
# IMPLEMENTATION OF FEDERAL PRIZE AND CITIZEN SCIENCE AUTHORITY: FISCAL YEARS 2017–18

*A Report by the*
OFFICE OF SCIENCE & TECHNOLOGY POLICY

*In Response to the Requirements of the*
America COMPETES Reauthorization Act of 2010 *and the*
Crowdsourcing and Citizen Science Act

June 2019

## About the Office of Science and Technology Policy

The Office of Science and Technology Policy (OSTP) was established by the National Science and Technology Policy, Organization, and Priorities Act of 1976 to provide the President and others within the Executive Office of the President with advice on the scientific, engineering, and technological aspects of the economy, national security, homeland security, health, foreign relations, the environment, and the technological recovery and use of resources, among other topics. OSTP leads interagency science and technology policy coordination efforts, assists the Office of Management and Budget with an annual review and analysis of Federal research and development in budgets, and serves as a source of scientific and technological analysis and judgment for the President with respect to major policies, plans, and programs of the Federal Government. More information is available at http://www.whitehouse.gov/ostp.

## About this Document

This document presents the sixth report on the use of prize competitions and challenges conducted by Federal agencies to spur innovation, engage citizen solvers, address tough problems, and advance their core missions. It also presents the first report on crowdsourcing and citizen science activities conducted by Federal agencies.

## Copyright Information

## Table of Contents

## Department, Agency, Office, and Division Abbreviations

| | |
|---|---|
| **ACF** | Administration for Children & Families (part of HHS) |
| **AFRL** | Air Force Research Laboratory (part of DOD) |
| **AHRQ** | Agency for Healthcare Research and Quality (part of HHS) |
| **ARS** | Agricultural Research Service (part of USDA) |
| **ASPR** | Office of the Assistant Secretary for Preparedness and Response (part of HHS) |
| **BOEM** | Bureau of Ocean Energy Management (part of DOI) |
| **CDC** | Centers for Disease Control and Prevention (part of HHS) |
| **CNCS** | Corporation for National and Community Service |
| **CPSC** | U.S. Consumer Product Safety Commission |
| **CTTSO** | Combatting Terrorism Technical Support Office (part of DOD) |
| **DARPA** | Defense Advanced Research Projects Agency (part of DOD) |
| **DHS** | Department of Homeland Security |
| **DOC** | Department of Commerce |
| **DOD** | Department of Defense |
| **DOE** | Department of Energy |
| **DOI** | Department of the Interior |
| **DOJ** | Department of Justice |
| **DOT** | Department of Transportation |
| **ED** | Department of Education |
| **EPA** | Environmental Protection Agency |
| **EERE** | Office of Energy Efficiency and Renewable Energy (part of DOE) |
| **FDA** | Food and Drug Administration (part of HHS) |
| **FEMA** | Federal Emergency Management Agency (part of DHS) |
| **FMC** | Federal Maritime Commission |
| **FNS** | Food and Nutrition Service (part of USDA) |
| **FTC** | Federal Trade Commission |
| **GSA** | General Services Administration |
| **HHS** | Department of Health and Human Services |
| **HRSA** | Health Resources and Services Administration (part of HHS) |
| **HUD** | Department of Housing and Urban Development |
| **IARPA** | Intelligence Advanced Research Projects Activity (part of ODNI) |

| | |
|---|---|
| **MCHB** | Maternal and Child Health Bureau (part of HHS-HRSA) |
| **NASA** | National Aeronautics and Space Administration |
| **NASEM** | National Academies of Sciences, Engineering, and Medicine |
| **NCATS** | National Center for Advancing Translational Sciences (part of HHS-NIH) |
| **NCEI** | National Centers for Environmental Information (part of DOC-NOAA) |
| **NCI** | National Cancer Institute (part of HHS-NIH) |
| **NEA** | National Endowment for the Arts |
| **NEH** | National Endowment for the Humanities |
| **NEI** | National Eye Institute (part of HHS-NIH) |
| **NIA** | National Institute on Aging |
| **NIAAA** | National Institute on Alcohol Abuse and Alcoholism (part of HHS-NIH) |
| **NIAID** | National Institute of Allergy and Infectious Diseases (part of HHS-NIH) |
| **NIBIB** | National Institute of Biomedical Imaging and Bioengineering (part of HHS-NIH) |
| **NIDA** | National Institute on Drug Abuse (part of HHS-NIH) |
| **NIDCR** | National Institute of Dental and Craniofacial Research (part of HHS-NIH) |
| **NIFA** | National Institute of Food and Agriculture (part of USDA) |
| **NIH** | National Institutes of Health (part of HHS) |
| **NIMH** | National Institute of Mental Health (part of HHS-NIH) |
| **NIST** | National Institute of Standards and Technology (part of DOC) |
| **NLM** | National Library of Medicine (part of HHS-NIH) |
| **NMFS** | National Marine Fisheries Service (part of DOC-NOAA) |
| **NNCO** | National Nanotechnology Coordination Office |
| **NOAA** | National Oceanic and Atmospheric Administration (part of DOC) |
| **NPS** | National Park Service (part of DOI) |
| **NSA** | National Security Agency |
| **NSF** | National Science Foundation |
| **NWS** | National Weather Service (part of DOC-NOAA) |
| **ODNI** | Office of the Director of National Intelligence |
| **OIG** | Office of Inspector General (part of HHS) |
| **OMB** | Office of Management and Budget |
| **ONC** | Office of the National Coordinator for Health Information Technology (part of HHS) |
| **OSTP** | Office of Science and Technology Policy |

| | |
|---|---|
| **SBA** | Small Business Administration |
| **SI** | Smithsonian Institution |
| **State** | Department of State |
| **Treasury** | Department of the Treasury |
| **USAID** | United States Agency for International Development |
| **USBR** | Bureau of Reclamation (part of DOI) |
| **USCG** | United States Coast Guard (part of DHS) |
| **USDA** | U.S. Department of Agriculture |
| **USFS** | U.S. Forest Service (part of USDA) |
| **USGS** | U.S. Geological Survey (part of DOI) |
| **USSOCOM** | U.S. Special Operations Command (part of DOD) |
| **VA** | Department of Veterans Affairs |

## Executive Summary

The America COMPETES Reauthorization Act of 2010 (COMPETES) updated the Stevenson-Wydler Technology Innovation Act of 1980 with a new provision on prize competitions (Section 24) that granted broad authority to all Federal agencies to conduct competitions to spur innovation and ingenuity. Under this authority, Federal agencies can offer incentives to invite fresh perspectives, novel approaches and participation from everyday citizen solvers, entrepreneurs, businesses, students, schools, nonprofits, and others who lend their collective problem-solving to improve aspects of public and private sector function. The passage of the COMPETES legislation solidified the use of crowdsourcing[1] in the Federal Government. Growing support for prize competitions helped open the door for the expansion of open innovation[2] in government, such as collaborative ideation, citizen science, bug bounties and hacking-for-good, code-sharing, and other activities in which motivated solvers participate to improve, secure, and enhance missions of Federal agencies.

In the 2 years since the Fiscal Year (FY) 2016 Prize Authority Progress Report, the total number of federally sponsored prize competitions catalogued on Challenge.gov has climbed from 744 to more than 875. Prize competitions have not only sparked successful start-up ventures and stimulated emerging markets, but have also offered a critical mass of examples and case studies for sharing across the Prizes and Challenges Federal Community of Practice.

In January 2017, the American Innovation and Competitiveness Act (AICA) became law. Section 402 of the AICA, the Crowdsourcing and Citizen Science Act, gave Federal agencies broad authority to use crowdsourcing—and specifically citizen science—to advance agency missions and facilitate broader public participation in the innovation process. The legislation highlighted the unique benefits of citizen science, "including accelerating scientific research, increasing cost effectiveness to maximize the return on taxpayer dollars, addressing societal needs, providing hands-on learning in science, technology, engineering, and math (STEM), and connecting members of the public directly to federal science missions and to each other." In addition, the AICA simplified and/or eliminated several of the COMPETES requirements for federally sponsored competitions, and formally introduced the term crowdsourcing into law. Importantly, the Crowdsourcing and Citizen Science Act supported a movement already building in the Federal Government and supported by the Federal Community of Practice for Crowdsourcing and Citizen Science. Since the act was signed into law, the CitizenScience.gov catalog has expanded the number of documented federally sponsored projects by more than 25%.

Crowdsourcing initiatives continue to expand across the public sector, gaining visibility and sponsorship at the highest levels of government. In March 2018, the White House convened a panel of government, industry, and philanthropic thought-leaders at the apex of water, energy, and prize competitions. Today, the Challenge.gov and CitizenScience.gov programs continue to encourage and document the applications and benefits of citizen engagement with the Federal Government, working closely with the White House Office of Science and Technology Policy (OSTP) and other executive offices to explore and document open innovation programs.

---

[1] Crowdsourcing, as defined by the Crowdsourcing and Citizen Science Act, is a method to obtain needed services, ideas, or content by soliciting voluntary contributions from a group of individuals or organizations, especially from an online community.

[2] Open innovation, as defined by the Government Accountability Office, encompasses activities and technologies to harness the ideas, expertise, and resources of those outside an organization to address an issue or achieve specific goals.

OSTP is required to submit a biennial report to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space and Technology of the House of Representatives on the activities carried out under these authorities. This report compiles prize competition data for FY17 and FY18, and for the first time, includes data on federally conducted crowdsourcing and citizen science projects.

This report includes detailed descriptions of the 92 prize competitions that were active in FY17 and FY18 under the prize authority provided by COMPETES (as reported by Federal agencies to OSTP) and summarizes 77 prize competitions conducted under other authorities voluntarily reported by Federal agencies to OSTP. These 169 prize competitions were conducted by 18 Federal departments and independent agencies.

In FY17, 18 agencies offered prize competitions enabled by the authority provided by the COMPETES Act, including the U.S. Department of Agriculture (USDA)-Food and Nutrition Service (FNS); USDA-National Institute of Food and Agriculture (NIFA); Centers for Disease Control and Prevention (CDC); Department of Energy (DOE); Department of Health and Human Services (HHS); Department of Homeland Security (DHS); Department of State (State); Environmental Protection Agency (EPA); Federal Trade Commission (FTC); Food and Drug Administration (FDA); General Services Administration (GSA); Health Resources and Services Administration (HRSA); National Aeronautics and Space Administration (NASA); National Institutes of Health (NIH); National Institute of Standards and Technology (NIST); National Science Foundation (NSF); Small Business Administration (SBA); and U.S. Bureau of Reclamation (USBR). In FY18, 17 agencies offered prize competitions enabled by the authority provided by the COMPETES Act, including Agency for Healthcare Research and Quality (AHRQ); CDC; DOE; Department Of Transportation (DOT); DHS; EPA; GSA; HHS; HRSA; NASA; NIH; NIST; NSF; SBA; State; United States Agency for International Development (USAID); and USBR.

Total prize purses ranged from $0 to $20 million with a median prize purse of $50,000 in FY17 and $75,000 in FY18. Sixty-three percent of prize competitions were conducted by agencies in partnership with another organization. Approximately 52% of all prize competitions were conducted in partnership with at least one non-Federal organization, and 34% were conducted with at least one Federal partner. Many prize competitions had multiple partners.

This report also includes detailed descriptions of the 18 crowdsourcing and citizen science activities that were active in FY17 and FY18 under the Crowdsourcing and Citizen Science Act (as reported by Federal agencies to OSTP) and summarizes 68 crowdsourcing and citizen science activities conducted under other authorities voluntarily reported by Federal agencies to OSTP. These 86 activities were conducted and reported by 14 Federal departments and independent agencies. In FY17, the first year the Crowdsourcing and Citizen Science Act was in force, only one agency—NASA—conducted activities under its authority (NASA has a long history of crowdsourcing and citizen science under other authorities). In FY18, the number of agencies using the Crowdsourcing and Citizen Science Act grew to include the Federal Emergency Management Agency (FEMA); National Oceanic and Atmospheric Administration (NOAA); U.S. Forest Service (USFS); NIFA; and U.S. Geological Survey (USGS). Similar to prize competitions, 81% of all crowdsourcing and citizen science activities were conducted in partnership with another organization. Of the 86 crowdsourcing and citizen sciences activities reported, 71% had at least one non-Federal partner and 33% had at least one Federal partner. Forty-four of the reported activities were localized—i.e., focused at a particular geographic location—and the rest were implemented as distributed, online networks of participants. The localized activities took place at sites across the U.S. and most provided opportunities for participants to directly interact with Federal researchers and facilitators.

# Prize Competitions

## Introduction

The history of Federal prize competitions is well documented, beginning with the Office of Management and Budget's memorandum on the use of prize competitions in March 2010. This was followed by the passing of the America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science (COMPETES) Reauthorization Act of 2010.[3] Prior to COMPETES, agencies could conduct prize competitions under multiple legal authorities. The National Aeronautics and Space Administration (NASA),[4] the Department of Defense (DOD),[5] and the Department of Energy (DOE)[6] all possessed independent authorities to directly administer prize competitions and use appropriated funds to provide prize purses. COMPETES expanded the authority of Federal agencies to conduct prize competitions to further their goals without affecting any existing prize authority already provided under any other law. COMPETES granted Federal agencies the authority to fund prize competitions through appropriations, gift funds from private entities, and as part of public-private partnerships.

Since the passing of COMPETES, the Federal Government has supported the use of prize competitions in many ways. In 2015, a Congressional Prize Caucus with bipartisan sponsorship was held to increase awareness and encourage the use of prize competitions. Numerous pieces of legislation supporting prize competitions to fuel medical research have also been passed (e.g., the 21st Century Cures Act[7] included a provision on EUREKA[8] Prize Competitions that authorized the National Institutes of Health (NIH) in the Department of Health and Human Services (HHS) to conduct prize competitions to fuel medical research). In January 2017, the American Innovation and Competitiveness Act (AICA)[9] was signed into law. The AICA made important updates to the broad prize authority previously granted to Federal agencies under COMPETES to encourage greater partnerships and eliminate unnecessary administrative burden, among other changes. In addition, the AICA provided Federal agencies with the ability to partner more broadly with the private sector and other government entities on incentive prize competitions, which could further expand their scope and sophistication. In March 2018, the White House convened a panel of government, industry, and philanthropic thought-leaders at the apex of water, energy, and prize competitions. The panel informed planning for prize competitions and grand challenges designed to catalyze innovation in critical water areas, including the Water Security Grand Challenge, a White House initiated, DOE-led effort to use prize competitions and other mechanisms to advance transformational technology and innovation to meet the global need for safe, secure, and affordable water.

Agencies use prize competitions to achieve a variety of goals, such as improving government service delivery, finding and highlighting innovative ideas, solving a specific problem, advancing scientific research, developing and demonstrating technology, informing and educating the public, engaging new people and communities, building capacity, and stimulating markets. While prize competitions are not the right tool for every problem, they can serve as a mechanism for spurring and sourcing innovation if and when they are aligned with a broader strategy and used systematically within an

[3] Public Law 111-358
[4] 42 U.S.C. § 2459f-1
[5] 10 U.S.C. § 2374a
[6] 42 U.S.C. § 16396
[7] Public Law 114-255
[8] 42 U.S.C. 284et seq.
[9] Public Law 114-329

agency. Previous versions of the Federal Prize Authority Progress Report[10] laid out the potential benefits of prize competitions in the public sector. Federal prize competitions have catalyzed advances in areas such as autonomous transport and infectious disease forecasting, and stimulated research and investment in market sectors including solar energy and small business development.

## Federal Community of Prizes and Challenges

All Federal agencies operating prize competitions and challenges are supported and assisted by the General Services Administration (GSA). In 2010, GSA launched Challenge.gov to deliver new tools and approaches to assist Federal agencies in advancing their core missions. Challenge.gov provides resources and collaborative opportunities to facilitate the use of prize competitions government-wide. In 2016, OSTP and Challenge.gov crowdsourced the expertise of Federal prize practitioners to launch an online Challenges and Prizes Toolkit,[11] a comprehensive resource that provides a guide to planning and executing Federal prize competitions.

The Challenge.gov platform hosts a variety of resources and tools developed and administered by GSA to assist Federal agencies in developing and executing successful competitions:

- **Resources for the Prizes Community of Practice.** Working in close coordination with agency prize leads and prize practitioners across government, the Challenge.gov program office develops trainings, case studies, and trend analyses for the Prizes and Challenges Federal Community of Practice, a network and active email list exchange of more than 730 current and prospective challenge managers in the Federal space. Monitoring the proliferation of State and local crowdsourcing initiatives, Challenge.gov expanded the email list to State and local government prize practitioners in 2018, inviting exchange and opening avenues for partnership.
- **In-person Training for Federal Prize Practitioners.** The Challenge.gov program has offered in-person and remote training (e.g., live-streams, recorded webinars) to more than 2,000 people across the Federal Government via GSA's DigitalGov University platform.[12]
- **Tools and Services for Contracting.** GSA maintains a contract vehicle—Sub-Schedule 541 4G, Challenges and Competitions Services—that provides agencies the ability to procure deeper technical expertise and dedicated services for their prize competitions. Contractors on the schedule offer agencies options for technical assistance, prize platforms, and access to communities of individual solvers and teams interested in entering prize competitions. GSA continues to assist agencies in taking advantage of the available services and to inform private sector vendors and agencies about the schedule and its benefits.

