**NASA Advisory Council – Committee Recommendation**

**Science Committee Recommendation to NASA Associate Administrator for Science Mission Directorate**

**Multi-Tiered Strategy to Facilitate Diverse Teams and Safe Environments**

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| **Name of Committee:** | Science Committee |
| **Chair of Committee:** | Dr. Meenakshi Wadhwa |
| **Date of Council Public Deliberation:** | May 30, 2019 |
| **Short Title of Recommendation:** | Multi-Tiered Strategy to Facilitate Diverse Teams and Safe Environments |

**Recommendation:**
The Science Committee recommends that the NASA Science Mission Directorate (SMD) develop a multi-tiered strategy to facilitate diverse teams and safe environments. To achieve these goals, the Science Committee recommends the following actions:

- The Committee strongly encourages the development of a five-year strategic plan for Diversity, Equity and Inclusion (DEI), as a first step in the process.
- The Committee strongly endorses the continuation of the "Principal Investigator 101" and "Principal Investigator Incubator" programs recently developed by SMD.
- SMD should continue its DEI-enlightened proposal review processes, including diverse review panels, providing DEI training at the beginning of every proposal review, the clear explanation of evaluation criteria, and the enforcement of these policies and criteria throughout the panels.
- SMD Announcements of Opportunity should include a required element of how the proposed activities and proposal team aligns with NASA's DEI goals.

**Major Reasons for the Recommendation:**
Efforts are needed to improve diversity of the SMD workforce and grant/contract awardee cohort, as well as inclusivity and equity (to make all feel welcome and to address systemic disparities). These are needed to patch the "leaky" pipeline affecting recruitment and retention, ensure a culture that values inclusion/equity, and assure that the next generation of STEM professionals inspired by NASA is truly reflective of the entire nation. In addition, it is important for potential Principal Investigators to be trained and be ready to serve in such roles. NASA is already making strides in this direction with the "Principal Investigator 101" and "Principal Investigator Incubator" programs.

**Consequences of No Action on the Recommendation:**
Diverse teams working in equitable and inclusive environments have been shown to produce more creative solutions. Inaction would leave the NASA workforce and grant/contract awardee cohort dominated by a single demographic not reflective of the nation's demographics.

**NASA Advisory Council – Committee Finding**

**Science Committee Finding**
**to NASA Associate Administrator for**
**Science Mission Directorate**

**Draft Science Strategy of the Moon**

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|---|---|
| **Name of Committee:** | Science Committee |
| **Chair of Committee:** | Dr. Meenakshi Wadhwa |
| **Date of Council Public Deliberation:** | May 30, 2019 |
| **Short Title of Finding:** | Draft Science Strategy of the Moon |

**Finding:** The Science Committee finds the following regarding the draft Science Strategy of the Moon:

(a) Why Return to the Moon - The Committee finds that the draft Strategy's introduction lacks a well-articulated narrative regarding the opportunity presented by returning to the Moon at this time, which could invite the perception that it is simply an "it's about time" endeavor. A narrative, perhaps around the scientific and technological advancements that have occurred over these past 50 years, could highlight NASA's progress and articulate why now is a rich environment in which to return to the Moon to further our exploration capabilities and scientific understanding.

(b) Science Goals - Three of the four Science Goals in the draft Strategy are derived from multiple community-based documents and are well-articulated and well-justified. However, one of the goals (Science Goal #3; particularly subgoals 3A and 3C) is based primarily on outcomes from a single workshop (Deep Space Gateway Concept Science Workshop, held on February 27 - March 1, 2018). The science areas in this goal were not as well-justified or as clearly stated as for the other goals. For instance, it was not clear what was meant by "identical sensors", and what the level of "high temporal frequency" would be. It was also not clear what was "novel and unique" about the science in the areas of heliophysics, astrophysics, and Earth science enabled by going to the Moon.

(c) Partial Gravity - In the NASA Science Role section of the draft Strategy, there is no mention of the fact that lunar exploration will also provide the first opportunity for scientific study of the effect of partial gravity on human health and performance. Such research is expected to fall under the purview of NASA's Human Exploration and Operations Mission Directorate (at Johnson Space Center's Human Health and Performance Directorate) and is not referenced in this document. Mention of this research in this document would be informative to readers of this important NASA scientific activity.

(d) Priorities and Principles - In the Priorities and Principles section of the draft Strategy, the third bullet is redundant with the second bullet. Also, for the fourth bullet, it is unclear what is meant by "providing situational awareness." If referring to space weather, this could be clarified.

