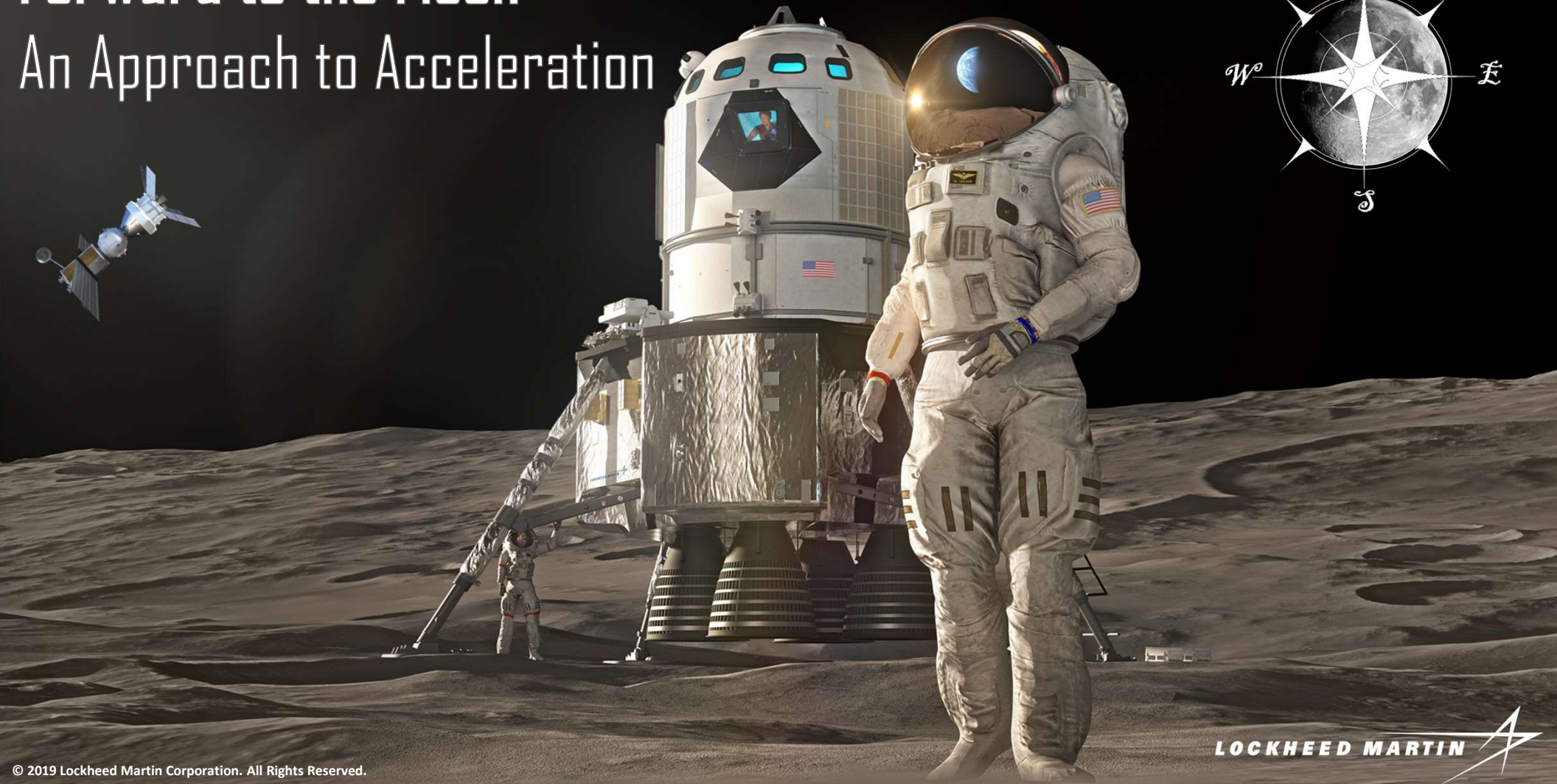
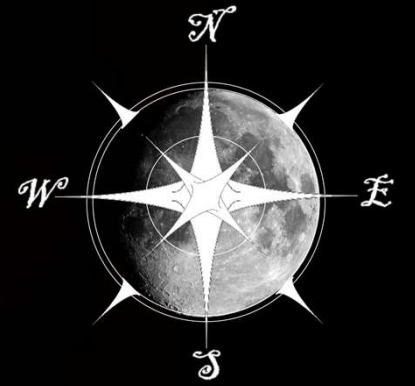


