

# NEXT GEN STEM (NGS)

## **FISCAL YEAR 2020 (FY20) ANNUAL PERFORMANCE REPORT (APR)**

### FUNDING SOURCE:

OFFICE OF STEM ENGAGEMENT (OSTEM)  
NEXT GEN STEM (NGS)

### MANAGING ORGANIZATION:

NASA HEADQUARTERS (HQ) OFFICE OF STEM ENGAGEMENT (OSTEM)

### PROJECT MANAGER:

CARRIE OLSEN  
(256)617-3552  
[carrie.olsen@nasa.gov](mailto:carrie.olsen@nasa.gov)

### DEPUTY PROJECT MANAGER OR ACTIVITY MANAGERS:

MARIA ARREDONDO  
(216)433-5689  
[MARIA.E.ARREDONDO@NASA.GOV](mailto:MARIA.E.ARREDONDO@NASA.GOV)  
GINA BLYSTONE  
(757) 864-7855  
[GINA.R.BLYSTONE@NASA.GOV](mailto:GINA.R.BLYSTONE@NASA.GOV)

DENISE DAVIS  
(301) 286-4853  
[DENISE.A.DAVIS-KONOPKA@NASA.GOV](mailto:DENISE.A.DAVIS-KONOPKA@NASA.GOV)

DYNAE FULLWOOD  
(281) 244-7426  
[ELICIA.D.FULLWOOD@NASA.GOV](mailto:ELICIA.D.FULLWOOD@NASA.GOV)

BEVERLY GIRTEN  
(202) 358-0212  
[BEVERLY.E.GIRTEN@NASA.GOV](mailto:BEVERLY.E.GIRTEN@NASA.GOV)

BETHANNE HULL  
(321) 867-4484  
[BETHANNE.HULL@NASA.GOV](mailto:BETHANNE.HULL@NASA.GOV)

---

## ENGAGEMENT/ACTIVITY DESCRIPTION:

---

The Next Gen STEM (NGS) project is comprised of an integrated portfolio of grants, partnerships, activities, educational products, and student engagement opportunities; designed to connect NASA's missions, programs, people, and STEM content to an audience comprised of primarily K-12 educators and students. That is, NGS is designed to reach students where they are – in school, in afterschool programs, in informal institutions (e.g., such as museums and science centers), and at home; using mission-driven content that focuses on lunar and Mars exploration (Moon to Mars), the Commercial Crew Program, aeronautics (Aeronaut-X) and the International Space Station (STEM on Station). The goal of these efforts is to make meaningful connections to NASA that spark students' interest in STEM; helping them to: a.) see themselves in STEM careers, and b.) provide authentic opportunities to contribute to NASA's missions in meaningful ways, on their paths to a higher education. In particular, the NGS project seeks to accomplish these things through concrete and proven approaches that are designed to broaden participation in STEM, within underserved and underrepresented communities.

In FY20 Moon to Mars (M2M) focused on NASA's Orion capsule, Space Launch System, and the Gateway Lunar Outpost. Moon to Mars design challenges were offered; supporting curriculum, digital badges, and webinars designed for middle and high school students and educators. The Commercial Crew Program (CCP) offered K-12 curriculum, hands-on activities, educator guides and resources; with an emphasis on technology in the classroom. Aeronaut-X (AX) (renamed in FY20 from "Small Steps – Giant Leaps") focused on cutting-edge aeronautics and the principles of sound. Specifically, AX provided student and educator audiences with informative learning content and resources about how NASA is creating a new generation of experimental aircraft. STEM on Station (SOS) utilized information about the work being conducted on the International Space Station (ISS), its crew, and the research occurring onboard; to inspire, engage, and educate Next Gen STEM audiences. From a comprehensive website, to conversations with astronauts in space, to hands-on STEM activities developed through high-profile partnerships; SOS maintained its commitment to connecting students and educators to NASA's missions.

The NASA STEM Educator Professional Development Collaborative (EPDC) provided high-quality STEM engagement expertise and resources in collaboration with the Office of STEM Engagement (OSTEM). The EPDC worked with educators and students, utilizing a hybrid-delivery of both virtual and face-to-face resources. The EPDC also offered a limited number of face-to-face engagements at events, seminars, and conferences; servicing large groups of students and educators. As Next Gen STEM formed dynamic partnerships with regional and national organizations that connected students with high quality resources in classrooms, afterschool, and during out of school time (e.g., during summer enrichment programming, and through informal program) settings; the EPDC continued to develop and leverage partnerships that supported the ongoing assessment of innovative methods, materials, and opportunities related to student engagement, educator professional development (PD), and effective support strategies.

Also in FY20, the Next Gen STEM project collaborated with NASA's Teams Engaging Affiliated Museums and Informal Institutions (TEAM II) and Museum Alliance (MA) programs, to successfully offer a variety of NASA resources and informal education opportunities; providing educators and students with access to NASA's staff and resources. Notably in FY20, TEAM II and MA also

facilitated student and educator connections with NASA’s experts through more than thirty (30) live-briefings. The live-briefing events, which provided expert advice; was made available online, for free, and to all members of the Museum Alliance community. TEAM II also led NASA’s competitive awards; and granted approximately \$58 million in combined funding, to more than sixty-five (65) organizations, in thirty-four (34) states, plus the District of Columbia.

Finally, in FY20, in response to the global COVID-19 pandemic, Next Gen STEM was an integral part of, and major contributor to, NASA STEM@Home and NASA @Home – efforts to make virtual opportunities for learning available for students, teachers and family who found themselves suddenly at home and, in ways large and small, cut off from previous in-person learning opportunities. In this time and space, Next Gen STEM also instituted it’s NASA STEM Stars initiative. These live, interactive virtual engagements that were broadcast and archived on the NASA STEM YouTube channel, offered students 13 and older an opportunity to meet a wide variety of NASA STEM professionals. The sessions focused not only on what the NASA role models did for a living, but also highlighted their educational and personal stories. NASA STEM Stars offered a real showcase of careers from subject matter experts specifically chosen to “look like” the students of the nation, to spark interest in STEM fields and to allow students to see themselves in STEM.

---

### ENGAGEMENT/ACTIVITY GOALS:

---

The NextGen STEM project adopts ***all three OSTEM goals as its overarching project goals:***

- Strategic Goal 1: Create unique opportunities for a diverse set of students to contribute to NASA’s work in exploration and discovery
- Strategic Goal 2: Build a diverse future STEM workforce by engaging students in authentic learning experiences with NASA’s people, content, and facilities
- Strategic Goal 3: Attract diverse groups of students to STEM through learning opportunities that spark interest and provide connections to NASA’s mission and work

***Learning Objectives 1.2, 2.1, 2.2, 3.1 and 3.2*** are directly relatable to NextGen STEM:

- **1.2:** Create structured and widely accessible experiential learning opportunities for students to engage with NASA’s experts and help solve problems that are critical to NASA’s mission.
- **2.1:** Develop and deploy a continuum of STEM learning opportunities that cultivates students in pursuing STEM careers and fosters interest in aerospace fields.
- **2.2:** Enable students, including those from underrepresented and underserved communities, to explore and pursue STEM pathways through authentic learning experiences and research opportunities with NASA’s people and work.
- **3.1:** Attract a broad and diverse set of students to STEM through targeted opportunities and readily available STEM engagement resources and content.
- **3.2:** Foster student exposure to STEM careers through direct and virtual experiences with NASA’s people and work.

