

A STRATEGIC FRAMEWORK TO SUPPORT SCIENTIFIC COMMUNICATIONS FOR MARS SAMPLE RETURN SCIENCE.

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Introduction: The joint NASA/ESA Mars Sample Return (MSR) Campaign is a cornerstone of both agencies' long-term scientific exploration strategy that will revolutionize our understanding of the history of Mars, the Solar System, and the potential for life beyond Earth. In 2023, findings from an Independent Review Board (IRB-2) emphasized the need for clear and compelling communication of MSR's scientific and strategic value to Congress, the scientific community, and the public [1]. In response, NASA's Science Mission Directorate's MSR IRB-2 Response Team (MIRT) acknowledged the critical need for strengthening and enhancing strategic communications to ensure mission success and public support [2].

The Mars Sample Return Campaign Science Group (MCSG) established the Strategic Communications Working Group (SCWG), tasked with creating a strategic framework of plain language work products to increase the reach and effectiveness of MSR Science communications. These products are designed to support decision-making processes, clarify the program's scientific goals, and expand stakeholder engagement through accessible and impactful messaging.

Statement of Task: The SCWG was tasked to communicate the importance of MSR Science and its potential findings in accessible, plain language for use by key stakeholders and decision-makers, including governments responsible for funding, agency decision-makers, and the global science community. The SCWG explicitly avoided involvement in mission architecture specifics, organizational management, geopolitical strategy, and branding tasks, focusing solely on science communication clarity and impact.

Public Perceptions of MSR Science and Existing Barriers to Effective Communication: Initial assessments by the SCWG identified three major areas

where public skepticism and misunderstanding are prevalent: the perceived value of MSR Science, the clarity of its scientific goals, and the overall merit of the Sample Receiving Project (SRP). This skepticism has been exacerbated by the perception that NASA's messaging is disconnected from enthusiastic grassroots efforts, the former of which is critical to broaden and amplify MSR's support.

Addressing MSR Science Communications Challenges via a Strategic Framework: The SCWG developed a strategic framework of six work products (WP) to organize, clarify, and enhance strategic MSR Science communications:

WP-1: Science Value Proposition. This document outlines the fundamental scientific benefits from MSR, capturing "big picture" themes that can be used to explicitly communicate, in lay terms, the value of returning samples from Mars. Central themes that emerged emphasized the transformative power of having the full might of Earth's advanced scientific instrumentation to deeply characterize martian samples at unprecedented resolution; the enduring legacy of sample curation enabling future generations and future technologies to further characterize the samples in ways presently impossible or infeasible; the central role of MSR Science in increasing our readiness for human exploration of Mars and future planetary science missions to more distant habitable worlds; and the value of unanticipated discoveries that may benefit humankind.

WP-2: Plain Language MSR Science Objectives. The MSR-SRP Science Objectives are highly technical and riddled with jargon to be appreciated by most key stakeholders, including the public. This document translates the MSR Science Objectives into easily understandable plain language for non-specialist audiences and decision-makers.

WP-3: Plain Language Sample Return Project (SRP) Science Questions. This document compiles and simplifies the high-level questions that frame SRP Science Objectives, making them accessible to a broader audience and reinforcing the relevance of the mission. This work product both compliments and expands upon the Science Value Proposition.

WP-4: Critical Sample Science Findings. The power of sample return missions – and more broadly, sample science – is underappreciated because stakeholders take for granted that foundational knowledge is often yielded by sample science. This document communicates key discoveries from other sample return missions and sample science in general that would not have been possible by remote observation alone.

WP-5: Recommendations for NASA and ESA leadership. This document provides key recommendations to enhance the agencies’ stewardship in leading cohesive communication efforts regarding MSR Science. It touches on the necessity for formal coordination of messaging and people power across public and community engagement activities, recommending a “one-stop-shop” for publicly available, publicly digestible information, as well as increased consistency in MSR branding efforts.

WP-6: Visualizations of MSR SRP Science. Compared to the MSR mission architecture, there is a lack of visual materials that clearly depict the expected scientific methodologies and discoveries of SRP Science. This document collates ideas for engaging and informative visual content that expand the reach and impact of the Strategic Framework’s individual work products.

Conclusion and Call to Action: The SCWG’s Strategic Framework serves as a first step in refining MSR Science communications. Importantly, this framework is intended to serve as a foundational hub to attract additional involvement from the science community to promote broader understanding, generate excitement and appreciation for the potential discoveries of sample return science, and to enhance support of MSR Science. By providing clear, targeted, and scientifically accurate communication tools, this community effort ensures that the profound implications of MSR Science are recognized and valued across diverse stakeholder audiences.

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References: [1] Figueroa et al. (2023). [2] Connelly et al. (2024).