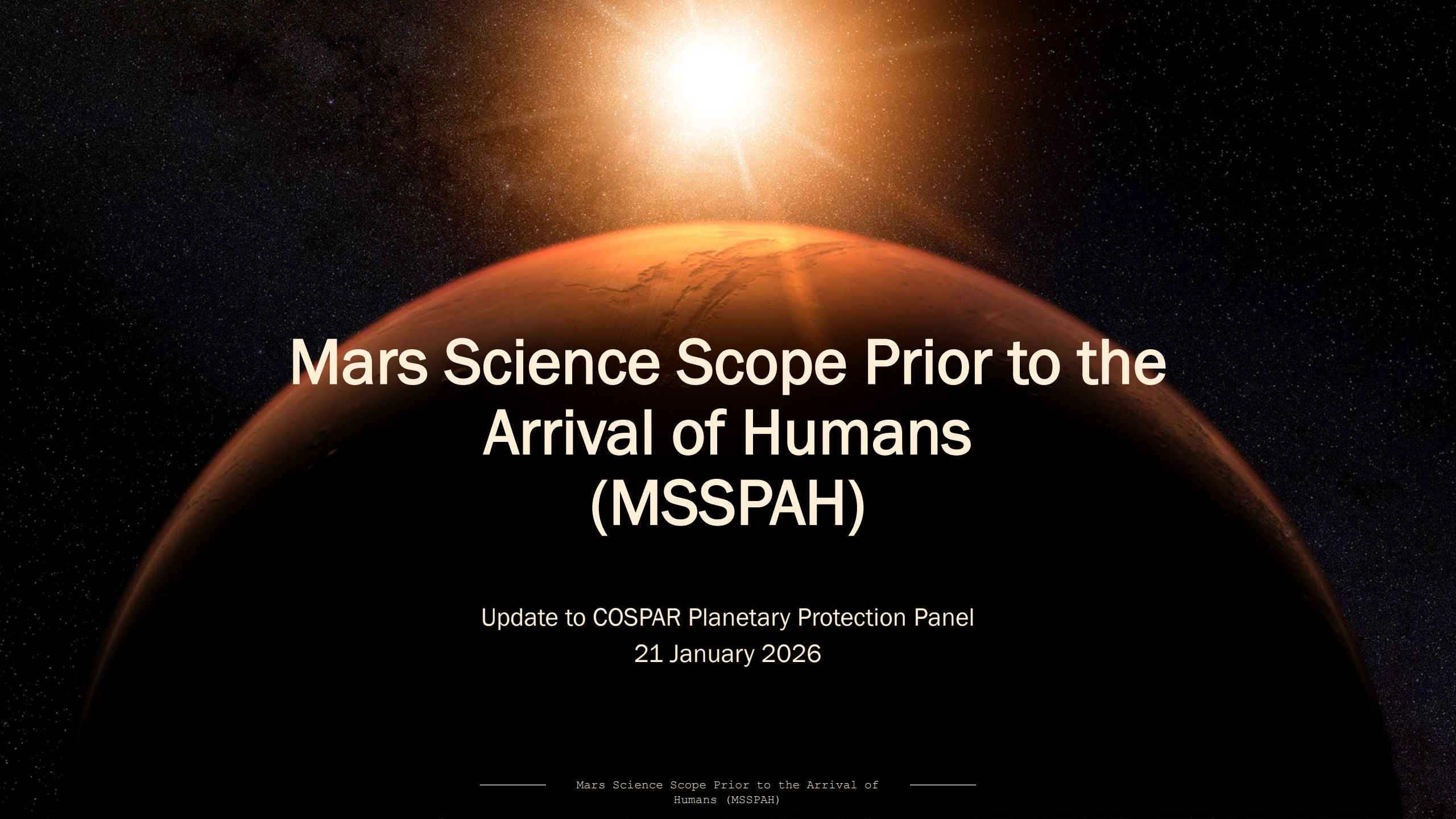