---

## ENGAGEMENT/ACTIVITY CONTRIBUTIONS TO PERFORMANCE GOALS (PG) AND SUCCESS CRITERIA

---

**PG 3.3.3: Provide opportunities for students to engage with NASA’s aeronautics, space, and science people, content, and facilities in support of a diverse future NASA and aerospace industry workforce.**

**PG 3.3.3 Success Criteria:** *Meet or exceed the national average in two of the four categories of student diversity for NASA STEM enrollees in internships, fellowships, or other student engagement opportunities. Diversity Categories: (1) students across all institutional categories and levels (as defined by the U.S. Department of Education), (2) racially or ethnically underrepresented students (Hispanics and Latinos, African Americans, American Indians, Alaska Native, Native Hawaiians and Pacific Islanders), (3) women, and (4) persons with disabilities at percentages that meet or exceed national averages for science and engineering enrollees, as determined by the most recent, publicly available data from the U.S. Department of Education’s National Center for Education Statistics.*

***\*NOTE: Next Gen STEM does not receive data on the individual diversity of their participants. However, NGS works to ensure and meet NASA’s four categories of student diversity in its efforts and opportunities.***

NASA STEM Stars –

- Category 1:
  - NASA STEM Stars was a new effort started in FY20 to reach students while they were at home due to the pandemic. The thirty-minute episodes were hosted each week on the NASA STEM YouTube channel. Each episode aimed to introduce a different profession at NASA to show students in grades 6-12 the diverse workforce, and different paths that are available at NASA. During the chats, SMEs shared about their background, education, and the NASA project they work on before opening it up to the student’s questions. Finally, before the chats ended, students were given a mission to complete at home and then shared it with NASA on social media using the hashtag #NextGenSTEM. Each production involved a team to support technology tests, create a personalized SME introduction video, developed content for the website, and a slide presentation to help the SME explain their journey to NASA. STEM Stars en Español is offered once a month. During FY20 the NASA STEM Stars teams hosted 26 episodes which included five episodes in Spanish. There were over 18,000 views of the FY20 episodes of which 2,603 were live views.

Moon to Mars (M2M) -

- Category 1, 2, 3, and 4:
  - High School Students reached – 6639
  - Middle School Students reached - 8000
  - Elementary School Students reached - 3540

- University Students reached – 1623
- App Development Challenge Contribution to the Mission- Provided SCA<sub>N</sub> with visualizations that directly supported upcoming mission planning and training activities. Provided a mechanism to view consolidated data and validate it against future mission data obtained directly from the lunar surface. Identified possible exploration routes that optimize communication with a lunar satellite or Earth ground stations.
- ROADS Contribution to the Mission- Provided sample analyses of biological signatures and geologic features. Added to the engineering and programming solutions posed by the challenges of flying to and landing on Mars.
- HERC Contribution to the Mission- Provided research and development of new technologies for future mission planning and crewed space missions to other worlds
- Student Launch Contribution to the Mission- New and unique solutions to current challenges. Future workforce experienced with NASA's Engineering Design Lifecycle and NASA contracting practices. Ability to indirectly share STEM topics, lessons, and NASA's message through team STEM Engagement efforts.

#### Commercial Crew Program (CCP) -

- Category 1 & 2:
  - The week of September 15th, an education specialist from Kennedy Space Center, joined a small team from the Educator Professional Development Collaborative (EPDC), in support of the Exploration Ground Systems (EGS) directorate, and traveled to Puerto Rico to provide professional development training to 244 K-12 educators from around the island. The team traveled and conducted workshops over 5 days, at 4 different sites: University of Puerto Rico at Mayagüez, Interamerican University of Puerto Rico at Arecibo, University of Puerto Rico at Arecibo, and EcoExploratorio at San Juan.
- Category 2 & 3:
  - Computer Science Education Week Collaboration with Microsoft: Although CESD Week was open to all, the "Microsoft Community shifted its focus to create specialized programs for underrepresented and minority students, in order to achieve the greatest impact for local schools and communities throughout the U.S., as well as address the lack of access to technology and professional underrepresentation in the tech industry".-Microsoft. The FY20 event focused on women. Over 22,000 students interacted with women employed by NASA that have expertise in STEM fields. Microsoft hosted coding classes in all of their store that week. One of the activities they used was the Crew Orbital Docking Simulation (CODing Sim) activity. Each class

watched a replay of the NASA panel as well as participated in the coding activity.

- Presentation to the Space Grant Directors Meeting followed by 1-hour breakout session where attendees learned about the entire Next Gen STEM Commercial Crew Pilot toolkit and experienced a hands-on demonstration of the NASA VR in the Classroom virtual field trip.
- Commercial Crew STEM PD FOR NASA Space Grant Consortia. Education specialists from NASA's Kennedy Space Center and Johnson Space center spoke about NASA's Commercial Crew Program and NextGen STEM pilot initiative including virtual reality tours/classroom field trips (VR) and K-12 STEM activities. This 2-day face-to-face professional development workshop is an exclusive training opportunity for Space Grant consortia and affiliate members.
- Diocese of Orlando Professional Development Workshop. An Education Specialist from Kennedy Space Center assisted in a workshop for the Diocese of Orlando. An overview of the NGS and CCP program was given, along with hands on activities of the Eggstronaut Design Challenge, the CODing Sim activity and a demonstration and informational session on the Virtual Reality field trips and the VR in the Classroom app. The day long workshop hosted 42 administrators, technology coordinators and educators from around the Central Florida area.
- NGS CCP was included as a guest speaker during the first ever virtual global NASA social for the #LaunchAmerica Mission leading up to the Demo-2 (DM-2) launch of the SpaceX Crew Dragon. L-1 featured a 30-minute virtual overview of NGS CCP STEM products. On L-0, the team shared the NGS CCP 360 Virtual Field trips. Overall, the Facebook group had more than 20,000 members and 98% of those participants were active on a regular basis. The video series had more than 52,000 views.
- A video was produced by LaRC for NASA@Home and PBS. The video aired in mid-July and introduced students to the Commercial Crew Program. In addition to background information, the video also contains a tutorial for the Eggstronaut activity. The video was part of a 3-episode series: Zoom without the Boom, Launching America, and Mars 2020-Perseverance.
- The NGS CCP STEM Launch Kit readiness helped with the Agency's quick shift to a virtual world. It had 47,000 page view for DM-2.
- Launch kits were created for the Boeing Orbital Flight Test, DM-2, & Crew-1. Additionally, a Mission Kit was created for DM-2 with new additions for educators, parents, and students targeted toward the crew's time aboard the space station.
- Our Texas State EPDC Educators hosted 29 webinars, 1 student focused webinar, 1 webshops, 1 face to face EPD workshop and presented at 3 conferences highlighting various aspects of the NGS Commercial Crew Program

#### Aeronaut-X (AX) -

- Categories 1, 2, 3, and 4:
  - The addition of AX content on the AX website
  - Partnering closely with the Aeronautics Research Mission Directorate for dissemination of AX content

#### STEM on Station (SOS) -

- Category 1, 2, 3, and 4:
  - STEM on Station did not receive data on the individual diversity of their participants. However, STEM on Station worked to ensure that the organizations selected, such as for in-flight education downlinks, reach underrepresented and underserved populations.
  - Downlink organizations included schools in rural, suburban, and urban areas, informal organizations (e.g., museums and science centers), and higher education organizations (e.g. colleges and universities).