# Forward to the Moon

## An Approach to Acceleration



LOCKHEED MARTIN



Uncompromised Safety  
through  
Existing Systems  
for

Bold Exploration

via

Global Cooperation





# Existing Plans and Systems with a New Focus



## SLS Block 1

*Heavy Lift for Launching Orion  
and Lunar Elements*



## Orion

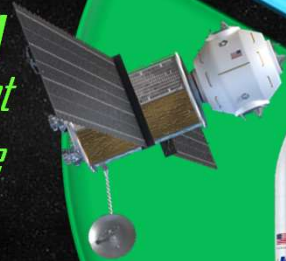
*Crew Transport to and from Gateway;  
Safe Haven; Gateway Command Deck*



Orion/SLS

## Phase 1 Gateway

*Power/Propulsion Element  
and Pass-Thru Node*



Gateway

## Commercial LVs

*Launch PPE and Lunar Elements*

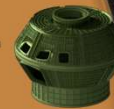


Lander



## Command Deck

*Orion-Derived*



## Ascent Propulsion

*ESM Propulsion Build-to-Print*



## Descent Stage

*New Cryogenics or Storable Propulsion*



# Operations Concept

PPE & Docking  
Node co-manifest  
in 2022



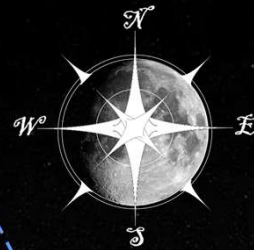
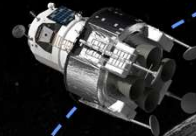
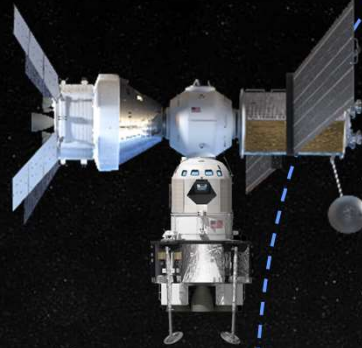
Lander elements  
launched, mated  
at Gateway