As Federal agencies continue to use prize competitions, contests have increased in number and become increasingly ambitious, complex, and visionary. Today, the Challenge.gov platform features more than 875 prize competitions and challenges from over 100 Federal departments, agencies, and bureaus. Tens of thousands of solvers and innovators have participated in these competitions on Challenge.gov, with additional entrants joining the competitions through other means. In addition, several agencies have chosen to administer prize competitions through third-party contractors and many have conducted prize competitions under authorities other than COMPETES.

[10] Previous versions of the Implementation of Prize Authority Progress Report can be found at http://www.challenge.gov/toolkit/resources.

[11] More information about the Challenge.gov toolkit can be found at http://www.challenge.gov/toolkit.

[12] More information about the DigitalGov University platform can be found at http://www.digital.gov.

Federal agencies have worked to expand their capacity and institutional abilities to conduct prize competitions in a number of different ways (see Table 1), including issuing department-wide policy or guidance on the use of prize competitions and challenges. In addition to internal support, Federal agencies have also developed interagency centers for prize programs on shared topic areas.

**Table 1. Department and Independent Agency Practices to Support Prize Competitions and Challenges.**

| Department and Independent Agency Practice | Agencies Implementing |
|---|---|
| Issuance of department- or agency-wide policy or guidance on the use of prize competitions and challenges | DHS, DOI, EPA, HHS, NASA, NIST, USAID, USDA |
| Common contract vehicles | DHS, ED, EPA, HHS, NASA |
| Internal communications tools | DHS, DOE, EPA, HHS, NASA, USAID |
| Coordinated external communications or webpage for prize competitions | DHS, EPA, NASA, USAID |
| Dedicated, central prize and challenge coordinator | DHS, EPA, HHS, NASA, USAID |
| Identified agency prize and challenge point-of-contact (not dedicated full-time to prize competitions) | AFRL, CTTSO, DOE, DOI, DOJ, NIST, NSF, IARPA, USDA |
| Distributed network or community of prize managers and points-of-contact within the agency | DOD, DOE, EPA, FTC, HHS, IARPA, NASA, USAID, USDA |
| Centralized training and design support for agency staff | DHS, HHS, NASA, NIST, USAID |
| Developing centers for interagency challenges in specific topic areas | DOI |
| Distributed network or community of project managers and/or resource people within the agency with expertise in prize competitions | CDC, DOE, EPA, FDA, NASA, NIH, NPS, NSF, SI, USAID, USDA, USGS |

This report discusses how Federal agencies have used incentive prize competitions and innovation challenges, and highlights the prize competitions conducted in FY17 and FY18 under the COMPETES prize authority and other authorities. Reporting of prize competitions under authorities other than COMPETES is strictly voluntary and therefore not comprehensive in this report.

## Highlights and Trends of Prize Competitions in FY17 and FY18

The total number of active prize competitions reported by Federal agencies in FY17 and FY18 was 169 under all authorities.[13] FY17 and FY18 prize competitions were categorized based on their status (launched, underway, or completed) in each fiscal year. If a prize competition reported any of the status options in both years, the prize competition was considered active and was counted in both years for trend analyses. This method was chosen to account for the contribution of prize competitions that continue over multiple years, rather than only counting during the year a prize is launched.[14] Appendix A lists the 92 prize competitions conducted under the authority granted by COMPETES, and Appendix B lists 77 voluntarily reported select activities conducted by agencies under other authorities.

[13] Note that information about the DOE American Inventions Made Onshore (AIM Onshore) prize was received after the submission deadline and was not included in the report analyses. However, AIM Onshore prize information is included in Appendix A.

[14] This method was not used for calculating aggregate prize purses and other monetary statistics so as to avoid double-counting.

**Table 2. List of Federal Departments, Independent Agencies, and Agencies within Departments, that Reported Prize Competitions in FY17 and FY18 Conducted under COMPETES and Other Authorities.**

| Departments and Independent Agencies | Agencies within Departments | COMPETES | | Other | |
|---|---|---|---|---|---|
| | | FY17 | FY18 | FY17 | FY18 |
| Department of Agriculture (USDA) | Food and Nutrition Service (FNS) | ✓ | | | |
| | National Institute of Food and Agriculture (NIFA) | ✓ | | | |
| Department of Commerce (DOC) | National Institute of Standards and Technology (NIST) | ✓ | ✓ | | |
| Department of Defense (DOD) | Defense Advanced Research Projects Agency (DARPA) | | | ✓ | ✓ |
| | United States Special Operations Command (USSOCOM) | | | ✓ | ✓ |
| Department of Energy (DOE) | | ✓ | ✓ | | |
| Department of Health and Human Services (HHS) | | ✓ | ✓ | | |
| | Administration for Children & Families (ACF) | | | ✓ | |
| | Agency for Healthcare Research and Quality (AHRQ) | | ✓ | | |
| | Centers for Disease Control and Prevention (CDC) | ✓ | ✓ | ✓ | ✓ |
| | Food and Drug Administration (FDA) | ✓ | | | |
| | Health Resources and Services Administration (HRSA) | ✓ | ✓ | | |
| | National Institutes of Health (NIH) | ✓ | ✓ | ✓ | ✓ |
| Department of Homeland Security (DHS) | | ✓ | ✓ | | |
| | United States Coast Guard (USCG) | | | | ✓ |
| Department of Interior (DOI) | Bureau of Reclamation (USBR) | ✓ | ✓ | | |
| Department of State | | ✓ | ✓ | ✓ | ✓ |
| Department of Transportation (DOT) | Bureau of Transportation Statistics (BTS) | | ✓ | | |
| Department of Veterans Affairs (VA) | | | | ✓ | ✓ |
| Environmental Protection Agency (EPA) | | ✓ | ✓ | ✓ | ✓ |
| Federal Trade Commission (FTC) | | ✓ | | | |
| General Services Administration (GSA) | | ✓ | ✓ | | |
| National Aeronautics and Space Administration (NASA) | | ✓ | ✓ | ✓ | ✓ |
| National Science Foundation (NSF) | | ✓ | ✓ | ✓ | ✓ |
| Office of the Director of National Intelligence (ODNI) | | | | ✓ | ✓ |
| Small Business Administration (SBA) | | ✓ | ✓ | | |
| United States Agency for International Development (USAID) | | | ✓ | ✓ | ✓ |

### *Agency Use of Prize Authorities*

In FY17, 18 agencies (Federal departments, independent agencies, and agencies within departments) offered prize competitions enabled by the authority provided by COMPETES. Twelve departments and agencies continued to administer prize competitions and challenges developed under other authorities. In FY18, 17 agencies offered prize competitions enabled by the authority provided by the

COMPETES Act and 12 departments and agencies administered prize competitions and challenges under other authorities (Table 2).

Federal agencies engaged a diverse population of citizen solvers and innovators who provided novel solutions that addressed a variety of problems and helped advance agency missions. For instance, innovators provided solutions that helped school districts better verify applications for free or reduced-price school meals (USDA, Box 1); encouraged the use of open data in biomedical and health applications (NIH, Box 2); helped address substance use disorders (NIH, Box 3); and solved the problem of solid waste disposal for astronauts in space suits (NASA, Box 4).

### *Goals of Prize Competitions*

For the fifth consecutive year, the most common prize competition goal reported was *engage new people and communities*, reported by 71.4% and 73.2% of active prize competitions in FY17 and FY18, respectively. Three other goals were reported by more than 50% of active prize competitions in both FY17 and FY18: (1) *solve a specific problem,* (2) *develop technology,* and (3) *find and highlight innovative ideas.* In FY18, *advance scientific research* was also reported by just over 50% of active prize competitions, up from 43.8% in FY17. The goal *advance scientific research* has witnessed the largest growth rate in recent years; the percentage of prize competitions reporting this goal has grown from 16.5% in FY14 to 52% in FY18. Notably, the percentage of prize competitions reporting *improve government service and delivery* rose from 4.6% to 9.8% from FY16 to FY18; however, these rates still mark a decline from FY14 when 15.5% of prize competitions reported this goal. Similarly, the goal *build capacity* has witnessed minimal growth since FY14, with reporting percentages rising from 10.3% to 17.1% from FY14 to FY18. Table 3 presents a breakdown of the percentage of prize competitions reporting each goal between FY14 and FY18.

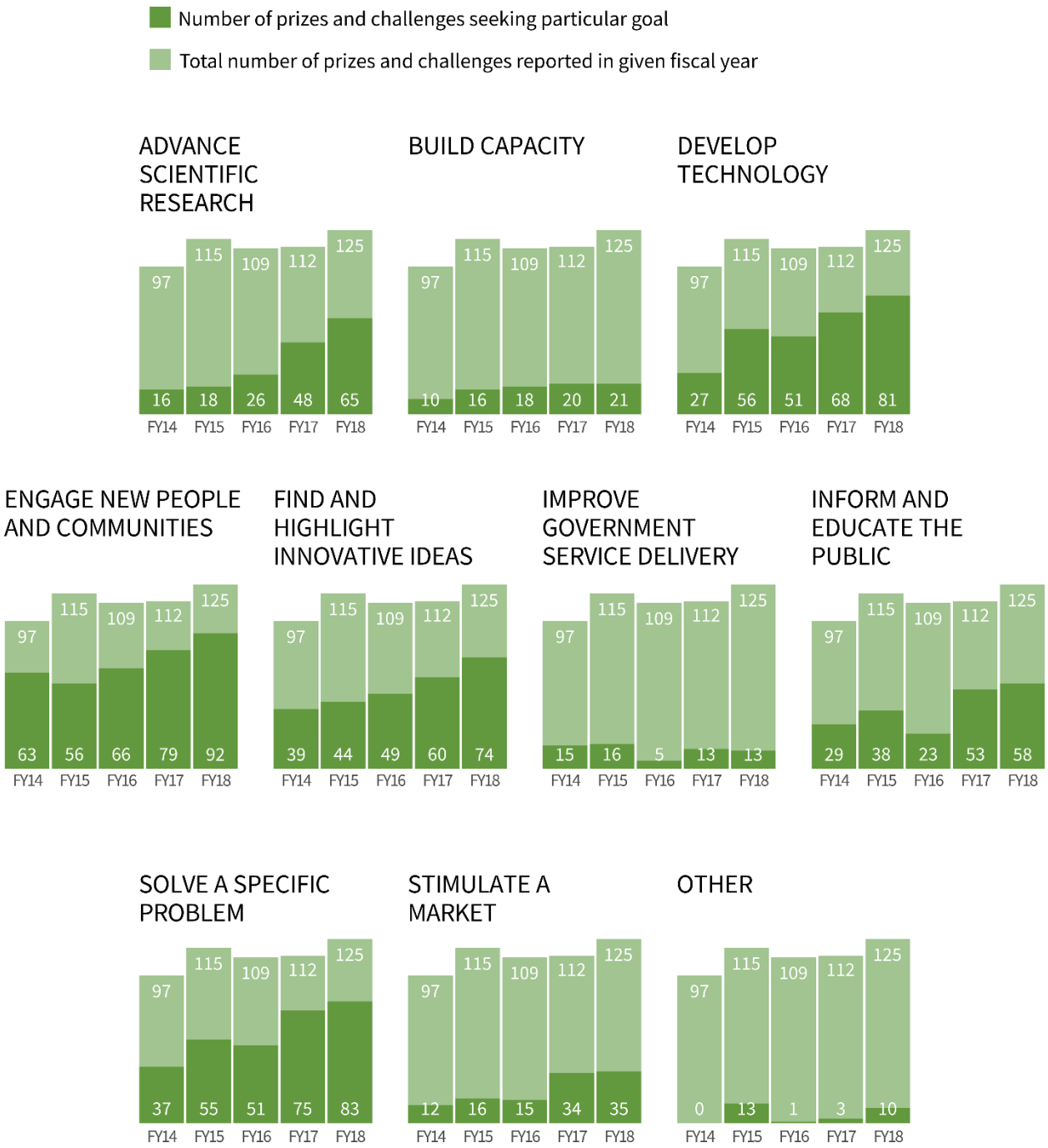
**Table 3. Percentage of Prize Competitions Reporting Each Goal**

| Goals | FY14 | FY15 | FY16 | FY17 | FY18 |
|---|---|---|---|---|---|
| Advance Scientific Research | 16.5% | 15.7% | 23.9% | 43.8% | 52.0% |
| Build Capacity | 10.3% | 13.9% | 16.5% | 18.8% | 17.1% |
| Develop Technology | 27.8% | 48.7% | 46.8% | 59.8% | 63.4% |
| Engage New People and Communities | 64.9% | 48.7% | 60.6% | 71.4% | 73.2% |
| Find and Highlight Innovative Ideas | 40.2% | 38.3% | 45.0% | 54.5% | 60.2% |
| Improve Government Service Delivery | 15.5% | 13.9% | 4.6% | 11.6% | 9.8% |
| Inform and Educate the Public | 29.9% | 33.0% | 21.1% | 48.2% | 46.3% |
| Solve a Specific Problem | 38.1% | 47.8% | 46.8% | 66.1% | 65.0% |
| Stimulate a Market | 12.4% | 13.9% | 13.8% | 30.4% | 27.6% |
| Other | 0.0% | 11.3% | 0.9% | 2.7% | 8.1% |

The number of prize competitions reporting multiple goals has increased; 96.8% of FY18 awards reported more than one goal, representing a small increase over FY16 and FY17 (94.5% and 93.8%, respectively). The average number of goals reported per prize has also risen markedly in recent years, from 2.8 goals per prize in FY16 to 4.2 goals per prize in FY18. The most common goal in FY17 and FY18, *engage new people and communities*, was frequently reported alongside other common goals, including *develop technology* (co-reported in 45.1% of prize competitions), *solve a specific problem* (44.7%), and *find and highlight innovative ideas* (43.4%). Notably, the most commonly reported pair of goals in FY17 and FY18 was *solve a specific problem* and *develop technology*, co-reported in 52.3% of

prize competitions, the highest level of co-reported goals since documentation began in FY14. Figure 1 shows the number of and the goals of the prize competitions conducted between FY14 and FY18.

**Figure 1. Goals Sought by Prize Competitions between FY14 and FY18.**



**Box 1. USDA National School Lunch and School Breakfast 2017 Verification Response Rate Challenge**

School districts approve nearly five million household applications for free or reduced-price school meal benefits annually, and each year, they are required to identify a small percentage of those applications for verification. Continued eligibility is conditional on complying with the verification process. Households that do not respond to the request for verification lose their benefits, even if they are income-eligible.Many districts struggle to get even half of their households to respond, whereas others have created low-cost and creative strategies that allow them to exceed 70 (and even 80 or 90) percent response rates. The Verification Response Rate Challenge was a public forum to exchange ideas on how to increase household response in the annual verification process. Through this challenge, school district and state agency staff were able to share their success stories and generate creative ideas for increasing household responses to verification.
This challenge provided a fun and encouraging forum for school district staff to share their experience and expertise with other school districts in a collaborative fashion, where ideas could be proposed and expanded through discussion boards. The goal was to provide a number of options school districts might use to increase their verification response rates, reduce the time and expense associated with repeat follow-up reminders to households, and reduce the risk that eligible children lose access to program benefits. USDA's Food and Nutrition Service (FNS) used the challenge format to maximize school district staff engagement and discover the most effective solutions. It was equally important that school districts were provided an opportunity to highlight the work they do. The winning submissions were featured at the 2017 School Nutrition Association Annual National Conference in Atlanta. FNS also produced a verification toolkit that is available to all school districts in the country that highlights practices and ideas from contest participants. Because school districts vary, the opportunity to provide a range of solutions is very important and the challenge format allowed school district staff and others an opportunity to participate at essentially no cost.

https://www.challenge.gov/challenge/usda-school-meal-programs-verification-response-rate-challenge/

***Solution Types Sought by Federal Agencies***

The most common solution type reported in FY18 was *ideas,* reported by 46.4% of active awards. Table 4 presents a breakdown of the percentage of prize competitions reporting each type of solution between FY14 and FY18. *Ideas* has been the most common solution since FY14, except in FY17, when *software and apps* overtook *ideas* by a narrow margin (44.6% and 42.9%, respectively). *Technology, demonstration, and hardware* has grown significantly over the past few years from 15.5% in FY14 to 41.5% in FY18. Other solutions have witnessed moderate changes in recent years, including *analytics, visualizations, and algorithms*, which decreased from 20.6% in FY14 to 12.2% in 2015 and 16.5% 2016 but has since increased to 25.9% and 27.6% in FY17 and FY18, respectively. The solutions *creative* and *scientific* have both fluctuated around 15–25% between FY14 and FY18. Eight prize competitions reported the solution *nominations* from FY14 to FY16, and no prize competitions reported *nominations* in either FY17 or FY18. Figure 2 shows the types of solutions sought by Federal agencies for prize competitions reported between FY14 and FY18.

The number of prize competitions reporting multiple solutions has also grown steadily over the past 4 years, from 36.1% in FY14 to 62.8% in FY18. Similarly, the average number of solutions reported per prize has risen from 1.54 solutions per prize in FY14 to 2.3 in FY18.

