

**NASA Advisory Council**  
National Aeronautics and Space Administration  
Washington, DC 20546

*Dr. Steven W. Squyres, Chair*

April 21, 2016

Mr. Charles F. Bolden, Jr.  
Administrator  
National Aeronautics and Space Administration  
Washington, DC 20546

Dear Administrator Bolden:

The NASA Advisory Council held its first public meeting of 2016 at NASA Headquarters in Washington, DC, March 31 – April 1, 2016.

As a result of our deliberations, and in accordance with our “two-tier” approach for transmitting recommendations and findings to the NASA leadership, the Council approved two Council recommendations and six Council findings for your consideration (enclosed). The Council also approved two Committee recommendations and four Committee findings for consideration by the respective NASA Associate Administrator. Copies of the latter also are enclosed for your information and awareness.

If you have any questions or wish to discuss further, please contact me.

Sincerely,

A handwritten signature in black ink, appearing to be 'S. Squyres', with a long horizontal line extending to the right.

Steven W. Squyres  
Chair

Enclosures

## NASA Advisory Council Recommendation

### Allocation of Resources for International Space Station (ISS) Research Required for the Journey to Mars 2016-01-01 (Council-01)

**Name of Committee:** NASA Advisory Council

**Chair of Committee:** Dr. Steven Squyres

**Date of Council Public Deliberation:** April 1, 2016

**Short Title of Recommendation:** Allocation of Resources for ISS Research  
Required for the Journey to Mars

**Recommendation:** The Council recommends that NASA conduct an internal evaluation of the top priority ISS research directly related to the Journey to Mars and determine whether some portion of the resources (including crew time, up-mass, and dollars) applied to the ISS National Laboratory could be used to more rapidly advance the Journey to Mars.

**Major Reasons for Proposing the Recommendation:** As articulated by the NASA Administrator and various NASA public documents, the Journey to Mars is NASA's top Exploration Goal.

Research for the Journey to Mars that utilizes the ISS must be concentrated in the next eight years, before NASA's Human Exploration focus shifts away from ISS utilization. Beyond the operational funding, launch up-mass and crew time for ISS research are the most limited resources.

The Council notes that the ISS National Laboratory has been allocated launch up-mass and at least 50% of ISS crew time for research that may eventually have potential for commercial benefits. The Council has also been told by NASA that a successful transition from the "Earth Reliant" phase to the "Proving Ground" phase is dependent at least in part on the success of attracting future commercial users of the ISS and/or the availability of commercial Low Earth Orbit (LEO) laboratory capability that NASA could use. The Council therefore believes that it would be beneficial for the Agency to better understand the effect that the resources being devoted to the ISS National Laboratory might have on the important research needed to reduce technology and human health risk for the Journey to Mars.

As additional information, we provide a section of the original legislation that allows for the allocation to the ISS National Laboratory to be altered as needed (see footnote below).

**Consequences of No Action on the Proposed Recommendation:** The Journey to Mars may be delayed as resources are deployed for commercialization.

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Section 504(d)(2) of the NASA Authorization Act of 2010, Public Law 111-267 (*bolded portion below added for emphasis*):

(d) RESEARCH CAPACITY ALLOCATION AND INTEGRATION OF RESEARCH PAYLOADS.

(2) ADDITIONAL RESEARCH CAPABILITIES.—If any NASA research plan is determined to require research capacity onboard the ISS beyond the percentage allocated under paragraph (1), such research plan shall be prepared in the form of a requested research opportunity to be submitted to the process established under this section for the consideration of proposed research within the capacity allocated to the ISS national laboratory. A proposal for such a research plan may include the establishment of partnerships with non-NASA institutions eligible to propose research to be conducted within the ISS national laboratory capacity. **Until September 30, 2020, the official or employee designated under subsection (b) may grant an exception to this requirement in the case of a proposed experiment considered essential for purposes of preparing for exploration beyond low-Earth orbit, as determined by joint agreement between the organization with which the Administrator enters into a cooperative agreement under subsection (a) and the official or employee designated under subsection (b).**

*[NOTE: The “official or employee designated under subsection (b)” is the NASA Liaison, Mr. Samuel Scimemi, Director, International Space Station Division, NASA Headquarters.]*

## NASA Advisory Council Recommendation

### Information Technology (IT) Security Risk Management Structure 2016-01-02 (IC-01)

**Name of Committee:** Institutional Committee

**Chair of Committee:** Ms. Kathryn Schmoll

**Date of Council Public Deliberation:** April 1, 2016

**Short Title of Recommendation:** IT Risk Management Structure

**Recommendation:** The Council recommends that NASA accelerate the schedule to develop an IT Security Risk Management structure from its current schedule completion date of December 31, 2017, to an earlier date.

