Policy Questions Framework for Missions

By Gabriel Swiney, Katie McBrayer, and Alyse Beauchemin

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Purpose of Analysis

As NASA embarks on a new era of exploration, it will rely on new ways of conducting missions. Using the Moon to Mars Objectives[1] in their high-level categories of science, infrastructure, transportation and habitation, and operations as a guide, the Office of Technology, Policy, and Strategy has developed a framework for evaluating policy questions early in mission and program lifecycles. Our work defines "policy questions" to mean potential impacts, in the broadest sense, to NASA, national, or international space community interests in science and exploration. This framework was designed to maximize positive impacts while minimizing negative impacts. Below are the 12 identified policy questions which can have profound implications for how a program or project is implemented. These policy questions can be applied to any future missions and used as a roadmap by providing relevant context and details. This list is often applicable not to only to NASA, but to the broader national, international, and commercial space communities and their collective future actions.

Identified Moon to Mars Policy Questions

Interoperability and standards: To what degree should NASA systems be interoperable by other actors and what standards should be in place to support this interoperability?

Risk posture for crew safety[2]: How should NASA update its existing human risk classification in this new operational environment, and at each phase of lunar development?[3]

Protection of valuable locations: How should the international community, and by extension NASA, equitably and sustainably identify and protect locations of high value and adjudicate their use by competing interests? For example, radio astronomy requires signal-free zones, but most activities will generate signals.

Avoiding interference among actors: How should NASA's actions in pursuit of the Moon to Mars Objectives ensure compatibility with other actors and not impede the ability of others to achieve mission success, and vice versa?

Human heritage protection: How should the international community decide which locations deserve protection and how may NASA assist in implementing that protection?

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[1] NASA. 2022. "Moon to Mars Objectives." September 2022. https://www.nasa.gov/sites/default/files/atoms/files/m2m-objectives-exec-summary.pdf.
[2] This policy question includes recurring tenet RT-3 (crew return).
[3] NASA, 2022. "Policy Directive 8700.1F: NASA Policy for Safety and Mission Success." Effective July 28, 2022, expires July 28, 2027. https://nodis3.gsfc.nasa.gov/displayDir.cfm?Internal_ID=N_PD_8700_001F_&page_name=main.

Planetary protection: What is the level of acceptable risk when NASA-involved missions return samples and crews from Mars and how much should NASA and international partners be willing to pay and work to limit that risk?

Sustainable development: How should NASA and international partners on a basis of equity, balance the needs of the present while considering future mission needs?[4]

Role of NASA and partners:[5] How should NASA and its partners determine their Moon to Mars roles and responsibilities with respect to one another? NASA partners include international actors, industry, other private actors, and other government agencies.

Transparency: How should NASA balance transparency and proprietary concerns of its commercial partners? For example, some partners may consider their planned activities or data streams proprietary, while NASA has a responsibility to share its own plans and scientific data publicly.

Benefit to all humanity: NASA operates to the benefit of all humanity. How should NASA's understanding of how to benefit humanity change as the Moon becomes increasingly developed? How should NASA engage with and communicate its understanding of benefit to humanity with the public?

Effects on Earth[6]: How should NASA quantify effects on the Earth of activities done in pursuit of agency Moon to Mars Objectives?

Cultural and ethical considerations: Prior OTPS work has considered many of the ethical questions surrounding Moon to Mars Objectives.[7] How should NASA continuously examine if its activities are consistent with values among the global community?

Conclusion

OTPS has identified 12 policy questions using the Moon to Mars Objectives that can be used as a framework for future science and exploration missions. Many of these issues cannot be addressed exclusively by NASA and will require engagement from broader national, international, and commercial space communities in early project and mission lifecycle phases.

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[4] We note that recurring tent RT-6 (responsible use) may overlap this policy question, depending on how that tenet is interpreted by the Federated Board.
[5] This policy question includes recurring tenets RT-1 (international collaboration) and RT-2 (industry collaboration).
[6] This policy question includes recurring tenet RT-9 (commerce and space development) but also includes non-economic effects on Earth.

[7] Pirtle, Zachary, Katie McBrayer, and Alyse Beauchemin. 2023. "Artemis, Ethics, and Society: Synthesis from a Workshop." NASA Report ID 20230012799. https://www.nasa.gov/wp-content/uploads/2023/09/otps-artemis-ethics-and-society-report-final-9-21-02023-tagged.pdf.