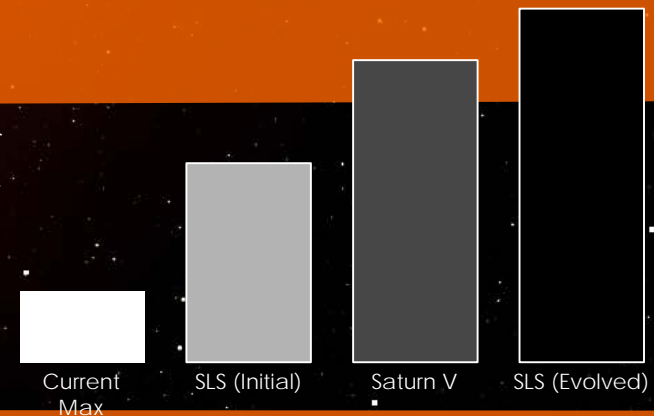
Volume

- Space Launch System will be able to offer payload accommodations with five times more volume than any contemporary launch vehicle.
- Payload fairings of up to 10-meter diameter are planned.



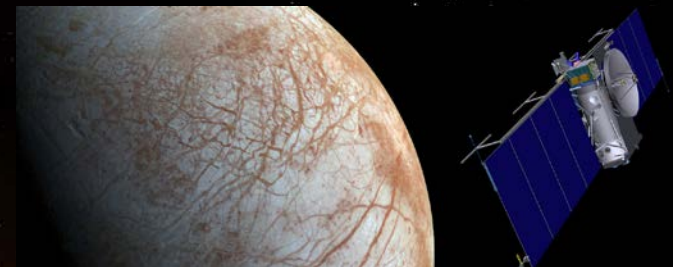
Mass

- Space Launch System will offer an initial capability of greater than 70 metric tons to low Earth orbit; current U.S. launch vehicle maximum is 28 t.
- Evolved version of SLS will offer greatest-ever capability of greater than 130 t to LEO.

