

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

*General Lester L. Lyles (USAF, Ret.), Chair*

December 20, 2017

**Mr. Robert M. Lightfoot, Jr.**  
**Acting Administrator**  
**National Aeronautics and Space Administration**  
**Washington, DC 20546**

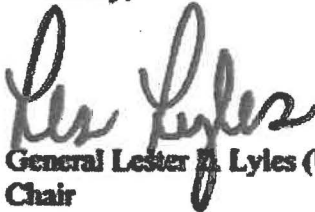
*Robert*  
Dear Acting Administrator Lightfoot:

The NASA Advisory Council held its third and final public meeting of 2017 at NASA Headquarters, Washington, DC, on December 7-8, 2017.

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 one Council recommendation and seven Council findings for your consideration (enclosed). The Council also approved one Committee recommendation and four Committee findings for consideration by the NASA Associate Administrators. Copies of the latter also are enclosed for your information and awareness.

If you have any questions or wish to discuss this further, please do not hesitate to contact me.

Sincerely,



General Lester L. Lyles (USAF, Ret.)  
Chair

Enclosures

## NASA Advisory Council Recommendation

### Interactive Link between the NASA Advisory Council and the National Space Council 2017-03-01 (HEOC-01)

<b>Name of Committee:</b>	Human Exploration and Operations Committee
<b>Chair of Committee:</b>	Mr. Kenneth Bowersox
<b>Date of Council Public Deliberation:</b>	December 8, 2017
<b>Short Title of Recommendation:</b>	Interactive Link between the NASA Advisory Council and the National Space Council

**Recommendation:** The Council recommends that NASA work with the National Space Council staff to establish an interactive link between the NASA Advisory Council and the National Space Council.

**Major Reasons for the Recommendation:** The implementation of the National Space Council provides an excellent opportunity for NASA to bring up problems and gain assistance in resolving issues which affect the broader space community, such as the dwindling supplier base for some critical space components. The NASA Advisory Council has tremendous insight into NASA, and could provide valuable input to the National Space Council staff on significant issues which have not reached the urgency level required for discussion at formal National Space Council meetings.

**Consequences of No Action on the Recommendation:** NASA will lose opportunities to gain the help of the National Space Council on issues that may not yet have reached the urgency level required to be brought up and discussed by the National Space Council members.

## NASA Advisory Council Finding

### Esteemed NASA Civil Servant Workforce

<b>Name of Committee:</b>	Science Committee Technology, Innovation and Engineering Committee
<b>Chair of Committee:</b>	Dr. Bradley Peterson Dr. William Ballhaus
<b>Date of Council Public Deliberation:</b>	December 7-8, 2017
<b>Short Title of Finding:</b>	Esteemed NASA Civil Servant Workforce

**Finding:** The Council wishes to acknowledge the science and engineering community's great esteem for its civil servant colleagues. NASA civil servants have worked tirelessly in many roles – as project scientists, mission planners, analysts, archivists, project managers, engineers, and more – to enable the breakthrough science of NASA's missions. The Council also would like to emphasize the value of NASA civil service technologists and researchers that invent, acquire, and adapt advanced technologies and capabilities (e.g., engineering methods) to the needs of NASA's science and exploration projects. The commitment, professionalism, and dedication of NASA's civil servants have earned the respect and gratitude of the science and engineering community. The community considers its civil servant colleagues – along with the missions they support – a national treasure.

## **NASA Advisory Council Finding**

### **NASA Human Exploration Plans**

<b>Name of Committee:</b>	Human Exploration and Operations Committee
<b>Chair of Committee:</b>	Mr. Kenneth Bowersox
<b>Date of Council Public Deliberation:</b>	December 8, 2017
<b>Short Title of Finding:</b>	NASA Human Exploration Plans

**Finding:** NASA's current phased approach to exploration which includes the International Space Station (ISS) for the "Earth dependent" phase, Cislunar space for the "proving ground" phase, and goals beyond Cislunar for the "Earth independent" phase, provide a useful framework for future exploration efforts. An important element in the phased approach is that human exploration efforts in the Cislunar "proving ground" contribute to future exploration efforts beyond Cislunar space, even if the focus of Cislunar activity shifts to the lunar surface.