#### Educator Professional Development Collaborative (EPDC) -

- Category 1, 2, 3, and 4:
  - The NASA STEM EPDC offered a total of 571 professional development and STEM engagement events in FY 2020. Of the 571 events that were offered; 385 were online webinars for educators, 18 were online webshops for educators, 79 were face-to-face events for educators, 43 were face-to-face student engagements, and 22 were online student engagement webinars.
  - FY 2020, participants earned 178 digital badges through the EPDC Digital Badging System totaling 696.5 hours of credit. Since the inception of the EPDC Digital Badging System in February 2016, educators have earned a total of 3,581 digital badges, and represent more than 26,008.5 hours of credit.
  - All professional development for educators were conducted with explicitly stated expectations that they would utilize their professional learning about NASA content and resources in direct connection to student learning; most educational credit for badges require that teachers provide evidence with deliverables such as lesson planning and/or instructional workshop that engaged students directly with NASA content.
  - EPDC Digital Badging System is a platform that can be used to support other NASA initiatives such as education challenges, competitions, and internships. For example, currently EPDC is conducting a series of online presentations specifically for MSIs. EPDC was also requested and lead the development of digital badges related to NASA M.U.S.I.C (MUREP Sustainability and Innovation Collaborative), a program designed to enhance MSI capabilities to competitively respond to funding opportunities that support NASA's aeronautics, space and science missions. The M.U.S.I.C. badges are hosted on the EPDC

Digital Badging System to be used and promoted by MUREP as a part of their MSI initiatives.

Teams Engaging Affiliated Museums and Informal Institutions (TEAM II) / Museum Alliance (MA) -

- Category 1, 2, and 4:
    - TEAM II solicitations required proposals to describe how they anticipated having a significantly positive impact on underrepresented and underserved populations. This competitive award requirement was included in the review and evaluation of submitted proposals in an effort to ensure that the awardee selections specified a strong plan to support the development of a diverse workforce.
  - Category 3 & 4:
    - Several of the awardees submitted proposals for an emphasis to engage girls and the majority proposed plans to engage racially or ethically underrepresented students. Some of the evaluation plans contained proposed approaches to begin to quantifying success in these categorized areas of diversity.
    - The MIE Alliance was active in implementing the TEAM II products, materials, and resources that resulted from the TEAM II awarded proposals. The implementation effort included the proposed efforts to specifically engage underrepresented and underserved populations. Actual quantitative data was not collected on this, but it is the teams' hope that implementation of NASA's Gateway will assist with this data collection effort in the future.
    - The review and selection of proposals to the 2019 NASA Teams Engaging Affiliated Museums and Informal Institutions (TEAM II) solicitation was completed in Q1. These include a planetarium show and activity kit on long-duration spaceflight designed to be accessible to the hearing-impaired community and participants with disabilities; a museum exhibit for visitors to construct their own imaginary habitat for successful living on Mars; dynamic, interactive shows and programs for schools and museums where participants can act as team members of NASA's Artemis program by creating solutions to problems encountered in an imaginary space journey to the Moon; and a program to serve schools and community centers across Puerto Rico including a NASA Summer Exhibition and STEM Interactive Learning Center (has had over 4000 direct and online participants in spite of hurricanes, earthquakes, and the pandemic).
- 

**PG 3.3.4: Enhance the effectiveness of education investments using performance assessment and evaluation-driven processes.**

**PG 3.3.4 Success Criteria:** *Discuss how the Activity has or plans to implement evaluation-driven processes to assess the overall impact of the Activity*



- An NGS Evaluation was conducted by Paragon TEC to characterize the implementation and associated impacts of NGS products and opportunities. The study determined how and to what extent the NGS products and opportunities: a) are developed in alignment with high-quality content development standards, b) demonstrate successful collaborative efforts with NASA's Mission Directorate and Subject Matter Experts (SMEs), assess educator and student outcomes, and d) characterize partnership development efforts. Findings from the FY20 Paragon TEC evaluation report supported changes to content and products developed.
- FY20 data was submitted into OEPM.
- FY20 Lessons Learned reports were submitted to the NGS Project Manager.
- SPOCS Evaluation: To document and increase the amount of student engagement through the Student Payload Opportunity with Citizen Science (SPOCS), the STEM on Station team worked with an external evaluator to gather information from students applying to participate in SPOCS.
- Downlink Evaluation: To increase the effectiveness of, and eliminate barriers to entry for, in-flight education downlinks, the STEM on Station team worked with an external evaluator to gather data and feedback from downlink clients to gather lessons learned and best practices in an effort to continually improve the opportunity, including the application process, for participants.
- COVID-19 Response Surveys: To meet participants where they were throughout the initial shift to virtual settings as a result of the global pandemic, the STEM on Station team deployed surveys to pulse downlink clients and potential SPOCS participants. After evaluating the responses to the surveys, STEM on Station rearranged downlink clients accordingly and made the decision to adjust the SPOCS timeline.
- The NASA STEM EPDC implemented a comprehensive evaluation model that identified the specific delivery mechanisms through which individual educators receive NASA STEM engagement and professional development services, as well as the content topics, frequency, and duration of the activity in which they are engaging. After events through which participants had registered online; the participants received an online follow-up survey to allow them to evaluate the presenter, the quality of the experience, and their likelihood for integrating the NASA content and resources into their teaching. Data collected from the survey respondents was then analyzed and used to inform planning for future events and the use of project resources.
- All completed badges were also evaluated by an EPDC specialist for the participants' mastery of content.
- TEAM II proposals required strong evaluation plans which contained external involvement. This requirement was included in the review and evaluation of submitted proposals to ensure that any selections addressed strong plans to support the development of a diverse workforce. Review and selection processes ensured that the selected proposals supported the effectiveness of education investments, through the utilization of performance assessments and evaluation-driven processes.

- The MIE Alliance was active in implementing the TEAM II products and materials and resources that resulted from the TEAM II awarded proposals. This implementation included proposed efforts to specifically utilize performance assessment and evaluation driven processes. Actual quantitative data was not collected or compiled for this, but the team does hope the implementation of NASA’s Gateway will support this data collection effort in the future.