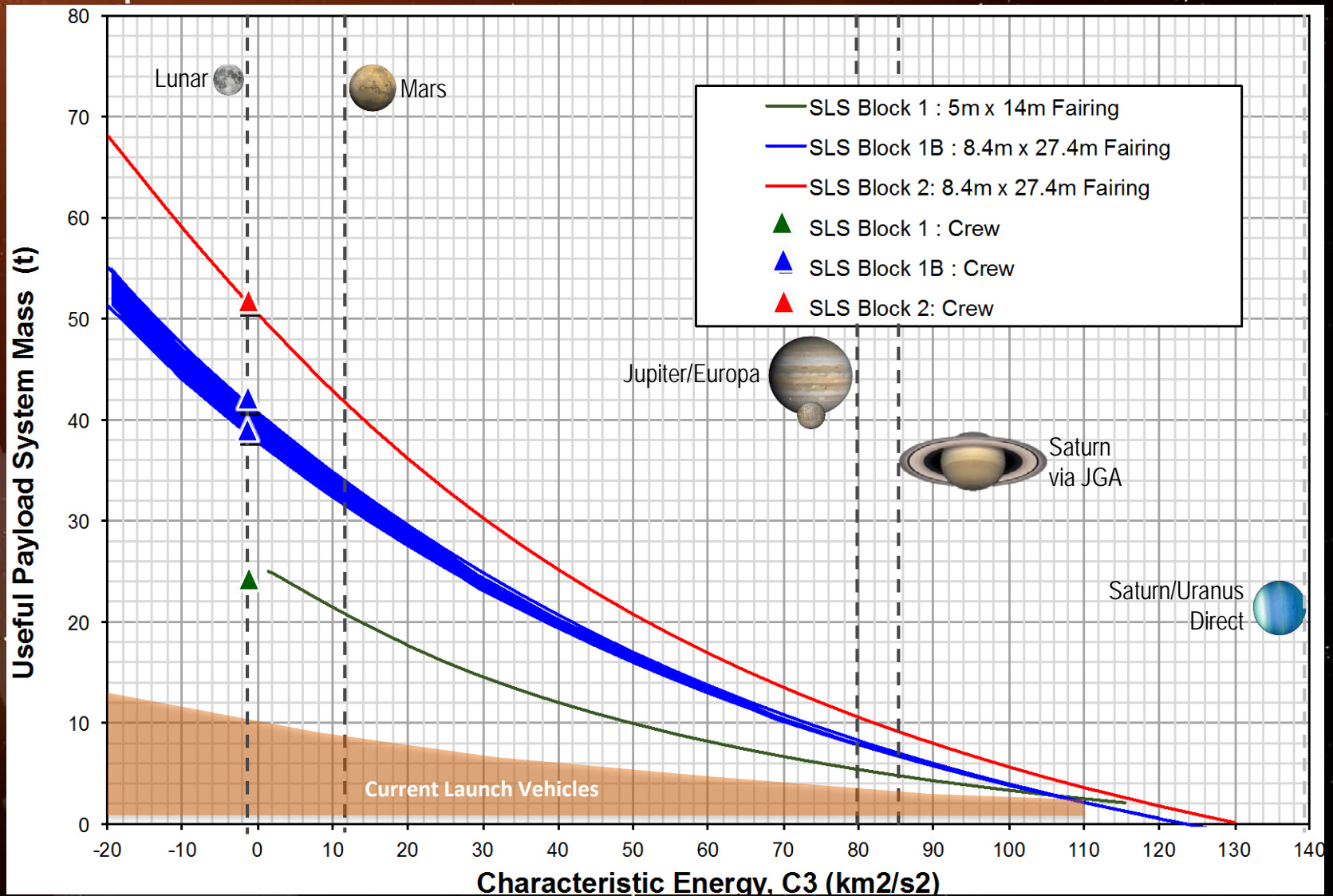


Departure Energy

- SLS offers reduced transit times to the outer solar system by half or greater.
- Higher characteristic energy (C3) also enables larger payloads to destination.