**NASA Advisory Council Finding**

**Demonstrating Continued Improvement:  
Office of Education  
Business Services Assessment (BSA)**

<b>Name of Committee:</b>	Ad Hoc Task Force on STEM Education
<b>Chair of Committee:</b>	Dr. Aimee Kennedy
<b>Date of Council Public Deliberation:</b>	December 7, 2017
<b>Short Title of Finding:</b>	Demonstrating Continued Improvement: Office of Education Business Services Assessment (BSA)

**Finding:** The Council's STEM Task Force has had a chance to look at more of the Business Services Assessment (BSA) details for the NASA Office of Education, and the Council concurs that the BSA efforts are addressing the issues that have been previously highlighted. The Council believes that the initial results have the potential to help NASA move forward in a more strategic and focused direction.

**NASA Advisory Council Finding**

**Demonstrating Continued Improvement:  
Office of Education  
Measurement and Evaluation**

<b>Name of Committee:</b>	Ad Hoc Task Force on STEM Education
<b>Chair of Committee:</b>	Dr. Aimee Kennedy
<b>Date of Council Public Deliberation:</b>	December 7, 2017
<b>Short Title of Finding:</b>	Demonstrating Continued Improvement: Office of Education Measurement and Evaluation

**Finding:** The NASA Office of Education is revamping the current plan to improve performance measurement and evaluation of NASA's STEM engagement activities. This effort has been briefed to the White House Office of Management and Budget (OMB), the National Science Foundation (NSF), and the NASA Advisory Council's STEM Task Force. The Council is encouraged by the collaboration, and supports the further development and implementation of this plan.

**NASA Advisory Council Finding**

**Demonstrating Continued Improvement:  
Office of Education  
Functional Leadership**

<b>Name of Committee:</b>	Ad Hoc Task Force on STEM Education
<b>Chair of Committee:</b>	Dr. Aimee Kennedy
<b>Date of Council Public Deliberation:</b>	December 7, 2017
<b>Short Title of Finding:</b>	Demonstrating Continued Improvement: Office of Education Functional Leadership

**Finding:** Building on the efforts of the Business Services Assessment (BSA), the NASA Office of Education is working across organizations to facilitate an integrated STEM education strategy that includes NASA Headquarters Mission Directorates and Staff Offices, as well as NASA Centers.

**NASA Advisory Council Finding**

**Demonstrating Continued Improvement:  
Office of Education  
STEM Engagement**

<b>Name of Committee:</b>	Ad Hoc Task Force on STEM Education
<b>Chair of Committee:</b>	Dr. Aimee Kennedy
<b>Date of Council Public Deliberation:</b>	December 7, 2017
<b>Short Title of Finding:</b>	Demonstrating Continued Improvement: Office of Education STEM Engagement

**Finding:** NASA plays an essential role in STEM engagement across the U.S. The aspirational change desired from this effort is complex. To sustain the long-term success of this effort, collaboration and commitment will need to be guaranteed across the Agency.



**NASA Advisory Council Finding**

**Demonstrating Continued Improvement:  
Office of Education  
Broadening Participation**

<b>Name of Committee:</b>	Ad Hoc Task Force on STEM Education
<b>Chair of Committee:</b>	Dr. Aimee Kennedy
<b>Date of Council Public Deliberation:</b>	December 7, 2017
<b>Short Title of Finding:</b>	Demonstrating Continued Improvement: Office of Education Broadening Participation

**Finding:** NASA's commitment to reaching underrepresented and underserved communities has been a long-term priority throughout the history of its STEM engagement activities. NASA should be sure not to lose sight of the role it has played, and should continue to play, in engaging, educating, inspiring, and employing underserved populations in the STEM workforce.

**NASA Advisory Council – Committee Recommendation**

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

**Autonomy Thrust**

<b>Name of Committee:</b>	Aeronautics Committee
<b>Chair of Committee:</b>	Mr. John Borghese
<b>Date of Council Public Deliberation:</b>	December 7, 2017
<b>Short Title of Recommendation:</b>	Autonomy Thrust

**Recommendation:** The Aeronautics Committee agrees that the NASA research in autonomous vehicles and autonomy is important for the U.S. Because of new technology, market demand and industry investment, autonomy and autonomous vehicles could change aviation similar in scope to the birth of aviation. Because of these dynamics, the Committee agrees with the approach to have independent evaluations of the autonomous vehicle market. The Committee recommends that NASA harmonize the two studies so that the results are presented contemporaneously to receive more value. The Committee also recommends that the NASA Aeronautics Research Mission Directorate (ARMD) identify issues and gaps that need to be addressed regardless of the studies' outcomes.

