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National Aeronautics and Space Administration

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SPACE LAUNCH SYSTEM

A NEW CAPABILITY FOR DISCOVERY

Steve Creech
NASA Space Launch System
October 13, 2017

www.nasa.gov/sls

SLS CAPABILITY AVAILABILITY

SLS Block 1
As Early As 2019

Provides

Initial Heavy-Lift Capability

Enables

Orion Test

SmallSats to Deep Space

SLS Block 1B Crew
As Early As 2022

Provides

105 t lift capability via Exploration Upper Stage

Co-manifested payload capability in Universal Stage Adapter

Enables

Deep Space Gateway

Larger CubeSat- and ESPA-Class Payloads

SLS Block 1B Cargo
As Early As 2022

Provides

8.4-meter fairings for primary payloads

Enables

Europa Clipper/Lander

Deep Space Transport

Ice or Ocean Worlds Missions

Large-Aperture Space Telescopes

SLS Block 2
As Early As 2028

Provides

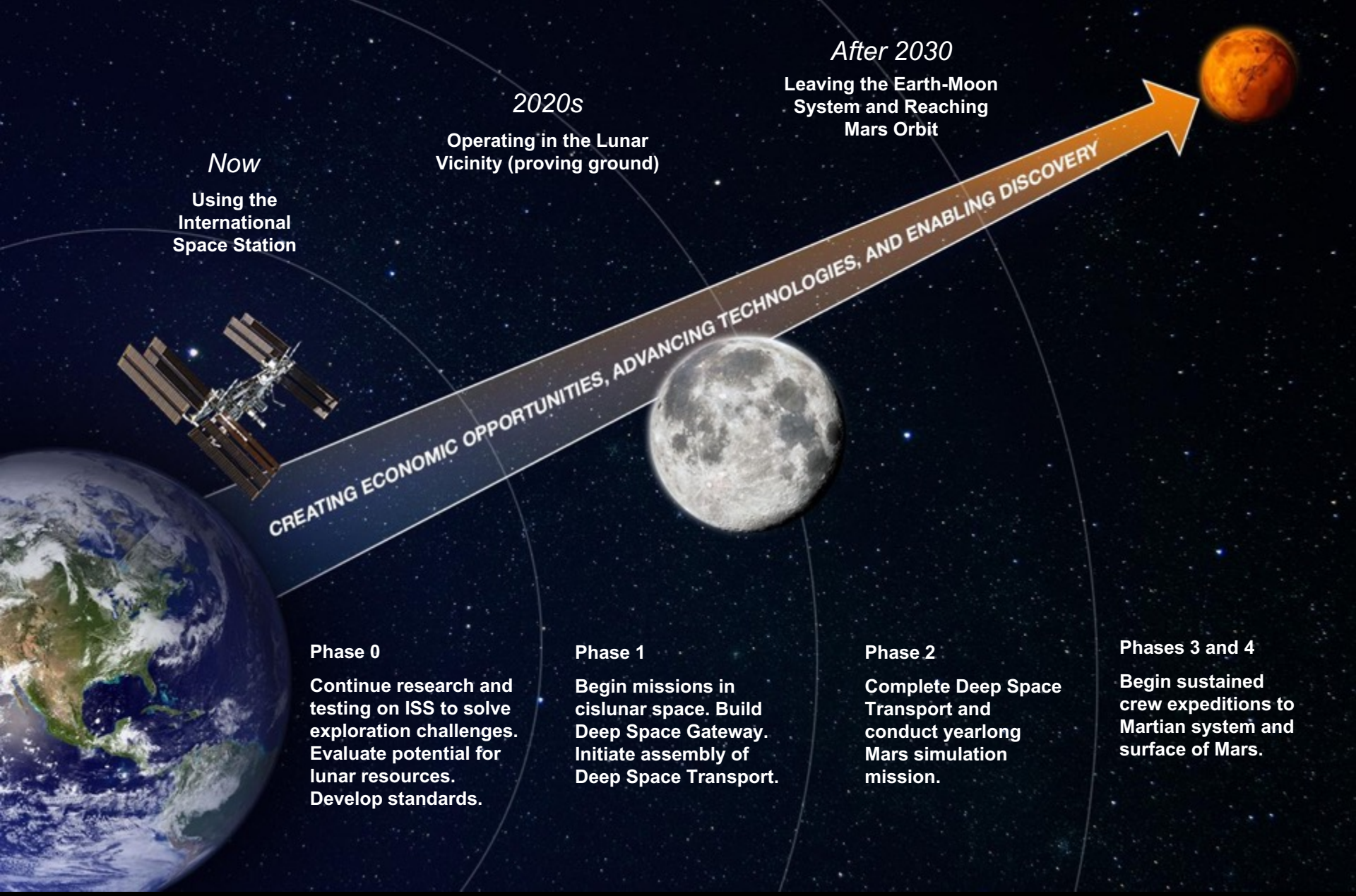
130 t lift capability via advanced boosters

