



**NASA Advisory Council Science, Technology,
Engineering and Mathematics (STEM)
Engagement Committee**

NOTES

May 28, 2019

STEM Engagement Committee Members

Present: Cristin Dorgelo, Norman Fortenberry, Michael Lach, Ray Mellado, Darryl Williams, and Aimee Kennedy, Chair

Not Present: Daniel Dumbacher, Carl Person

Others Present:

Beverly Girten (Executive Secretary), Michael Kincaid, Kris Brown, Diane DeTroye, NASA HQ Office of STEM Engagement; Rob LaSalvia, Rick Gilmore, Cathy Graves, Tara Strang, Glenn Research Center

Opening Comments

Dr. Beverly Girten, Committee Executive Secretary welcomed everyone and noted the meeting is taking place in accordance with the Federal Advisory Committee Act (FACA).

CoSTEM/STEM Education Advisory Panel Update

Dr. Kennedy and Mr. Mellado participated in a closed meeting on May 24, 2019 for the CoSTEM Education Advisory Panel during which the group looked at the implementation plan for the Federal STEM Plan. Work on the implementation plan is moving forward.

Office of STEM Engagement (OSTEM) Updates

Overview/Budget/ National Space Council/Moon 2024

Mr. Kincaid summarized the Fifth National Space Council Meeting where Vice President Pence announced plans to land the first American woman and next American man on the Moon by 2024. Mr. Kincaid then introduced the Artemis program.

Business Services Assessment (BSA) Closeout/Strategy/Portfolio

Ms. Brown reviewed the BSA implementation timeline, noting the Office of STEM Engagement completed all BSA implementation actions and officially closed out BSA activities on April 30, 2019. Ms. Brown commented the actions were completed six months earlier than planned. Ms. Brown provided a brief summary of the systemic and programmatic work completed and noted the BSA effort resulted in foundational changes in how the Office of STEM Engagement does business. The new NASA Strategy for STEM Engagement drives Office of STEM Engagement work over next three years. The strategy drives three focus areas into actionable objectives and strategies.

Ms. Brown reviewed the structure and overall content of the NASA STEM Engagement portfolio. Using drivers from NASA Strategic Plan and the STEM Engagement goals and requirements and looked at how agency portfolio to identify gaps. The STEM Engagement Council had opportunity to weigh in on gaps and opportunities for Office of STEM Engagement to consider in the future. Dr. Lach commented the slide presented communicate significant progress over past 9-12 months. Dr. Lach questioned which aspects of the portfolio have the highest return on investment. He discussed developing a framework for what spark means and designing an initiative based on the framework. Some aspects of the portfolio will be more impactful than others and it is important to see what the literature says first before moving forward. The literature will help to make the hard decisions.

Ms. Brown noted that the portfolio team did an analysis of each activity across the agency against the STEM Engagement strategy and objectives. They completed a gap analysis to identify areas that need improvement. She noted there are places that are natural in the pipeline for NASA to invest but that is needs to be balanced with NASA being a mission organization.

Dr. Lach commented a key driver of spark is the interpersonal relationship between a young person and a more experienced STEM professional, noting an internship is likely more powerful than a fellowship, which is more independently driven. Working with NASA employees and contractors allows students to see how STEM professionals work. He suggesting establishing a set of guiding principles to identify which aspects of the portfolio are more likely to result in better outcomes for everyone.

Connecting Nation's STEM to NASA's Mission STEM Partnerships/Apollo 50th Anniversary

Dr. Girten provided an update on the Teams Engaging Affiliated Museums and Informal Institutions (TEAM II) solicitation which has a due date of August 13, 2019. Dr. Girten provided an update on partnerships, emphasizing the recent work completed under the partnership with Tynker. The agreement was signed in December, 2018 and NASA and Tynker have already completed an enormous amount of work under the first annex. One NASA-themed coding challenge has been completed and two additional challenges are forthcoming in fall 2019. Dr. Girten also shared the recently signed space act agreement with Boeing, noting Tynker and Boeing agreements are linked to the Apollo 50th anniversary. Both partnerships will amplify efforts in those arenas.

NextGen STEM: Commercial Crew Program

Diane DeTroye commented that the appropriated money for SEAP (STEM Engagement and Accountability Project) is transitioning to NextGen STEM, which includes TEAM II and ISS activities, for example, STEM on Station. NextGen STEM focuses mission-driven efforts to enable content that is beneficial to mission directorates, while keeping target audience in mind. NextGen STEM works to leverage STEM Engagement resources. For example, Space Grant has investments in educator professional development. Ms. DeTroye then gave an overview of the three NextGen STEM themes: Moon to Mars, Commercial Crew, and Low Sonic Boom Airplane. Low Sonic Boom Airplane refers to how the country could get back into supersonic transport. These three topics were selected in conjunction with the mission directorates and support the student community.

