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Statement of
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before the

Subcommittee on Commerce, Justice, Science, and Related Agencies
Committee on Appropriations
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Overview

Mr. Chairman and Members of the Subcommittee, I am pleased to have this opportunity to discuss NASA's endeavors in science, technology, engineering, and mathematics (STEM) engagement. NASA is committed to achieving its exploration goals, and to reigniting America's passion for space exploration, innovation and discovery. Our groundbreaking work in science, aeronautics and space technology leads to discovery and societal benefits, and exploration is in our DNA – the desire to discover and inhabit distant worlds, whether across Earthly oceans or vast regions of space. The Artemis Program will bring together the capabilities and resources of our international and commercial partners and demonstrate to young people around the world the power of a unified purpose.

As NASA prepares to land the first woman and the next man on the Moon by 2024, we envision having students across the nation join us in our journey. We envision NASA's direct work with students will attract and engage the Artemis generation – our future aerospace workforce – and stimulate interest in STEM careers across the nation. NASA's unique contributions are vital to attracting the next generation STEM workforce and will further NASA's strategic goals of exploration, science, aeronautics, and space technology. NASA is positioned to make valuable contributions in the Federal sector by providing mission-driven opportunities toward enhancing our nation's STEM literacy, and by helping to build a vibrant and diverse next generation STEM workforce.

To execute our STEM engagement efforts, we leverage our community of talented and dedicated education professionals, and capitalize on our technical workforce, tremendously committed to inspiring and engaging youth and students in STEM. NASA has a portfolio of activities and opportunities dedicated to attracting, engaging and educating students and to support educators and educational institutions across the nation. These range from internships and fellowships, research and development (R&D) opportunities, challenges and competitions, pre-college and

college STEM experiences, virtual learning, educator and faculty support, as well as institutional support. In FY2018, over 820,000 students participated in NASA STEM Engagement activities, from Elementary students to Post-Doctoral scholars, and over 180,000 educators participated in NASA professional development activities.

The involvement of and contributions from NASA's technical workforce are vital to NASA's STEM engagement efforts. NASA scientists, technologists and engineers work and interact with students, serve as mentors, and contribute to a realm of STEM engagement activities and opportunities. There is benefit in establishing a direct connection to the technical workforce as key stakeholders for STEM engagement, specifically to: serve as STEM role models; stimulate and facilitate participation within their respective disciplines; and provide relevant knowledge regarding technical content.

NASA's Office of STEM Engagement (OSTEM) guides the Agency's efforts to inspire and motivate students to pursue careers in STEM. OSTEM leads the strategic guidance, integration of efforts agency-wide, and enables a mission-driven approach through close collaboration with the Mission Directorates. The Office is also responsible for effective management of the appropriated Program and the assessment and evaluation of the agency's portfolio of STEM programs, projects and products.

NASA is working to increase alignment between OSTEM activities and the technical needs of NASA's Mission Directorates through strategic partnerships with Mission Directorates. These partnerships allow students to generate innovative ideas and novel solutions that directly align with the largest technical challenges facing the Agency. One example is Artemis Student Challenges, engaging students in activities designed to contribute to NASA's efforts to return humans to the Moon.

The 2020 Budget proposes termination of funding for the Office of STEM Engagement's portfolio of grants and cooperative agreements and redirects funding to NASA's core mission of exploration. The Budget continues internships, fellowships, and student STEM engagement activities funded by NASA Mission Directorates.

STEM Engagement Program

NASA's OSTEM is accountable for implementing the funding provided by Congress in FY 2019. These appropriated funds are comprised of four projects: Space Grant (\$44M); Established Program to Stimulate Competitive Research (EPSCoR) (\$21M); Minority University Research and Education Project (MUREP) (\$33M); and, Next Gen STEM (\$12M). These four projects invest in a variety of endeavors involving direct support to students, support to universities and educational institutions, including museums and other informal education organizations. The projects also provide a spectrum of research and student opportunities.

Space Grant

Space Grant works to expand opportunities for students to understand and participate in NASA's aeronautics and space projects by supporting and enhancing science and engineering education, research, and outreach efforts. Space Grant is a national network of 52 Consortia with over

1,000 affiliate members involving colleges and universities, museums and science centers, and aerospace industry partners from across the country.

EPSCoR

EPSCoR establishes partnerships with higher education institutions that effect lasting improvements in a state's or region's research infrastructure, R&D capacity and hence, its national R&D competitiveness. Five Federal agencies conduct EPSCoR programs, including NASA. NASA's involvement in EPSCoR is directed at the parts of the country that have not, in the past, participated equably in competitive aerospace-related research activities. Twenty-five states, Puerto Rico, and the U.S. Virgin Islands and Guam currently participate. (We are now at 28 jurisdictions)

In 2019, NASA EPSCoR partnered with the Mission Directorates to make substantive investments in mission-driven R&D competitive opportunities. These included research awards in a wide variety of technical fields across NASA as well as International Space Station (ISS) Flight Opportunity Awards that enable research opportunities in low Earth orbit.

