



## SPACE

PERFORMANCE. INNOVATION. EXPERIENCE.

# SAFEGUARDING SPACE, PROTECTING EARTH

## RELIABLE SPACE SUPERIORITY CAPABILITIES FOR THE ULTIMATE HIGH GROUND

Moog designs and manufactures innovative systems and components for commercial and government spacecraft, missiles, and launch vehicles. An industry leader in space avionics, actuation and mechanisms, propulsion, fluid controls, structures, and shock and vibration isolation, Moog has been committed to revolutionizing the way to space since the inception of spaceflight. For future space missions, Moog is investing in next-generation orbital maneuvering vehicles, radiation-hardened avionics, propulsion test facilities, and metal additive manufacturing.

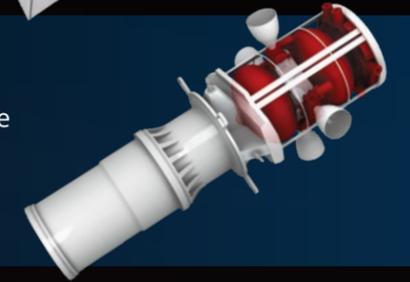
## SPACECRAFT BUSES

- Flight-proven spacecraft
- Modular, adaptable, payload agnostic
- Built on GEO-proven technologies



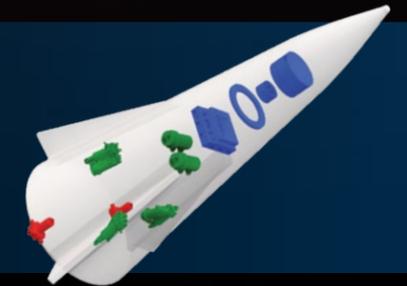
## DIVERT AND ATTITUDE CONTROL SYSTEMS

- Fluid components and engines integrated into propulsive divert and attitude control systems (DACs)
- Solid, liquid, and cold gas solutions
- Finding solutions for unique packaging and propulsion challenges



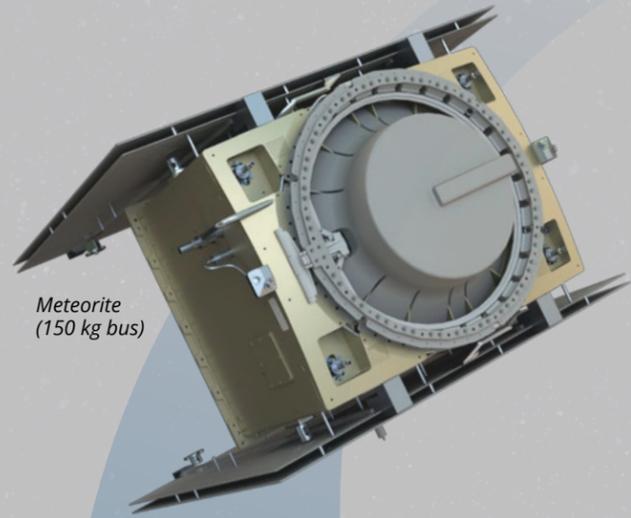
## INTEGRATED NAVIGATION, GUIDANCE AND CONTROL

- Robust, radiation-hardened solutions for hypersonic vehicles
- Photonics-enabled systems to reduce size, weight, and power
- Integrated actuation, propulsion, and power system control in a single package