**Priorities and Principles (DRAFT)**

- Achieve the decadal survey objectives across the disciplines that can be addressed at the Moon or near the Moon
- Perform all research to the standards of NASA Science, including competitive selections, open data policies, etc.
- Enable competitive research through Mission of Opportunities or otherwise on or around the Moon
- Actively enable human exploration through providing situational awareness

**NASA Advisory Council – Committee Finding**

**Science Committee Finding**
**to NASA Associate Administrator for**
**Science Mission Directorate**

**Draft NASA Science Plan**

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|---|---|
| **Name of Committee:** | Science Committee |
| **Chair of Committee:** | Dr. Meenakshi Wadhwa |
| **Date of Council Public Deliberation:** | May 30, 2019 |
| **Short Title of Finding:** | Draft NASA Science Plan |

**Finding:** The Science Committee finds the following regarding the draft NASA Science Plan:

(a) Introduction and Future State – The Science Mission Directorate (SMD) is in an exciting era when there is transformational potential for a science strategy that enables excellence and innovation. We see inspirational language that speaks to this in each of the Focus Areas, and in the "2024 Future State" summary of the Science Update presentation, but find the introduction section to be merely descriptive by comparison. An introduction and conclusion that capture the visionary and ambitious plan for the future would provide much needed context for the document. It may also be useful to identify the SMD divisions in the introduction below the description of the key science themes.

(b) Rename "Protect and Improve" Theme – One of the three themes, "Protect and Improve Life on Earth" (highlighted in the Introduction and the SMD Mission Statement) does not inspire the same level of wonder and excitement as the other two themes; as written, it implies an applied science focus rather than the discovery science implied by the other two themes. This theme could be re-worded along the lines of the following:

- "Unlocking the mysteries of our planet"
- "Advancing the frontiers for humanity"

The first of these options conveys the excitement for exploring the many unknowns of our interconnected planet (Earth system). The second of these options conveys the message that NASA SMD pushes the forefront of knowledge for applications that benefit life and society.

(c) Interconnectivity and Partnerships – While there is discussion of collaboration with the Human Exploration and Operations Mission Directorate (HEOMD) and the Space Technology Mission Directorate (STMD) specifically in the context of the exploration initiative (in Strategy 1.2), the document does not sufficiently or broadly highlight the areas and mechanisms for interconnectivity and partnerships between SMD and the other Mission Directorates.

(d) Foster Innovation – The SC finds the use of the word "create" in Strategies 2.1 and 2.2 of the draft NASA Science Plan to neglect the work that is currently being done to seed a culture that embraces innovation and collaboration. Use of words such as "foster" or "grow" would communicate the need for progress, while acknowledging that work has already begun in these areas.

> **STRATEGY 2.1:** Create a culture that encourages innovation and entrepreneurship across all elements of the NASA Science portfolio.
> **STRATEGY 2.2:** Create a culture that encourages collaboration in pursuit of common goals.

(e) Diversity, Equity and Inclusion – While referencing the importance of diversity (e.g., in the Teamwork section and in Strategy 4.1), it was noted that there is not adequate emphasis on equity and inclusion in the document. Diversity alone is not sufficient to ensure the best outcomes in driving excellence and innovation.

(f) Human Health in Space – This draft NASA Science Plan document covers the activities of SMD. The Space Life and Physical Sciences Research and Applications (SLPSRA) Division, part of HEOMD, supports research on the effects of spaceflight on human health and performance and on biological and physical systems. These scientific activities are discussed in SLPSRA's strategic plan and could be referenced here to increase readers' awareness of the full scope of science at NASA.

(g) Portfolio Summaries – The draft NASA Science Plan portfolio summaries for the programs within each division should include all programs listed for each division in SMD's Science Budget Request Summary table. In the planetary science portfolio summary, the Outer Planets and Ocean Worlds Program was omitted.

**NASA Advisory Council – Committee Finding**

**Science Committee Finding**
**to NASA Associate Administrator for**
**Science Mission Directorate**

**Science and Technology Definition Teams**

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| **Name of Committee:** | Science Committee |
| **Chair of Committee:** | Dr. Meenakshi Wadhwa |
| **Date of Council Public Deliberation:** | May 30, 2019 |
| **Short Title of Finding:** | Science and Technology Definition Teams |

**Finding:** The Science Committee is concerned about the switch to Federal Advisory Committee Act (FACA) authorization for Science and Technology Definition Teams (STDTs) for upcoming mission concept development. This means that STDTs cannot recommend any implementation strategies, but instead only make recommendations on the science investigations and measurement requirements necessary to address these objectives. This has several negative ramifications. One impact is that this slows the process of NASA science mission development. The Science Mission Directorate must now conduct an implementation analysis after the STDT, rather than doing this as part of the STDT process. Another impact is the potential for cost growth. The development of science objectives and measurement requirements independently from technical implementation concepts and associated cost analysis could lead to financially unfeasible missions. When these steps are integrated, cost targets can be included in the science objective formulation discussion.