---

**PG 3.3.5: Provide opportunities for students to contribute to NASA’s aeronautics, space, and science missions and work in exploration and discovery.**

**PG 3.3.5 Success Criteria:** *Number of paper presentations and peer-reviewed research publications (and beginning in FY2021 to include student proposed solutions and products) resulting from STEM engagement investments. (Target number is 1,300)*

***\*NOTE: A baseline for the target number of student proposed solutions and products resulting from STEM engagement higher education student challenges and competitions will be determined in FY 2020. The baseline number will be used to determine a target number for FY 2021 performance assessment.***

- The App Development Challenged contribution to the Mission- Provided SCaN with visualizations that directly supported upcoming mission planning and training activities. Provided a mechanism to view consolidated data and validate it against future mission data obtained directly from the lunar surface. Identified possible exploration routes that optimize communication with a lunar satellite or Earth ground stations.
- WEAR Contribution to the Mission- Used student ideas that led to increasing the number of days in space. Provided student designs to a NASA design team for consideration in actual prototype. Provided feedback on human factors beyond safety such as ergonomics and comfort. Collaborated with a NASA design team using practical engineering. Developed STEM skillsets within the Artemis generation needed for future exploration.

---

**ENGAGEMENT/ACTIVITY PARTNERS AND ROLE OF PARTNERS IN ACTIVITY EXECUTION:** *(Bulleted list or table. Should include a brief description of how partners were involved in the project activity)*

---

Moon to Mars (M2M) -

**App Development Challenge**

Space Communications and Navigation (SCaN):

Bryan Welch, ADC Technical Advisor

Irene Tzinis, SCaN Social Media Coordinator – ADC Promotion

Tim Gallagher, SCaN Outreach and Intern Coordinator – ADC Promotion/Mentors

#### Next Gen STEM:

- Denise Koepka-Davis, NGS GSFC POC – ADC Mentor Recruitment

#### JSC Virtual Reality Training Lab:

- Angelica Garcia, Software and Simulation Engineer – SME, live event presenter
- Jon Schlueter, Software and Simulation Engineer - SME, live event presenter
- Tanner Hunt, Software and Simulation Engineer – SME, live event presenter

#### HEO Communication:

- Patricia Moore, HEO Communication Specialist – SME, Live event presenter

#### GRC XR Lab:

- Herb Schilling– Promotion and mentor recruitment. Identified coding organizations to aide in promotion and future collaboration. SME for future presentations.

#### NASA Creatives:

- Michael Lentz – Promotion and mentor recruitment

#### JSC XR Community of Practice:

- James Mireles– Promotion and mentor recruitment

#### Agency XR Community of Practice:

- David Reynolds– Promotion and mentor recruitment

### **ROADS**

NESSP- Northwest Earth and Space Pipeline: Funded by the Washington Space Grant Consortium and runs the national R.O.A.D.S. on Mars Student Challenge and provides training, support, and materials to each of the individual hubs. POC: Dr. Robert Winglee

Southeastern Louisiana University- Southeastern Louisiana University: Partnered to be the host site for the Louisiana Hub of the R.O.A.D.S. on Mars Student Challenge, Also sponsored student teams: Team STILE and Team GEAR UP . POC's: Dr. Wendy Conarro and Dr. Troy Williams

Jones County Junior College: Partnered to be the host site for the Mississippi Hub of the R.O.A.D.S. on Mars Student Challenge: POC: Dr. Michael Trest

### **Human Exploration Rover Challenge\***

- The Boeing Co., financial sponsorship
- Jacobs Engineering, financial sponsorship
- Polaris Industries, financial sponsorship
- U.S. Space & Rocket Center, Space Act Agreement, event venue
- The City of Huntsville, obstacle materials and labor
- Cyient, financial sponsorship
- Lockheed Martin Corp., financial sponsorship
- Northrop Grumman Corp., financial sponsorship
- Science Applications International Corp (SAIC), financial sponsorship
- Corporate Office Properties Trust, or COPT, financial sponsorship
- National Space Club, financial sponsorship
- Teledyne Brown Engineering, financial sponsorship
- Redstone Federal Credit Union, financial sponsorship
- BWXT, financial sponsorship
- Integration Innovation, Inc., financial sponsorship
- MTS, financial sponsorship
- University of Alabama, Huntsville, financial sponsorship
- AI Signal Research, financial sponsorship
- American Institute of Aeronautics and Astronautics, or AIAA, Greater Huntsville Section, award sponsorship
- National Defense Industrial Association, or NDIA, financial sponsorship
- Quantitech, Inc., financial sponsorship

- International System Safety Society, Tennessee Valley Chapter, award sponsorship
- Huntsville Madison County Convention & Visitors Bureau, volunteers, local literature, bags, name badges
- McDonald Scales, Inc., loan of scales to weigh rovers

- Currie Systems, bottled water
- KBR, financial sponsorship
- Drury Inn & Suites, discounted guest rooms for teams, award sponsorship
- Radiance, financial sponsorship

\*No guarantee of future partnership.

## **Student Launch**

- External Sponsors/Partners
- Northrop Grumman – Primary sponsor; provide award trophies, team stipends, speakers, and monetary award for USLI Overall Winner. Assist with conducting awards ceremony and provide key note speakers for Awards Ceremony (ceremony conducted virtually in 2020). Pay for awards ceremony when held during in-person events.
- Bragg Farms – Provide field for launch event. (in-person launch cancelled in 2020 prior to event; field and viewing area were prepared prior to the event being cancelled)
- National Association of Rocketry – Provide hardware and safety review assistance throughout all project milestones (PDR, CDR, FRR) and during Launch Week events; provide range management and assistance throughout Huntsville launch. (in-person Launch Week events and launch cancelled in 2020 due to COVID-19)
- National Space Club – Huntsville chapter – Provide trophies and monetary awards for USLI Second Place and SLI Judges' Award.
- Bastion Technologies, Inc. – Provide monetary award for USLI Safety Award.

### Internal Partners

- HEO Mission Directorate – Provide funding for labor and services related to executing the College/University component (USLI).
- Next Gen STEM – Provide funding for labor and services related to executing the Middle School/High School component (SLI).
- Space Launch System Office – Provide speakers and exhibits for Launch Week activities (supported virtually in 2020).
- Human Landing Systems Office – Provided guidance and assistance in planning the FY21 USLI Payload Challenge (planned in FY20).

## WEAR

NGS and RadWorks co-developed the WEAR STEM Challenge team where middle school and high school students provide concepts of wearable technologies with multiple functions in a competition. NGS provided management of the student engagements while Radworks provided access to SMES, use of NASA facilities and proposal review.