**Major Reasons for Proposing the Recommendation:** The Agency would benefit from formalizing an IT Security Risk Management Framework and Cybersecurity Strategy to more effectively deploy limited resources. This is required to enable informed decisions on investments and planned actions.

**Consequences of No Action on the Proposed Recommendation:** If this recommendation is not accepted there could be a non-optimal deployment of resources applied to NASA cybersecurity efforts.

**NASA Advisory Council Finding**  
**Business Services Assessment (BSA)**

**Name of Committee:** Institutional Committee

**Chair of Committee:** Ms. Kathryn Schmoll

**Date of Council Public Deliberation:** April 1, 2016

**Short Title of Finding:** Business Services Assessment

**Finding:** The Council commends the overall BSA efforts to date. There is excellent transparency in the BSA process. The Council reinforces the importance of having senior management backing and engagement where possible. The commitment at all levels and across all Centers is vital. The Council suggests when determining what BSAs to perform and implement in the future, NASA should consider the Office of Inspector General Report on NASA’s Top Management Challenges. The recent deep dive teams took advantage of lessons learned from the early assessment teams. Leadership should be mindful of BSA “process overload.” The Council endorses the Mission Support Council approved Human Capital Deep Dive recommendations. The Council stresses the importance of tracking that these BSA decisions actually get implemented and the actions are accomplished.

## NASA Advisory Council Finding

### Information Technology (IT) Implementation Plan

**Name of Committee:** Institutional Committee

**Chair of Committee:** Ms. Kathryn Schmoll

**Date of Council Public Deliberation:** April 1, 2016

**Short Title of Finding:** IT Implementation Plan

**Finding:** The Council commends the Agency on the recently approved IT Implementation Plan in establishing a coherent plan with common nomenclature and framework. The IT Implementation Plan has been developed with extensive involvement from all stakeholders. The plan seems well-defined but potentially resource intensive.

## NASA Advisory Council Finding

### Technology Demonstration Incentives for Small and Medium-Class Science Missions

**Name of Committee:** Technology, Innovation and Engineering Committee

**Chair of Committee:** Dr. William Ballhaus

**Date of Council Public Deliberation:** April 1, 2016

**Short Title of Finding:** Technology Demonstration Incentives for Small and Medium-Class Science Missions

**Finding:** In July 2014, the Council recommended that the Science Mission Directorate and Space Technology Mission Directorate Associate Administrators review the policy that disincentivizes infusion of new technology into small and medium-class science missions. The flagship missions utilize new technologies, but smaller missions have not. The Council is pleased to see incentives were added to the last Discovery round for inclusion of new technologies that could benefit future science missions. For example, four out of five selected Phase A Discovery study teams took advantage of these incentives to include new technologies (i.e., Deep Space Optical Communications). The Council finds that it would be useful to explore similar technology demonstration incentives for other science program mission areas.

## NASA Advisory Council Finding

### Transfer of Restore-L Mission from Human Exploration and Operations Mission Directorate (HEOMD) to Space Technology Mission Directorate (STMD)

**Name of Committee:** Technology, Innovation and Engineering Committee

**Chair of Committee:** Dr. William Ballhaus

**Date of Council Public Deliberation:** April 1, 2016

**Short Title of Finding:** Transfer of Restore-L Mission from HEOMD to STMD

**Finding:** The transfer of the Restore-L mission from HEOMD to STMD resulted in a net reduction of \$37 million in budget to the STMD portfolio. The majority of the reductions were taken from the Technology Demonstration Missions, which eliminates the Low Density Supersonic Decelerator and Composite Exploration Upper Stage. It appears that Restore-L has much in common with the Defense Advanced Research Projects Agency (DARPA) Phoenix program, with the differentiator being Low Earth Orbit vs. Geosynchronous Earth Orbit demonstration. Has NASA collaborated with the DARPA to the maximum extent possible? The cumulative U.S. Government investment is ~\$800 million using a common set of contractors and hardware.