**Table 4. Percentage of Prize Competitions Reporting Each Solution Type**

| Solutions | FY14 | FY15 | FY16 | FY17 | FY18 |
|---|---|---|---|---|---|
| Analytics, Visualizations, and Algorithms | 20.6% | 12.2% | 16.5% | 25.9% | 27.6% |
| Business Plans | 8.2% | 11.3% | 14.7% | 8.9% | 8.1% |
| Creative | 20.6% | 25.2% | 22.0% | 25.9% | 26.0% |
| Ideas | 34.0% | 45.2% | 47.7% | 42.9% | 46.4% |
| Nominations | 4.1% | 2.6% | 0.9% | 0.0% | 0.0% |
| Scientific | 14.4% | 13.0% | 21.1% | 22.3% | 22.0% |
| Software and Apps | 34.0% | 22.6% | 26.6% | 44.6% | 43.1% |
| Technology, Demonstration, and Hardware | 15.5% | 26.1% | 34.9% | 37.5% | 41.5% |
| Other | 2.1% | 8.7% | 0.0% | 8.0% | 13.8% |

**Box 2. NIH Open Science Prize**

The goal of this Challenge, which was a collaboration between the National Institutes of Health, the Wellcome Trust, and the Howard Hughes Medical Institute, was to stimulate the development of novel and ground-breaking tools and platforms to enable the reuse and repurposing of open digital data, publications, and other research outputs relevant to biomedical or health applications. The prize also aimed to forge new international collaborations to bring together open science innovators from the United States and abroad to co-develop services and tools of benefit to the global research community.

Of 435 submissions received from 45 countries, 6 finalists were chosen. These included a tool to store and process data related to the neural circuits of fruit fly brains (critical for modeling mental and neurological diseases in people); a website that makes it free and easy for families with rare Mendelian diseases to share health and genetic information with other families, clinicians, and researchers; a data platform to aggregate and provide timely information on air quality from around the globe; a web-based application to allow collaborative annotation, discovery, and analysis of publicly available brain imaging data; and a project to allow clinicians and researchers to access, search, and present information from otherwise unpublished clinical trials. The grand prize went to a project developing an integrated framework for real-time molecular epidemiology and evolutionary analysis of emerging epidemics, such as Ebola, MERS-CoV, and Zika. https://www.opensciencеprize.org/

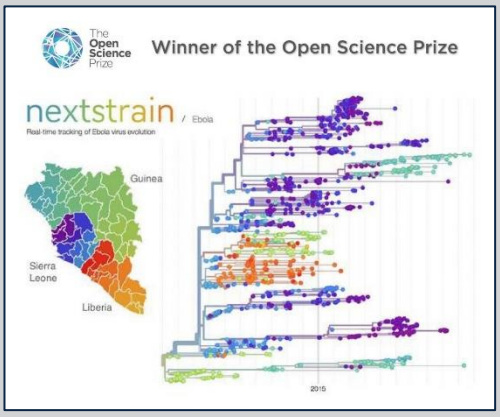
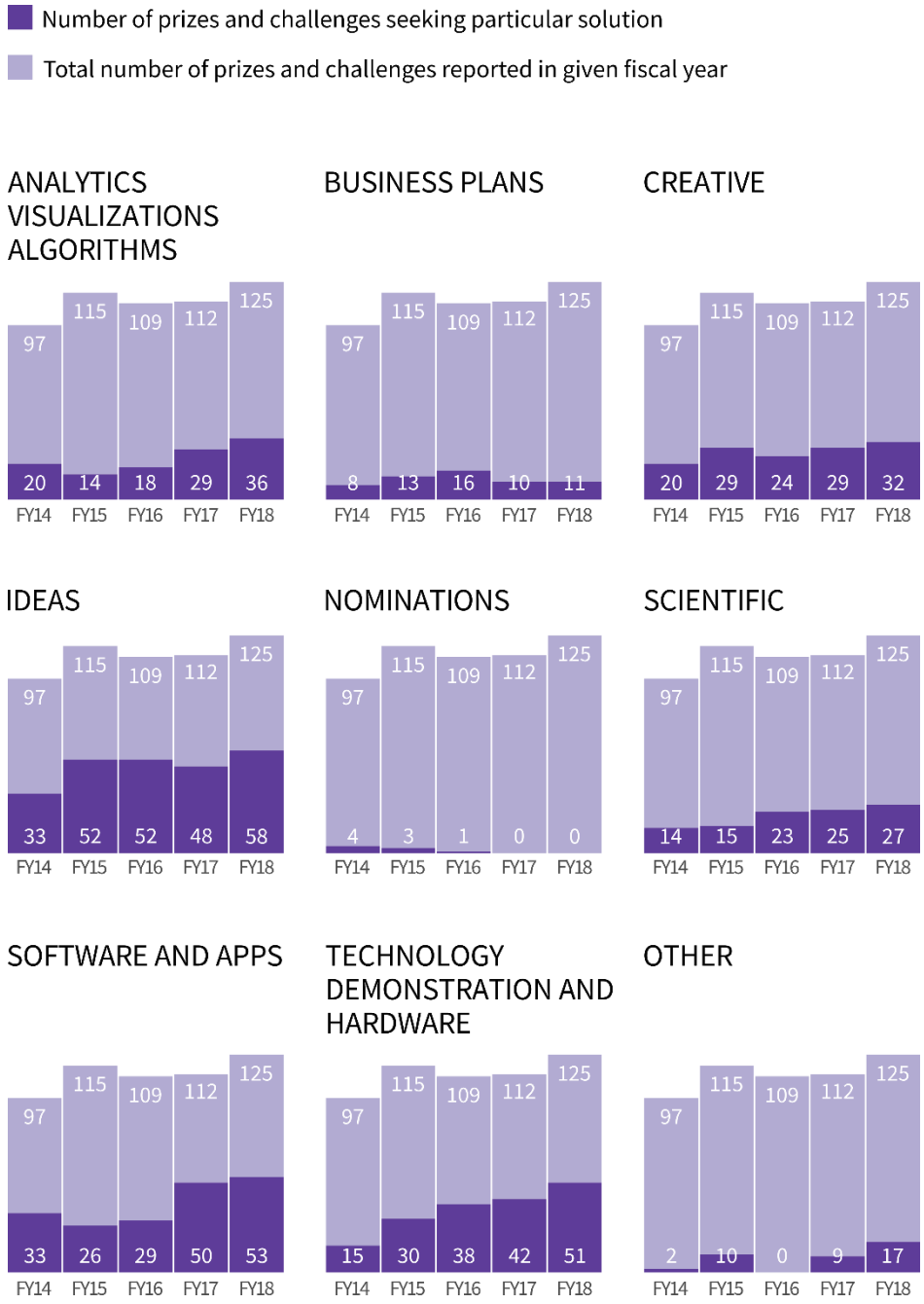



Image: NIH

**Figure 2. Solutions Sought by Federal Agencies between FY14 and FY18.**



### *Outreach Mechanisms and Submissions*

Departments and agencies used a number of mechanisms to solicit entries for prize competitions in FY17 and FY18. The most common solicitation method was social media (89.3% and 94.4% for FY17 and FY18, respectively), followed closely by email (86.6% and 84% for FY17 and FY18, respectively).

The number of submissions received for prize competitions in FY17 and FY18 varied widely, depending on the nature of the competition, the desired pool of participants, and outreach mechanisms used, among other factors. The largest number of submissions for any prize in FY17 and FY18 was 9,339 for the DHS Passenger Screening Algorithm Challenge. The FY17 and FY18 reporting cycle was the first time data on outreach mechanism and submission number were collected from agencies.

### *Total Prize Purse Offered*

Total prize purses ranged from $0 to $20 million with a median of $50,000 in FY17 and $75,000 in FY18 under all authorities. In both FY17 and FY18, the largest total purse came from the Antimicrobial Resistance, Rapid, Point-of-Need Diagnostic Test Challenge, run by HHS. The competition awarded ten semi-finalists $50,000 each during the first step of the challenge to develop innovative diagnostic tools. Teams then competed for additional prizes in the second and third step, including $19 million to be awarded to up to three winners in FY20. Although many prize purses were quite modest (less than $1,000), 12 competitions in FY17 and FY18 had totals of $1 million or more (typically awarded to multiple winners). In addition to monetary awards, departments and agencies also offered non-monetary incentives to challenge winners, such as mentoring or training, recognition in press or at events, publication in journals, or opportunities to present their findings to government officials or industry representatives, among others.

Agencies have used both COMPETES and non-COMPETES authority to execute competitions of various monetary value over time; there does not appear to be a trend in the use of COMPETES or other authorities over time. Among other agencies (i.e., those that have not reported more than 10 total competitions between FY14 and FY18),[15] the majority of prize competitions and those with the highest monetary value were conducted under COMPETES authority. These observations are consistent with prize competitions reported in previous years.

### *Partnerships with Other Organizations*

Sixty-two percent of prize competitions were conducted by agencies in partnership with another organization. Approximately 53% were conducted in partnership with at least one non-Federal organization, and 34% were conducted with at least one Federal partner. Many prize competitions had multiple Federal or non-Federal partners. Federal partners included other agencies and federally funded research and development centers. Non-Federal partners included academic institutions, professional societies, State or local governments, private sector organizations, non-governmental organizations, foreign governments, journals, and contractors. Partners provided both monetary and non-monetary contributions to the prize competitions, including subject matter experts, competition judges, technical reviewers, administrative support, or access to resources such as event space, technical assistance, or outreach platforms.

[15] Other agencies include the CNCS, CPSC, DHS, DOJ, DOT, ED, FMC, FTC, GSA, HUD, NEA, NNCO, OMB, SBA, Treasury, USDA, and VA.

**Box 3. NIH: The 2017 "$100,000 for Start a SUD Startup" Challenge**


The Start a SUD Startup Challenge sought research ideas that could be the basis for new and successful startups to address Substance Use Disorders (SUD). The Challenge was intended to award "would-be" startups at a much earlier stage than most investors, incubators, or traditional modes of research funding (e.g., small business grants) and allowed scientists to test whether their research could be fostered into a biotech startup that could later compete for National Institute on Drug Abuse (NIDA) Small Business Innovation Research and Small Business Technology Transfer funding. A variety of innovators submitted ideas to the SUD Startup Challenge including U.S. academic institutions, newly formed small businesses, and members of the general public. Innovators were diverse in terms of age, level of education, gender, race, and understanding of commercialization and entrepreneurship. Importantly, about 60% of submitted ideas came from teams or individuals who had not previously applied for NIH grant funding, tapping a pool of talent and ideas that NIDA has never before interacted with. The total prize purse offered was $100,000, divided among 10 awards of $10,000 each. In addition, NIDA entrepreneurship experts provided winners with mentorship support to help them develop a minimum viable proof of their proposed products. Winning submissions included a platform for social rebuilding during recovery, a solution addressing neonatal abstinence syndrome, an opioid prescription awareness tool, and a means of detecting and reporting illicit online pharmacies selling controlled substances.
https://www.Challenge.gov/challenge/the-2017-100000-for-start-a-sud-startupchallenge/
Image: NIH

## Trends in Prize Competitions from FY14 to FY18

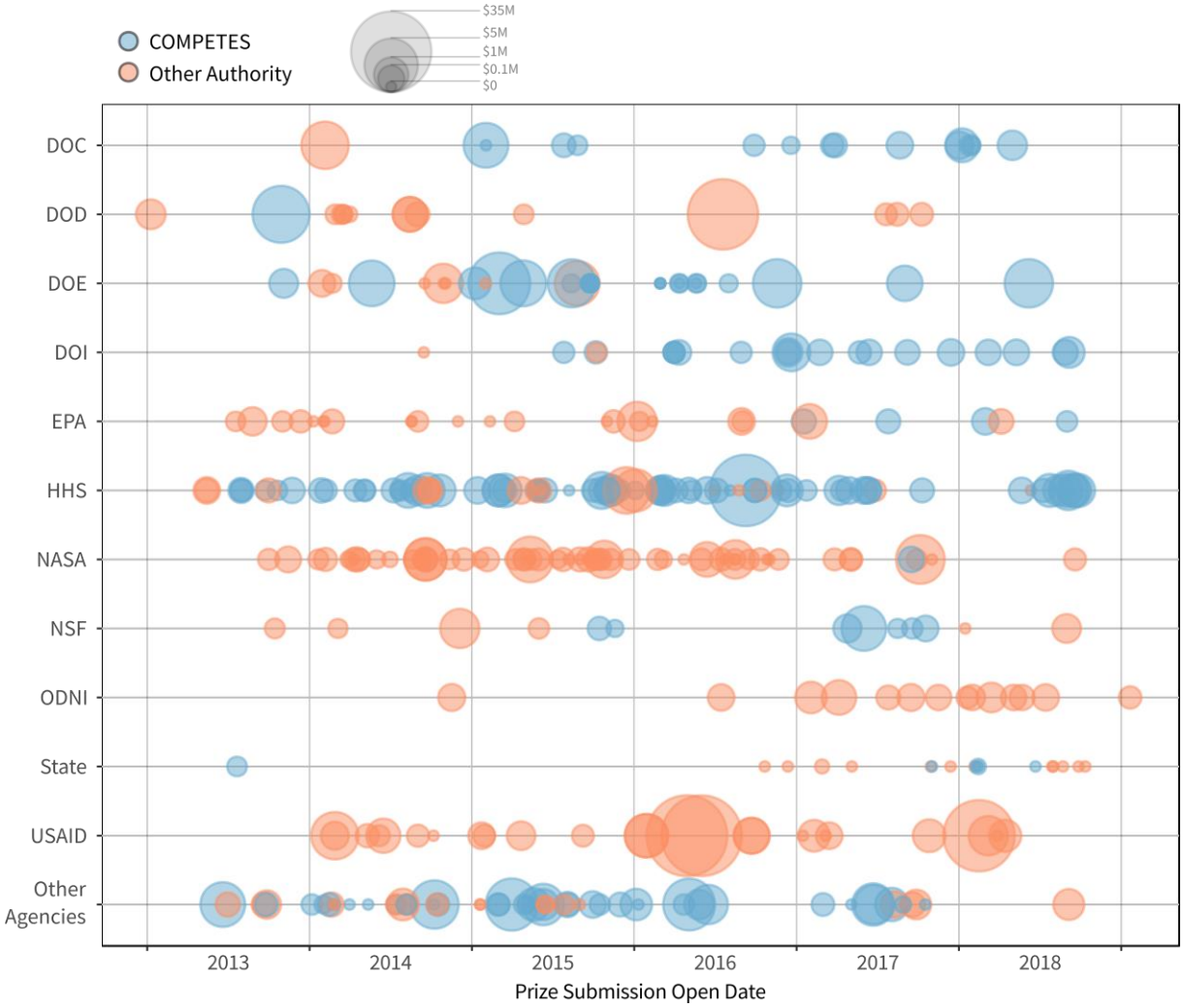
To examine the use of prize competitions by Federal agencies over time, the total number and magnitude of prize purses reported by Federal agencies under COMPETES and non-COMPETES authorities between FY14 and FY18 were tallied.[16] Figure 3 shows prize competitions arranged by agency over time from FY14 to FY18 by date of open submission. Each circle represents an individual prize competition, and the size of the circle corresponds to the size of the prize purse allocated.

Numerous agencies have increasingly leveraged the COMPETES authority to execute prize competitions in recent years, including DOC, DOE, DOI, and HHS. Since gaining the COMPETES authority, many of these agencies have stopped reporting prize competitions under any other authority while other agencies, such as EPA and State, continue to primarily use non-COMPETES authorities. Some agencies, such as ODNI, have never used COMPETES and rely exclusively on other authorities to execute prize competitions.

Overall, the total number of prize competitions reported increased steadily from 97 in FY14 to 121 in FY18 (see Table 5 for a breakdown of prize competitions conducted between FY14 and FY18). Nine agencies account for the bulk of competitions and prize money offered between FY14 and FY18: HHS and NASA have both funded over 100 competitions since FY14 and DOE, DOD, DOI, EPA, NSF, ODNI, and USAID have each sponsored over 20. The proportion of prize competitions conducted under the COMPETES authority varies through time from a low of 32% in FY14 to a high of 58% in FY16.

[16] Trend analyses are limited to prize competitions reported from FY14 to FY18. Data collected for prize competitions prior to FY14 did not contain comparable information as those collected in later years.

**Figure 3. Prize Competitions Reported since FY14.**[17] Agencies that reported more than 10 total prize competitions between FY14 and FY18 are listed separately; all others are grouped as one entry. Circle size corresponds to total allocated prize purse.[18]




With respect to the magnitude of the prize purses offered, the total amount of all prize purses combined in any fiscal year increased by 116% from $32 million in FY14 to $69 million in FY18. Of the prize purses offered in FY17 and FY18, four agencies (DOD, DOE, HHS, and NSF) held competitions with total prize purses equal to or greater than $2 million. These four agencies all show an increase in total prize purses offered from FY14 to FY18 with the exception of DOE, which had a sharp drop in prize purses from over $18 million FY16 to $3 million in FY17 and $6.5 million in FY18. Two agencies had substantial increases in prize purses offered in recent years: DOD increased from $6.75 million in FY16 to $18.8 million and HHS went from $1.9 million in FY14 to $24 million in FY18.

[17] Figure 3 only shows agencies that have reported more than 10 prize competitions. Agencies that have conducted 10 or fewer total prize competitions between FY14 and FY18 are grouped together under *Other Agencies*. See Footnote 14 for a list of other agencies.