10-meter fairings for primary payloads

Enables

Crewed Mars Orbit Missions

Crewed Mars Surface Missions



A PHASED APPROACH TO HUMAN SPACEFLIGHT

SLS PLAYS A KEY ROLE INTO THE 2030s

0368.3

BOOSTER PROGRESS

CORE STAGE PROGRESS

ENGINE PROGRESS

IN-SPACE STAGE AND ADAPTER PROGRESS

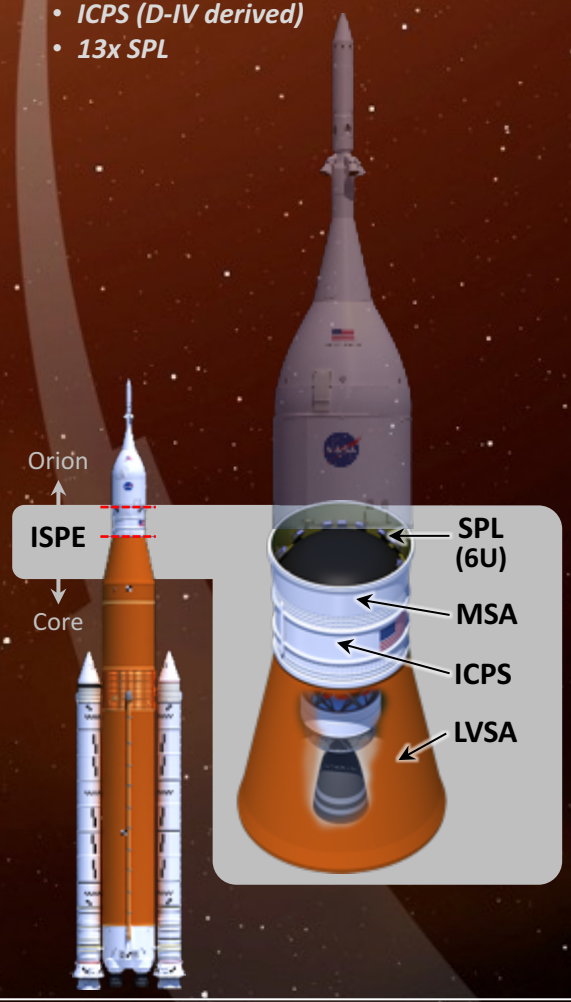
SLS SPACECRAFT/PAYLOAD INTEGRATION & EVOLUTION (SPIE)