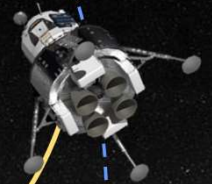
Orion  
EM-3 w/  
4 crew



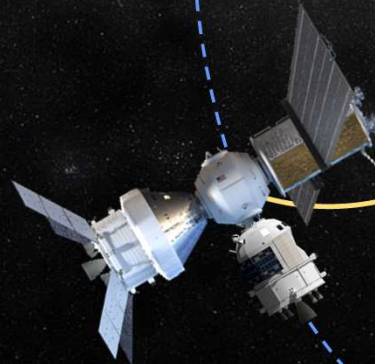
Depart Gateway



Begin  
descent to  
the south  
pole

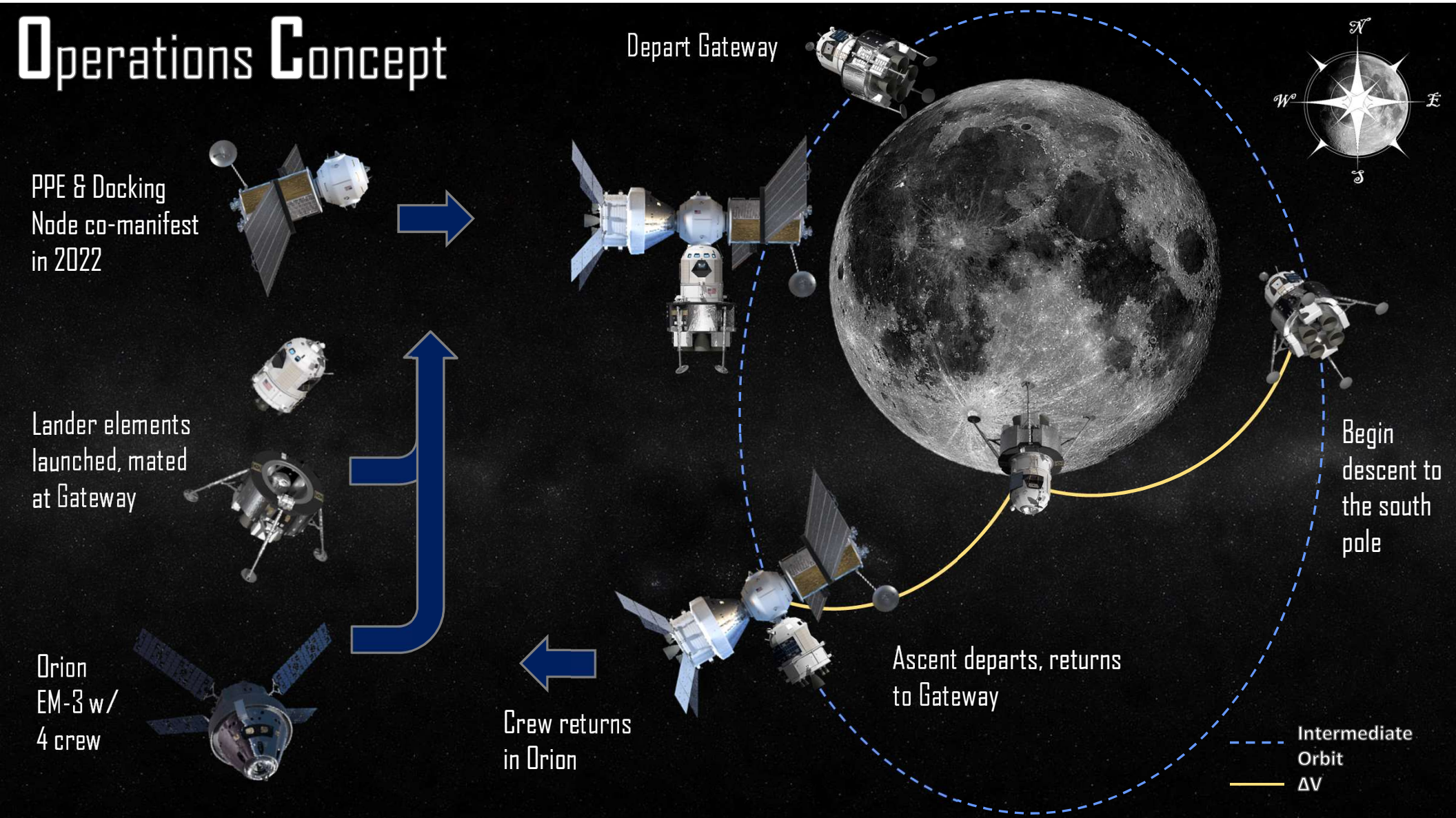


Ascent departs, returns  
to Gateway



Crew returns  
in Orion

--- Intermediate  
Orbit  
—  $\Delta V$





# A Polar Destination

## Shackleton Crater Region

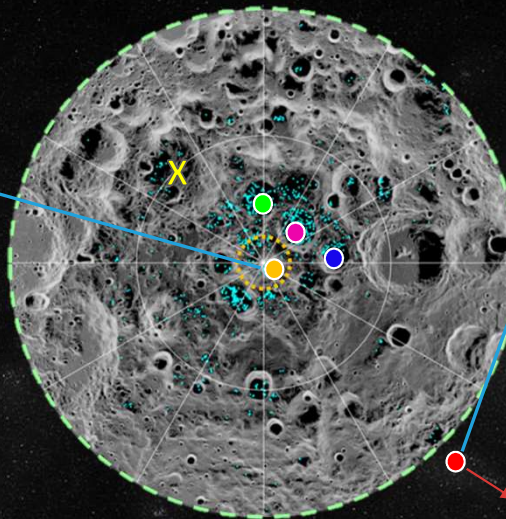


Volatiles in the  
Permanently  
Shadowed Regions

Test models of  
lunar "water  
cycle"

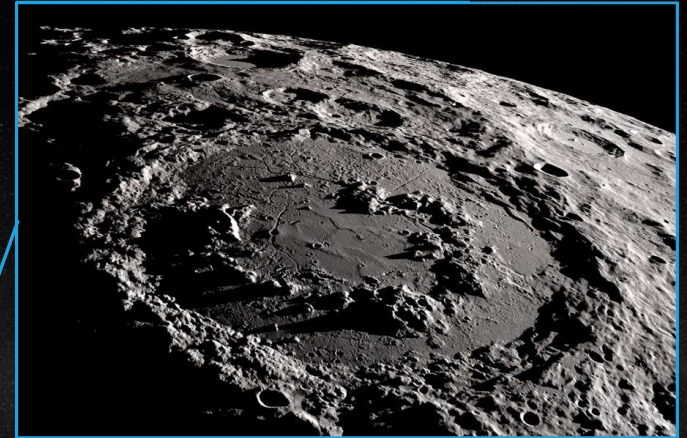
### Potential Landing Sites of Scientific Interest

- South Pole Area - 10°
- Polar Regions
- LROSS Impact Site
- Shackleton
- Haworth
- Shoemaker
- Faustini
- Schrödinger



Surface water ice deposits at the South Pole.

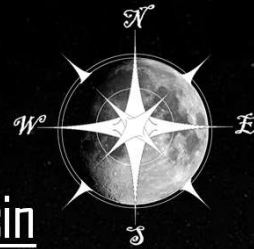
## Schrödinger Basin



Crater fractures and  