[18] Forty-six reported prizes are not included because they did not list a submission open date. Due to a difference in data collection, the total prize value in 2014 and 2015 may refer to the total prize allocated or awarded.

**Table 5. Number of Prize Competitions Reported by Federal Departments and Agencies from FY14 through FY18.** Numbers in parentheses were conducted under the authority granted by the COMPETES Act. Gray shading indicates agencies combined into the "other agencies" category in Figure 3.

| Department/Agency | FY14 | FY15 | FY16 | FY17 | FY18 |
|---|---|---|---|---|---|
| **CNCS** | 0 (0) | 1 (1) | 0 (0) | 0 (0) | 0 (0) |
| **CPSC** | 2 (2) | 1 (1) | 0 (0) | 0 (0) | 0 (0) |
| **DHS** | 2 (0) | 2 (1) | 2 (2) | 1 (1) | 3 (2) |
| **DOC** | 1 (0) | 5 (4) | 3 (2) | 5 (5) | 6 (6) |
| **DOD** | 10 (1) | 6 (1) | 1 (1) | 3 (0) | 3 (0) |
| **DOE** | 7 (4) | 14 (9) | 22 (18) | 2 (2) | 4 (4) |
| **DOI** | 0 (0) | 2 (1) | 7 (5) | 11 (11) | 15 (15) |
| **DOJ** | 5 (1) | 5 (1) | 0 (0) | 0 (0) | 0 (0) |
| **DOT** | 1 (1) | 0 (0) | 0 (0) | 0 (0) | 1 (1) |
| **ED** | 2 (0) | 2 (0) | 0 (0) | 0 (0) | 0 (0) |
| **EPA** | 12 (0) | 3 (0) | 7 (0) | 6 (3) | 6 (4) |
| **FMC** | 0 (0) | 1 (1) | 0 (0) | 0 (0) | 0 (0) |
| **FTC** | 1 (1) | 2 (2) | 0 (0) | 1 (1) | 0 (0) |
| **GSA** | 2 (2) | 1 (1) | 2 (2) | 1 (1) | 1 (1) |
| **HHS** | 22 (18) | 25 (18) | 29 (25) | 26 (22) | 21 (19) |
| **HUD** | 2 (2) | 1 (1) | 0 (0) | 0 (0) | 0 (0) |
| **NASA** | 17 (0) | 24 (0) | 23 (0) | 23 (0) | 17 (0) |
| **NEA** | 1 (1) | 0 (0) | 0 (0) | 0 (0) | 0 (0) |
| **NNCO** | 0 (0) | 2 (0) | 0 (0) | 0 (0) | 0 (0) |
| **NSF** | 3 (0) | 3 (0) | 3 (2) | 6 (5) | 6 (4) |
| **ODNI** | 1 (0) | 2 (0) | 0 (0) | 6 (0) | 13 (0) |
| **OMB** | 0 (0) | 1 (1) | 0 (0) | 0 (0) | 0 (0) |
| **SBA** | 0 (0) | 5 (5) | 3 (3) | 2 (2) | 1 (1) |
| **State** | 1 (1) | 0 (0) | 0 (0) | 8 (3) | 20 (8) |
| **Treasury** | 0 (0) | 0 (0) | 1 (1) | 0 (0) | 0 (0) |
| **USAID** | 5 (0) | 8 (0) | 4 (0) | 6 (0) | 6 (1) |
| **USDA** | 0 (0) | 1 (1) | 2 (2) | 2 (2) | 0 (0) |
| **VA** | 0 (0) | 4 (0) | 0 (0) | 3 (0) | 3 (0) |
| **Total** | 97 (34) | 115 (49) | 109 (63) | 112 (58) | 125 (63) |

The magnitude of the total Federal prize purse issued under the COMPETES authority has increased over time from $25 million in FY14 to $38 million in FY18. The median prize purse per competition conducted under the COMPETES authority has risen sharply from $27,000 in FY14 to $82,000 in FY18.

Under the "other agencies" category, the total prize purse of prize competitions active in each year has fluctuated between $1.5 and $4 million. The number of prize competitions included in this category has declined from 18 in FY14—representing 9 different agencies—to 8 in FY18, representing 5 agencies. At the same time, the median prize purse per competition in this category has increased over time from $15,000 in FY14 to $226,000 in FY18.

**Box 4. NASA's Space Poop Challenge**

Space is an extremely inhospitable environment that requires robust protection of human explorers. Astronauts wear space suits during extravehicular activity, but they are also worn to protect personnel from unforeseen circumstances during launch and entry of spacecraft and during activities inside space vehicles. Depending on circumstances, astronauts could find themselves in their suits for up to 10 hours during launch or landing or up to 6 days if something catastrophic were to happen during a mission. The current solution for managing solid waste in space suits is to equip astronauts with diapers, but this is a low-tech and temporary solution that does not provide a healthy or protective option longer than 1 day. The goal of the Space Poop Challenge was to find viable concepts and designs for a urine and fecal management system for space suits that could be used over a continuous duration of 144 hours in the event of cabin depressurization or other unforeseen circumstance during a mission to the Moon. To maximize the range of innovative technical solutions, NASA chose a crowdsourced competition, working with the company HeroX, with a total prize purse of $30,000, which attracted over 20,000 registrants and 5,170 submissions from around the world. One of the top three solutions included a mini airlock and tool based on laparoscopic surgical instruments that would allow the removal of waste, entry of wipes and underwear, and manipulation required for cleaning in the space suit. Another concept included a design for self-inflating air pumps to help dry the skin that was based on emergency air bag technology to save power and complexity while providing a high rate of air flow. The winning submission included a compact wiping mechanism that provided a novel approach to skin cleaning and infection prevention. NASA is using these solutions to help develop future space suit designs.
https://herox.com/SpacePoop
Image: NASA

***Trends in Prize Competitions for Select Agencies***

DOD, DOE, and HHS accounted for 20% to 48% of competitions active from FY14 to FY18 and 48% to 74% of the prize money offered by Federal agencies in those years. However, the number, size, and authority used to fund prize competitions by these three agencies changed substantially in this same period.

The number of prize competitions offered by DOE increased from 7 in FY14 to 22 in FY16, but decreased to just 2 in FY17 and 3 in FY18. Of the prizes reported, DOE uses the COMPETES authority for the majority of competitions from FY14 to FY16 and for all competitions that were active in FY17 and FY18.

HHS has reported the most prize competitions of any Federal agency (ranging between 21 and 29 active competitions in any year from FY14 to FY18) and the highest use of the COMPETES authority: 72% to 90% of reported HHS prize competitions in any given year were offered under the COMPETES authority. The median HHS prize purse has steadily increased from $46,000 in FY14 to $130,000 in FY18.

# Crowdsourcing and Citizen Science

## Introduction

As part of the American Innovation and Competitiveness Act (AICA), Congress passed the Crowdsourcing and Citizen Science Act (15 USC § 3724)[19], which grants Federal agencies the direct, explicit authority to use crowdsourcing and citizen science to stimulate and facilitate broader public participation in the advancement of Federal agency missions. The Crowdsourcing and Citizen Science Act defines citizen science as "a form of open collaboration in which individuals or organizations participate voluntarily in the scientific process in various ways, including— (A) enabling the formulation of research questions; (B) creating and refining project design; (C) conducting scientific experiments; (D) collecting and analyzing data; (E) interpreting the results of data; (F) developing technologies and applications; (G) making discoveries; and (H) solving problems." It further defines crowdsourcing as "a method to obtain needed services, ideas, or content by soliciting voluntary contributions from a group of individuals or organizations, especially from an online community." Crowdsourcing engages participants in a wide range of activities and topics from digitizing archives to satellite image analysis; citizen science is a form of crowdsourcing that allows participants to become directly involved in the scientific process through data collection, logistical support, and many other direct contributions to research. The Federal Government supports them jointly because of their many shared elements, including mechanisms for organizing and engaging both online and on-the-ground communities.

While the Crowdsourcing and Citizen Science Act has only recently codified these practices for Federal agencies, the Federal Government has a long history of engaging citizens in the scientific process. For example, Thomas Jefferson collected and shared weather observations and planned to establish a network of weather observers by providing a thermometer to one dependable deputy for each county of Virginia to collect twice-daily observations of temperature and wind direction. In 1890, the Organic Act created what is now the National Weather Services' Cooperative Observer Program,[20] which supports thousands of volunteers in the collection of observational meteorological data.

The use of volunteer reports and observations by professionals is a long-standing model of citizen science that continues to have an impact on research carried out by Federal agencies to advance their missions. For example, volunteer water quality monitoring has shaped the EPA's understanding of the environment, and reports from the public have improved the USGS's analysis of earthquakes.

In response to increasing public interest in recent years, Federal agencies have sought to facilitate community-based participation in their missions by preserving and improving access to scientific collections, data, and other research products. At the same time, technological advances have made it easier for both researchers and the public to gather and contribute valuable data and observations. With the dropping cost of sensors and greater access to the internet and smartphones, the collection and reporting of field-based measurements by both research specialists and citizen scientists has become increasingly streamlined. The past decade has also seen the emergence of online projects that involve participants in data and image analysis, sometimes through gaming interfaces. Such projects offer new pathways for the public to participate and can attract individuals outside the reach of more traditional models of scientific engagement. These trends help make crowdsourcing and citizen science more efficient as a means for Federal agencies to carry out their missions and engage the public.

[19] More information on the Crowdsourcing and Citizen Science Act can be found at https://www.govinfo.gov/content/pkg/USCODE-2016-title15/pdf/USCODE-2016-title15-chap63-sec3724.pdf.

[20] More information about the Cooperative Observer Program can be found at https://www.weather.gov/coop/.

## Federal Crowdsourcing and Citizen Science Community of Practice

As implementation of crowdsourcing and citizen science entered a period of rapid growth, a nucleus of Federal officials who had been considering how to employ these methods came together. As early as 2012, Federal employees from various agencies began meeting as an informal discussion group, which led to the establishment in 2014 of the Federal Community of Practice for Crowdsourcing and Citizen Science[21] (FedCCS). These efforts are amplified by the work of the Agency Citizen Science and Crowdsourcing Coordinators, a group of Federal employees designated by their agency leaders to be responsible for implementing tasks to advance crowdsourcing and citizen science. FedCCS works within and across Federal agencies to address a unique challenge: How Federal agencies can engage the public directly and creatively as partners to enhance agencies' diverse missions. This community is growing rapidly, including almost 400 people from more than 60 Federal agencies in 2018.

Working together, the FedCCS increases efficiency, efficacy, and innovation across the Federal Government by sharing resources and expertise, methods and strategies, and identifying shared opportunities and needs. CitizenScience.gov is the Federal Government's central hub for crowdsourcing and citizen science efforts. It provides essential resources, including:

- **The Federal Crowdsourcing and Citizen Science Catalog:** A vetted catalog of projects at the Federal level that helps improve collaboration among Federal agencies and reveals opportunities for new high-impact projects.
- **The Federal Crowdsourcing and Citizen Science Toolkit:** A comprehensive toolkit to assist Federal Crowdsourcing and Citizen Science practitioners by providing how-to process steps, case studies, a resource library, and legal and policy resources to aid Federal agencies in setting up and managing their own projects.
- **The Federal Community of Practice for Crowdsourcing and Citizen Science:** A group of practitioners who share skills, resources, and experiences among themselves and with others to help expand and improve public participation across the government.

This centralized online resource opens opportunities for the Federal Government to pursue and strengthen interagency partnerships as well as to collaborate with industry, academia, and other organizations on crowdsourcing and citizen science initiatives. It also increases the ability of Federal practitioners to access resources for project development, gain top-level approval and support, and share lessons with fellow practitioners. By bringing together relevant resources and people in one place, CitizenScience.gov helps improve the FedCCS's impact without undercutting its practitioner-led organization.

[21] More information about the FedCCS can be found at https://digital.gov/communities/crowdsourcing-and-citizen-science/.

## Crowdsourcing and Citizen Science Act

The Crowdsourcing and Citizen Science Act grants Federal agencies the direct, explicit authority to use crowdsourcing and citizen science. This authority supports efforts at the agency level to change perceptions about the validity of citizen science data as well as create infrastructure to support implementation. As momentum increases, agencies such as NSF have funded work on the science of citizen science focused on identifying effective approaches and developing empirically supported best practices. The FedCCS continues to help agencies overcome concerns that might hinder implementation—from data quality to privacy, liability, and cybersecurity—and FedCCS members work together to address policy challenges for the community. For example, many citizen science projects involve a Federal agency collecting information directly from the public, a process that is regulated by the Paperwork Reduction Act (PRA).[22] The PRA requires agencies to develop an Information Collection Request (ICR), which requires OMB approval and may require significant effort from multiple agency employees. However, agencies are finding ways to address this requirement while collecting data in a timely fashion. For example, EPA developed a generic ICR that covers all crowdsourcing and citizen science requests within the EPA, shortening the time required to get a citizen science project started. This resource is now available and has been emulated by other members of the FedCCS community. Table 6 demonstrates actions undertaken by Federal agencies within the FedCCS to increase their capacity to effectively use crowdsourcing and citizen science tools.

As described in the Crowdsourcing and Citizen Science Act, unique benefits of crowdsourcing and citizen science projects include "accelerating scientific research, increasing cost effectiveness to maximize the return on taxpayer dollars, addressing societal needs, providing hands-on learning in science, technology, engineering, and math (STEM), and connecting members of the public directly to Federal agency missions and to each other." Crowdsourcing and citizen science expand how government engages with the Nation, moving beyond working only with established entities (e.g., universities, private firms, non-governmental organizations) through contracts and grants to a collaborative approach involving broad public participation. Federal projects that use crowdsourcing and citizen science do not solely benefit the U.S. Government; they also have positive impacts on the citizens who participate in them.

Crowdsourcing and citizen science activities:

- **Enhance scientific research and monitoring:** There are multiple paths by which crowdsourcing and citizen science support scientific research and monitoring. In certain applications, volunteers are able to collect observations over geographic areas and/or time periods that would be impractical or impossible for Federal agencies, given personnel and resource constraints. In addition, volunteers can provide unique perspectives and local expertise for interpreting data.
- **Provide hands-on STEM learning and increase STEM literacy**: Crowdsourcing and citizen science help educate, engage, and empower students, educators, and the broader American public by applying their curiosity and contributing their talents to a wide range of real-world problems. Students have the opportunity to acquire lifelong enthusiasm for science, along with valuable skills in STEM. For students, working on real-world problems can make classroom learning experiences more engaging. For adults, working on crowdsourcing or citizen science projects can help advance their knowledge and skills while contributing to a larger scientific enterprise. A recent study from the National Academies of Sciences, Engineering, and Medicine (NASEM) found that "citizen science

[22] 44 U.S.C. 3501 et seq.

supports learning outcomes related to scientific practices, content, identity, agency, data, and reasoning."[23]

- **Address societal needs:** Crowdsourcing and citizen science can help address societal needs and Federal agency goals, ranging from enhancing the accuracy of prediction markets to tagging and transcribing national archive records. The ability to reach populations that may not previously have been engaged in scientific enterprises allows an influx of new ideas and insights. The study from NASEM also reported that "citizen science can create opportunities for communities, especially communities who have been marginalized, neglected, or even exploited by scientists, to collaborate with scientists and the science community."

**Table 6. Department and Independent Agency Practices to Support Crowdsourcing and Citizen Science.**

| Department and Independent Agency Practice | Agencies Implementing |
|---|---|
| Issuance of department-wide policy or guidance on the use of crowdsourcing and citizen science | FDA, FEMA, NPS, SI, USDA |
| Inclusion of crowdsourcing and citizen science in agency-wide plans | FDA, FEMA, NOAA, SI, USDA |
| Articulated connections of how use of crowdsourcing and citizen science activities supports agency's mission | FDA, FEMA, NIH, USDA |
| Crowdsourcing and citizen science integrally or routinely used in certain agency science products | NOAA, USGS |
| Leverage existing platforms or tools | EPA, FEMA, NASA, NIH, NOAA, NPS, SI, USDA |
| Internal communications tools | CDC, EPA, FDA, FEMA, NASA, NIH, NOAA, NPS, SI, USDA |
| Coordinated external communications or webpage for crowdsourcing and citizen science | CDC, FEMA, NASA, NIH, NOAA, SI, USDA |
| Dedicated full-time crowdsourcing and citizen science coordinator | FDA, USGS |
| Identified crowdsourcing and citizen science point-of-contact (not dedicated full-time to crowdsourcing and citizen science) | CDC, EPA, FEMA, NASA, NIH, NIST, NOAA, NPS, NSF, SI, USDA |
| Distributed network or community of project managers and/or resource people within the agency with expertise in crowdsourcing and citizen science | CDC, EPA, FDA, NASA, NIH, NPS, NSF, SI, USDA, USGS |
| Centralized training and design support for agency staff | CDC, FEMA, USDA |
| Developed or developing generic ICR | EPA, NASA, USDA, USGS |
| Offer grant funding to support implementation of crowdsourcing and citizen science | NASA, NIH, NOAA, NSF, USDA |

[23] *Learning Through Citizen Science: Enhancing Opportunities by Design*; available at https://www.nap.edu/catalog/25183/learning-through-citizen-science-enhancing-opportunities-by-design.