## NASA Advisory Council Finding

### Exploration Proving Ground Missions: Risk Reduction Matrices and Technology Investment Plans

**Name of Committee:** Technology, Innovation and Engineering Committee

**Chair of Committee:** Dr. William Ballhaus

**Date of Council Public Deliberation:** April 1, 2016

**Short Title of Finding:** Exploration Proving Ground Missions: Risk Reduction Matrices and Technology Investment Plans

**Finding:** A set of Exploration Proving Ground missions is currently being defined. The Council looks forward to reviewing the risk reduction matrices and technology investment plans associated with the Proving Ground missions. Specifically, the Council is interested in understanding what technology risk reduction efforts require use of the International Space Station and why, and what is the plan to retire these technology risks by the time the ISS retires in 2024.

## NASA Advisory Council Finding

### Small Satellites: End-of-Life and Architectural Debris Mitigation

**Name of Committee:** Technology, Innovation and Engineering Committee

**Chair of Committee:** Dr. William Ballhaus

**Date of Council Public Deliberation:** April 1, 2016

**Short Title of Finding:** Small Satellites: End-of-Life and Architectural Debris Mitigation

**Finding:** The Council finds that the mission utility of small satellites is increasing rapidly and promulgated across industry, academia and government. The end-of-life issue associated with the operational deployment of thousands of small satellites creates a continually increasing architectural debris problem. There is a need for mitigating this potential debris problem. Should NASA play a role in helping the U.S. Government deal with this problem? The NASA Administrator could get this topic on the agenda for the Partnership Council meeting and engage the Federal Aviation Administration.

**NASA Advisory Council – Committee Recommendation**

**Technology, Innovation and Engineering Committee Recommendation  
to NASA Associate Administrator for  
Space Technology Mission Directorate (STMD)**

**Independent Study of  
Current Small Satellite Technology Developments**

<b>Name of Committee:</b>	Technology, Innovation and Engineering Committee
<b>Chair of Committee:</b>	Dr. William Ballhaus
<b>Date of Council Public Deliberation:</b>	April 1, 2016
<b>Short Title of Recommendation:</b>	Independent Study of Current Small Satellite Technology Developments

**Recommendation:** The Technology, Innovation and Engineering Committee recommends that STMD conduct an independent study of current small satellite technology developments to determine the appropriate focus for NASA’s small spacecraft technology investments.

**Major Reasons for Proposing the Recommendation:** NASA is at risk for having STMD’s small satellite technology investments duplicated in commoditized capabilities.

**Consequences of No Action on the Recommendation:** Given this, what is the appropriate, discriminating role for STMD vis-à-vis all the other organizations that are developing small satellite technology?

## NASA Advisory Council – Committee Recommendation

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

#### NASA Planning for Full System-Level Sterilization

<b>Name of Committee:</b>	Science Committee
<b>Chair of Committee:</b>	Dr. Bradley Peterson
<b>Date of Council Public Deliberation:</b>	April 1, 2016
<b>Short Title of Recommendation:</b>	NASA Planning for Full System-Level Sterilization

**Recommendation:** In order to ensure that future scientific instruments can meet the challenges of planetary protection implementations for missions to worlds that could support Earth life, the Science Committee, on behalf of the Planetary Protection Subcommittee, recommends that NASA provide support to enable instrument developers to qualify and employ construction methods that will be compatible with the use of system-level microbial techniques, including the use of dry heat microbial reduction (DHMR).

Concomitantly, the Committee recommends that NASA benchmark or consider engaging the Space Studies Board (SSB) to conduct a study to identify successful approaches by which modern instruments can be subjected to the current suite of commercially available microbial-reduction methods, including the use of DHMR. Approaches from other fields (including medical, military and food-industry practitioners) would be particularly important to evaluate. Methods identified for use should be compatible with implementation strategies capable of complying with the regulatory framework for planetary protection currently in use by NASA and the Committee on Space Research (COSPAR).