bedrock exposure

Volcanic deposits  
and impact evidence

Possible location for a low  
radio frequency array



## Science Questions

How does bombardment at the  
Moon illuminate Solar System  
evolution?

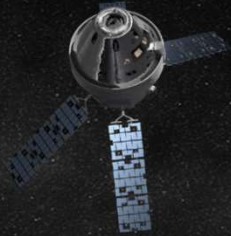
What is the Moon's past and  
present geologic history?

Where and how deep is the  
water on the Moon located?

# The Path to the Pole



'20



**EM-1**

Send an exploration class spacecraft further than before

**June 2020**

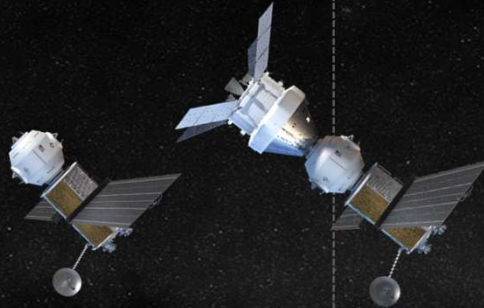
'21

**Phase 1 Gateway**

Establish humanity's first permanent lunar orbital presence

**2022**

'22



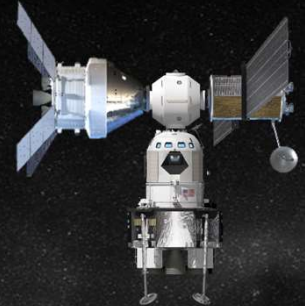
**Enhanced EM-2**

Confirm Gateway operational readiness

**2022/2023**

'23

'24



**EM-3**

Forward to the Moon's Surface

**Mid 2024**



# Lander Development