SLS Payload Mission Capture

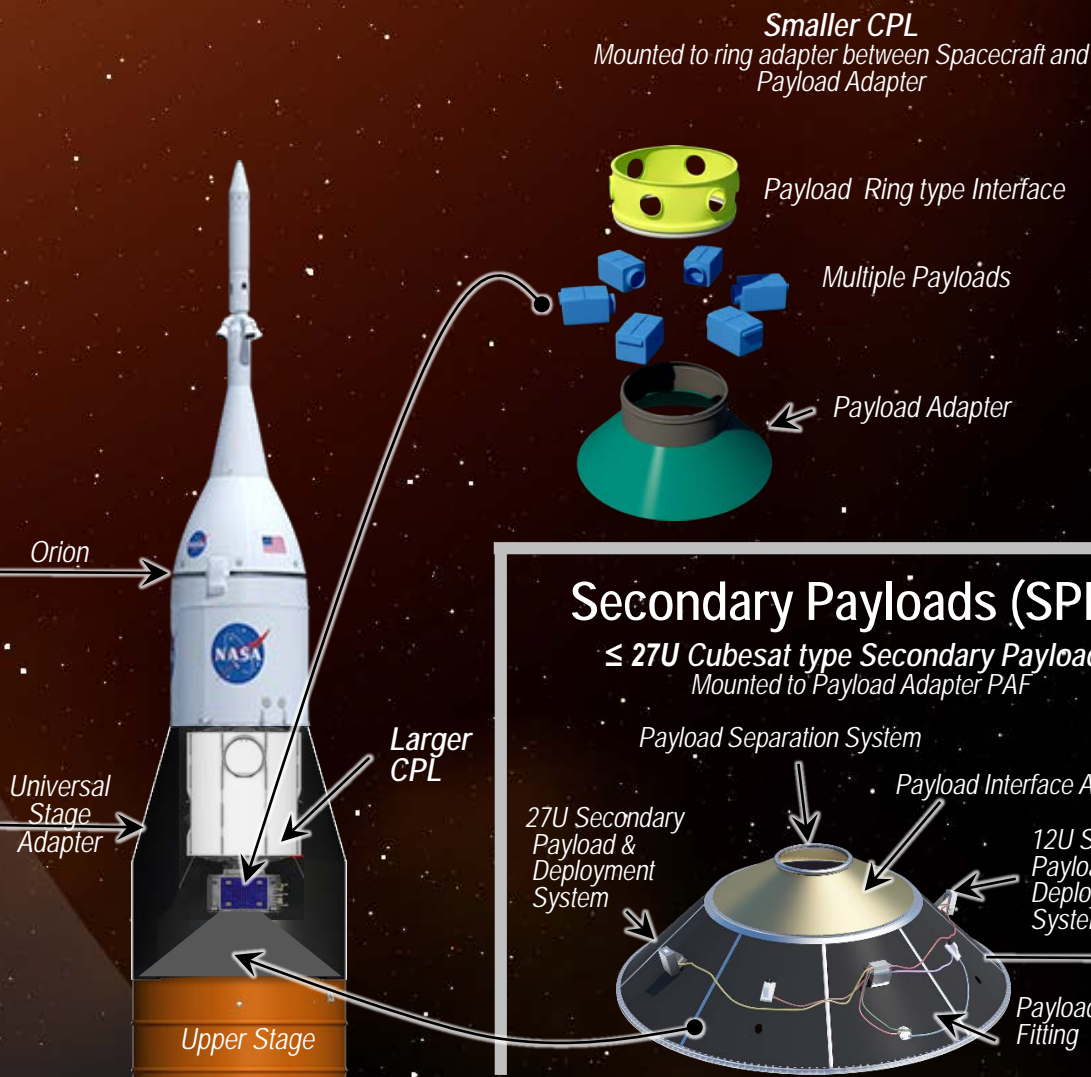


Range of SLS Spacecraft/Payload Types

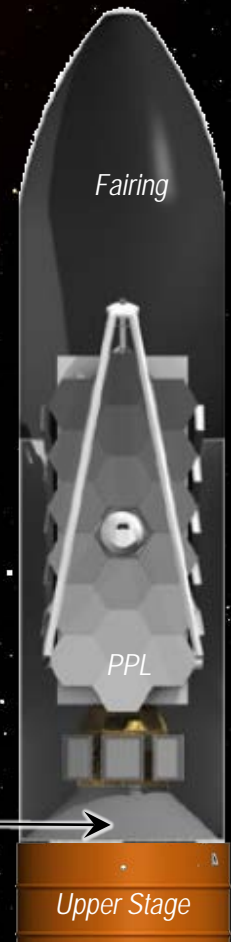