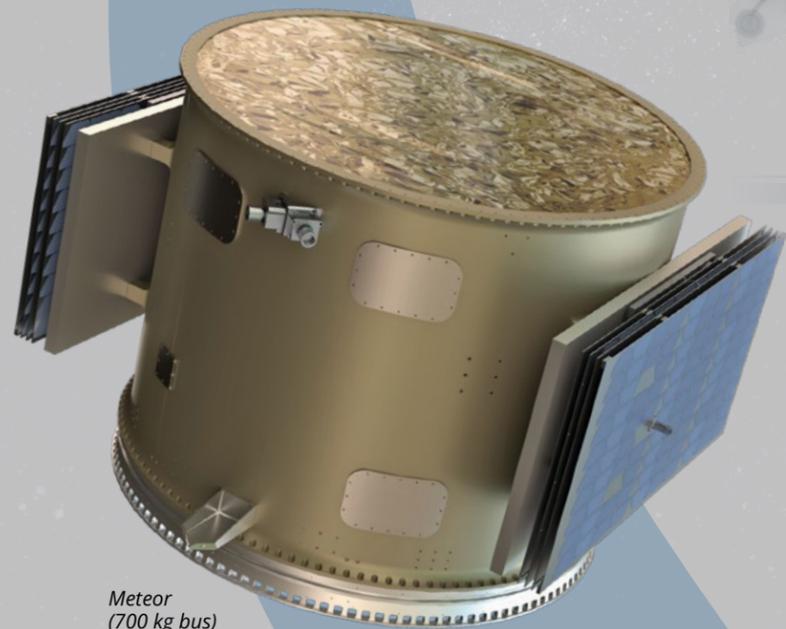


# SPACECRAFT TECHNOLOGIES

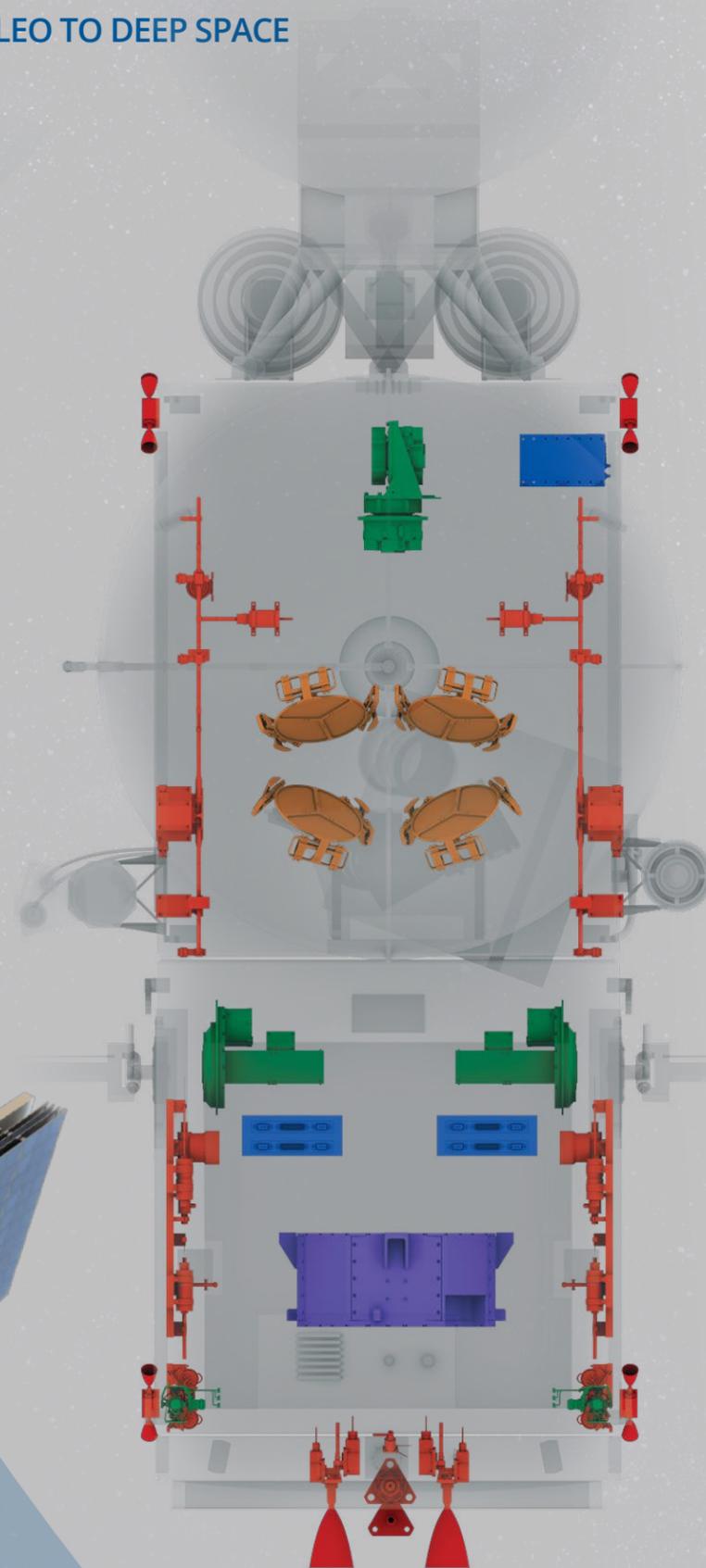
FLIGHT-PROVEN INNOVATION FROM LEO TO DEEP SPACE



Meteorite  
(150 kg bus)



