



# Mars Exploration Program Commercial Services

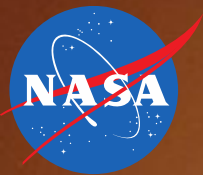
## Humans to Mars Summit

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Co-lead, MEP commercial services

May 7, 2024

 @redplanetrick



# High-Level Co-Equal Program Science Themes, 2023 - 2043

Driven by science, MEP will focus its systemic approach on the following science themes, which draw upon the MEPAG goals of life, climate, geology and preparation for human exploration.

SECTION 2  
SCIENCE  
THEMES

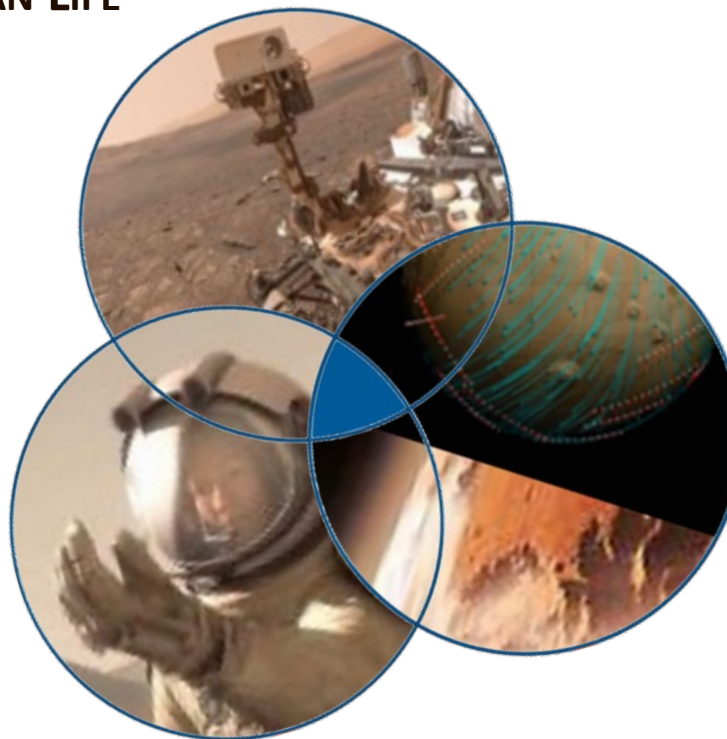
**DRAFT**

## EXPLORE THE POTENTIAL FOR MARTIAN LIFE

Advance the search for past and present microbial life and habitable environments through time, while developing approaches that protect both Mars and Earth.

## SUPPORT HUMAN EXPLORATION OF MARS

Make observations that are synergistic with the objectives for human exploration of Mars and prepare for the science that humans will do once there.



## DISCOVER DYNAMIC MARS

Understand the dynamic geological and climatological processes on Mars to illuminate the evolution of the Martian system, our home planet Earth, our solar system, and distant planets around other stars.

EXPLORING  
**MARS**  
TOGETHER  
2023 - 2043

# Challenging but Achievable 'Hills to Climb'



- **Budget constraints** while:
  - Executing Mars Sample Return is the highest science priority in the next decade
  - Commitment to Artemis achievements is a central near-term strategy in the nation's Moon to Mars ambitions
- **Mars Relay Network orbiters are aging**, and not expected to last past ~2030, having already lived far past their original estimated lifetimes
- **Steeper requirements for next steps in Mars exploration:**
  - More sophisticated instruments and spacecraft
  - Replenishable networks of orbital and landed assets for systems science
  - Closing strategic knowledge gaps to support planning for a sustained human-robotic presence on Mars

Challenges are balanced with the growing capacity of both commercial and international organizations and the potential for new partnership models that provide mutual benefits.