ISPE HARDWARE DEVELOPMENT & PAYLOAD INTEGRATION FOR SLS MISSIONS

SLS Block 1

Test Flight

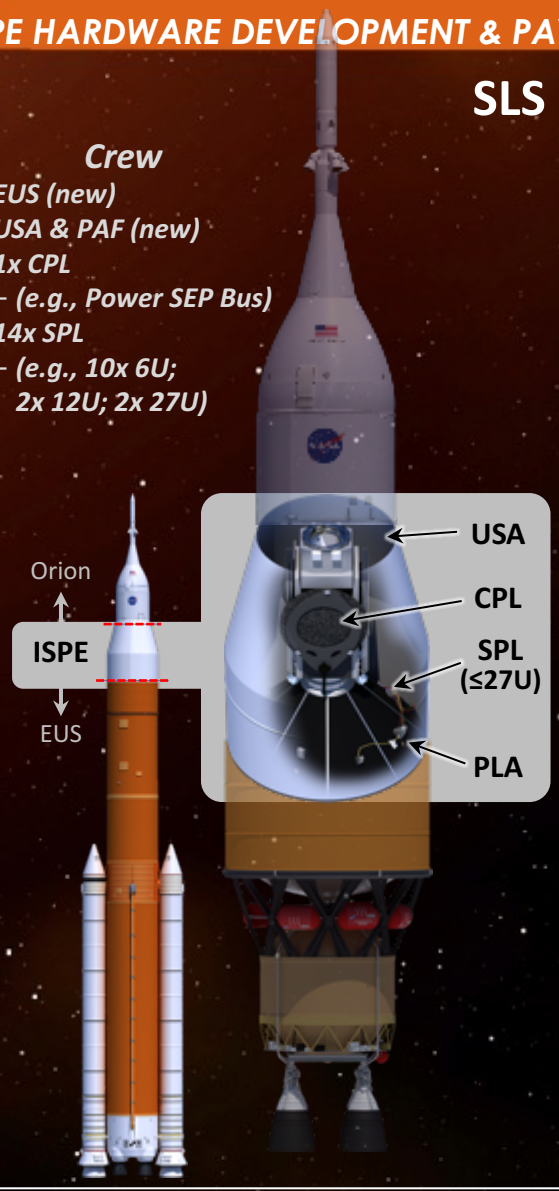
- *ICPS (D-IV derived)*
- *13x SPL*



SLS Block 1B

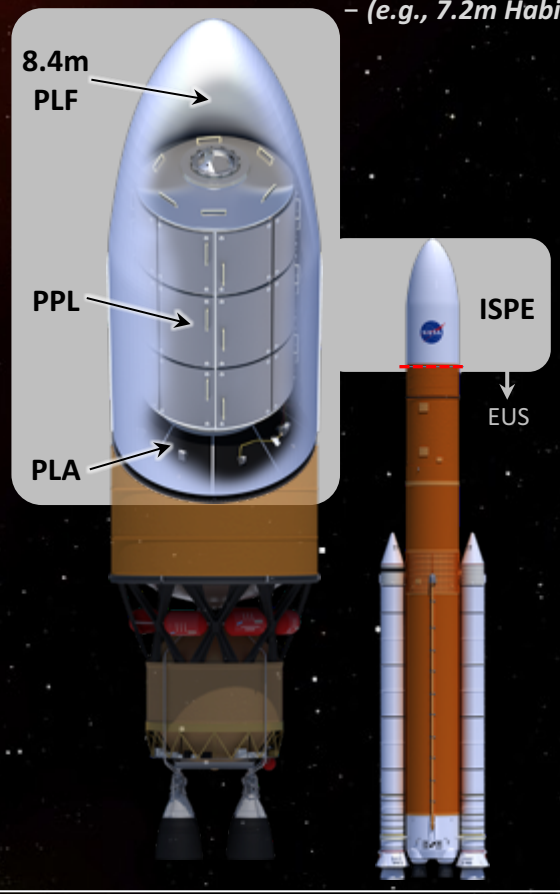
Crew

- *EUS (new)*
- *USA & PAF (new)*
- *1x CPL*
  - *(e.g., Power SEP Bus)*
- *14x SPL*
  - *(e.g., 10x 6U; 2x 12U; 2x 27U)*



Cargo

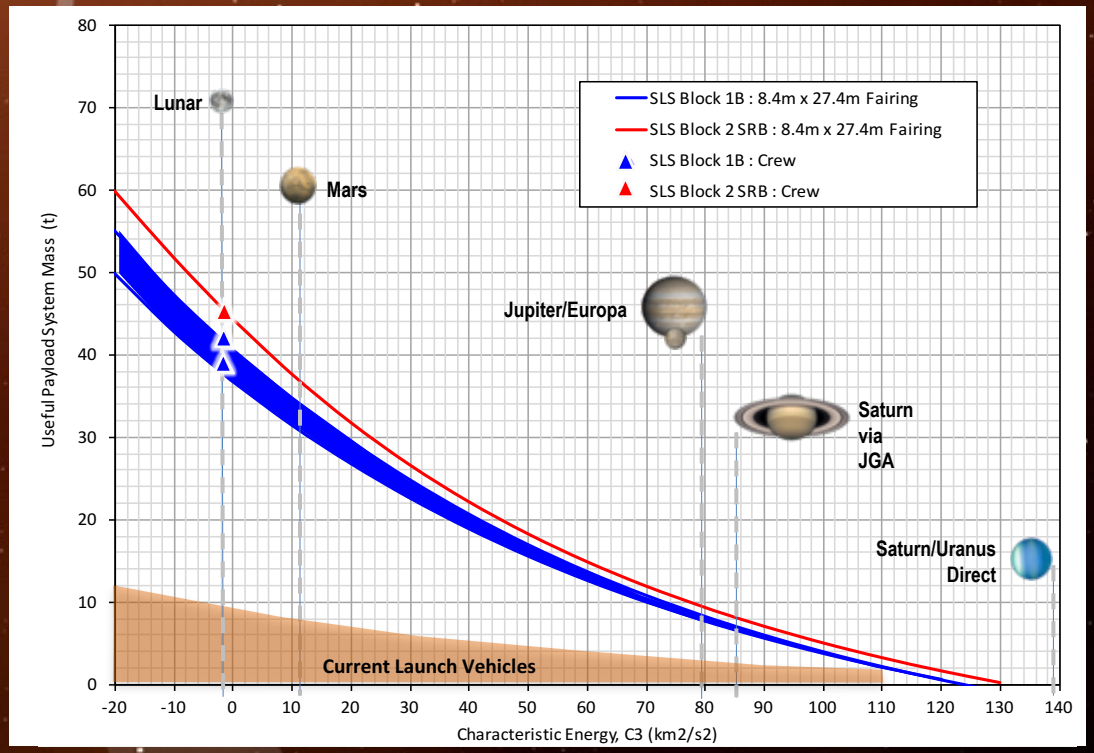
- *EUS*
- *PLF (new)*
- *1x PPL*
  - *(e.g., 7.2m Habitat)*