Meteor  
(700 kg bus)



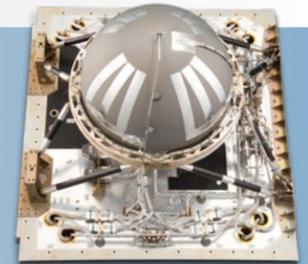
## INTEGRATED SPACECRAFT BUSES AND TUGS

- Payload agnostic, flight-proven spacecraft
- Radiation-shielding design
- Built on GEO-proven technologies
- Meteorite: ESPA Class Bus, 3-5 Years in High LEO
- Meteor: Medium Spacecraft Bus for LEO to Lunar



## PROPULSION

- Chemical, electric, cold gas, and green propulsion
- Complete systems, subsystems, and components to enable dynamic space operations
- Station keeping, attitude control, and divert and attitude control systems
- Thrusters from 1N to 500 N



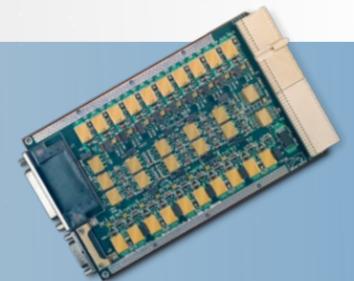
## AVIONICS

- High performance and radiation-tolerant avionics
- Command and data handling, power control/distribution, and motor controllers
- Payload processing, data storage, and GPS receivers
- Onboard computing, artificial intelligence, and machine learning



## POWER SYSTEMS

- High-power control systems
- Power for telemetry, solar array, and battery management
- DC converters and switching solutions



## MECHANISMS

- Rotary and linear actuators for spacecraft motion control
- Solar array drives, gimbals, and antenna pointing mechanisms
- Control electronics and specialty positioners



## PAYLOAD ADAPTERS, SHOCK AND VIBRATION CONTROL

- Vibration and shock isolation solutions
- SoftRide and ShockWave products
- Payload adapters and ESPA ring



# SPACE ACCESS TECHNOLOGIES

ENABLING FIRST-FLIGHT SUCCESS FOR MORE THAN 70 YEARS



## ● ACTUATION

- Motion control for launch vehicles and space planes
- Electrohydraulic (EH), Electromechanical (EM), and Electrohydrostatic (EHA)
- Thrust vector, fin, flap, and engine control



## ● PROPULSION

- Earth-storable and cryogenic propulsion components and systems
- Fluid and pneumatic controls for engines
- Cold gas and Earth-storable thruster for roll control
- Divert and attitude control systems



## ● AVIONICS AND POWER SYSTEMS

- Control and power for actuation systems
- Data acquisition and engine controls
- Inertial navigation sensors and integrated guidance, navigation, and control solutions
- Power distribution and management
- Ethernet switches



## ● SHOCK AND VIBRATION CONTROL

- Shock and vibration isolation solutions
- Optimized for coupled payload and launch systems
- Significant reductions in launch environments
- More flexibility to maximize mission capabilities



## ● ESPA RING AND PAYLOAD ADAPTERS

- Industry standard for small satellite rideshare and bus structures
- ESPA is payload configurable
- Payload adapters for any mission scenario



## SURFACE AND HUMAN EXPLORATION

From radiation-hardening to regolith protection to withstanding harsh lunar temperatures, Moog technology is designed to play critical roles in power conversion and management, data control and handling, and much more, enabling human exploration to the Moon, Mars, and beyond. Moog stands the test of time, as our environmental control and life support systems hardware has supported human operations on the International Space Station for more than 25 years.

## ENVIRONMENTAL CONTROL, LIFE SUPPORT, AND PROPULSION

- Valves, regulators, and quick disconnects
- Oxygen, nitrogen, water, and waste removal solutions
- High pressure, low pressure, and thermal regulation
- Feed and pressurization systems, thrusters, and valves
- Applications: rovers, habitats, and deep space