Orion Spacecraft



Orion Co-Manifested Payload (CPL)



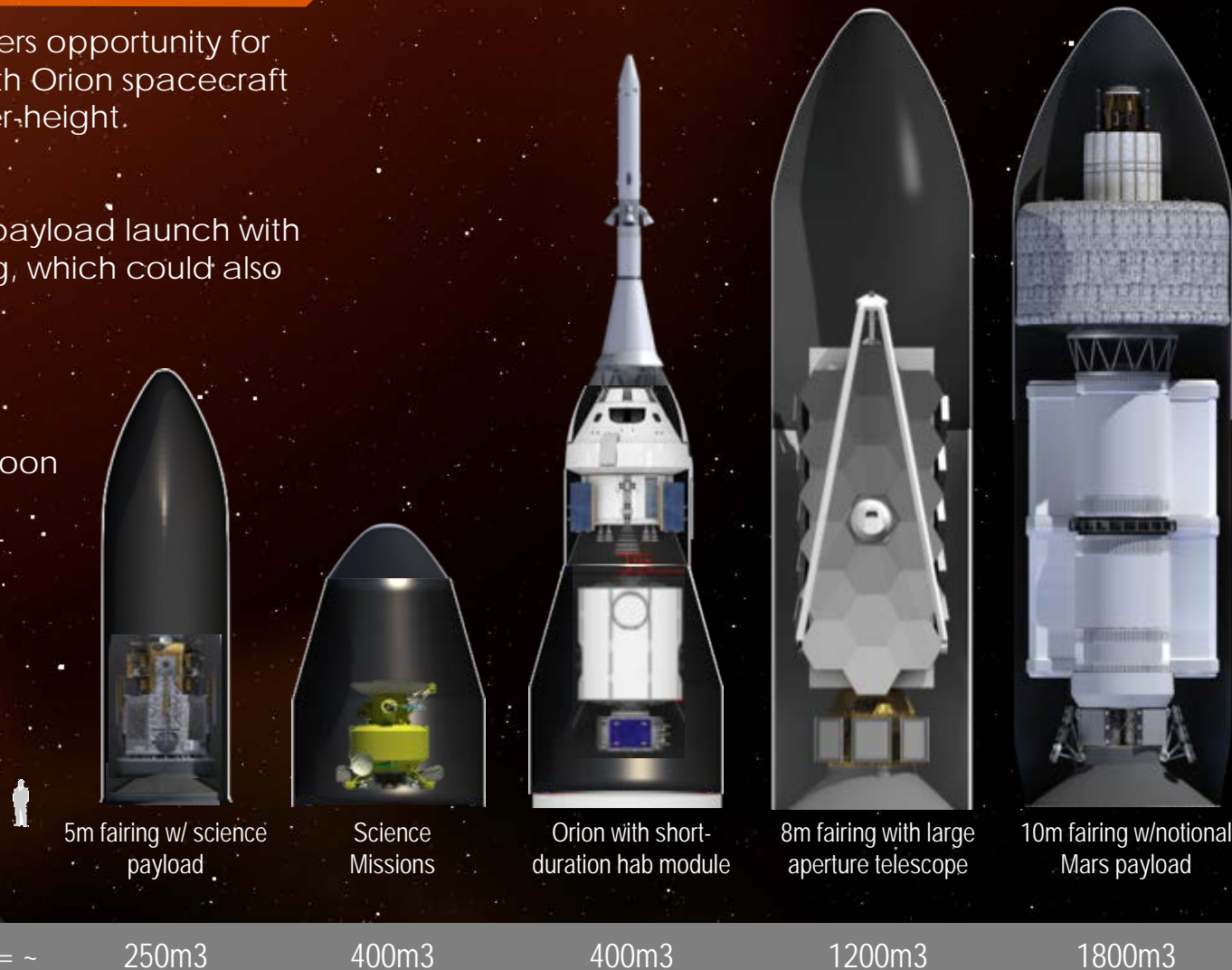
Primary Payload (PPL)