- The past decade has seen extraordinary growth in commercial capabilities for low-cost spacecraft
  - CubeSats
  - SmallSats
  - Miniaturized instruments and avionics
  - New launch vehicles and rideshare opportunities
- The result has been a transformation in the economics of Earth-orbiting space missions
  - . . . and more recently we see the beginnings of new commercial opportunities for low-cost lunar missions
- We seek to capitalize on these advances and understand how they can be applied to Mars; however, we also need to be mindful of unique challenges of Mars relative to Earth-orbit and lunar mission applications

#### Some Tied to Large Distance of Mars

- Telecommunications & Navigation
- Transportation & Propulsion
- Power

#### Some Tied to Unique Martian Environment

- Atmosphere
- Dust
- Thermal



## Strategically Supports the Draft MEP 2024-2044 Plan



- Advances 2 Near-term Activities in the MEP Future Plan that can be accomplished within the current budget climate, provides key information to validate the future potential low-cost Mars mission framework
  - *Explore opportunities for commercial services to address infrastructure needs*
  - *Award study contracts to industry to define better potential public-private partnerships*



OCT 2022

MEP Industry Day: >100 attendees in person and online

NOV 2022 – NOV 2023

11 Site Visits



### Finding 1: Significant Leverage Potential

- Commercial capabilities are currently focused on Earth and Moon due to market demand  
YET
- US Industry has many existing and emerging capabilities that could be leveraged for Mars exploration with small deltas in designs/costs to existing systems designed for Earth and Moon

### Finding 2: Strong interest from industry:

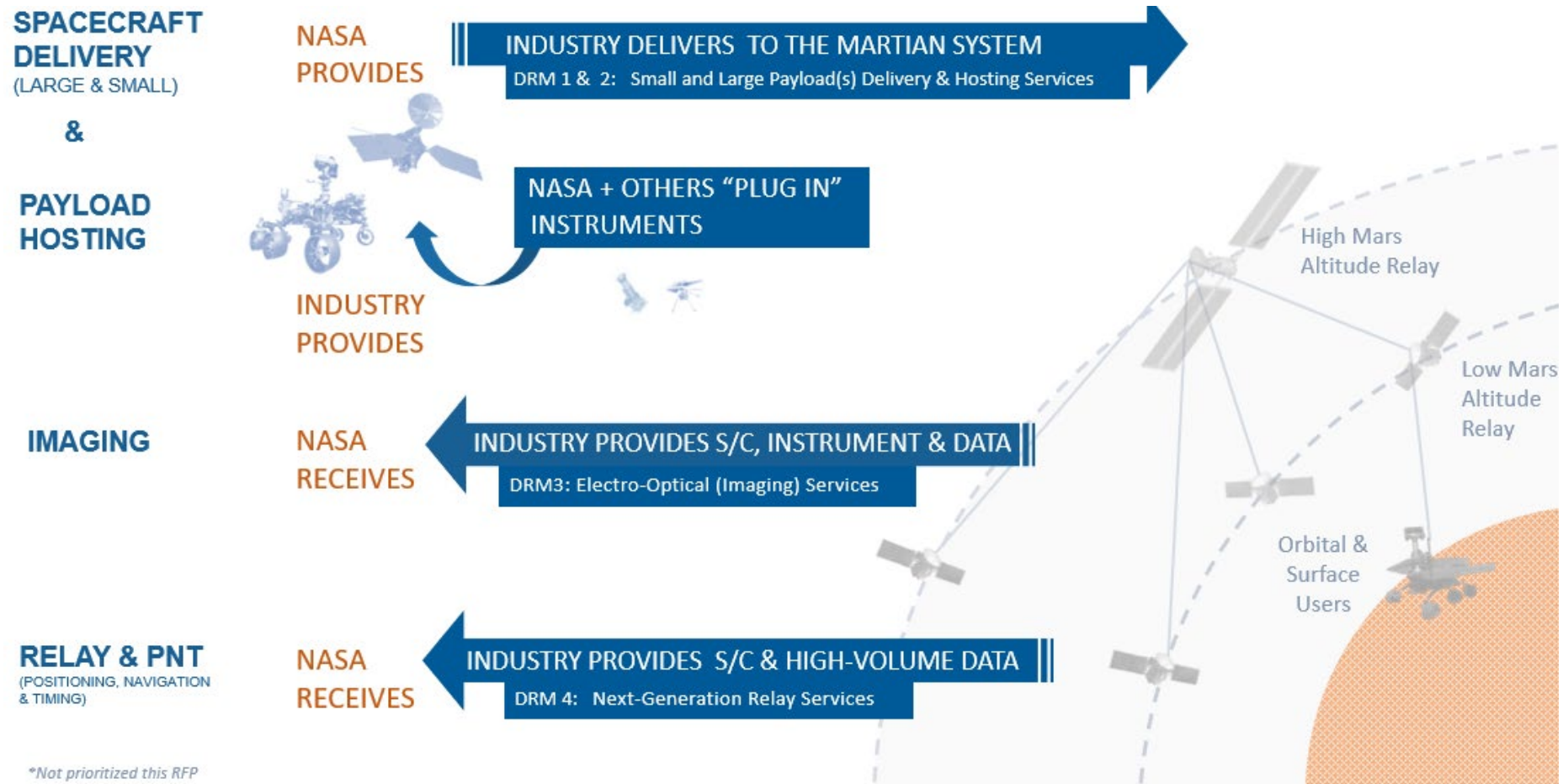
- to support MEP potential service areas  
(All but one company expressed strong desire to study future service model with NASA)
- to study with MEP how Mars future exploration could fit into their business models