Notes: ISPE – Integrated Spacecraft Payload Element SPL – Secondary Payload MSA– MPCV Stage Adapter ICPS – Integrated Cryogenic Propulsion Stage LVSA – Launch Vehicle Stage Adapter EUS – Exploration Upper Stage USA – Universal Stage Adapter CPL – Co-manifested Payload PLA – Payload Adapter PLF - Payload Fairing PPL – Primary Payload

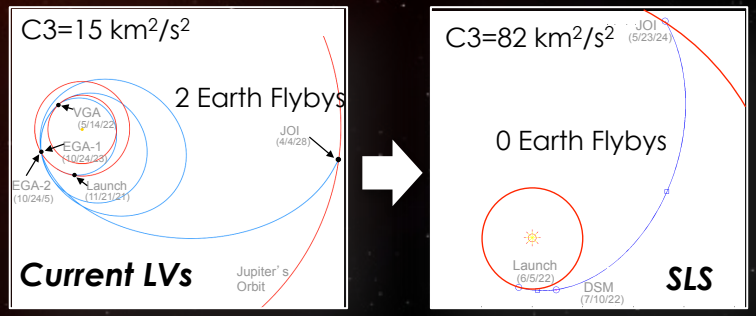
----- *ISPE Separation Plane*

SLS TIME TO DESTINATION



Europa Clipper

- Desired launch date of June 2022
- Jovian system transit time reduced by 65% over existing launch vehicles
- Reduced mission operations cost over time



Earliest Launch

*Period: 6/4/22 – 6/24/22 (SLS)
*Period: 6/18/22 – 7/8/22 (Atlas)

Cruise:

2.5 Years (SLS)
7.4 Years (Atlas)

Jupiter Orbit Insertion

12/24/24 or 5/1/25 (SLS)
11/26/29 (Atlas)

Jovian System Operations

Prime Europa Flyby Campaign: 36 months

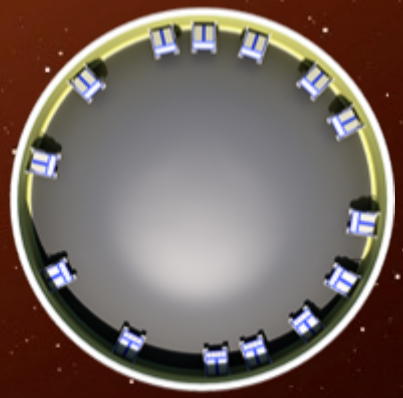
SLS PAYLOAD VOLUME

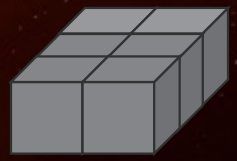
FAIRING AVAILABILITY

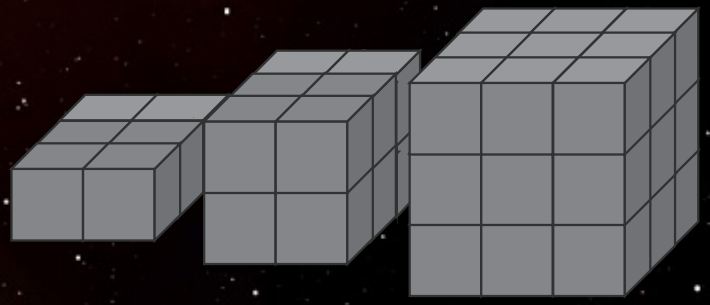
- Potential opportunities exist for launch of a 5m fairing on the Block 1 configuration of SLS
- Universal Stage Adapter offers opportunity for co-manifested payloads with Orion spacecraft or near-term 8.4-meter lower-height accommodations
- Universal Stage Adapter accommodations early as soon as second flight of SLS; 8.4- and 10-meter fairings available as needed.