**Major Reasons for the Recommendation:** While the studies will be done in different time frames, there is benefit in sharing information. Given the fast moving pace of these new markets and the uncertainty of future outcomes, NASA should also address major issues and gaps such as changes to the national airspace, electric propulsion, and autonomy.

**Consequences of No Action on the Recommendation:** The studies will lack the benefit of a healthy discussion on any differences in outcomes. If the studies result in different outcomes at different time periods, there will be uncertainty on which outcome should be used for NASA technology investment.

**NASA Advisory Council – Committee Finding**

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

**Low Boom Flight Demonstrator**

<b>Name of Committee:</b>	Aeronautics Committee
<b>Chair of Committee:</b>	Mr. John Borghese
<b>Date of Council Public Deliberation:</b>	December 7, 2017
<b>Short Title of Finding:</b>	Low Boom Flight Demonstrator

**Finding:** The Aeronautics Committee expressed excitement and applauds the progress of the Low Boom Flight Demonstration (LBFD) project, and is looking forward to staying abreast on the future steps. The Committee emphasized the importance of community outreach, and provided examples on how to involve students to learn about NASA efforts. The Committee also applauds the single chain of command employed on LBFD as being important to the success of such a large program as well as using the best talents across the NASA Aeronautics Research Mission Directorate (ARMD) locations, but cautioned NASA to take careful consideration as to how the virtual office is set up so that there is a clear understanding of the line of authority. The Committee also applauded outreach from other parts of NASA as well as the risk reduction underway, and suggests that risk reduction projects be funded to the extent necessary since NASA has not developed a manned X-plane recently.

## **NASA Advisory Council – Committee Finding**

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

#### **System Wide Safety Assurance Project**

<b>Name of Committee:</b>	Aeronautics Committee
<b>Chair of Committee:</b>	Mr. John Borghese
<b>Date of Council Public Deliberation:</b>	December 7, 2017
<b>Short Title of Finding:</b>	System Wide Safety Assurance Project

**Finding:** The Aeronautics Committee finds that the System Wide Safety (SWS) project has progressed well and provides an opportunity to get students excited about engineering. Specifically, the Committee encourages NASA to partner with universities in generating data – data is hard to get and it could be a space that universities can fill. The Committee cautions NASA to engage with the machine learning community with a particular focus on false alarms in the system. The Committee agrees with NASA’s focus on Terminal Areas Operations with emphasis on the most critical needs in traditional aviation and Unmanned Aircraft Systems (UAS) Traffic Management (UTM) for near-term needs to support unmanned and autonomous systems. The Committee recognizes that SWS is a big challenge and agrees with the approach to start with a few tasks first to gain an understanding of the effectiveness of the technology. The SWS team should also keep abreast of new algorithms and approaches in this rapidly moving technology area.

**NASA Advisory Council – Committee Finding**

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

**Hypersonics Project**

<b>Name of Committee:</b>	Aeronautics Committee
<b>Chair of Committee:</b>	Mr. John Borghese
<b>Date of Council Public Deliberation:</b>	December 7, 2017
<b>Short Title of Finding:</b>	Hypersonics Project

**Finding:** The Aeronautics Committee believes that the work NASA is doing is important in order to maintain U.S. supremacy in Hypersonics by developing tools, technologies and methodologies as well as training the future workforce in this area. The project has a clear focus on the understanding of the fundamental physics of transition for multi-mode hypersonic engines and other key hypersonic phenomena and technologies, and NASA has an opportunity for important technology validation. NASA also has a focus on the important challenge of understanding and validating the quantification of uncertainty, as minor changes can have a significant impact to vehicle performance. The Committee expressed concern that NASA project personnel have access to the data collected even in cases where the data is sensitive. The Committee also suggested outreach opportunities with universities in this important areas for the U.S.

**NASA Advisory Council – Committee Finding**

**Technology, Innovation and Engineering Committee Finding  
to NASA Associate Administrator for  
Space Technology Mission Directorate**

**Small Satellite Technology**

<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>	December 7, 2017
<b>Short Title of Finding:</b>	Small Satellite Technology

**Finding:** The NASA Space Technology Mission Directorate (STMD) should be commended for following through to implement the recommendations from the Institute for Defense Analysis (IDA) Small Satellite study, focusing investments on relevant NASA mission areas and pre-competitive platform technologies. The Technology, Innovation and Engineering Committee is satisfied that STMD has met the intent of its July 2016 recommendation. In executing this plan, there appears to be a bottleneck in acquiring launch opportunities. The Committee is requesting more information to understand the impact and potential means to reduce this delay.