# Priority Design Reference Missions (DRMs)



Exploring new commercial partnership models to provide services at Mars across 3 key areas

- Large and Small Payload(s) Delivery and Hosting Services
- Electro-Optical (Imaging) Services
- Next-Generation Relay Services



\*Not prioritized this RFP

# MEP Commercial Services Guiding Principles with Industry Input

(derived from the draft MEP 2024-2044 Plan and used in the study RFP)



## 1 LEVERAGED CAPABILITIES

Leverage innovative, existing or soon-to-be-existing, commercial space systems (particularly those being developed for NASA's Moon-to-Mars initiatives) to accelerate Martian exploration

## 2 LAUNCH OPPORTUNITIES

Enable one or more missions per Mars launch opportunity, in profitable partnerships with US industry

## 3 LOWER COSTS / RISKS

Substantially lower costs, while maintaining acceptable risk

## 4 INDUSTRY LEADERSHIP

Empower leadership of U.S. industry in deep space

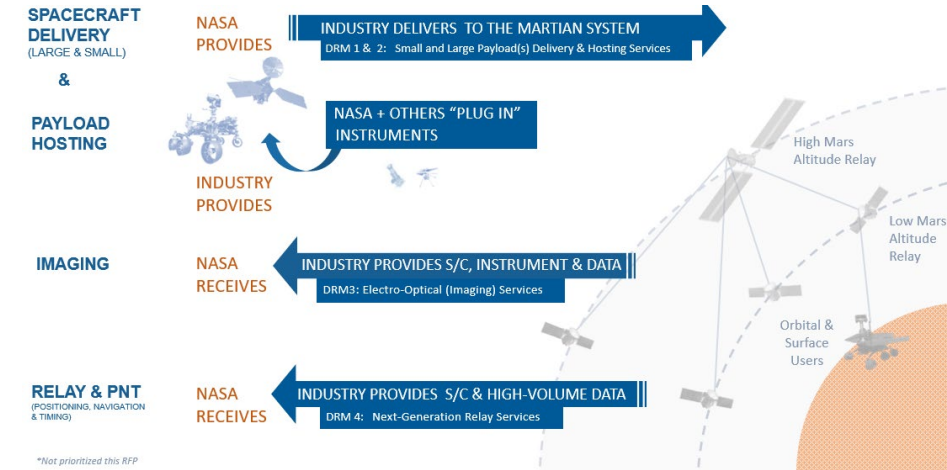
## 5 SUSTAINABILITY

Build toward a sustainable human-robotic presence at Mars





AWARDEES			
DRM 1	DRM 2	DRM 3	DRM 4
Lockheed Martin	ULA	Albedo	SpaceX
Impulse	Blue Origin	Redwire	Lockheed Martin
Firefly	Astrobotic	Astrobotic	Blue Origin



Summary of priority service areas and DRMS from RFP Release

### Initiate Three Studies per Design Reference Mission (DRM)

- Provides higher level of confidence with DRM estimates
- Ensures diversity in emerging vs. experienced
- 3 companies studying two DRM areas (Astrobotic, Blue Origin, Lockheed Martin) to ensure cost-savings in number of studies and increased number of end-to-end concepts