SLS Payload Accommodations

Fairing Availability

- ◆ Universal Stage Adapter offers opportunity for co-manifested payloads with Orion spacecraft or near-term 8.4-meter lower-height accommodations.
- ◆ USA can also support dual-payload launch with industry-standard 5-m fairing, which could also fly on Block 1 configuration
- ◆ Universal Stage Adapter accommodations early as soon as 2023; 8.4- and 10-meter fairings available in the mid- and late-2020s, respectively.



total mission volume = ~

250m³

400m³

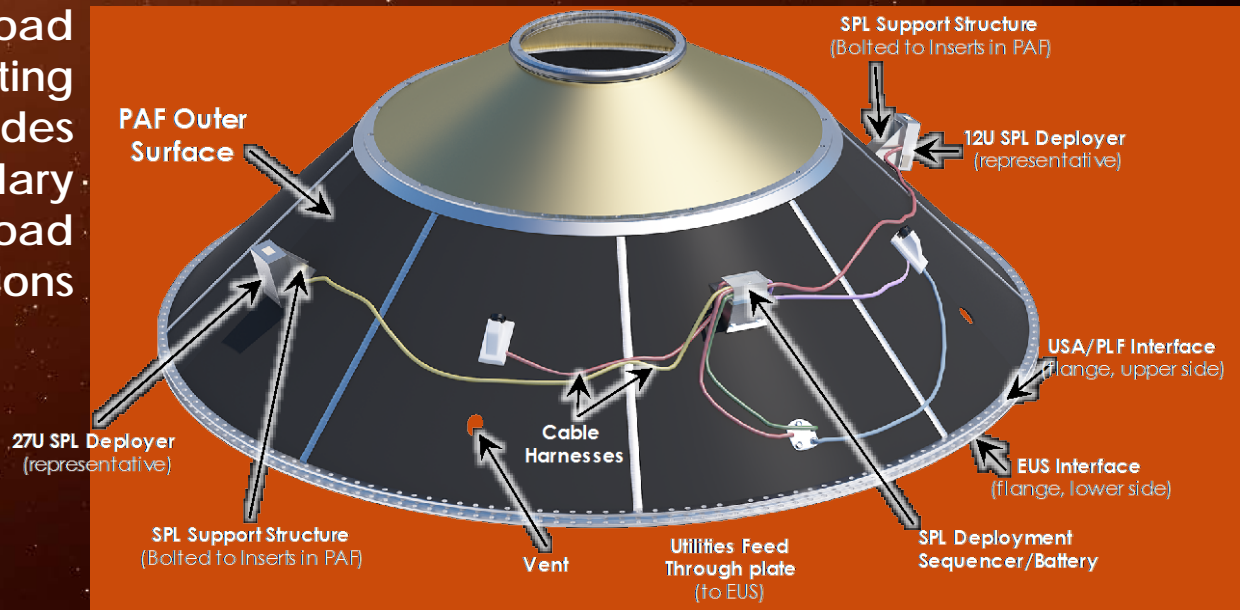
400m³

1200m³

1800m³

Secondary Payload Capability

SLS Payload Attach Fitting (PAF) provides Secondary Payload accommodations



- Block 1B vehicle offers up to seven 12U to 27U payload locations (or their volume equivalent) on the PAF outer face
- Payloads will be “off” from roll-out through Orion separation and payload deployment
- Payload Deployment System Sequencer; payload deployment will begin with pre-loaded sequence following Orion separation and Upper Stage disposal burn
- Payload requirements captured in a Interface Definition and Requirements Document



One Launch, Multiple Disciplines

The first SLS launch will carry 13 6U smallsats, representing multiple disciplines and partners. The smallsats will be deployed from the Orion Stage Adapter.

Moon

- Lunar Flashlight (NASA)
- Lunar IceCube (Morehead State University)
- LunaH-Map (Arizona State University)
- Omotenashi (JAXA)

Asteroid

- NEA Scout

Sun

- CuSP (Southwest Research Institute)



Earth

- EQUULEUS (JAXA)
- Skyfire (Lockheed Martin)



And Beyond

- Biosentinel (NASA)
- ArgoMoon (ESA/ASI)
- Three Centennial Challenge Winners (TBD)





NextSTEP and
Future Capacities Team (FCT)