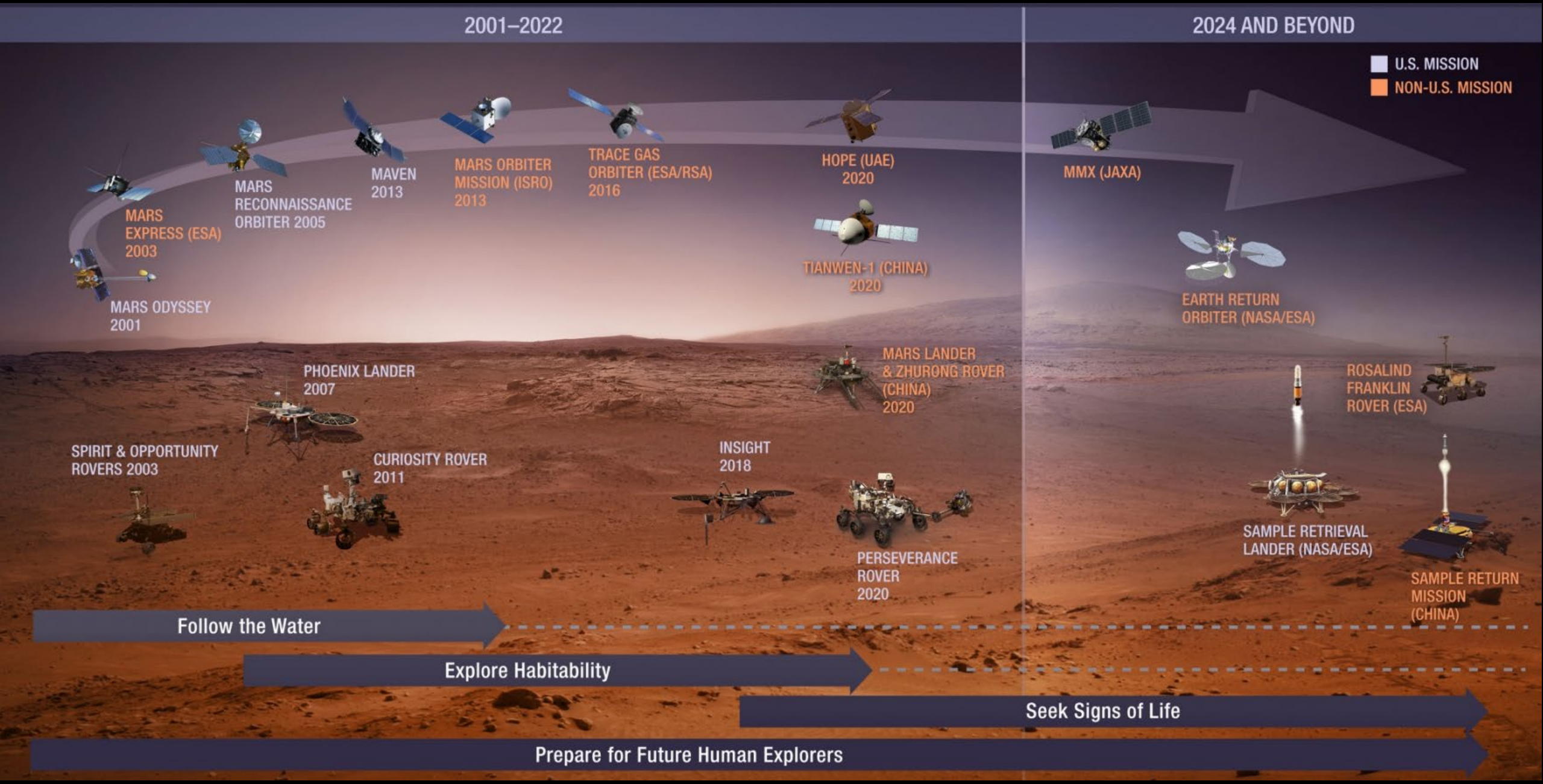