**Major Reasons for the Recommendation:** In the past, the SSB has made recommendations about the measures that should be taken to protect potentially habitable worlds (e.g., Mars, Europa, and Enceladus) from terrestrial contamination, often reflecting the rigor with which the Viking landers and orbiters of the mid-1970's were treated to reduce biological contamination. Based on SSB recommendations, knowledge of Earth organisms, and ongoing scientific discoveries regarding these potentially habitable worlds, it is clear that methods to reduce or eliminate biological contamination on outbound and inbound space missions (and preventing recontamination) will continue to be necessary for the most compelling targets.

**Consequences of No Action on the Recommendation:** Future NASA science, particularly life detection efforts and in-situ exploration of special regions, may not be possible without the development of new instruments amenable to dry heat microbial reduction or other commercially available microbial reduction methods.

## NASA Advisory Council – Committee Finding

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

#### Deep Space Network

**Name of Committee:** Science Committee

**Chair of Committee:** Dr. Bradley Peterson

**Date of Council Public Deliberation:** April 1, 2016

**Short Title of Finding:** Deep Space Network

**Finding:** The Science Committee finds that the Planetary Science Subcommittee (PSS) is alarmed by reports of increasing data losses by active planetary missions (e.g., Cassini, with details provided by the Outer Planets Assessment Group in their February 2016 finding on the Deep Space Network), especially following a 10% funding cut to the Deep Space Network at the end of 2015. The PSS supports aggressive efforts to address this issue and would like to hear updates as soon as possible. In particular, current NASA science missions using the Deep Space Network should be asked to inform NASA about recent Deep Space Network performance changes they have experienced.

**NASA Advisory Council – Committee Finding**

**Aeronautics Committee Finding  
to NASA Associate Administrator for  
Aeronautics Research Mission Directorate**

**Aeronautics Research Mission Directorate (ARMD)  
10-Year Investment Strategy**

**Name of Committee:** Aeronautics Committee

**Chair of Committee:** Ms. Marion Blakey

**Date of Council Public Deliberation:** April 1, 2016

**Short Title of Finding:** ARMD 10-Year Investment Strategy

**Finding:** The Aeronautics Committee endorsed the 10-year strategy that ARMD has established. The Committee finds that ARMD needs to be sure to focus on a goal setting strategy that makes aviation safe for the environment.

**NASA Advisory Council – Committee Finding**

**Aeronautics Committee Finding  
to NASA Associate Administrator for  
Aeronautics Research Mission Directorate**

**Aeronautics Research Mission Directorate (ARMD)  
X-Planes Initiative**

**Name of Committee:** Aeronautics Committee

**Chair of Committee:** Ms. Marion Blakey

**Date of Council Public Deliberation:** April 1, 2016

**Short Title of Finding:** ARMD X-Planes Initiative

**Finding:** The Aeronautics Committee was excited about the X-planes initiative of ARMD for its technology significance and inspirational value for future generations. The Committee feels that it is an opportunity for the younger community to get excited about aeronautics and commended ARMD for the strategy. (The younger community includes not only the NASA younger generation of employees but also the universities and the overall younger community through Science, Technology, Engineering and Mathematics (STEM) to be inspired to pursue the aeronautics research fields.)

**NASA Advisory Council – Committee Finding**

**Aeronautics Committee Finding  
to NASA Associate Administrator for  
Aeronautics Research Mission Directorate**

**Aeronautics Research Mission Directorate (ARMD)  
Strategic Planning**

**Name of Committee:** Aeronautics Committee

**Chair of Committee:** Ms. Marion Blakey

**Date of Council Public Deliberation:** April 1, 2016

**Short Title of Finding:** ARMD Strategic Planning

**Finding:** The Aeronautics Committee believes that Unmanned Aircraft Systems Traffic Management is a potential test bed for capability prototyping to be an integrating force and potentially revolutionize the Air Traffic Management for the benefit of the aviation industry. The Committee found that it has the potential to be a contributing factor to NextGen.