- Using student ideas that lead to increasing the number of days in space
- Providing student designs to a NASA design team for consideration in actual prototypes
- Providing feedback on human factors beyond safety such as ergonomics and comfort
- Co-working with a NASA design team using practical engineering
- Developing STEM skillsets within the Artemis generation needed for future exploration
- Partner: RadWorks
- Program Manager: Catherine McLeod (JSC)
- POC/SME: Julie Hansen (LaRC)
- Additional Team Members and SME's or symposium panelists:
  - Dr. Martha Cloudsley (LaRC)
  - Dr. Sheila Thibeault (LaRC)
  - Dr. B. Seshadri (LaRC)
  - Charles Wittkopp (LaRC)
  - Nicole Dugan (LaRC)
- NGS CCP partnered with the Office of Communication offices at KSC and Headquarters for the planning of events related to the crewed demonstration launch of SpaceX's Crew Dragon (DM-2) in May. NGS CCP products were prominently featured in the press kits and the administrator's talking points. Because of COVID-19, we had to pivot to conceptualizing virtual events. The Ride to Station Challenge was upgraded to a live social event by OComm and was part of the live NASA Virtual Social.
- Partnership with the Office of Communications Guest Ops team lead to the inclusion of the NGS CCP to be included in the first ever virtual global NASA social for the #LaunchAmerica Mission. The virtual social had over 50,000 views on the live count and over 20,000 members.
- Partnered with Speakers Bureau/Microsoft for National Computer Science Education Week. This collaboration focused on women in grades K-12. Over 22,000 students interacted with women employed by NASA that have expertise in STEM fields. Microsoft hosted coding classes in all of their store that week. One of the activities they used was the CCP NEXT Gen STEM Crew Orbital Docking Simulation (CODing Sim) activity.
- Aeronautics Research Mission Directorate – Collaborated with the OSTEM team to ensure accuracy of content from a technical perspective.
- NASA Science, Technology, Engineering, and Math (STEM) Educator Professional Development Collaborative (EPDC) – Cooperative agreement managed by Texas State University collaborated with OSTEM and each mission-focused activity to provide educator webinars and educator and student digital badges based on the activity content focus.
- Microsoft Hacking STEM: STEM on Station collaborated with the Microsoft Hacking STEM team to release a new data exploration activity for space travel in anticipation of Microsoft's

October 17, 2020, Day of Data celebration. In addition to activity development, STEM on Station worked to provide subject matter experts and NASA STEM expertise for two Global Teams Live Events slated for FY21 to amplify the ISS 20<sup>th</sup> anniversary message and educational content for students and educators around the world.

- Nanoracks: STEM on Station collaborated with Nanoracks for the development of the Student Payload Opportunity with Citizen Science (SPOCS) challenge, released on August 24, 2020. Five teams from higher education institutions will fly payloads related to bacteria resistance or sustainability on the International Space Station in FY22.
- Texas Instruments: With the shift to virtual-only student experiences in early summer, STEM on Station worked closely with Texas Instruments (TI) to support 70 student teams participating in the TI NASA CODES contest, resulting in 24 teams advancing to Phase 3, and 10 final teams selected for the final public voting that resulted in a winning team that will be granted an immersive on-site experience when in-person visits resume.

Teams Engaging Affiliated Museums and Informal Institutions (TEAM II) / Museum Alliance (MA) –

- NNX16AM22G (FY2015 Cohort) ScienCenter, Ithaca NY: Life on the Edge will be a 1,500-sq-ft traveling exhibition to engage museum visitors, youth ages 8-14 and their families, with space, space exploration, and the search for life beyond our home planet through the lens of Earth's extremophiles. The major highlights from this period are the refinement of exhibit ideas through prototyping with the public and beginning the fabrication process. The plans for the final exhibition now include four sections (Hidden in Plain Sight, Tools for the Search, Adapted for Extremes, and Keep Looking) and an introduction (Defining Life), each with unique hands-on exhibit experiences. The ScienCenter, in conjunction with our partner and Co-I at SpectrUM Discovery Area in Missoula, MT, has been working with SciNation. SciNation is a group of tribal leaders who help bring STEM experiences to tribal audiences. Working with our partners at SpectrUM, the prototyping phase that is currently ongoing will also incorporate feedback from SciNation, a group of tribal science advisors in Montana. Feedback from these advisors will help us develop a more inclusive and culturally sensitive final exhibition and activities.
- NNX16AM34G (FY2016 Cohort) Orlando Science Center, Orlando FL: STEM Satellites: A Mobile Mathematics and Science Initiative for Orlando Metropolitan Area Children's Hospitals engages chronically and critically ill children ages 9-19 who face the greatest educational disparities in NASA-themed Aeronautics, Space Exploration, and Space Science exhibits. A major highlight from this fourth year of effort was the fabrication, testing, completion, and delivery of our Mission: Mars cart, all corresponding Creative Tasks, and instructional website to participating hospitals in January 2020. Other creative tasks were also prototyped and tested for our second (Mission: Stars) and third (Mission: Origins of the Solar System) carts.
- 80NSSC20M0029 (FY 2020 Cohort) EcoExploratorio: The Innovation Space Learning Activities (ISLA) Center aims to impact underserved students from 4th to 8th grade, teachers, and informal educators, and communities from Puerto Rico through a series of educational fairs and workshops. The activities are planned to be School and Community NASA STEM Fairs (a co-curricular intervention), NASA Educator Workshops (a curricular intervention), and NASA Summer Exhibition and STEM Interactive Learning Center at the Mall (an out-of-school

intervention). The project adapted to online activities due to Covid. 4 educator workshops, 90% committed to integrate into classes and continue to learn more. 19 webinars on topics related to space exploration, aeronautics, and NASA missions, some which included hands-on activities to promote audience engagement and participation. Total of 4,638 direct participants. ISLA Center is designed to serve students and teachers from schools in Puerto Rico, which population is primarily Hispanic. The primary audience for the activities are from public schools and rural communities. During Space Week, a talk was directed to girls and female students since it was a panel of women working in Space Exploration. Also, the main audience in the online community are females.

- Project Evaluation: In FY20, 18 active TEAMII/CP4SMPVC awardees, located in 11 states and Puerto Rico, utilized best practices for evaluation in their projects as required in the solicitation to which they proposed. Evaluation reports are produced on a timing associated with major project evaluation milestones. 3 evaluation reports were completed in FY20. 2 uploaded to share publicly on [informalscience.org](https://www.informalscience.org).
- Summative evaluation from completing project: <https://www.informalscience.org/growing-beyond-earth-evaluation-results-summary-2016-2020>
- Front-end evaluation report: <https://www.informalscience.org/scigirls-space-exploring-moon-mars-and-nasa-careers-front-end-evaluation>
- Educator Professional Development Collaborative (EPDC) – submitted separate report.

---

### ENGAGEMENT/ACTIVITY ACCOMPLISHMENTS: (250 – 500 words)

---

#### Moon to Mars -

- Activity from Crew Transportation With Orion Module Chosen to Accompany the Roll Out of the STEM NEXT Partnership with NASA – NASA is entering a partnership with STEM NEXT. A big splash event will include a webcast with either an astronaut, engineer or both on or about 10/22/20. This event is being promoted by the partner and its affiliates. The Design a Crew Module activity from the Crew Transportation With Orion Module has been selected as the pre-activity to be highlighted leading up to the event.
- Houston We Have A Podcast, Episode 163, Next Gen STEM Airs - On Episode 163, Jamie Semple and Mike McGlone, education specialist and coordinator, respectively, based at NASA's Johnson Space Center, share how students and teachers get involved in the form of student programs and challenges that contribute to missions across the agency. This episode was recorded on September 3, 2020. [Listen now.](#)
- Successful Train-the-Trainer sessions covering the FY19 Moon to Mars Curriculum Modules
- NASA announced Blue Origins, Dynetics, and Space X for Artemis Human Landers. M2M Supports Human Landing System Announcement – With this, students at home were able

to create their own impact craters. Thanks to contributions from the NGS Moon to Mars team, students were able to gain a better understanding of why astronauts are visiting the Moon for the Artemis III mission. The Impact Craters activity was both modified for homebound students and parents, and supported with an activity demonstration video.