Mars Science Scope Prior to the Arrival of Humans (MSSPAH)

Update to COSPAR Planetary Protection Panel

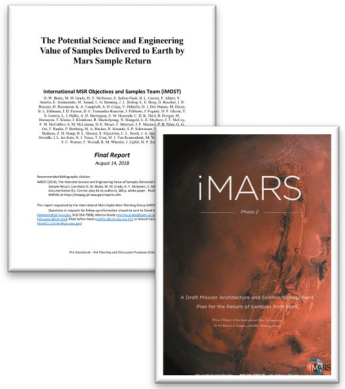
21 January 2026


2001–2022
2024 AND BEYOND
U.S. MISSION
NON-U.S. MISSION
MARS EXPRESS (ESA) 2003
MARS RECONNAISSANCE ORBITER 2005
MAVEN 2013
MARS ORBITER MISSION (ISRO) 2013
TRACE GAS ORBITER (ESA/RSA) 2016
HOPE (UAE) 2020
MMX (JAXA)
TIANWEN-1 (CHINA) 2020
EARTH RETURN ORBITER (NASA/ESA)
MARS ODYSSEY 2001
PHOENIX LANDER 2007
MARS LANDER & ZHURONG ROVER (CHINA) 2020
ROSALIND FRANKLIN ROVER (ESA)
SPIRIT & OPPORTUNITY ROVERS 2003
CURIOSITY ROVER 2011
INSIGHT 2018
PERSEVERANCE ROVER 2020
SAMPLE RETRIEVAL LANDER (NASA/ESA)
SAMPLE RETURN MISSION (CHINA)
Follow the Water
Explore Habitability
Seek Signs of Life
Prepare for Future Human Explorers

IMEWG Overview

Background

- forum established to foster international co-operation in relation to the exploration of Mars
  - www.imewg.org
- 30+ member nations have signed the Terms of Reference



Previously Chartered Study Groups

- Coordinated high-level planning efforts representing international Mars science priorities
  - e.g. International Mars Architecture for the Return of Samples (iMARS); International MSR Objectives and Samples Team (iMOST)

MSSPAH Charter

Purpose

- provide input to enable informed decision-making about future missions by space agencies and the international Mars exploration community

Task

- identify and prioritize investigations that can and should be conducted at Mars prior to human missions by considering:
  - The natural next steps or continuation of current science exploration pathways
  - Investigations that would potentially be affected by the introduction of humans to the environment
  - Investigations that could help reduce risk for crew health and backward planetary protection, and/or reduce margins for engineering systems

Tasks (Slide 1 of 3)

Task 1: Scientific Priorities

- Starting from the current science/PP themes and objectives driving robotic exploration of Mars, identify scientific/PP information that could be acquired by robotic missions in the time frame before humans arrive on Mars
  - Define categories of investigations to address the above themes.
  - Establish which objectives require landed measurements and prepare a non-exhaustive list of candidate landing-site criteria to best address these science objectives

- Establish assumptions, specifically categorize what characteristics of Mars may be most likely to change once humans and human-supporting infrastructure have arrived.

Tasks (Slide 2 of 3)

Task 2: Human Preparation

- Starting from the current documentation, identify science/PP investigations that should be done to prepare for human exploration of the Mars environment. Include hazards that have been identified in past scientific studies.
  - ➢ Document previously agreed-to science priorities that may be at risk if human exploration occurs prior to completion of targeted robotic investigations.
  - ➢ Classify and establish the level of residual risk to crews in the absence of the prioritized scientific information.

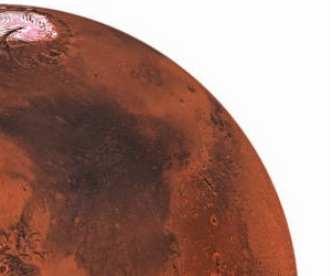
Tasks (Slide 3 of 3)

Task 3: Prioritization

- Establish metrics to prioritize scientific and PP objectives (e.g., scientific return, temporal urgency, exploration enabling)
- Generate matrix of investigations vs metrics to identify priorities

Task 4: Administrative & Review

- Review interim conclusions
- Establish schedule to complete presentation and final report