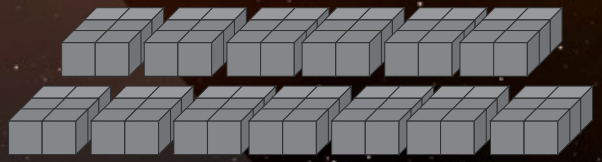
	5m fairing w/ science payload	Science Missions	Orion with short-duration hab module	8m fairing with large aperture telescope	10m fairing w/notional Mars payload
total mission volume = ~	250m3	400m3	400m3	1,200m3	1,800m3

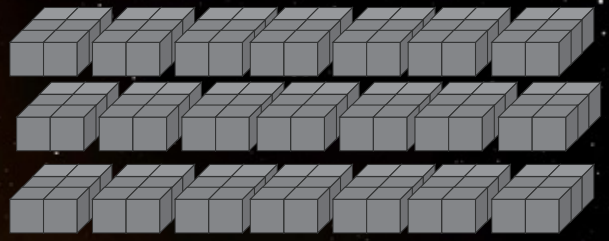
SLS SECONDARY PAYLOAD EVOLUTION







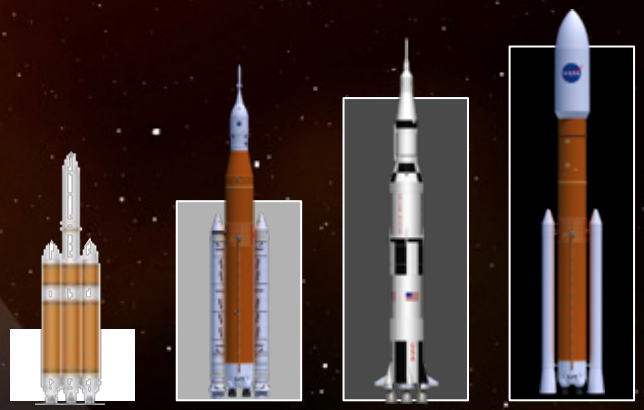




SLS MASS TO DESTINATION

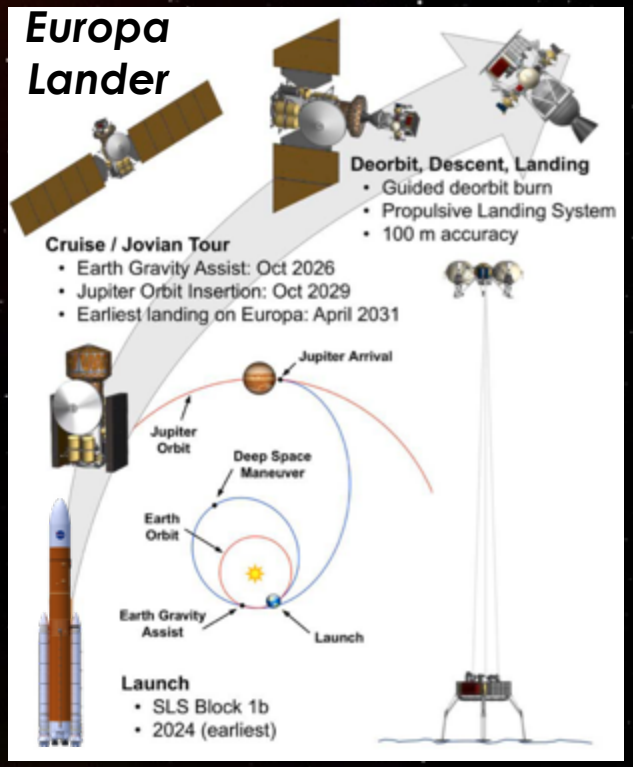
- **Up to 5 times greater mass to orbit capability than current launch systems**
  - Increases payload mass margins
  - Offers range of injection propulsion options
- **New Horizons**
  - SLS would have doubled delivered payload mass to Pluto
- **Europa Lander**
  - 16 mT delivery to outer planets (with margin)

Payload Lift Comparison



New Horizons

Europa Lander



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THE ADVENTURE BEGINS NOW.

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