- NGS Moon to Mars is Collaborating Heavily with JPL Education, Mars Public Engagement, and the OSTEM com team to build the one-stop-shop STEM Toolkit for the Mars 2020 Mission, Perseverance Rover.
- NGS Moon to Mars is Exploring a Collaboration with Blue Origin – Based on Blue Origins interests (i.e., SME support, curriculum, payloads, etc.), M2M identified plans to have subsequent conversations with the Rover Challenge POC(s) and the Curriculum Module POC(s).
- A Reported 179 Participants Registered for the EPDC Mars 2020 Perseverance Webinars Leading Up to Launch. For the first two of four planned webinars about Perseverance, the EPDC witnessed an uptick in the number of registrants and the percentage of attendees that usually attend. The increase in attendees rose from 40% to 67% who all came to learn about the history of our robotic exploration of the Solar System, this rover's exciting goals, and the exclusive STEM Toolkit available to students and educators that includes lessons, activities, and projects that include biology, geology, physics, mathematics, engineering, coding, and language arts.
- Dave Bowles (left), former LaRC center director, and Dave Throckmorton, Vice President of Research at the National Institute of Aerospace – both spoke to the WEAR Challenge students during the culminating event later in October 2020. Dave Bowles spoke to one group and Dave Throckmorton spoke to both groups about systems engineering challenges

#### Commercial Crew Program (CCP) –

- The Ride to Station challenge was announced. Students were challenge to create their own code to complete the CODing Sim challenge and submit it for judging by Next Gen STEM education specialists.
- Development of the Ride to Station App and Educator Guide. This app allowed the user to experience the stages of a Commercial Crew mission from planning, to launch, and docking. It also gave students a look at the careers that make the mission possible. The educator guide was developed to supplement the app because there is value in leveraging the app as an engagement tool before any of the CCP lessons, and especially the CODing Simulation, which is similar to the final mission in the app, docking a spacecraft to the station.
- As part of NGS CCP K-4 activities, the Astro-Not-Yets: Explore Sound was released. It is a story of a classroom in FL where students notice the windows rattling during a Commercial Crew launch. Students learn about the engineering design process, problem solving, and working as a team as they work through the “Sound on a String” activity.
- Members of the CCP team from Kennedy and Langley exhibited at the 82nd Annual International Technology and Engineering Educators Association (ITEEA) in Kansas City,



MO. The NASA booth showcased Commercial Crew K-12 content for educators highlighting the Crew Orbital Docking (CODing) Simulation and Virtual Reality fieldtrips.

- Presentation to the Space Grant Directors Meeting followed by 1-hour breakout session where attendees learned about the entire Next Gen STEM Commercial Crew Pilot toolkit and experienced a hands-on demonstration of the NASA VR in the Classroom virtual field trip.
- Commercial Crew STEM PD FOR NASA Space Grant Consortia. Education specialists from NASA's Kennedy Space Center and Johnson Space center spoke about NASA's Commercial Crew Program and NextGen STEM pilot initiative including virtual reality tours/classroom field trips (VR) and K-12 STEM activities. This 2-day face-to-face professional development workshop is an exclusive training opportunity for Space Grant consortia and affiliate members.
- Diocese of Orlando Professional Development Workshop. An Education Specialist from Kennedy Space Center assisted in a workshop for the Diocese of Orlando. An overview of the NGS and CCP program was given, along with hands on activities of the Eggstronaut Design Challenge, the CODing Sim activity and a demonstration and informational session on the Virtual Reality field trips and the VR in the Classroom app. The day long workshop hosted 42 administrators, technology coordinators and educators from around the Central Florida area.
- NGS CCP was included as a guest speaker during the first ever virtual global NASA social for the #LaunchAmerica Mission leading up to the Demo-2 (DM-2) launch of the SpaceX Crew Dragon. L-1 featured a 30-minute virtual overview of NGS CCP STEM products. On L-0, the team shared the NGS CCP 360 Virtual Field trips. Overall, the Facebook group had more than 20,000 members and 98% of those participants were active on a regular basis. The video series had more than 52,000 views.
- A video was produced by LaRC for NASA@Home and PBS. The video aired in mid-July and introduced students to the Commercial Crew Program. In addition to background information, the video also contains a tutorial for the Eggstronaut activity. The video was part of a 3-episode series: Zoom without the Boom, Launching America, and Mars 2020-Perseverance.
- The NGS CCP STEM Launch Kit readiness helped with the Agency's quick shift to a virtual world. It had 47,000 page view for DM-2.
- Launch kits were created for the Boeing Orbital Flight Test, DM-2, & Crew-1. Additionally, a Mission Kit was created for DM-2 with new additions for educators, parents, and students targeted toward the crew's time aboard the space station.
- Our Texas State EPDC Educators hosted 29 webinars, 1 student focused webinar, 1 webshops, 1 face to face EPD workshop and presented at 3 conferences highlighting various aspects of the NGS Commercial Crew Program

#### Aeronaut-X (AX) –

- Successfully completed Phase I products and began work on Phase II products in support of ARMD missions.

- Integrated on-line product show casing.
- Began Cultural Responsive Teaching focus in product development.

#### STEM on Station (SOS) –

- During FY20, STEM on Station continued to support the 20<sup>th</sup> anniversary of permanent human presence on the space station.
- Downlink clients included 20<sup>th</sup> anniversary elements in their education and outreach plans and STEM on Station products also included 20<sup>th</sup> anniversary imagery. STEM on Station conducted 18 total in-flight education downlinks. In-person downlinks reached over 19,000 students and educators and virtual downlinks racked up over 75K views on YouTube.
- Views for STEMonstrations videos on YouTube rose 146%, and the STEM on Station website averaged almost 100,000 views per month for a total of 1,171,387 views.
- In support of Commercial Crew, STEM on Station developed a launch kit for the Demo-2 SpaceX mission and released an Astro-Not-Yets storybook.