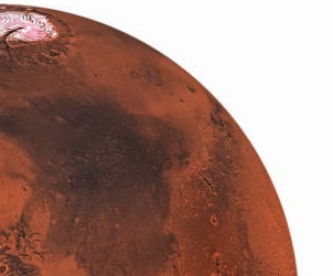


Task Summary

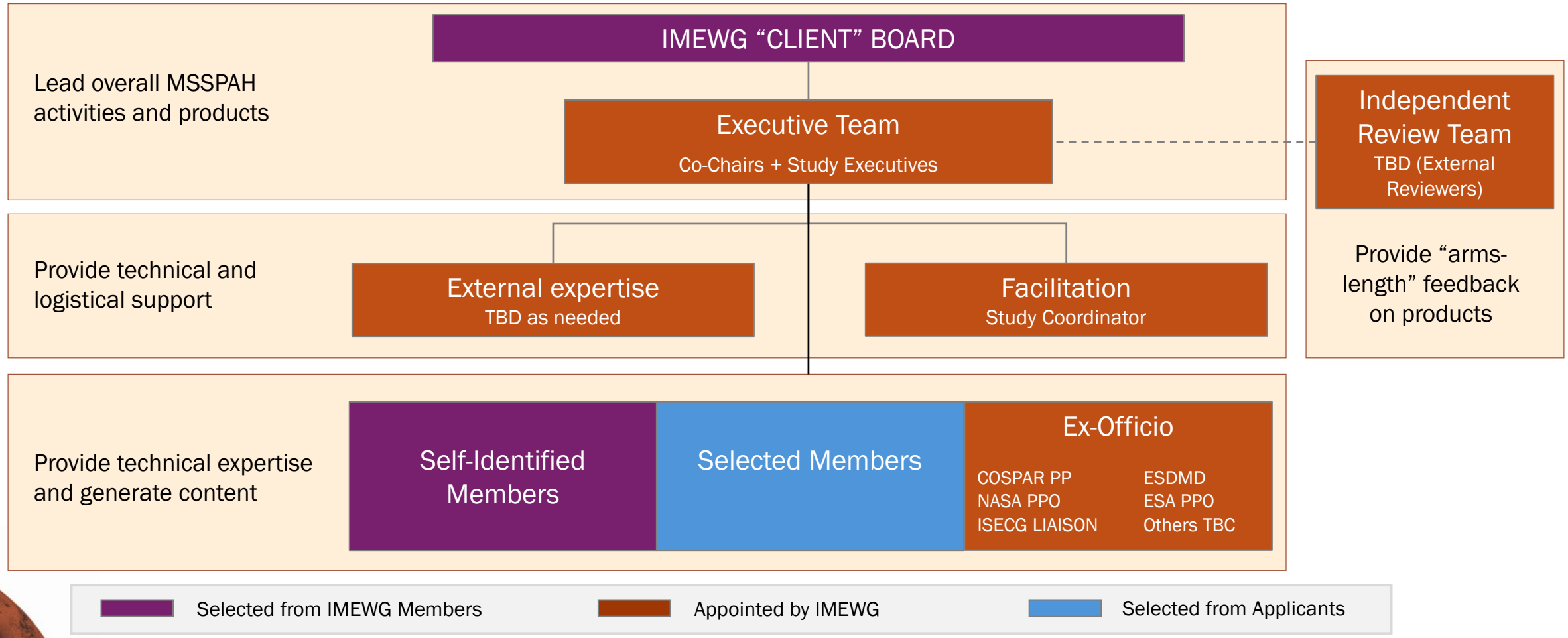
What does planet Earth want to know about planet Mars?

Which of these could help advance readiness for human exploration? Which could be jeopardized by human presence?

How do we pick which are the most important? Which ones *are* the most important?