Ms. DeTroye shared highlights from NextGen STEM Commercial Crew efforts, including classroom activities for K-12 that are enhanced by digital learning, engineering design challenges, and virtual tours. NextGen STEM starts by looking at what the evidence says is a good way to do it and then revise as

evaluation and feedback is received. For example, for grades 5-12, the egg drop is enhanced with technology and additional tools that give students exposure to the kind of tools they will need in the workforce. These include graphs and platforms that are notable within education community. Ms. DeTroye highlighted the VR (virtual reality) field trip, noting it is an unprecedented opportunity for SpaceX and Boeing facilities. The team is able create 360 degree videos in those facilities. The videos are viewed using an Oculus headset and can be exported to Google Expeditions or Google Cardboard. The field trips come with teacher materials so a teacher can use it in the classroom.

Ms. DeTroye noted the X-59 Low Boom Aircraft activities are called Small Steps to Giant Leaps in honor of Neil Armstrong who started his career as a test pilot. The team is creating activities that are focused on sound: how sound travels, sound effects, and forces of flight. The team created activity guides for classrooms. They are trying a novel experimental approach, of creating a citizen science activity. The activity enables students to measure ambient noise in their community and add their data to a database for use by NASA researchers. Low Boom Aircraft resources include a comprehensive activity guide that brings all the pieces together.

Ms. DeTroye then shared the Moon to Mars efforts, which include building a launch vehicle, the Gateway, and lunar landers. The activities were developed using the expertise NASA had with the Rocket Educators Guide. NextGen STEM updated materials from the Rocket Educators Guide. The Moon to Mars team conducted a coding challenge and subject matter experts are currently in the process of evaluating student submissions. The team is also developing curriculum support materials.

Dr. Girtten shared two activity booklets that were published in hardcover and online, Forward to the Moon with Artemis and the NASA National Park Service Junior Ranger Spaceflight Explorer booklet. The Forward to the Moon with Artemis has a print order of 100,000 booklets. National Park Service is printing 50,000 copies of the Junior Ranger booklet.

Dr. Michael Lach shared that he had some questions and concerns about NextGen STEM and Dr. Kennedy invited him to share those questions and concerns during the meeting. Dr. Lach stated there is data that shows saturation of products in middle school and more opportunities are needed for high school and elementary school. Dr. Lach also expressed concerns over the use of "NextGen." Although NextGen is not trademarked, there is a connection to the NextGen Science Standards. Dr. Lach commented that hands-on and inquiry are passé. The egg drop has routinely been characterized as something we don't want to do. The egg drop may conflict with more research-based science education research. Dr. Lach also asked about what success looks like for NextGen STEM. He questioned how are people to use NextGen STEM materials and how will NASA know if the materials are used well. He noted there is an abundance of online resources for teachers and schools and are generally not used well. Dr. Lach questioned how will NextGen STEM will distinguish itself from the masses available on Google and Pinterest.

Sparking Interest in STEM

Mr. Rob LaSalvia began his presentation by stating Dr. Lach raised a good point, that is, how might we ensure the products in the portfolio provide the greatest amount of good. He also shared the bulk of funding in 2019 focused on higher education. Mr. LaSalvia stated his team should have internal best practices in a month which will be used to make the portfolio as strong as possible. Mr. LaSalvia commented his team has worked with National Science Foundation colleagues to investigate how longitudinal tracking can be strengthened.

Mr. LaSalvia noted Office of STEM Engagement efforts are working to attract underrepresented students. Office of STEM Engagement seeks diverse candidates and at a minimum seeks to have participants reflective of college enrollment. While Mr. LaSalvia noted the Office of STEM Engagement exceed some measures over the past two years, there is still work to do. Mr. LaSalvia presented data to show how Office of STEM Engagement is ahead of its target.

Mr. Gilmore then discussed the NASA Advisory Council STEM Engagement Committee's recommendation related to NASA's role in sparking interest in STEM. Dr. Cathy Graves reviewed the recommendation and shared the team has potential candidates, which includes individuals beyond STEM experts, and stated the team will share the panel members when finalized. Sometime in mid-June or July, the team will conduct a forum at NASA Headquarters to discuss the recommendation. The forum work will result in the production of a report which will be used to develop future solicitations. Dr. Tara Strang then presented potential questions for the panel.

Mr. Gilmore then shared the team will continue talking about disseminating the report both internally and externally. The report can be used to support future solicitations, can be shared at professional conferences and with other federal agencies.

Dr. Lach questioned the scope of the report, noting there are two top-level questions which may be intertwined. The first is, What is spark and how do we generate it among people? The second, depending on the answer, is, What should NASA do about it?

Discuss/Finalize Findings and Recommendations

The STEM Engagement Committee continued discussions and agreed upon one finding:

Finding: The Office of STEM Engagement brings a continuous improvement approach to its work and is making good progress on the work plans previously presented (i.e. BSA findings, NASA STEM Engagement strategy, Federal 5-year STEM plan).

Major Reasons for the Finding:

- The Office of STEM Engagement continues to align their STEM engagement programs for maximum impact.
- The Office of STEM Engagement continues to leverage scalability of their reach through strategic partnerships.

Adjourn Meeting

Dr. Girtten then adjourned the meeting.