## Highlights and Trends of Crowdsourcing and Citizen Science Activities in FY17 and FY18

The Crowdsourcing and Citizen Science Act encourages Federal agencies to use crowdsourcing and citizen science, where appropriate, to enhance research, education, monitoring, and program operations. This section of the report highlights the crowdsourcing and citizen science activities directly conducted by Federal agencies in FY17 and FY18 under the Crowdsourcing and Citizen Science Act as well as select activities conducted under other authorities.

The Federal Government supports many more crowdsourcing and citizen science activities than what is included here. Because agencies are required only to report activities conducted under the authority of the Crowdsourcing and Citizen Science Act, reported activities conducted under other authorities should be considered representative rather than comprehensive. Further, some agencies, including NSF and NIH, primarily support crowdsourcing and citizen science activities through grants, contracts, cooperative agreements, and other funding mechanisms to non-Federal entities. These federally-funded activities are not included in this report, which focuses only on activities directly carried out or overseen by Federal agencies.

Federal agencies and nongovernmental organizations have mobilized citizen scientists across the Nation to accomplish scientific work across a range of disciplines from monitoring wildlife populations such as American pikas in the Columbia River Gorge (USFS, Box 5) and surveying harmful algal blooms in North American waters (EPA, Box 6) to coordinating with digital volunteer networks to help the emergency management community during disasters (FEMA, Box 7) and collecting daily weather data (NWS, Box 8). These activities are just a small sample of the crowdsourcing and citizen science activities supported by the Federal Government, but they highlight the many ways that citizen scientists and volunteers are actively participating and helping Federal agencies better fulfill their missions and serve all Americans and their communities.

**Box 5. USFS: Monitoring the Status of the Columbia River Gorge Pika Population after the Eagle Creek Fire**

American pikas are charismatic small mammals that are considered important indicators of environmental change because of their extreme sensitivity to long periods of warm weather. The 2017 Eagle Creek Fire burned nearly the entire low-elevation territory of pikas on the Oregon side of the Columbia River Gorge (CRG), prompting widespread public interest in the fate of the CRG pikas, which live at lower elevations than any other pika population in the United States. Following the 2017 Eagle Creek Fire, citizens ranging from hikers and outdoor enthusiasts to K-12 students and teachers have joined the Cascades Pika Watch (CPW), a citizen science initiative supported by the United States Department of Agriculture Forest Service, Oregon Zoo, the Point Defiance Zoo and Aquarium, and several leading pika biologists. Over 1,000 citizen scientists have helped the CPW conduct pika surveys over the past 5 years. Many enthusiastically share pika pictures and stories with the larger volunteer community through the CPW's Facebook group. Citizen scientists who have participated in CPW have indicated that the project promotes a sense of stewardship and responsibility as well as a deepened awareness of the complexity of wildlife management and conservation. The wealth of data collected by citizen scientists helps inform management decisions and contributes to a better understanding of how CRG pikas respond to environmental changes and disturbances such as wildfires.
https://www.oregonzoo.org/cascades-pika-watch
Image: https://www.oregonzoo.org/cascades-pika-watch

In FY17 and FY18, Federal agencies reported 86 active crowdsourcing and citizen science projects. These activities illustrate how volunteers have contributed to a diverse array of projects conducted across the Federal Government, at local to global scales, and engaged participants from elementary school students to senior citizens. In addition, projects are designed with different purposes and contribute to all parts of the scientific process, including defining research questions, conducting experiments, gathering and analyzing data, interpreting results, making new discoveries, developing new technologies and applications, and solving complex problems. Appendix C lists the 18 crowdsourcing and citizen science projects conducted under the Crowdsourcing and Citizen Science Act, and Appendix D lists 68 voluntarily reported projects conducted under other authorities.

Departments and agencies that reported crowdsourcing and citizen science activities in FY17 and FY18 include USFS, NIFA, and ARS in the Department of Agriculture; NOAA in the Department of Commerce; DOE; NIH; FEMA; BOEM, USBR, NPS, and USGS in the Department of Interior; EPA; NASA; and the Smithsonian Institution. Table 7 provides a breakdown of the authorities used in FY17 and FY18 by departments and independent agencies to conduct crowdsourcing and citizen science activities.

**Table 7. List of Federal Departments, Independent Agencies, and Agencies within Departments That Reported Running Crowdsourcing and Citizen Science Projects in FY17 and FY18 Conducted under the Crowdsourcing and Citizen Science Act and Other Authorities.**

| Departments and Independent Agencies | Agencies within Departments | Crowdsourcing and Citizen Science Act | | Other Authorities | |
|---|---|---|---|---|---|
| | | FY17 | FY18 | FY17 | FY18 |
| Department of Agriculture (USDA) | U.S. Forest Service (USFS) | | ✓ | | |
| | National Institute of Food and Agriculture (NIFA) | | ✓ | | |
| | Agricultural Research Service (ARS) | | | ✓ | ✓ |
| Department of Commerce (DOC) | National Oceanic and Atmospheric Administration (NOAA) | | ✓ | ✓ | ✓ |
| Department of Energy (DOE) | | | | ✓ | ✓ |
| Department of Health and Human Services (HHS) | National Institute of Health (NIH) | | | ✓ | ✓ |
| Department of Homeland Security (DHS) | Federal Emergency Management Agency (FEMA) | | ✓ | | |
| Department of Interior (DOI) | Bureau of Ocean Energy Management (BOEM) | | | ✓ | ✓ |
| | U.S. Bureau of Reclamation (USBR) | | | ✓ | ✓ |
| | National Park Service (NPS) | | | ✓ | ✓ |
| | U.S. Geological Survey (USGS) | | ✓ | ✓ | ✓ |
| Environmental Protection Agency (EPA) | | | | ✓ | ✓ |
| National Aeronautics and Space Administration (NASA) | | ✓ | ✓ | ✓ | ✓ |
| Smithsonian Institution (SI) | | | | ✓ | ✓ |

**Box 6. Cyanoscope: EPA Collaborative Partnership on Monitoring Harmful Algal Blooms**

Harmful algal blooms (HABs) occur when colonies of algae grow out of control while producing toxic or harmful effects on people, fish, shellfish, marine mammals, and birds. Algal toxins in water can cause fish kills, beach closures, and unsafe drinking water supplies that endanger human and animal health. HABs are a national concern because they affect not only the health of people and marine ecosystems, but also the health of local and regional economies. The Cyanoscope program aims to monitor and manage harmful algal and cyanobacterial blooms by educating the public on HABs; monitoring and providing surveillance to better understand the dynamics of HABs; and collecting key data to assist in determining trends, hotspots, and other important aspects of HABs. Crowdsourcing and citizen science is the most cost effective way to collect data on HABs. Participants collect cyanobacteria and take microscopic images using equipment provided in a Cyanoscope kit. The images plus location information and fluorometric data are uploaded to the iNaturalist.org website for identification and become part of a public database of algal blooms throughout North America. As HABs can be transitory in nature, having a large collaborative network of individuals over a broad area provides better coverage and monitoring opportunities than a typical research study that is limited in duration and geographic coverage.
https://cyanos.org/

### *Agency Use of Crowdsourcing and Citizen Science Authorities*

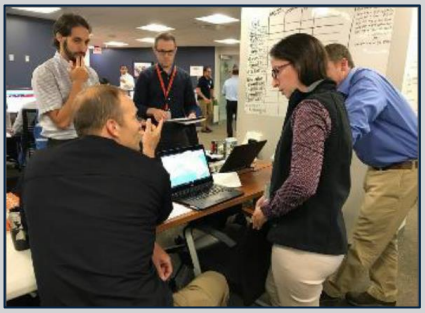
Numerous Federal agencies have a long history of crowdsourcing and citizen science under a variety of authorities prior to the passage of the Crowdsourcing and Citizen Science Act in 2017. In its first year, FY17, only one project sponsored by NASA cited the authority provided by the new act (although NASA continued to support numerous other crowdsourcing and citizen science activities using other authorities). In the following year, FY18, NASA was joined by FEMA, NOAA, NIFA, USFS, and USGS in using the authority of the Crowdsourcing and Citizen Science Act, although many agencies initiated or continued to administer activities developed under other authorities, including BOEM, DOE, EPA, NASA, NIH, NOAA, NPS, SI, USBR, ARS, and USGS in both FY17 and FY18.

### *Participation in Federal Crowdsourcing and Citizen Science Activities*

The number of participants involved in crowdsourcing and citizen science activities in FY17 and FY18 varied widely, depending on the nature of the activity, the desired pool of participants, and outreach mechanisms used, among other factors. The largest number of participants reported in FY17 or FY18 was the over 700,000 virtual players involved in NIH's Applying Protein Databases to Crowdsourcing Structural Protein Design project.

Although crowdsourcing is often associated with online communities, more than half of the activities reported by Federal agencies involved activities tied to a particular place or time. Of the 86 crowdsourced and citizen science activities included in this report, 44 were localized, and although many included a digital component, they required engagement by participants at particular geographic locations. Table 8 and Figure 4 list and map localized activities in the United States. Table 9 lists activities that were geographically distributed—i.e., not restricted to participation at a particular place. These activities were predominantly online, allowing participation from anywhere across the U.S. or the world.

**Box 7. FEMA Crowdsourcing Unit and Playbook for Emergency Management**



One of the primary challenges facing first responders during natural disasters is obtaining timely and accurate information about where help is needed. To promote faster and more efficient responses during disasters, the FEMA Crowdsourcing Unit coordinated with digital volunteers to gather and synthesize critical information from social media and other non-traditional channels provided by citizens impacted by disasters. During recent emergencies, FEMA found that information posted on social media by informal, online networks has proved to be accurate, timely, and useful. As a result, FEMA has invested in a Crowdsourcing Unit and is developing a playbook outlining how to leverage spontaneously emerging crowdsourcing networks to support decision-making and response during disasters at all levels of emergency management. The playbook provides a roadmap on how to efficiently gather and disseminate different types of information needed by different constituencies in a timely manner. During response activities to Hurricanes Maria, Lane, Florence, and Michael, the FEMA Crowdsourcing Unit facilitated a daily coordination call that served as a collaborative forum for participant volunteers to share activities, data collection methodology, and products across the group. FEMA, among others, used these products to assist in cross-validating official information and supporting data-driven decision making.

Overall, localized citizen science activities were carried out by six departments and agencies: DOC, DOI, EPA, HHS, SI, and USDA. Some of the activities lasted as little as 1 day or are episodic, such as those related to earthquake response. In contrast, others are ongoing, multi-year efforts monitoring local habitats, animal populations, and environmental conditions for both people and wildlife. Localized projects took place across the United States, including Puerto Rico, but to some degree, their distribution reflects where Federal agencies have scientists and facilities physically located. For example, the majority of the Smithsonian Institution's numerous local citizen science activities take place near Washington, DC, where the Smithsonian museums are located. The USDA reported over a dozen citizen science efforts throughout the country, but most are associated with National Forests or other federally managed land. Although localized projects led by Federal scientists at a site are effective at directly engaging members of the public, such activities can be limited in the number of people they can include due to constraints on the availability of Federal resources. In contrast, distributed online activities are commonly open to anyone in the world, greatly increasing the number of potential participants, and often allow participants to work largely independently with little or no interaction with the project facilitators.

### *Partnerships with Other Organizations*

Under all authorities in FY17 and FY18, 85% of all crowdsourcing and citizen science activities were conducted in partnership with another organization. Of the 86 crowdsourcing and citizen science activities reported, 71% had at least one non-Federal partner, and 33% had at least one Federal partner. Federal partners included other agencies, interagency working groups, and regional councils. Non-Federal partners included academic institutions, professional societies, State or local governments, tribal associations, non-profit or private sector organizations, regional councils or coalitions, and foundations. Partners provided both monetary and non-monetary contributions to the crowdsourcing and citizen science activities, including subject matter experts, technical reviewers, administrative support, or access to resources such as event space, supplies, data management, or online platforms.

### *The Diversity of Crowdsourcing and Citizen Science Projects*

It is difficult to make generalizations about the nature of Federal crowdsourcing and citizen science activities due to the great variety of approaches used, number of people engaged, and scope of the science addressed. The number of people participating in each activity varied widely, from fewer than 10 to over 700,000. Duration of activities also covered a large range from less than a day to many decades. Nevertheless, a few broad patterns do emerge. First, reported crowdsourcing and citizen science activities are equally divided into projects that focused on localized activities (Table 8) versus those where involvement was geographically distributed and primarily online (Table 9). Many projects had both local and online components—for example, logging direct observations of the timing of the first appearance of different plants in spring in Acadia National Park using an app or logging into a website to analyze aerial photos of particular coastlines—but the primary distinction between localized and distributed projects was whether participation required being at a particular location or region. Both categories of projects can provide opportunities to directly interact with Federal scientists either in person or online; many localized activities are directly led by Federal scientists, giving citizen scientists the opportunity to interact face-to-face. Both localized and distributed projects were represented by 43 activities each, of which Crowdsourcing and Citizen Science Act authority was used for 13 localized projects and 9 distributed projects. In addition, some Federal agencies were more represented in one category or the other. Specifically, USFS and NPS were particularly well represented among localized projects because these are the agencies that manage the National Forests and National Parks where activities take place. In contrast, NASA was particularly well represented in distributed activities with the common thread being the analysis of remote sensing data, work that can be carried out by non-specialists but requires human attention to be done efficiently and effectively (in contrast to automating the process).

**Box 8. National Weather Service Cooperative Observer Program**

Long before the term *citizen science* was coined, the National Weather Service (NWS) relied on engaged citizen volunteers to collect and report basic meteorological and climate data from across the country. The NWS's Cooperative Observer Program (COOP) is a weather and climate observing network of, by, and for the people. More than 8,700 volunteers take observations on farms, in urban and suburban areas, National Parks, seashores, and mountaintops. The data are truly representative of where Americans live, work, and play and feed into the NWS mission of providing weather watch and warning information for protection of life and property. COOP has been in existence for over 125 years, since the first network of cooperative stations was formally codified in the Organic Act of 1890 that established the Weather Bureau, with informal participation at some sites reaching back 200 years. Many of the volunteers are multi-generational observers carrying on a long American tradition of weather observation dating all the way back to George Washington, Thomas Jefferson, and Benjamin Franklin, all of whom maintained weather records. Because of its many decades of relatively stable operation, high station density, and high proportion of rural locations, the COOP Network has been recognized as the most definitive source of information on U.S. climate trends for temperature and precipitation. In addition to NWS, FEMA relies on COOP rainfall and snowfall data as a primary information source for disaster declaration and relief efforts, and USDA risk management models get 80% of their data from COOP for agricultural disaster relief.
https://www.weather.gov/coop/

Although every crowdsourcing and citizen science project had a specific objective, several common themes are evident in the activities included in this report. First, a large number of crowdsourcing and citizen science activities included an educational aim, directly targeting either students or the broader public. In addition, many projects, both localized and distributed, focused on environmental monitoring or environmental stewardship, either by deploying citizen scientists to carry out regular observations in the field (for example, meteorological measurements or animal population observations) or having them process information from the field online (for example, satellite images). Another use of citizen science, particularly by the Smithsonian Institution's Transcription Center, was to enlist the public to digitize old analog records (e.g., field notebooks from scientific expeditions and photograph collections of specimens), increasing their scientific and historical value by making them accessible and searchable.

Overall, crowdsourcing and citizen science is particularly well suited for projects that require human effort but can be carried out with minimal training. Despite advances in computer analysis and artificial intelligence, analysis of much scientific data has not been efficiently or successfully automated. The rise of widespread internet connectivity, however, provides a means for leveraging the efforts of numerous participants as a force multiplier by automatically compiling and collating their contributions, amplifying the usefulness of engaging citizen scientists and volunteers in carrying out various agencies' missions.