## AUTOMATION AND ARTIFICIAL INTELLIGENCE

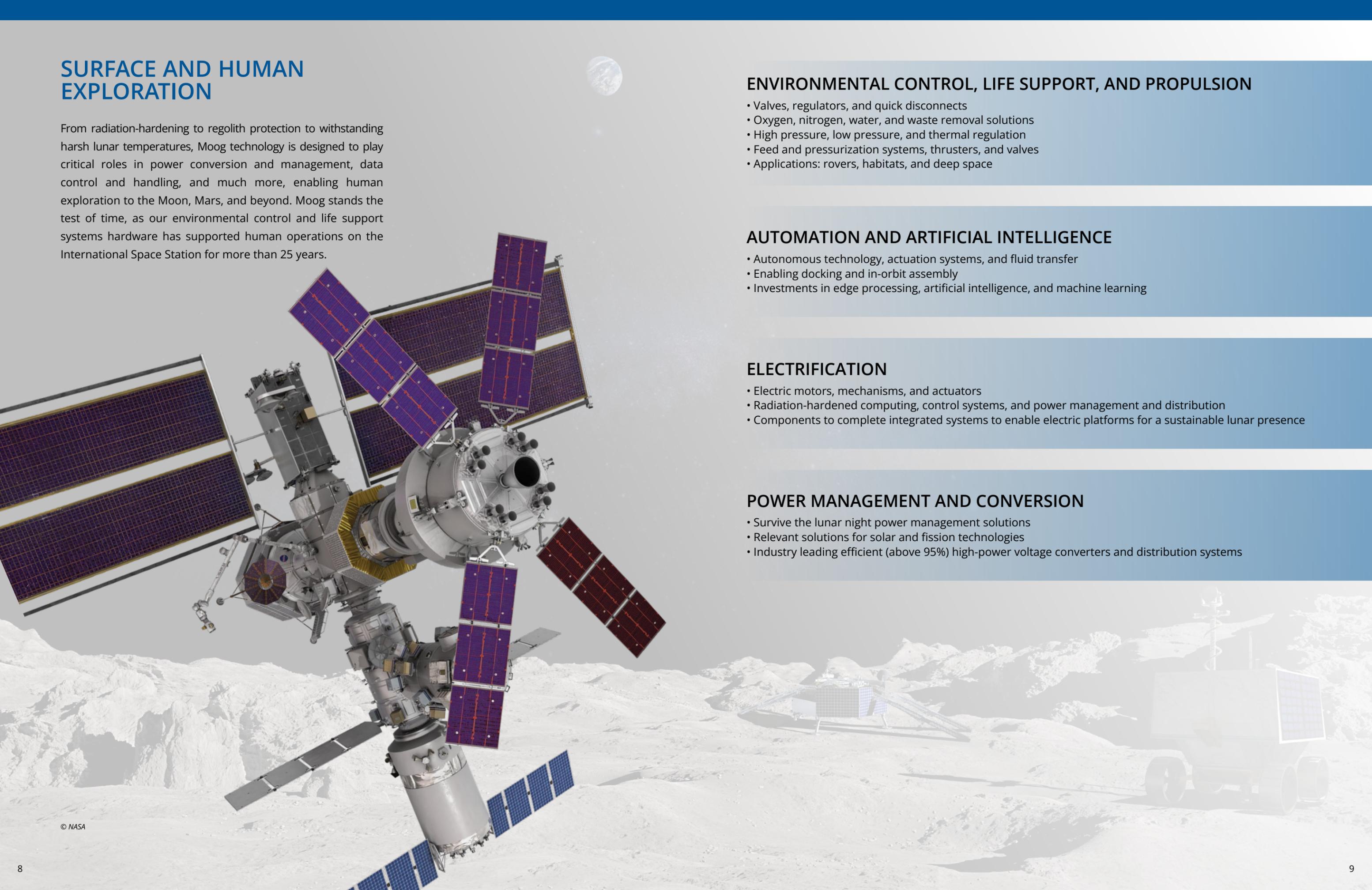
- Autonomous technology, actuation systems, and fluid transfer
- Enabling docking and in-orbit assembly
- Investments in edge processing, artificial intelligence, and machine learning

## ELECTRIFICATION

- Electric motors, mechanisms, and actuators
- Radiation-hardened computing, control systems, and power management and distribution
- Components to complete integrated systems to enable electric platforms for a sustainable lunar presence

## POWER MANAGEMENT AND CONVERSION

- Survive the lunar night power management solutions
- Relevant solutions for solar and fission technologies
- Industry leading efficient (above 95%) high-power voltage converters and distribution systems