#### Educator Professional Development Collaborative (EPDC) accomplishments submitted in separate report.

- By fostering awareness, engagement and understanding of NASA-unique content through professional development for educators, NASA STEM EPDC positively influences STEM curriculum the education of students across the nation. EPDC provides an educational specialist who works on-site at 8 NASA Centers and provides both on-site and off-site professional development for educators within the vicinity of their assigned Centers. EPDC specialists also offer professional development at the national level through presentations and exhibits at key national conferences; they provide online professional development through a comprehensive set of culturally responsive webinar offerings and digital badges in STEM content areas that feature NASA content, activities and resources.
- In addition, EPDC is committed to providing professional learning for educators throughout their careers spanning from preservice training through the induction and in-service years of teaching, and into educational leadership roles and advanced degrees. Special emphasis is also provided to those post-secondary educators who prepare STEM teachers as well as home school educators and informal educators who work in museums, afterschool and summer programs, and other community organizations.
- EPDC utilizes a central online event registration system allows EPDC to easily track the number of professional development events delivered and the number of participants served by each role group. The NASA STEM EPDC program has also implemented a comprehensive evaluation model also captures data to determine which educators are receiving NASA professional development services through what specific delivery mechanisms, covered topics, frequency and duration of the professional development in which educators are engaging. After every online event, registered participants receive an online follow-up survey to allow them to evaluate the presenter, the quality of the experience, and their likelihood for integrating the NASA content and resources into their teaching; for face-to-face events, presenters initiate and send the followup survey to participants to complete. These evaluation data are then used by EPDC to inform planning

and the use of project resources for future events and the use of project resources and provide NASA with important insights on how best to expend resources in educator professional development that will result in the desired impacts.

- Professional Development Events: In FY 2020 EPDC sponsored various types of online professional development, expanding our offerings to adjust to current needs. These events have been wide spread and encompass all 50 states, the District of Columbia, Puerto Rico, and the US Virgin Islands. In FY 2020 NASA STEM EPDC delivered a total of 547 EPD events, including:
  - Online Webinars/Webshops: 425
  - Face-to-Face Workshops: 122
- Below is a summary of the types of professional development events conducted over the six year period of performance for NASA EPDC:
  - **PD/Engagement Events for Six Years of EPDC**

PD Events by Type	Year 1 FY 2015	Yr. 2 FY 2016	Yr. 3 FY 2017	Yr. 4 FY 2018	Yr. 5 FY 2019	Yr 6 FY 2020	6-Year Total
Online EPD Webinar & Webshops	172	216	219	203	131	403	1,344
Face-to-Face PD Event	122	248	404	410	289	79	1,552
Online Student Webinars	-	-	-	-	-	22	22
Face-to-Face Student Events	-	-	-	-	-	43	43
Total events	294	464	623	613	420	547	2,961

- **Digital Badges:** In addition, in FY 2020 the NASA STEM EPDC Digital Badging System awarded the following:
    - Digital Badges: 178
    - Representing: 696.5 hours of credit
- As the chart below reflects, digital badge earned in FY 2020 were considerably higher than in FY 2019, the year in which EPDC badging system was being transitioned from Penn State University to Pensar Learning. This transition was necessary because EPDC wanted to add a Student Badging component to the system to create direct make opportunities for students as a result of the expanded scope of work included in the cooperative agreement executed in 2019. The addition of a Studet Badging component required additional security measures for minors that Penn State was unable to provide. This transition has now been successfully accomplished.

#### Digital Badges Earned

NASA Digital Badging System	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	6-Yr Total
Badges Earned		1,004	1,303	1,069	27	178	3,581
PD Hours Represented by Badges Earned		5,587	10,668	8,883	154	696.5	26,008.5

- In looking at the 5-year history of the EPDC Digital Badging System, it should be noted that the large number of badges completed in FY 2016, 2017, and 2018 were primarily the result of participants in the MUREP Educator Institutes (MEI) being required to complete two badges as a pre-requisite for participation in MEI. The the substantial decrease in the

number of badges completed in FY 2019 was the result of two factors—the discontinuation of MEI and the transition of the EPDC Badging System from one vendor to another in order to add a Student Badging component to the system.

- **Educators Served:** EPDC staff and specialists provide professional development to educators through EPDC-sponsored events, events sponsored by the NASA Centers, and through other collaborative initiatives. The table below shows the educators served in FY 2020 by quarter by role group. It is important to note that the category of Informal Educators includes parents who are home schooling as well as educators working in informal settings such as museums, science centers, after school programs, and other community venues.

Quarter/ FY 2020	Elem. School Teachers	Middle School Teachers	High School Teachers	Pre- Service Teacher	Higher Ed. Faculty	Admins	Informal Educators	Students/ Other	Totals
Quarter #1	853	2,162	2,641	597	541	43	429	8,144	15,410
Quarter #2	660	992	787	222	303	34	395	7,636	11,035
Quarter #3	828	1,559	826	280	390	21	941	2,096	6,941
Quarter #4	882	1,631	1,279	318	271	37	1,273	5,258	10,949
<b>Total FY 2020</b>	3,223	6,420	5,533	1,417	1,505	135	3,038	23,134	44,405

- **Educators Served for Six Years of EPDC**

Level	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	6-Yr Total
Pre-Service	992	2,109	2,726	1,813	1,642	3,223	12,505
Elementary	2,047	6,653	10,542	6,283	4,784	6,420	36,729
Middle School	2,430	8,198	12,639	5,894	4,438	5,533	39,132
High School	1,140	4,367	7,813	4,672	3,686	1,417	23,095
Higher Education	1,765	1,189	3,412	2,137	1,269	1,505	11,277
Administrator	101	535	1,136	705	731	135	3,343
Informal Educators	982	1,638	3,186	2,490	1,746	3,038	13,080
Students/Other	114,798	9,520	23,855	27,569	49,641	23,134	248,517
Totals	124,255	34,209	65,309	51,563	67,937	44,405	387,678

- **EPDC Performance Summary:** In each year of the cooperative agreement, EPDC greatly exceeded NASA’s goal of reaching more than 10,000 educators per year in professional learning ranging from 1-40 hours in duration. In addition, EPDC served educators from all 50 states, the District of Columbia, Puerto Rico, and the US Virgin Islands. In the section below, EPDC’s contribution to each FY 2020 Annual Performance Indicator (API) is further delineated.

## TEAM II

- Programmatic Accomplishments: In 2020, there were 18 active TEAM II/CP4SMPVC projects. Four (4) projects from the FY19 cohort had a start date during FY2020, and 4 from previous cohorts completed their projects during the reporting period.
- Management/Operational Accomplishments: Review and selection of proposals to the 2019 NASA Teams Engaging Affiliated Museums and Informal Institutions (TEAM II) solicitation was completed in Q1. The NRA required alignment to NASA Strategic Objective 3.3 and the OSTEM Engagement Objectives and Strategies, as well as the support of Federal STEM education goals. Proposers were required to align with the theme/priority “Moon to Mars.” Forty-seven (47) eligible proposals came from 24 states, DC, Puerto Rico, and the U.S Virgin Islands. The project organized the online peer review which concluded in October and in November an online panel peer review and Mission Directorate/Office prioritization review. 4 proposals were selected and announced in December. Selected proposals were from museums and planetariums in Minnesota, Pennsylvania, and Puerto Rico. Awards were made in Q2 and projects had start dates in Q2 and Q3.
- These include a planetarium show and activity kit on long-duration spaceflight designed to be accessible to the hearing-impaired community and participants with disabilities; a museum exhibit for visitors to construct their own imaginary habitat for successful living on Mars; dynamic, interactive shows and programs for schools and museums where participants can act as team members of NASA’s Artemis program by creating solutions to problems encountered in an imaginary space journey to the Moon; and a program to serve schools and community centers across Puerto Rico including a NASA Summer Exhibition and STEM Interactive Learning Center (has had over 4000 direct and online participants in spite of hurricanes, earthquakes, and the pandemic).
- 2021 TEAM II NRA was postponed due to impact on proposer community of Covid-19, causing many to close. Options for multi-tiered awards compiled, and community input sought through the Program Specific Data of the TEAM II-RORR.
- Data collection, synthesis, and OEPM entry for 22 active grantees during FY 2019 was completed by the due date of January 31, 2020. A Technical Officer refresher training was held in conjunction with the NSSC in April. A training session on FY2020 annual activity report data collection was held for grantees in July.