**Figure 4. Localized Federal Citizen Science and Crowdsourcing in the U.S.**

Labels correspond to project codes in Appendices C and D (see Table 8 for project titles)

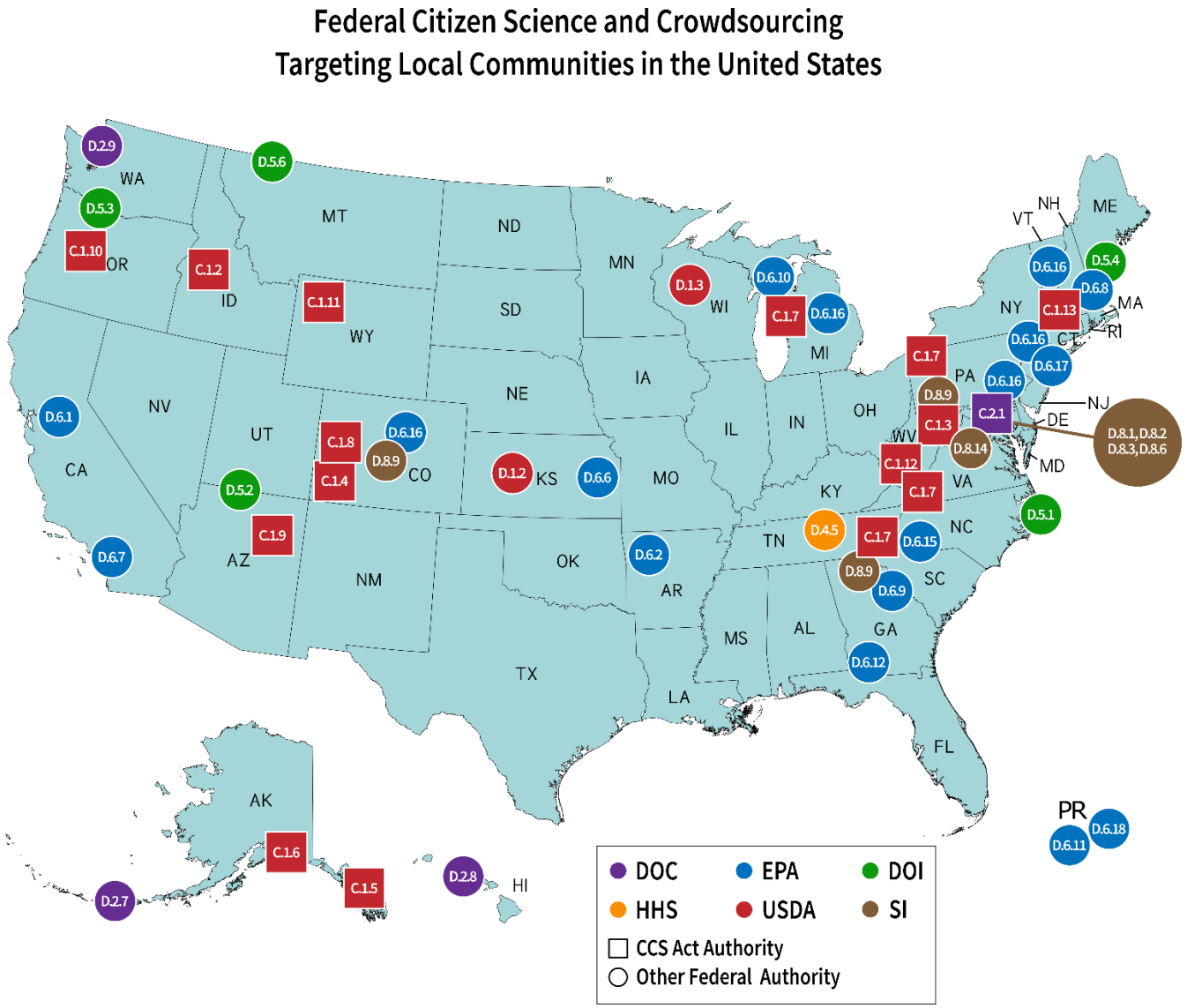


**Table 8. Localized Federal Citizen Science and Crowdsourcing Activities in the U.S.**

## Crowdsourcing and Citizen Science Act (Appendix C)

| Project Code | Agency | Project |
|---|---|---|
| C.1.2 | USDA | Boise Multi-Party Monitoring, Boise, ID |
| C.1.3 | USDA | Científicos en Familia: A Program to Engage Diverse Communities in Citizen Science and Stewardship |
| C.1.4 | USDA | Citizen Science for Rangeland Health: Engaging Ranchers in Science |
| C.1.5 | USDA | Collaborative Investigations at Admiralty Cove |
| C.1.6 | USDA | Culturally Responsive Citizen Science Development with FIA in Interior Alaska |
| C.1.7 | USDA | Engaging Angler Scientists to Help Prioritize and Monitor the Effectiveness of Stream Reconnection Projects |
| C.1.8 | USDA | Engaging Citizen Scientists in Field Research on American Pika, an Indicator Species for Alpine Ecosystem Integrity |
| C.1.9 | USDA | Location of Plants Traditionally Used by American Indian Tribes to Improve Management of Federal Lands on the Four Forest Restoration Initiative |
| C.1.10 | USDA | Monitoring the Status of the Columbia River Gorge (CRG) Pika Population After the Eagle Creek Fire |
| C.1.11 | USDA | Neighbors to Nature: Cache Creek Study |
| C.1.12 | USDA | Potomac Highlands Cooperative Weed and Pest Management Area Non-Native Invasive Species Citizen Science Program |
| C.1.13 | USDA | Tracking the Vernal Window with a Low-Cost Instrumentation Suite |
| C.2.1 | DOC | Urban Heat Island Mapping Campaign |

## Other Agency Authorities (Appendix D)

| Project Code | Agency | Project |
|---|---|---|
| D.1.2 | USDA | Collaborative Adaptive Rangeland Management |
| D.1.3 | USDA | FarmLab |
| D.2.7 | DOC | Steller Watch |
| D.2.8 | DOC | Hawaii Bottomfish Heritage Project: Tracing Traditions and Preserving Culture |
| D.2.9 | DOC | Cooperative Research Provides New Data for ESA-listed Rockfish in Puget Sound, WA |
| D.4.5 | HHS | Community Mapping Project: Engaging Students in Citizen Science for Safe Routes to School |
| D.5.1 | DOI | Battle of the Atlantic Expedition |
| D.5.2 | DOI | Aquatic Insect Monitoring in Grand Canyon |
| D.5.3 | DOI | Archaeology Citizen Science at Fort Vancouver |
| D.5.4 | DOI | Biodiversity Discovery and Phenology in Acadia National Park |
| D.5.6 | DOI | Glacier National Park Common Loon Citizen Science |
| D.6.1 | EPA | Building Capacity to Measure Air Pollution Mitigation Strategies at Schools |
| D.6.2 | EPA | Crowdsourcing to Monitor Private Wells and Assess Contaminant Sources |
| D.6.6 | EPA | Kansas City Transportation and Local Scale Air Quality Study (KC TRAQS) |
| D.6.7 | EPA | Marine/Water Contact Sanitary Survey Workshops in California |
| D.6.8 | EPA | Measuring Coastal Acidification in New England Estuaries |
| D.6.9 | EPA | Micro CSI-Urban Edition: A Microbial Citizen Science Initiative in Urban Watersheds |
| D.6.10 | EPA | Using Citizen Science to Analyze Underwater Videos in the Great Lakes |
| D.6.11 | EPA | Using Citizen Science to Improve Drinking Water Epidemiology Studies in Puerto Rico |
| D.6.12 | EPA | Low Cost Sensors for Real-time Continuous Water Quality Monitoring in Georgia |
| D.6.15 | EPA | Community-led Air Sensor Evaluation in North Carolina |
| D.6.16 | EPA | Regional Sensor Loan Program |
| D.6.17 | EPA | Ironbound Neighborhood Air Monitoring |
| D.6.18 | EPA | The Efficacy of Citizen Science Air Monitoring for Building Public Awareness of Exposures in a US Caribbean Urban Neighborhood Impacted by Heavy Industrial Contamination |
| D.8.1 | SI | City Nature Challenge DC 2018 |
| D.8.2 | SI | Chesapeake Bay Parasite Project |
| D.8.3 | SI | Environmental Archaeology at the Smithsonian Environmental Research Center |
| D.8.6 | SI | Global Change Research Wetland Plant Census |
| D.8.9 | SI | Neighbor Nestwatch |
| D.8.14 | SI | Virginia Working Landscapes: Grasslands Biodiversity Survey |

**Table 9. Distributed Federal Citizen Science and Crowdsourcing Activities**

## Crowdsourcing and Citizen Science Act (Appendix C)

| Project Code | Agency | Project |
|---|---|---|
| C.1.1 | USDA | 4-H Guide for NASA GLOBE Observer Clouds |
| C.3.1 | DHS | FEMA Crowdsourcing Unit and Playbook for Emergency Management |
| C.4.1 | DOI | Project eTrout |
| C.5.1 | NASA | Backyard Worlds: Planet 9 |
| C.5.2 | NASA | Landslide Reporter |
| D.7.3 | NASA | Aurorasaurus |
| D.7.4 | NASA | Disk Detective |
| D.7.5 | NASA | Globe Observer |
| D.7.6 | NASA | Image Detective |

## Other Agency Authorities (Appendix D)

| Project Code | Agency | Project |
|---|---|---|
| D.1.1 | USDA | Invasive Mosquito Project |
| D.2.1 | DOC | Cyclone Center |
| D.2.2 | DOC | Meteorological Phenomena Identification Near the Ground |
| D.2.3 | DOC | Old Weather |
| D.2.4 | DOC | Community Collaborative Rain, Hail and Snow (CoCoRaHS) network |
| D.2.5 | DOC | CrowdMag |
| D.2.6 | DOC | Crowdsourced Bathymetry |
| D.2.10 | DOC | NWS Cooperative Observer Program |
| D.3.1 | DOE | The Open PV Project |
| D.4.1 | HHS | Crowdsourcing Optimal Cancer Treatment Strategies that Maximize Efficacy and Minimize Toxicity |
| D.4.2 | HHS | Applying Protein Databases to Crowdsourcing Structural Protein Design |
| D.4.3 | HHS | OMics Compendia Commons |
| D.4.4 | HHS | NIDCR 2030: Envisioning the Future, Together |
| D.4.6 | HHS | NNLM Wikipedia Edit-a-thon |
| D.5.5 | DOI | Dragonfly Mercury Project: Engaging Citizens with Resource Conservation |
| D.5.7 | DOI | Did You Feel It? (DYFI) |
| D.5.8 | DOI | iCoast - Did the Coast Change? |
| D.5.9 | DOI | Nature's Notebook |
| D.5.10 | DOI | The National Map Corps (TNMCorps) |
| D.6.3 | EPA | Cyanoscope: EPA collaborative partnership on monitoring harmful algal blooms |
| D.6.4 | EPA | EPA/US Coast Guard Auxiliary Partnership for HAB monitoring |
| D.6.5 | EPA | HiveScience: A Citizen Science Project for Beekeepers |
| D.6.13 | EPA | Smoke Sense |
| D.6.14 | EPA | Air Sensor Toolbox |
| D.7.1 | NASA | Globe Program |
| D.7.2 | NASA | Students' Cloud Observations on-Line (S'cool) |
| D.8.4 | SI | eMammal |
| D.8.5 | SI | Fossil Atmospheres |
| D.8.7 | SI | Invader ID |
| D.8.8 | SI | Leafsnap |
| D.8.10 | SI | Smithsonian Transcription Center |
| D.8.11 | SI | Smithsonian Transcription Center - Biodiversity Collection Records and Specimen Labels |
| D.8.12 | SI | Smithsonian Transcription Center - Project PHaEDRA: Preserving Harvard's Early Data and Research in Astronomy |
| D.8.13 | SI | Smithsonian Transcription Center - Transcription of Science-related Archival Documents |

## Summary

The America COMPETES Act of 2010 and the Crowdsourcing and Citizen Science Act of 2017 are encouraging open innovation, generating new Federal partnerships with the private sector, creating educational opportunities for young and old alike, and bringing new and diverse perspectives to bear on a variety of societal issues.

Federal prize competitions reported in FY17 and FY18 under the COMPETES Act and other authorities demonstrate a continuing upward trend in engagement between Federal and non-government entities to address societal needs and improve return on taxpayer dollars. These initiatives are engaging solvers and innovators in the development of new technologies and tackling problems that impact lives domestically and abroad.

The results presented in this report show that agencies are leveraging the prize authority to accomplish a wider variety of goals than in previous years, ranging from developing technology to educating the public to stimulating markets. In addition, FY17 and FY18 saw an increase in solutions particularly focused on information technology ranging from creating software and mobile apps to advancing the development of hardware to the analysis and visualization of data. These trends—wider and more creative use of prize competitions and solutions focused on information technology—are expected to continue in the near future. Overall, the number and diversity of prize competitions indicate that they are having the positive effect intended by Congress when it passed the COMPETES Act in 2010.

Although Federal agencies had been active in the crowdsourcing and citizen science arena before its enactment, the Crowdsourcing and Citizen Science Act gave them a new authority to directly tap the creativity, innovation, and curiosity of the American public. Crowdsourcing and citizen science is being used to develop and expand research efforts, support education initiatives, and address societal needs.

This report is the first effort to collate the Federal Government's diverse engagement in crowdsourcing and citizen science since the Crowdsourcing and Citizen Science Act was enacted in 2017. Agencies have customized their crowdsourcing and citizen science efforts in terms of duration and scope to help accomplish their missions, including leveraging short-term field campaigns, multi-year monitoring efforts, and global online networks. Through localized crowdsourcing and citizen science programs, thousands of Americans across the country and its territories directly engage with Federal scientists to conduct research and improve the quality of life in their own neighborhoods and communities. Distributed online programs, which have no physical boundaries to participation, expand the impact of crowdsourcing and citizen science to allow millions more to participate. Unlike prize competitions, the Crowdsourcing and Citizen Science Act has not been in place long enough to analyze trends in how these activities have been used over time, but they are proving particularly beneficial in applications that cannot be easily automated but instead require human intelligence and understanding to efficiently and correctly sort and analyze complex observations. The snapshot of current crowdsourcing and citizen science programs captured by this report will provide a baseline to track how the number and variety of projects changes over time to help identify best practices and ensure that they have the greatest positive impact on the American people.

## Summary of Prize Competitions Active in Fiscal Years 2017 and 2018 Conducted Under COMPETES Authority

| Agency | Name | Solution Type(s) | Primary Goal(s) | Date Open | Date Complete | Entry #s | Prize #s | Total Prize Purse |
|---|---|---|---|---|---|---|---|---|
| USDA | National School Lunch and School Breakfast 2017 Verification Response Rate Challenge | Creative; Ideas | Improve service delivery; Highlight ideas; Solve specific problem; Engagement | 5/4/2017 | 6/15/2017 | 36 | 7 | $0 |
| | 2017 Innovations in Food and Agricultural Science and Technology (I-FAST) Prize Competition | Software; Ideas; Hardware | Advance science; Develop technology; Engagement; Stimulate market | 9/15/2017 | 10/6/2017 | 4 | 3 | $400,000 |
| DOC | 2017 RAMP: Reusable Abstractions of Manufacturing Processes | Software; Analytics; Other | Improve service delivery; Highlight ideas; Advance science; Engagement; Stimulate market | 12/19/2016 | 4/17/2017 | 14 | 8 | $3,250 |
| | 2018 RAMP: Reusable Abstractions of Manufacturing Processes | Software; Analytics; Other | Improve service delivery; Highlight ideas; Advance science; Engagement; Stimulate market | 1/29/2018 | 4/21/2018 | 9 | 6 | $3,250 |
| | Agile Robotics for Industrial Automation Competition (ARIAC) | Ideas; Analytics; Scientific | Highlight ideas; Solve specific problem; Advance science; Develop technology | 1/26/2018 | 5/17/2018 | 50 | 3 | $17,500 |
| | Federal Impact Assessment Challenge | Ideas; Analytics; Economic impact assessment | Improve service delivery; Highlight ideas; Educate public; Engagement | 9/27/2016 | 5/31/2017 | 1 | 0 | $20,000 |
| | NIST the Future of Public Safety Technology 100K Video Series Challenge | Creative; Ideas | Educate public; Engagement | 8/24/2017 | 12/22/2017 | 107 | 6 | $100,000 |

| Agency | Name | Solution Type(s) | Primary Goal(s) | Date Open | Date Complete | Entry #s | Prize #s | Total Prize Purse |
|---|---|---|---|---|---|---|---|---|
| DOC | NIST Virtual Public Safety Test Environment Challenge | Ideas; Hardware | Highlight ideas; Advance science; Develop technology; Engagement; Stimulate market | 3/28/2017 | 5/3/2017 | 21 | 5 | $50,000 |
| | PerfLoc: Performance Evaluation of Smartphone Indoor Localization Apps | Software; Analytics; Scientific | Highlight ideas; Solve specific problem; Advance science; Develop technology | 3/22/2017 | 1/17/2018 | 16 | 1 | $35,000 |
| | The Unlinkable Data Challenge: Advancing Methods in Differential Privacy | Software; Ideas; Analytics; Concept papers | Highlight ideas; Solve specific problem; Advance science; Engagement; Stimulate market | 5/1/2018 | 5/6/2019 | 11 | 5 | $190,000 |
| | The Unmanned Aerial Systems Flight and Payload Challenge | Ideas; Hardware | Solve specific problem; Advance science; Develop technology; Stimulate market | 1/8/2018 | 1/29/2018 | 30 | 11 | $432,000 |
| | Virtual Reality Heads-Up Display Navigation Challenge | Creative; Hardware | Highlight ideas; Advance science; Engagement; Stimulate market | 1/2/2018 | 1/29/2018 | 18 | 6 | $125,000 |
| DOE | Cleantech University Prize (Cleantech UP) | Business plans | Highlight ideas; Develop technology; Engagement | 9/1/2017 | 3/1/2018 | 250 | 13 | $570,000 |
| | Solar in your Community Challenge | Ideas; Business plans | Highlight ideas; Educate public; Engagement; Build capacity; Stimulate market | 11/18/2016 | 3/17/2017 | 201 | 35 | $3,000,000 |
| | The American-Made Solar Prize | Software; Ideas; Hardware; Business plans; Scientific | Highlight ideas; Develop technology; Engagement; Build capacity; Stimulate market | 6/7/2018 | 10/5/2018 | N/A | N/A | $3,000,000 |