MUREP

Through MUREP, NASA provides financial assistance via competitive awards to Minority Serving Institutions (MSIs), including Historically Black Colleges and Universities, Hispanic Serving Institutions, Asian American and Native American Pacific Islander Serving Institutions, Tribal Colleges and Universities, and eligible community colleges, as required by the MSI-focused Executive Orders. These institutions recruit and retain underrepresented and underserved students, including women and girls, and persons with disabilities, into STEM fields. MUREP investments assist faculty and students in research and provide authentic STEM engagement opportunities related to NASA missions.

Next Gen STEM

Next Gen STEM focuses on NASA's efforts to engage kindergarten through grade 12 (K-12) students and provide support to informal educational institutions. It has developed a suite of evidence-based pilot activities to engage middle school students in NASA's mission content. Next Gen STEM also makes significant investments in museums and informal institutions. These include a competitive award program called Teams Engaging Affiliated Museums and Informal Institutions (TEAM II) for museums and science centers, providing inquiry- and/or experiential-based educational opportunities in direct alignment with major NASA missions for students in grades 4-8. The TEAM II 2019 solicitation call for proposals tied to NASA's Moon to Mars efforts, with proposal content directly aligned with major NASA technology and mission efforts. Next Gen STEM also funds the NASA Museum Alliance, which has over 1,200 member organizations across the U.S. and over 130 outside the U.S. in 37 countries.

NASA Internships and Fellowships

NASA internships provide unique NASA research and development work experiences for high school, undergraduate, and graduate students. Funding for these internships comes from across

the Agency, depending on work the interns would complete during their term. Interns work alongside a NASA mentor and other subject matter experts in their field, contributing to an important project and being fully involved with their team. These opportunities leverage the Agency's unique missions and programs to enhance and increase the capability, diversity, and size of the nation's future STEM workforce.

In FY 2018, NASA provided 8,005 internships and fellowships to 7,357 higher education students across all institutional categories and levels. These significant awards provided a total of over \$14M in direct financial support to higher education students. Some recent statistics show that 30.2 percent of higher education internships and fellowships were awarded to racially or ethnically underrepresented student participants, compared to 24.5 percent for the national average of STEM degree enrollees. Additionally, 39.5 percent of the Agency's higher education internships and fellowship positions were filled by women.

NASA STEM Partnerships

NASA collaborators, funded and unfunded, are located in all 50 states, the District of Columbia, Guam, Puerto Rico, and the U.S. Virgin Islands. Collaborators include government agencies, industry, formal and informal education institutions including museums, science centers, planetariums, and youth-serving organizations, non-profit, and other education organizations. Collaborators extend the reach of NASA STEM engagement opportunities. In FY 2018, OSTEM collaborated with 1,695 institutions and organizations.

A few recent partnerships include Microsoft's Hacking STEM team to develop a series of standards-aligned lesson plans for middle and high school students and a collaboration with Peanuts Worldwide in the development of STEM-based curriculum for grades K-5, leveraging an existing Space Act Agreement to bring Snoopy into the modern day. The Peanuts lessons focused on NASA's deep space exploration objectives and interactive ways to celebrate the 50th anniversary of humans first setting foot on the moon.

NASA's Role in the Federal STEM Plan

NASA plays a leading role in the federal STEM community through its leadership of the National Science and Technology Council's Committee on STEM Education (CoSTEM) and its subcommittee, Federal Coordination in STEM Education (FC-STEM). NASA serves as co-chair of both the Committee and Subcommittee, in collaboration with the NSF and the White House Office of Science and Technology Policy. NASA representatives also serve on FC-STEM's Interagency Working Groups (IWGs), which are responsible for implementing specific sections of the CoSTEM strategic plan.

At NASA, we are excited that members of the IWG on Inclusion in STEM are supporting a partnership with the NSF Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science (INCLUDES) initiative. It is focused on broadening participation at-scale through networked impact. NASA, like many mission agencies, stands to benefit if we are better able to identify, foster, and retain STEM talent from diverse backgrounds and perspectives, but NASA cannot achieve this goal alone. We hope this

project will not only serve NASA's need for a well-trained and creative engineering workforce, but will also support the work of other federal agencies and the private sector that are in need of engineers who bring unique ideas and perspectives to the workplace.

Conclusion

NASA's work serves as an inspiring example of what humankind can do when it comes together to achieve a common goal for the common good. While visiting Georgia Tech in Atlanta last July, NASA Administrator Bridenstine said, "When we partner with a university, [...] the students actually develop the technology that we fly to the Moon. And then, when they graduate, not only do they have the educational background, but they have the hands-on experience that we can take advantage of and put them right to work." We bring new knowledge and opportunities and inspire the next generation. Inspiring an Artemis generation will help us successfully cultivate new talent for the STEM careers of tomorrow. Our efforts will draw on insights and efforts from all across America, engaging the brightest minds of academia, businesses of all sizes and types and a generation of young professionals joining us at the beginning of their careers. Building on these lessons, NASA will take the next giant leap in human exploration and launch a new generation in space.

Thank you Mr. Chairman and Members of the Subcommittee. I would be pleased to answer any questions you may have.