Europa
Clipper



Potential Near Term SLS Missions

Timeframe: 2021- 2025

Resource
Prospector

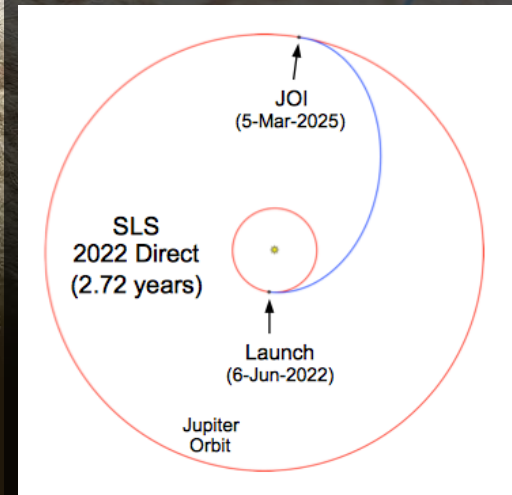
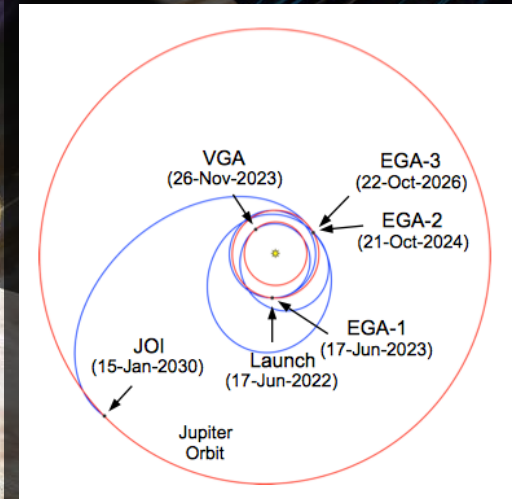
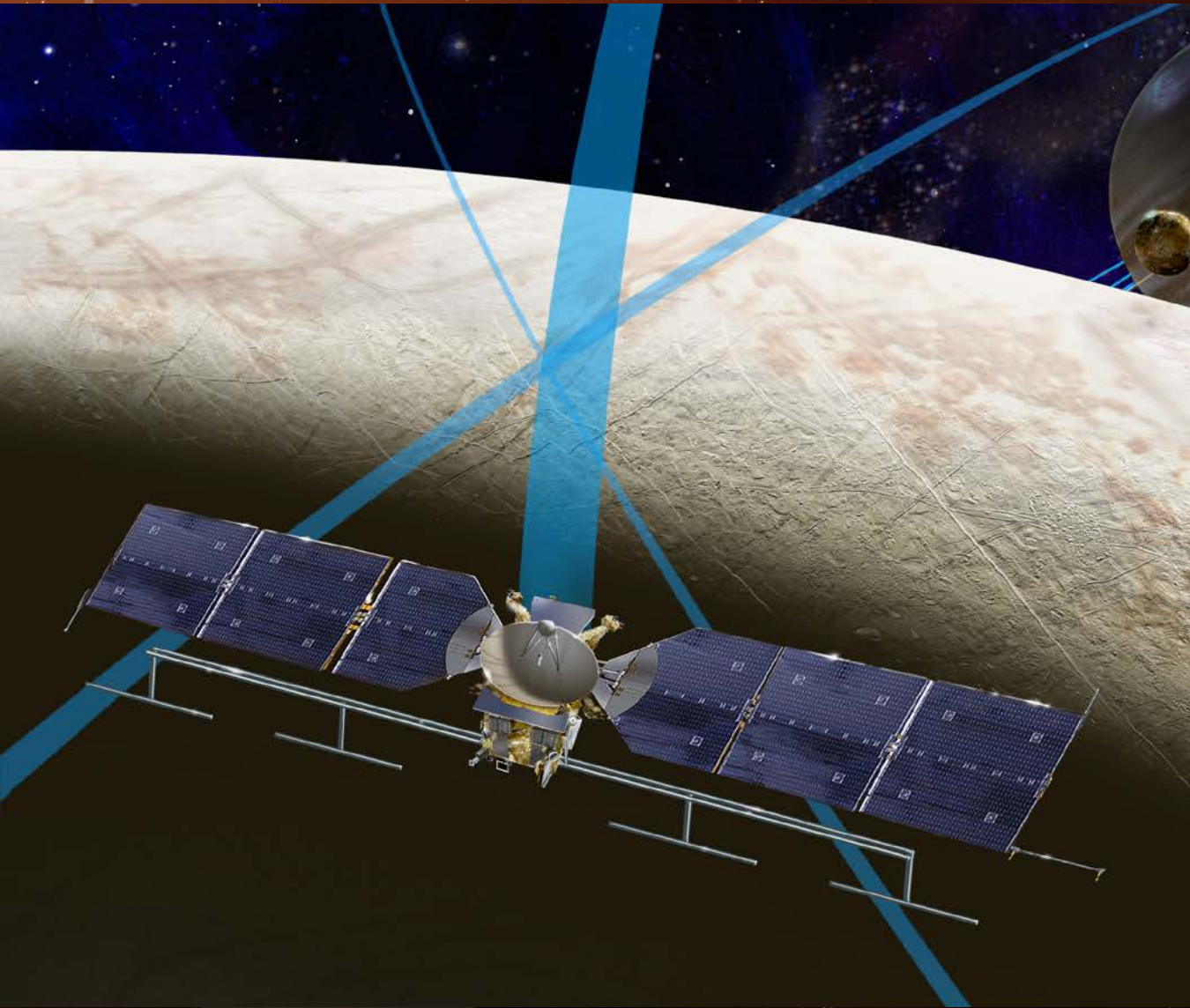


Asteroid Redirect Crew Mission
(ARCM)