| Agency | Name | Solution Type(s) | Primary Goal(s) | Date Open | Date Complete | Entry #s | Prize #s | Total Prize Purse |
|---|---|---|---|---|---|---|---|---|
| DOE | American Inventions Made Onshore (AIM Onshore) | Software; Creative; Ideas; Business plans; Scientific | Improve government service delivery; Find and highlight innovative ideas; Solve a specific problem; Develop technology; Inform and educate the public; Engage new people and communities; Build capacity; Stimulate a market | 2/6/2018 | N/A | 20 | 4 | $950,000 |
| DOI | Saving the ʻŌhiʻa – Hawaiʻi's Sacred Tree | Ideas; Hardware; Scientific | Highlight ideas; Solve specific problem; Advance science; Develop technology; Educate public; Engagement; Build capacity; Stimulate market | 8/28/2018 | 4/1/2019 | N/A | 1 | $70,000 |
| | Arsenic Sensor – Stage 1 | Ideas | Highlight ideas; Solve specific problem; Advance science; Engagement | 12/13/2016 | 3/13/2017 | 39 | 5 | $50,000 |
| | Colorado River Basin Data Visualization | Analytics | Improve service delivery; Solve specific problem; Advance science; Develop technology; Educate public; Engagement | 9/7/2017 | 11/17/2017 | 24 | 9 | $60,000 |
| | DataApp: A Mobile App Framework for Field Data Capture | Ideas | Solve specific problem; Advance science; Develop technology; Engagement | 5/23/2017 | 7/6/2017 | 24 | 7 | $30,000 |
| | Detecting Leaks and Flaws in Water Pipelines - Stage 1 | Ideas | Solve specific problem; Advance science; Develop technology; Engagement; | 3/8/2018 | 5/8/2018 | 54 | 5 | $75,000 |

| Agency | Name | Solution Type(s) | Primary Goal(s) | Date Open | Date Complete | Entry #s | Prize #s | Total Prize Purse |
|---|---|---|---|---|---|---|---|---|
| DOI | Detecting the Movement of Soils (Internal Erosion) Within Earthen Dams, Canals, Levees and their Foundations | Ideas | Solve specific problem; Advance science; Develop technology; Engagement; | 3/31/2016 | 5/10/2016 | 29 | 5 | $20,000 |
| | Downstream Fish Passage at Tall Dams | Ideas | Solve specific problem; Advance science; Develop technology; Engagement | 3/31/2016 | 5/10/2016 | 44 | 4 | $20,000 |
| | Eradication of Invasive Mussels in Open Water - Stage 1 | Ideas; Hardware; Scientific | Solve specific problem; Advance science; Develop technology; Engagement | 12/14/2017 | 2/28/2018 | 67 | 3 | $100,000 |
| | Indirect Estimates of Reservoir Water Storage | Hardware | Solve specific problem; Advance science; Develop technology; Engagement | 2/22/2017 | 5/22/2017 | 20 | 1 | $75,000 |
| | Long-Term Corrosion Protection of Existing Hydraulic Steel Structures – Stage 1 | Ideas | Solve specific problem; Advance science; Develop technology; Engagement | 6/13/2017 | 9/5/2017 | 30 | 5 | $75,000 |
| | More Water, Less Concentrate - Stage 1 | Ideas | Highlight ideas; Solve specific problem; Advance science; Develop technology | 12/13/2016 | 3/13/2017 | 66 | 8 | $150,000 |
| | Pathogen Monitoring - Stage 1 | Ideas | Highlight ideas; Solve specific problem; Advance science; Engagement | 5/10/2018 | 8/8/2018 | N/A | N/A | $40,000 |
| | Powering Electronic Instruments on a Rotating Shaft - Stage 1 | Ideas; Hardware; Scientific | Solve specific problem; Advance science; Develop technology; Engagement; Stimulate market | 9/6/2018 | 12/6/2018 | N/A | N/A | $250,000 |
| | Preventing Rodent Burrows in Earthen Embankments | Ideas | Solve specific problem; Advance science; Develop technology; Engagement | 8/29/2016 | 10/11/2016 | 75 | 5 | $20,000 |

| Agency | Name | Solution Type(s) | Primary Goal(s) | Date Open | Date Complete | Entry #s | Prize #s | Total Prize Purse |
|---|---|---|---|---|---|---|---|---|
| DOI | Sub-Seasonal Climate Forecast Rodeo | Analytics | Solve specific problem; Advance science; Develop technology; Engagement | 12/20/2016 | 5/3/2018 | N/A | N/A | $800,000 |
| HHS | AHRQ Step Up App Challenge: Advancing Care Through Patient Assessments | Software | Highlight ideas; Solve specific problem; Advance science; Develop technology; Engagement; Stimulate market | 8/13/2018 | 9/9/2019 | N/A | N/A | $250,000 |
| | 2017 Million Hearts® Hypertension Control Challenge | Ideas | Highlight ideas | N/A | N/A | 98 | 24 | $0 |
| | 2018 Million Hearts® Hypertension Control Challenge | Ideas | Highlight ideas | N/A | N/A | 23 | N/A | $0 |
| | The Healthy Behavior Data Challenge | Software; Ideas | Highlight ideas; Solve specific problem | 4/29/2017 | 1/31/2018 | 9 | 7 | $100,000 |
| | 2016 FDA Naloxone App Competition | Software | Highlight ideas; Engagement | N/A | N/A | N/A | N/A | $40,000 |
| | Bridging the Word Gap Challenge | Software; Creative; Ideas; Hardware | Highlight ideas; Solve specific problem; Develop technology; Educate public; Engagement; Stimulate market | 11/9/2015 | 3/26/2017 | 80 | 16 | $300,000 |
| | Addressing Opioid Use Disorder in Pregnant Women and New Moms | Software; Creative; Ideas; Hardware | Highlight ideas; Solve specific problem; Advance science; Develop technology; Educate public; Engagement; Stimulate market | 9/19/2018 | N/A | 79 | N/A | $375,000 |

| Agency | Name | Solution Type(s) | Primary Goal(s) | Date Open | Date Complete | Entry #s | Prize #s | Total Prize Purse |
|---|---|---|---|---|---|---|---|---|
| HHS | Care Coordination for Children with Special Health Care Needs (CSHCN) | Software; Hardware; Analytics | Highlight ideas; Solve specific problem; Develop technology; Engagement; Stimulate market; Improve health care delivery and experiences of health care | 8/30/2018 | N/A | 60 | N/A | $375,000 |
| | Remote Pregnancy Monitoring | Software; Creative; Ideas; Hardware | Highlight ideas; Solve specific problem; Advance science; Develop technology; Engagement; Stimulate market | 9/1/2018 | N/A | 76 | N/A | $375,000 |
| | Using Technology to Prevent Childhood Obesity in Low-Income Families and Communities | Software; Creative; Ideas; Hardware; Analytics; Other | Highlight ideas; Solve specific problem; Develop technology; Educate public; Engagement; Build capacity; Stimulate market; Improve health care delivery and experiences of health care | 7/24/2018 | N/A | 76 | N/A | $375,000 |
| | Rare Diseases are not Rare! Challenge | Software; Creative; Ideas | Highlight ideas; Advance science; Educate public; Engagement | 9/30/2018 | 10/31/2018 | N/A | N/A | $5,000 |
| | NEI 3-D Retina Organoid Challenge (3-D ROC) | Ideas; Scientific | Highlight ideas; Solve specific problem; Develop technology; Engagement | 6/1/2017 | 8/1/2017 | 13 | 1 | $100,000 |
| | NEI 3-D Retina Organoid Challenge (3-D ROC) 2020 | Scientific | Solve specific problem; Advance science; Develop technology; Engagement; Stimulate market | 9/4/2018 | 3/2/2020 | N/A | N/A | $1,000,000 |

| Agency | Name | Solution Type(s) | Primary Goal(s) | Date Open | Date Complete | Entry #s | Prize #s | Total Prize Purse |
|---|---|---|---|---|---|---|---|---|
| HHS | Improving Care for People with Alzheimer's Disease and Related Dementias using Technology (iCare-AD/ADRD) Challenge | Software | Develop technology | 9/1/2018 | 6/1/2019 | N/A | N/A | $400,000 |
| | Open Science Prize | Software; Ideas; Hardware; Analytics; Scientific | Highlight ideas; Advance science; Develop technology; Educate public; Engagement; Build capacity; Stimulate market | 10/20/2015 | 12/1/2017 | 96 | 7 | $710,000 |
| | Storytelling About Wellness in Tribal Communities | Creative | Educate public; Engagement | 11/28/2016 | 1/31/2017 | 32 | 5 | $10,000 |
| | A Wearable Alcohol Biosensor: A Second Challenge | Software; Hardware; Analytics | Solve specific problem; Advance science; Develop technology; Stimulate market | 12/10/2016 | 5/15/2017 | 5 | 1 | $300,000 |
| | Design by Biomedical Undergraduate Teams (DEBUT) | Creative; Hardware | Highlight ideas; Develop technology; Engagement; Build capacity; Educate Biomedical Engineering Students | N/A | 5/31/2017; 5/31/2018 | 77 | 10 | $130,000 |
| | The 2017 "$100,000 for Start a SUD Startup" Challenge | Ideas; Business plans; Scientific | Highlight ideas; Educate public; Engagement; Build capacity; | 6/9/2017 | 12/22/2017 | 18 | 10 | $100,000 |
| | Follow that Cell | Scientific | Highlight ideas; Solve specific problem; Advance science; Develop technology | 3/17/2015 | 3/30/2017 | 10 | 2 | $400,000 |

| Agency | Name | Solution Type(s) | Primary Goal(s) | Date Open | Date Complete | Entry #s | Prize #s | Total Prize Purse |
|---|---|---|---|---|---|---|---|---|
| HHS | Antimicrobial Resistance, Rapid, Point-of-Need Diagnostic Test Challenge | Hardware; Scientific | Solve specific problem; Advance science; Develop technology; Engagement; Stimulate market | 9/8/2016 | 1/3/2020 | 74 | 10 | $20,000,000 |
| | The Simple Extensible Sampling Tool Challenge | Software | Solve specific problem; Educate public | 9/29/2016 | 5/15/2017 | 8 | 1 | $40,000 |
| | Blockchain in Healthcare Code-a-Thon | Software; Creative; Hardware | Develop technology; Educate public; Engagement; Stimulate market | 1/23/2017 | 3/7/2017 | 83 | 10 | $15,000 |
| | CHPL Data Challenge | Software; Creative | Highlight ideas; Solve specific problem; Develop technology; Educate public | 7/10/2018 | 10/31/2018 | N/A | N/A | $40,000 |
| | Consumer Health Data Aggregator Challenge | Software; Analytics | Highlight ideas; Solve specific problem; Educate public; Engagement; Build capacity; Stimulate market | 3/1/2016 | 11/7/2016 | 25 | 6 | $175,000 |
| | Easy EHR Issues Reporting Challenge | Software; Analytics | Solve specific problem; Develop technology | 5/22/2018 | 10/15/2018 | N/A | N/A | $80,000 |
| | Move Health Data Forward Challenge | Software; Hardware; Business plans | Highlight ideas; Solve specific problem; Develop technology | 5/10/2016 | 9/8/2016 | 31 | 17 | $250,000 |
| | Oh, the Places Data Goes: Health Data Provenance Challenge | Ideas; Hardware | Highlight ideas; Solve specific problem; Develop technology; Stimulate market | 4/6/2017 | 1/22/2018 | 19 | 6 | $180,000 |
| | Patient Matching Algorithm Challenge | Analytics; Scientific | Advance science; Educate public; Engagement; Stimulate market | 6/12/2017 | 10/12/2017 | 7000 | 6 | $75,000 |

| Agency | Name | Solution Type(s) | Primary Goal(s) | Date Open | Date Complete | Entry #s | Prize #s | Total Prize Purse |
|---|---|---|---|---|---|---|---|---|
| HHS | Privacy Policy Snapshot Challenge | Software; Analytics | Improve service delivery; Solve specific problem; Educate public | 12/13/2016 | 4/10/2017 | 6 | 3 | $35,000 |
| | Provider User Experience Challenge | Software; Analytics | Improve service delivery; Highlight ideas; Solve specific problem; Educate public; Engagement; Build capacity; Stimulate market | 3/1/2016 | 11/7/2016 | 34 | 6 | $175,000 |
| | Proving the Potential: A Health Data and Standards Code-a-Thon | Software; Creative; Hardware | Develop technology; Educate public; Engagement; Stimulate market | 4/11/2017 | 4/21/2017 | N/A | 3 | $15,000 |
| | Secure API Server Showdown Challenge | Software; Ideas; Hardware | Solve specific problem; Develop technology; Educate public; Engagement; Stimulate market | 10/10/2017 | 1/15/2018 | 2 | 2 | $50,000 |
| | HHS Opioid Code-a-Thon | Software; Hardware | Highlight ideas; Engagement | 12/7/2017 | 12/7/2017 | 50 | 3 | $30,000 |
| DHS | Hidden Signals Challenge-"Can you Identify Biothreats in Real-Time?" | Hardware; Analytics | Improve service delivery; Highlight ideas; Solve specific problem; Engagement | 10/17/2017 | 4/13/2018 | 37 | 7 | $300,000 |
| | Passenger Screening Algorithm Challenge | Software; Analytics | Improve service delivery; Highlight ideas; Solve specific problem; Advance science; Develop technology; Engagement | 6/22/2017 | 12/15/2017 | 9,339 | 8 | $1,500,000 |

| Agency | Name | Solution Type(s) | Primary Goal(s) | Date Open | Date Complete | Entry #s | Prize #s | Total Prize Purse |
|---|---|---|---|---|---|---|---|---|
| State | AIT FY18 Fishackathon | Software; Creative; Ideas; Hardware; Analytics | Highlight ideas; Solve specific problem; Advance science; Develop technology; Educate public; Engagement; Build capacity | N/A | N/A | N/A | N/A | $10,000 |
| | FY17 and FY18 NASA Hackathon | Software; Creative; Ideas; Hardware; Analytics | Highlight ideas; Solve specific problem; Advance science; Develop technology; Educate public; Engagement; Build capacity | N/A | N/A | N/A | N/A | $23,350 |
| | Boldline P3 Accelerator – Cohort 1 | Ideas; Other | Improve service delivery; Highlight ideas; Develop technology; Educate public; Engagement; Build capacity; Build public-private partnerships | 11/1/2017 | 11/21/2017 | 52 | 9 | N/A |
| | Boldline P3 Accelerator for Religious Freedom (RF) – Cohort 2 | Ideas; Other | Improve service delivery; Highlight ideas; Develop technology; Educate public; Engagement; Build capacity; Build public-private partnerships | 6/22/2018 | 8/23/2018 | 31 | 6 | N/A |
| | DOS Fishackathon | Software; Ideas | Highlight ideas; Solve specific problem; Develop technology; Educate public; Engagement; | 2/10/2018 | 2/11/2018 | 3,500 | 1 | $200,000 |
| | Competition for the President's Day | Ideas | Educate public; Engagement | N/A | N/A | N/A | 10 | $100 |
| | 3-2-1 GO! | Analytics | Educate public | N/A | N/A | N/A | N/A | N/A |

| Agency | Name | Solution Type(s) | Primary Goal(s) | Date Open | Date Complete | Entry #s | Prize #s | Total Prize Purse |
|---|---|---|---|---|---|---|---|---|
| State | E-Farmer Support App | Software; Other | Solve specific problem; Develop technology; Build capacity; Stimulate market | N/A | N/A | N/A | N/A | $100,000 |
| | Centennial Logo Competition | Creative; Ideas | Improve service delivery; Highlight ideas; Solve specific problem; Educate public; Engagement | 2/13/2018 | 3/4/2018 | 34 | 1 | $912.74 |
| DOT | Solving for Safety Visualization Challenge | Hardware; Analytics | Highlight ideas; Solve specific problem; Develop technology; Educate public; Engagement | 6/14/2018 | N/A | 54 | N/A | $350,000 |
| EPA | Advanced Septic System Nitrogen Sensor Challenge | Ideas; Hardware; Analytics; Scientific | Highlight ideas; Solve specific problem; Advance science; Develop technology; Stimulate market | 1/17/2017 | 2/21/2020 | 18 | 6 | $55,000 |
| | Campus RainWorks Challenge | Creative; Ideas; Hardware; Scientific | Solve specific problem; Advance science; Develop technology; Educate public; Engagement | 1/30/2018 | 12/14/2018 | N/A | 4 | $16,000 |
| | Nutrient Sensor Action Challenge - Stage I | Creative; Ideas; Hardware; Analytics; Scientific | Highlight ideas; Solve specific problem; Advance science; Develop technology; Engagement; Stimulate market | 7/26/2017 | 9/20/2017 | 29 | 5 | $50,000 |
| | Nutrient Sensor Action Challenge - Stage II | Creative; Ideas; Hardware; Business plans; Analytics; Scientific | Highlight ideas; Solve specific problem; Advance science; Develop technology; Engagement; Stimulate market | 3/1/2018 | 1/31/2019 | 7 | 2 | $100,000 |

| Agency | Name | Solution Type(s) | Primary Goal(s) | Date Open | Date Complete | Entry #s | Prize #s | Total Prize Purse |
|---|---|---|---|---|---|---|---|---|
| FTC | IoT Home Inspector Challenge | Software; Creative; Ideas | Highlight ideas; Solve specific problem; Educate public; Stimulate market | 3/1/2017 | 5/22/2017 | N/A | 2 | $34,000 |
| GSA | Student Design Competition: New San Francisco Federal Building Plaza | Creative; Ideas | Improve service delivery; Highlight ideas; Solve specific problem; Educate public; Engagement | 10/18/2017 | 6/14/2018 | 63 | 3 | $1,750 |
| NASA | Earth & Space Air Prize | Hardware | Solve specific problem; Develop technology | 9/9/2017 | 1/31/2018 | 20 | 3 | $250,000 |
| NSF | 2017-2018 Community College Innovation Challenge | Software; Ideas; Hardware; Business plans; Scientific | Highlight ideas; Advance science; Educate public; Engagement; Build capacity | 10/18/2017 | 2/14/2018 | 41 | 10 | $81,700 |
| | Engineering Research Centers (ERC)-Wide Perfect Pitch Competition | Creative | Engagement; Build capacity | 8/16/2017 | 9/29/2017 | 15 | 3 | $8,000 |
| | Generation Nano: Superheroes Inspired by Science | Creative | Educate public; Engagement | 9/18/2017 | 1/10/2018 | 388 | 9 | $14,880 |
| | NSF Wireless Innovation for a Networked Society (WINS) | Software; Hardware; Business plans | Highlight ideas; Solve specific problem; Develop technology; Educate public; Engagement | 6/1/2017 | 11/15/2018 | 20 | 8 | $2,000,000 |
| | NSF-Hearables Challenge | Software; Analytics | Highlight ideas; Solve specific problem; Develop technology; Educate public; Engagement; Build capacity; Stimulate market | 4/25/2017 | 6/30/2017 | 7 | 4 | $145,000 |

| Agency | Name | Solution Type(s) | Primary Goal(s) | Date Open | Date Complete | Entry #s | Prize #s | Total Prize Purse |
|---|---|---|---|---|---|---|---|---|
| SBA | InnovateHER 2017 Challenge | Creative; Ideas; Business plans | Highlight ideas; Solve specific problem; Engagement; Build capacity | 12/29/2016 | 6/23/2017 | N/A | 3 | $70,000 |
| | Growth Accelerator Fund Competition | Other | Engagement; Build capacity; Stimulate market | 6/23/2017 | 7/21/2017 | 63 | 20 | $1,000,000 |
| | #SmallBusinessWeek Hackathon | Software | Improve service delivery; Highlight ideas; Solve specific problem; Develop technology; Educate public | 4/27/2018 | 4/27/2018 | 75 | 4 | $24,000 |
| USAID | Sign on For Literacy Prize | Software; Hardware | Highlight ideas; Solve specific problem; Develop technology; Engagement | 11/8/2017 | 2/16/2018 | 104 | 5 | $500,000 |