MSSPAH Structure



Community Applicants

Applications

- Total of 34 applicants
  - ➢ Most with expertise in science or planetary protection

Selections

- Recommended candidates reflect a mix of skills needed to support the effort
- Representation from nine different countries, including early career
- Does not include or affect ex-officio appointments and IMEWG nominees

Key Roles

Executive Group

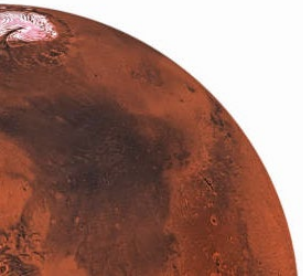
- **Co-Chairs:** Lisa May (USA), Jorge Vago (ESA)
- **Study Executives:** Brandi Carrier (NASA/JPL), Tim Haltigin (CSA)

Facilitation

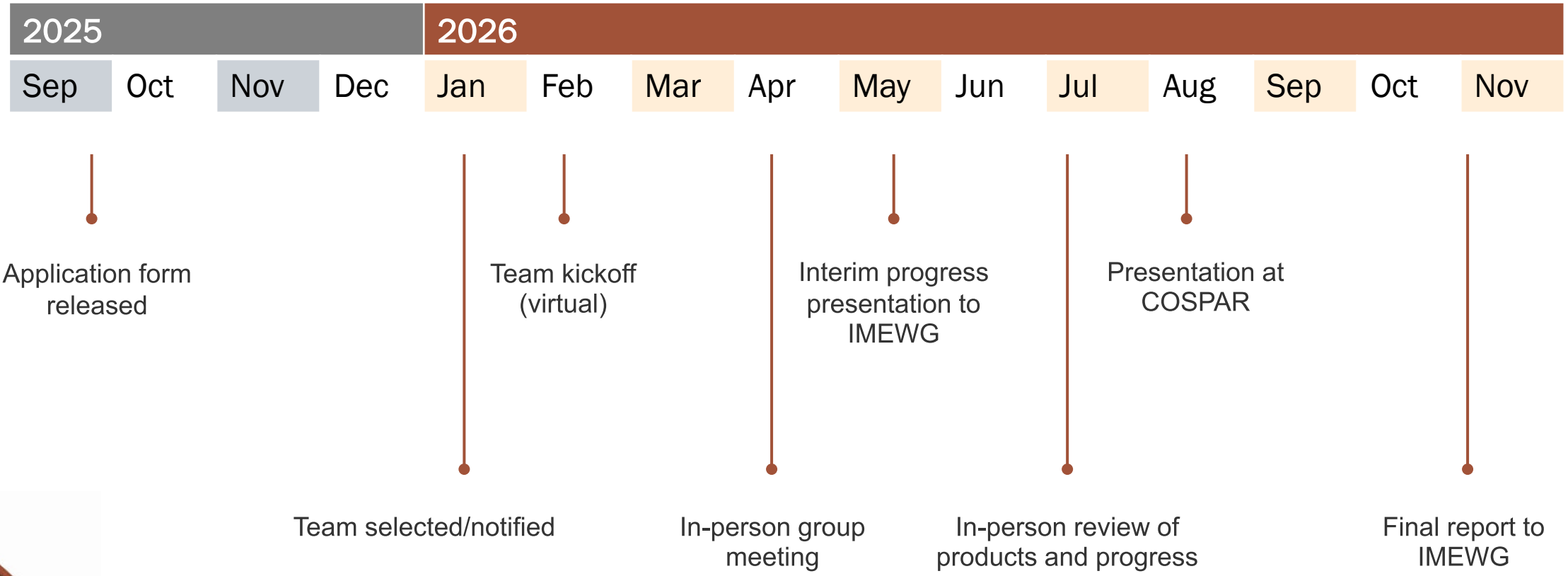
- **Study Coordinator:** Fiona Thiessen (ESA)

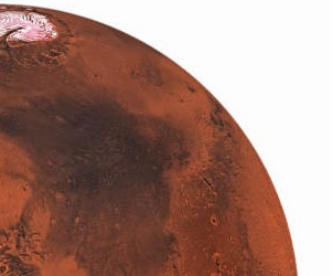
Planetary Protection Ex-Officio Members

- **COSPAR Planetary Protection Panel:** Karen Olsson-Francis
- **NASA Planetary Protection:** Erin Lalime
- **ESA Planetary Protection:** Luca Stoll



Notional Timeline





Discussion Prompts

Starting Position

- Are there considerations that the working group should take as initial inputs from PPP?

Engagement

- In what format / how often does PPP want to receive progress updates?