## Museum & Informal Education Alliance (MIE/MA)

- In FY20, NASA MIE Alliance enhanced the capabilities of institutions and support educators in all 50 states, DC, and Puerto Rico.
- MIE Alliance Professional Development Conversations: In FY20 the MIE Alliance hosted 53 professional development webinars with NASA subject matter experts. The audio/video recordings are archived, and participants are able to download the presenter's presentation and are encouraged to use the slides all or in part in their own work. Educational resources, activities, and opportunities related to the subject are shared. Links to additional resources are also shared. The format allows participants direct access to NASA subject matter experts,

many of them newsmakers. The Museum Alliance and Solar System Ambassadors/NASA Nationwide networks share most webinars as an efficiency measure.

- Programmatic Accomplishments:
  - In response to the Covid-19 closures, the MIE Alliance rapidly rolled out a new resource for informal educators, to support their efforts to continue to provide meaningful STEM content. The Remote Outreach Best Practices webinar series gave members a much-needed venue for frank conversations and sharing of best practices. Webinars were dedicated to participant-identified topics such as virtual summer camps, remote astronomy, and livestreaming.

---

### ENGAGEMENT/ACTIVITY IMPROVEMENTS MADE IN THE PAST YEAR:

---

(e.g. activity management, cost efficiencies) (100 – 250 words)

- Re-defined the AX working group creating an integrated, multi-center team with improved team dynamics and performance.
- Strengthened relationship with Aeronautics Research Mission Directorate (ARMD) via the STEM Lead, April Lanotte.
- Downlink clients worked with the STEM on Station team to collect student questions through pre-recorded video, which were used by the NASA TV production team to stream out during the live connection to the space station.
- STEM on Station also worked with Texas Instruments to complete a student challenge, pivoting from an in-person experience at NASA to an online culminating event.
- The EPDC Digital Badging System transitioned from Penn State University to Pensar Learning in order to accommodate security issues related to the offering of student badges.
- EPDC expanded scope of services to incorporate more STEM engagement activities for students to better align with NASA's transition to the Office of STEM Engagement.
- Internally, EPDC made alignments and reclassifications for the way EPDC specialists are classified as employees and are annually evaluated. As a result, EPDC had developed and implemented an evaluation process that was more in alignment with the duties of the EPDC specialist role. To provided ongoing relevant data toward this evaluation, a monthly goals reporting form was developed and specialists submit this completed form to the EPDC management team on a monthly basis. These monthly reports will be utilized in combination with other measures to complete the annual evaluation.
- To deepen understanding of grant policy and understand and communicate impacts from Covid-19, project personnel participated in NASA grants training and joined regular meetings held by the Grants Policy and Compliance Branch.
- The first of its kind (and one-time-only) TEAM II Remote Opportunity Rapid Response (RORR) competitive solicitation was conceived, developed and released in 2020 as an Appendix to the 2020 Engagement Opportunities NASA STEM NRA. The rapid response nature of this opportunity allowed projects to be implemented as quickly as possible during the school year. This was enabled by shortening the requirements for project description (5 pages)

and due date (45 days after release), and making substantial use of the expertise and experience of TEAM II staff and reviewers to process proposals in a highly condensed timeline. A TEAM II staff member took the lead in many aspects of proposal processing, gaining valuable experience.

- Updated member newsletter platform for increased capability, improved design. A project to rename what was previously NASA's "Museum Alliance" was implemented in FY20. New name options (presented with the goals of a broader community of practice and increasing Alliance membership, reach and influence) were polled through the Alliance listserv newsletter and by surveying applicants to the TEAM II grant program.

---

### CURRENT AND PROJECTED CHALLENGES:

*Identify any current or projected challenges in the implementation or execution of activities. Explain how the activity management team is working to address the challenges identified.*

---

- The Covid-19 Pandemic effected students and educators across the country. Impacts from students transitioning from the classroom to a home learning presented a number of challenges, likewise students and educators across the country navigated the way in which online instruction was conducted differently.
- The activity management team worked to provide students and educators their resources virtually. Educator professional development workshops were conducted virtually to provide teachers resources to engage in NASA's NGS content.
- On-site experiences: Due to the COVID-19 pandemic, efforts to bring student participants on-site have been halted. The SPOCS finalist workshop and Texas Instruments immersive on-site experience for students in the TI NASA Codes contest were intended to take place at Johnson Space Center. These in-person events were re-worked to provide students with a valuable experience, but the benefits offered through an in-person site visit were not able to be matched directly. This challenge is expected to continue as long as on-site experiences are not an option for our student or educator participants.
- The COVID-19 pandemic's effect on museum and informal education institutions' operations in order to carry out their funded awards and on their ability to develop proposals impacted most of our awardee institutions for 6-10 months of 2020. Most rated the impact as moderate and indicated there may be some delays, and a need to shift the use of money to some related areas that were not initially described. All felt that award efforts could be completed without additional money as long as no cost extensions would be available. Details on addressing these challenges are being addressed by Technical Officers and when needed by NSSC.

---

**REFERENCES (OPTIONAL – INCLUDE ONLY IF NEEDED):**  
(APA style reference list)

---

- Committee on STEM Education of the National Science and Technology Council, (2013). *Coordinating federal STEM-education investments: Progress report*. Retrieved from [http://www.whitehouse.gov/sites/default/files/microsites/ostp/stem\\_stratplan\\_2013.pdf](http://www.whitehouse.gov/sites/default/files/microsites/ostp/stem_stratplan_2013.pdf)
- Executive Office of the President, O. of S. and T. P. (2018). Charting a Course for Success: America's Strategy for STEM Education. A Report by the Committee on STEM Education of the National Science & Technology Council. In Executive Office of the President. Executive Office of the President.
- National Aeronautics and Space Administration. (2018). NASA Strategic Plan 2018. Washington, Dc: NASA Headquarters.  
[https://www.nasa.gov/sites/default/files/atoms/files/nasa\\_2018\\_strategic\\_plan.pdf](https://www.nasa.gov/sites/default/files/atoms/files/nasa_2018_strategic_plan.pdf)
- National Science Foundation. (2010). Preparing the Next Generation of Stem Innovators Identifying and Developing Our Nation's Human Capital. Nsb-10-33. ERI
- President's Council of Advisors on Science and Technology. (2012). *Engage to excel: producing one million additional college graduates with degrees in Science, technology, engineering, and mathematics*. Retrieved from [http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-engage-to-excel-final\\_feb.pdf](http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-engage-to-excel-final_feb.pdf)