# WHEREVER YOUR MISSION NEEDS TO BE

## SPACECRAFT



AEOHF



GOES-R



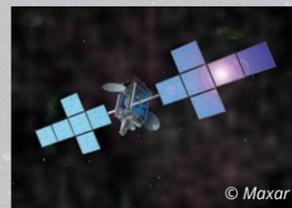
ORBCOMM Generation 2 (OG2)



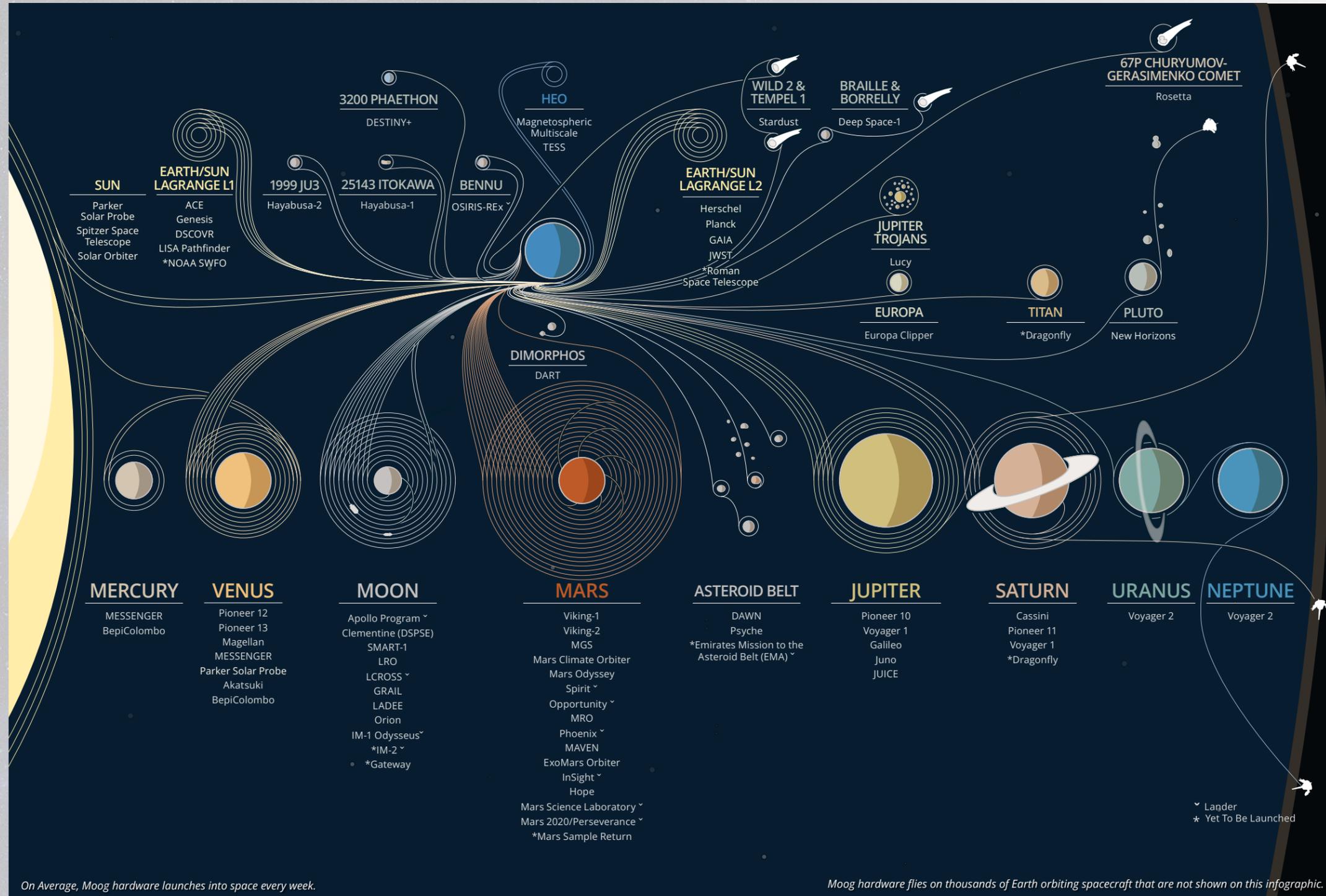
JWST



Galileo



1300



## LAUNCH VEHICLES



Vulcan



New Glenn



Ariane 5



SLS



Falcon 9



Atlas V

# MOOG

Shaping the way our world moves™

For More Information:  
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[www.moog.com/space](http://www.moog.com/space)



Moog Space and Defense



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