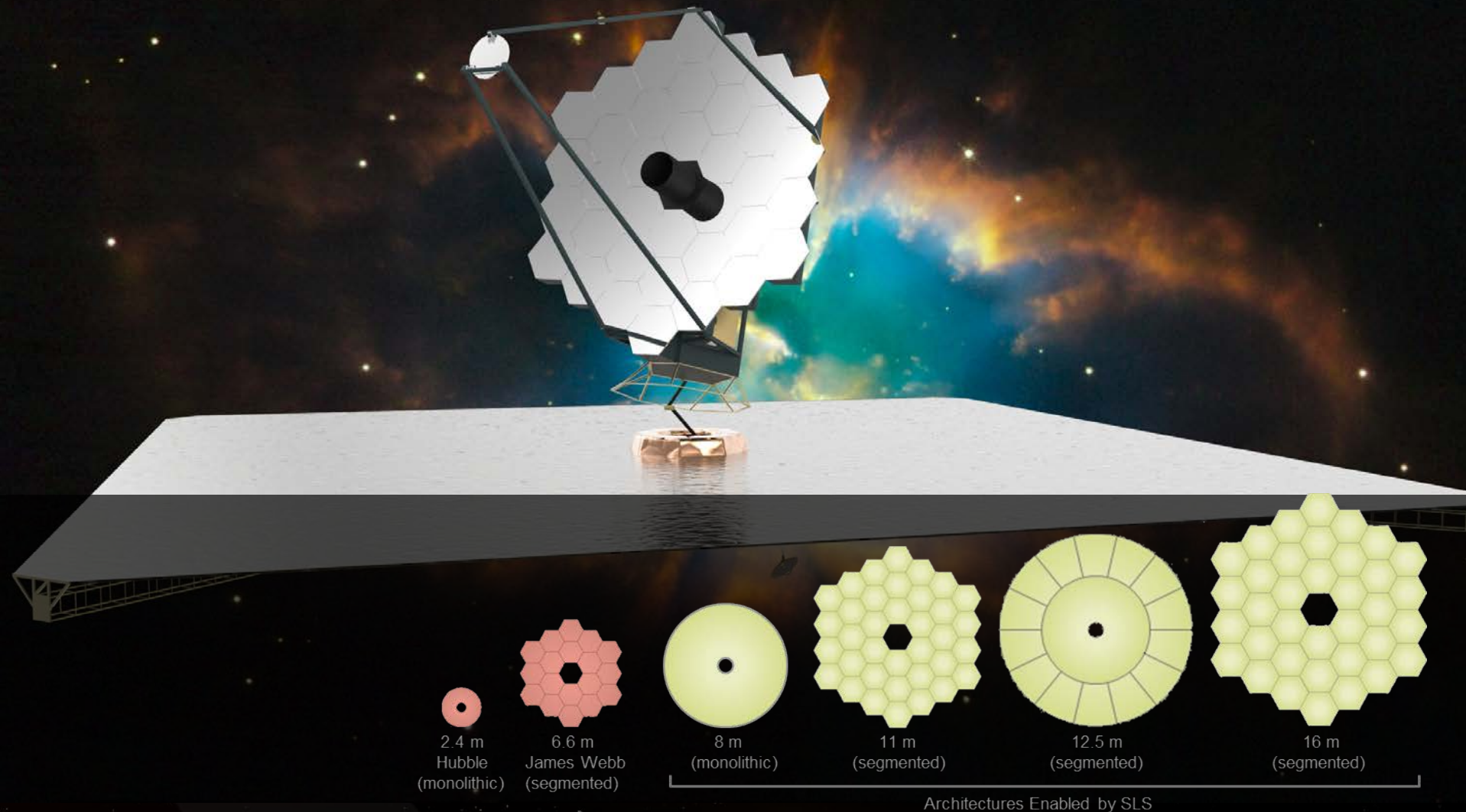


Super
Secondaries

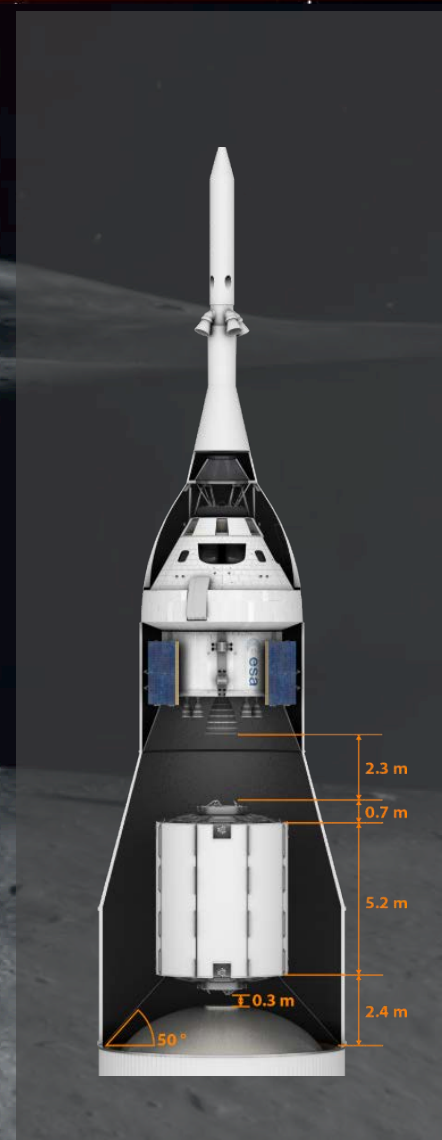
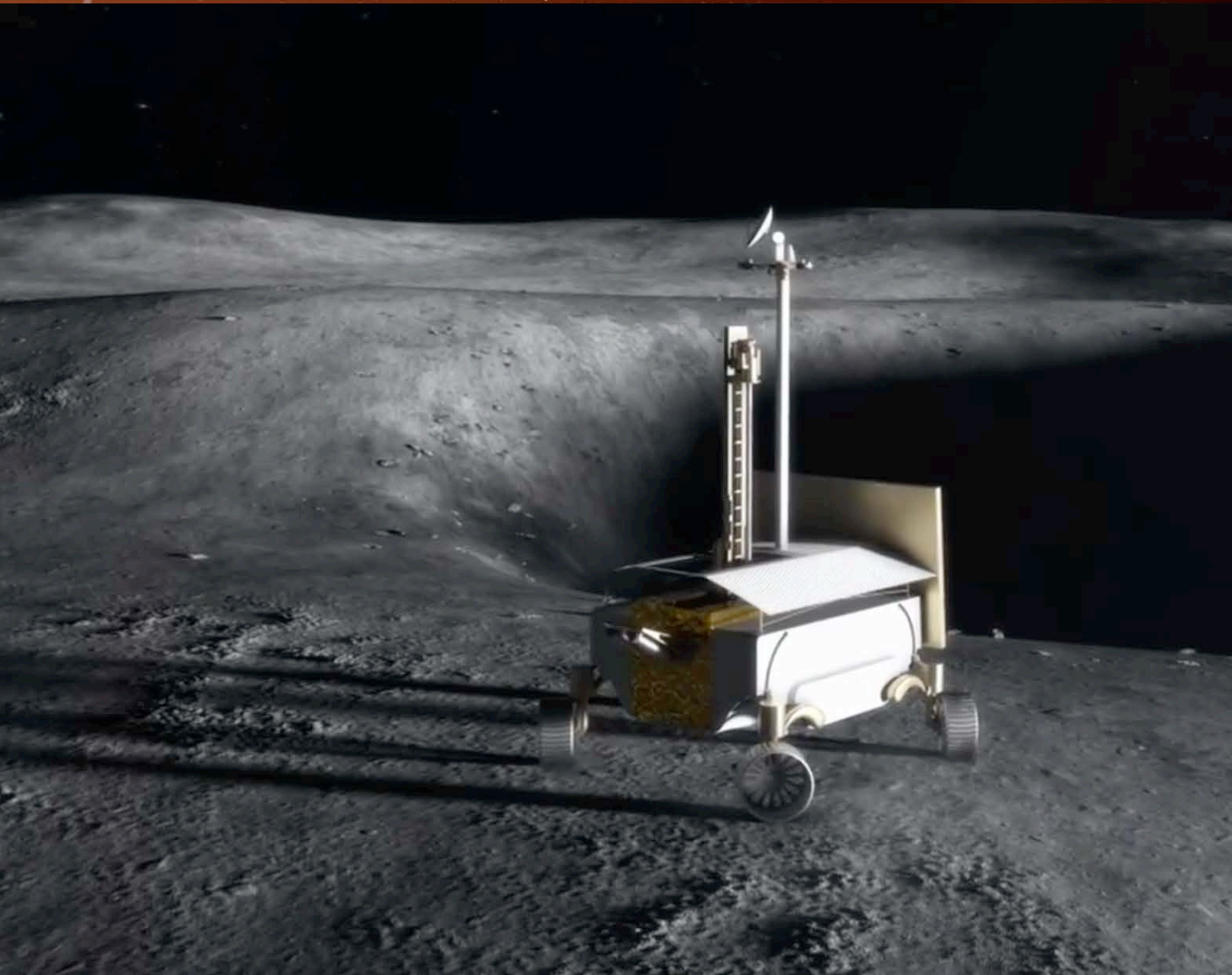
Utilization of SLS Departure Energy



Utilization of SLS Volume



Utilization of SLS Co-Manifest Capabilities



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