## Summary of Prize Competitions Active in Fiscal Years 2017 and 2018 Conducted Under Authority Other than COMPETES

| Agency | Name | Solution Type(s) | Primary Goal(s) | Date Open | Date Complete | Entry #s | Prize #s | Total Prize Purse | Authority |
|---|---|---|---|---|---|---|---|---|---|
| DOD | DARPA Spectrum Collaboration Challenge (SC2) | Software; Hardware; Scientific | Highlight ideas; Solve specific problem; Advance science; Develop technology; Engagement; Stimulate market | 7/19/2016 | 1/11/2019 | 152 | 23 | $18,750,000 | 10 USC 2374a |
| | CubeSat Challenge | Creative; Ideas; Scientific | Highlight ideas; Advance science | 8/15/2017 | 10/18/2017 | 35 | 7 | $35,000 | 10 USC 2374a |
| | Technology Challenges and Opportunities to SOF in 2027 | Ideas | Highlight ideas | 7/21/2017 | 8/10/2017 | 108 | 18 | $25,000 | 10 USC 2374a |
| | Urban 3D Challenge | Software; Analytics | Highlight ideas; Solve specific problem; Develop technology | 10/9/2017 | 12/4/2017 | 790 | 8 | $34,500 | 10 USC 2374a |
| HHS | Domestic Violence Awareness Month YouTube Challenge | Ideas | Highlight ideas; Solve specific problem; Educate public; Engagement; Build capacity | 10/12/2016 | 11/2/2016 | 26 | 3 | $10,000 | 15 U.S.C. § 3719 and 42 U.S.C. § 10401(a)(1) |
| | Challenges in Computational Precision Medicine (CPM) 2018 | Software; Ideas; Analytics; Scientific | Highlight ideas; Solve specific problem; Advance science; Develop technology; Educate public; Engagement | 6/12/2018 | 8/16/2018 | 819 | 12 | $0 | HHS-NCI statutory authority |

| Agency | Name | Solution Type(s) | Primary Goal(s) | Date Open | Date Complete | Entry #s | Prize #s | Total Prize Purse | Authority |
|---|---|---|---|---|---|---|---|---|---|
| HHS | ICGC-TCGA DREAM Somatic Mutation Calling - RNAChallenge (SMC-RNA) | Software; Scientific | Solve specific problem; Advance science; Develop technology; Engagement | 6/29/2016 | 5/12/2017 | 11 | N/A | $0 | HHS-NCI statutory authority |
| | NCI-CPTAC DREAM Proteogenomics Challenge | Software; Analytics; Scientific | Solve specific problem; Advance science; Engagement; Stimulate market | 6/26/2017 | 11/20/2017 | 504 | 3 | $25,000 | HHS-NCI statutory authority |
| | PROSTATEx Challenge | Software; Ideas; Analytics; Scientific | Highlight ideas; Solve specific problem; Advance science; Develop technology; Educate public; Engagement | 11/21/2016 | 6/23/2017 | N/A | N/A | $0 | HHS-NCI statutory authority |
| DHS | The U.S. Coast Guard Ready for Rescue Challenge | Ideas; Hardware; Analytics | Improve service delivery; Highlight ideas; Solve specific problem; Advance science; Develop technology; Educate public | 9/5/2018 | 10/15/2018 | N/A | N/A | $255,000 | Procurement Authority |
| State | Diplomacy Lab | Ideas; Research | Improve service delivery; Engagement | N/A | N/A | N/A | N/A | $0 | N/A |
| | Almaty Mini Maker Faire—Pitching Challenge | Software; Creative; Ideas; Hardware; Scientific | Highlight ideas; Solve specific problem; Develop technology; Engagement | N/A | N/A | 12 | 3 | $6,000 | N/A |
| | Spelling Bee | Creative; Ideas | Engagement; Build capacity | N/A | N/A | 20 | 5 | $0 | N/A |
| | World Tourism Day Quiz | N/A | Educate public; Engagement; Stimulate market; Other | 9/27/2018 | 9/28/2018 | 7 | 5 | $0 | N/A |

| Agency | Name | Solution Type(s) | Primary Goal(s) | Date Open | Date Complete | Entry #s | Prize #s | Total Prize Purse | Authority |
|---|---|---|---|---|---|---|---|---|---|
| State | Impact Video Competition | Creative | Highlight ideas; Educate public | 10/30/2017 | 12/8/2017 | 30 | 3 | $0 | Foreign Assistance Act |
| | "150 Years of Cooperation and Friendship" Logo Contest | Creative; Ideas | Solve specific problem; Engagement | 2/27/2017 | 3/16/2017 | 182 | 1 | $271 | Fulbright-Hays Act |
| | #MEthroughUSeyes | Other | Educate public; Engagement | 5/5/2017 | 5/25/2017 | 120 | 10 | $0 | State Department |
| | #OscarsME2018 | Other | Educate public; Engagement | 2/5/2018 | 2/26/2018 | 400 | 5 | $0 | State Department |
| | #USElections2016 - Official Trivia Contest Rules | N/A | Educate public | 10/21/2016 | 10/31/2016 | 450 | 10 | $0 | State Department |
| | GIFT O'CLOCK 2016 - #MEholidaysWithUS | Other | Educate public; Engagement | 12/12/2016 | 12/22/2016 | 30 | 10 | $0 | State Department |
| | Montenegrin Summer in the States #USalumniMNE | Other | Educate public; Engagement | 8/1/2018 | 9/10/2018 | 231 | 13 | $0 | State Department |
| | Tis the season 2017 - #MEholidaysWithUS | Other | Educate public; Engagement | 12/13/2017 | 12/26/2017 | 45 | 5 | $0 | State Department |
| | U.S. Embassy Podgorica: Give Away #1 | Other | Educate public; Engagement | 7/30/2018 | 8/1/2018 | 68 | 1 | $0 | State Department |
| | U.S. Embassy Podgorica: Give Away #2 | Other | Educate public; Engagement | 8/23/2018 | 8/28/2018 | 64 | 1 | $0 | State Department |
| | U.S. Embassy Podgorica: Give Away #3 | Other | Educate public; Engagement | 10/12/2018 | 10/17/2018 | 36 | 1 | $0 | State Department |

| Agency | Name | Solution Type(s) | Primary Goal(s) | Date Open | Date Complete | Entry #s | Prize #s | Total Prize Purse | Authority |
|---|---|---|---|---|---|---|---|---|---|
| VA | PseudoVet | Software | Solve specific problem; Develop technology | 8/8/2017 | 2/1/2018 | 542 | 75 | $95,000 | Space Act/Pro-curement Authority |
| | VA Gun Safety Matters Challenge | Software; Creative; Ideas; Hardware | Highlight ideas; Solve specific problem; Educate public; Engagement | 9/19/2017 | 1/8/2018 | 40 | 3 | $60,000 | Space Act/Pro-curement Authority |
| | Veterans Online Memorial Challenge | Software | Improve service delivery; Solve specific problem; Develop technology | 9/27/2017 | 6/30/2018 | 76 | 22 | $197,373 | Space Act/Pro-curement Authority |
| EPA | Smart City Air Challenge | Other | Highlight ideas; Engagement; Stimulate market | 8/30/2016 | 10/28/2016 | 22 | 2 | $100,000 | Clean Air Act Amendments, Section 103 |
| | Tox Test Challenge Stage II | Hardware; Scientific | Highlight ideas; Solve specific problem; Advance science; Develop technology; Engagement; Build capacity; Stimulate market | 1/30/2017 | 8/31/2017 | 9 | 5 | $500,000 | Toxic Sub-stances Control Act (TSCA) |
| | Wildland Fire Sensors Challenge | Hardware | Improve service delivery; Highlight ideas; Solve specific problem; Advance science; Develop technology; Educate public; Engagement; Stimulate market | N/A | 1/5/2018 | 27 | 2 | $60,000 | Clean Air Act, Section 103, 42 USC 7403 |

| Agency | Name | Solution Type(s) | Primary Goal(s) | Date Open | Date Complete | Entry #s | Prize #s | Total Prize Purse | Authority |
|---|---|---|---|---|---|---|---|---|---|
| NASA | 3D-Printed Habitat Challenge (Phases 2&3) | Creative; Ideas; Hardware; Scientific; Other | Highlight ideas; Solve specific problem; Advance science; Develop technology; Educate public; Engagement; Stimulate market | N/A | May, 2019 | 38 | 18 | $1,100,000 | 51 USC § 20144 |
| | Breakthrough, Innovative, and Game-Changing (BIG) Idea Challenge | Ideas; Analytics; Scientific | Highlight ideas; Solve specific problem; Develop technology; Engagement; Build capacity; Educate public | N/A | N/A | 45 | N/A | $0 | 31 USC § 6301, et seq. |
| | CineSpace Film Competition | Creative | Educate public | N/A | N/A | 931 | 10 | $26,000 | 31 USC § 6301, et seq. |
| | Cube Quest Challenge | Hardware | Highlight ideas; Solve specific problem; Advance science; Develop technology; Educate public; Engagement; Stimulate market | N/A | N/A | 13 | N/A | $5,000,000 | 51 USC § 20144 |
| | Future Engineers 3D Design Challenges | Creative; Hardware | Highlight ideas; Solve specific problem; Educate public | N/A | N/A | 1310 | 61 | $0 | 51 USC § 20113(e) |
| | High Performance Fast Computing Architecture Challenge | Software; Ideas | Solve specific problem; Develop technology | 5/3/2017 | 9/30/2017 | 335 | N/A | $35,000 | 31 USC § 6301, et seq. |
| | High Performance Fast Computing Ideation Challenge | Software; Ideas | Solve specific problem; Develop technology | 5/3/2017 | 6/16/2017 | 4,808 | N/A | $20,000 | 31 USC § 6301, et seq. |

| Agency | Name | Solution Type(s) | Primary Goal(s) | Date Open | Date Complete | Entry #s | Prize #s | Total Prize Purse | Authority |
|---|---|---|---|---|---|---|---|---|---|
| NASA | REALM User Interface Challenge | Software | Solve specific problem | 9/16/2016 | 12/2/2016 | 51 | 9 | $11,025 | 31 USC § 6301, et seq. |
| | Human Exploration Rover Challenge | Creative; Ideas; Hardware | Highlight ideas; Educate public; Engagement | N/A | N/A | 600 | 31 | $25,300 | 51 USC § 20113(e) |
| | International Space Apps Challenge | Software; Creative; Ideas; Hardware; Analytics; Scientific | Highlight ideas; Advance science; Develop technology; Educate public; Engagement; Build capacity | N/A | N/A | 2000 | N/A | $0 | 51 USC § 20113(e) |
| | RASC-AL Special Edition: Mars Ice Challenge | Ideas; Hardware; Analytics | Highlight ideas; Solve specific problem; Advance science; Develop technology; Engagement; Build capacity | N/A | N/A | 46 | N/A | $0 | 31 USC § 6301, et seq. |
| | NASA Tournament Lab Micro-Purchase Challenges | Software; Creative; Ideas | Highlight ideas; Solve specific problem; Advance science; Develop technology; Educate public; Engagement | N/A | N/A | 1,514 | 35 | $44,800 | 31 USC § 6301, et seq. |
| | Open MCT Notebook Challenge | Software | Solve specific problem; Develop technology | 9/28/2017 | 11/13/2017 | 35 | 3 | $12,900 | 31 USC § 6301, et seq. |
| | Partnership Agreement Maker (PAM) Graphical User Interface (GUI) Updates | Software | Improve service delivery; Solve specific problem | 11/21/2016 | 4/3/2017 | 60 | 12 | $15,684 | 31 USC § 6301, et seq. |

| Agency | Name | Solution Type(s) | Primary Goal(s) | Date Open | Date Complete | Entry #s | Prize #s | Total Prize Purse | Authority |
|---|---|---|---|---|---|---|---|---|---|
| NASA | REALM Location Tracking Algorithm Challenge | Analytics | Solve specific problem; Develop technology | N/A | N/A | N/A | 0 | $26,500 | 31 USC § 6301, et seq. |
| | Rice Business Plan Competition | Ideas; Hardware; Business plans | Highlight ideas; Advance science; Educate public; Engagement; Stimulate market | 11/1/2016 | 3/15/2018 | 1150 | 2 | $70,000 | 31 USC § 6301, et seq. |
| | Robonaut 2 Tool Localization Challenge | Analytics | Solve specific problem; Develop technology | 2/23/2016 | 10/19/2017 | 222 | 9 | $19,250 | 31 USC § 6301, et seq. |
| | Robotic Mining Competition | Software; Hardware; Scientific | Solve specific problem; Develop technology; Educate public; Engagement | N/A | N/A | 94 | 45 | $34,000 | 51 USC § 20113(e) |
| | Space Poop Challenge | Design | Solve specific problem; Develop technology | 10/11/2016 | 12/20/2016 | 5,170 | 3 | $30,000 | 31 USC § 6301, et seq. |
| | Space Robotics Challenge | Software; Analytics | Highlight ideas; Solve specific problem; Develop technology; Educate public; Engagement; Stimulate market | N/A | N/A | 405 | 20 | $900,000 | 51 USC § 20144 |
| | Student Launch Initiative | Hardware | Solve specific problem; Advance science; Develop technology; Educate public; Engagement | 8/15/2016 | 4/24/2017 | 143 | 38 | $19,000 | 51 USC § 20113€ |

| Agency | Name | Solution Type(s) | Primary Goal(s) | Date Open | Date Complete | Entry #s | Prize #s | Total Prize Purse | Authority |
|---|---|---|---|---|---|---|---|---|---|
| NASA | Swarmathon | Software; Creative; Hardware | Solve specific problem; Advance science; Develop technology; Educate public; Engagement; Build capacity | N/A | N/A | 114 | 55 | $32,000 | FAR |
| | Vascular Tissue Challenge | Hardware; Analytics; Scientific; Other | Highlight ideas; Solve specific problem; Advance science; Develop technology; Educate public; Stimulate market; Provide lifesaving medical advances | 6/13/20186 | 9/30/2019 | 12 | N/A | $500,000 | 51 USC § 20144 |
| NSF | The NSF 2026 Idea Machine | Ideas; Scientific | Highlight ideas; Advance science; Engagement | 8/31/18 | N/A | 801 | N/A | $164,000 | NSF Act of 1950, as amended |
| | The Vizzies Challenge | Software; Creative; Hardware; Analytics; Scientific | Educate public; Engagement | 1/15/2018 | 4/18/2018 | 372 | 8 | $11,250 | NSF Act of 1950, as amended |
| ODNI | 3D Multi-View Stereo Challenge | Analytics | Highlight ideas; Advance science; Develop technology; Educate public; Engagement | July, 2016 | October, 2016 | 40 | 13 | $100,000 | National Security Act, 50 USC 3024(n) |
| | Disguised Faces in the Wild Competition | Software | Solve specific problem; Advance science; Develop technology; Benchmark state of the art | 1/20/2018 | 5/1/2018 | 12 | 6 | $25,500 | National Security Act, 50 USC 3024(n) |

| Agency | Name | Solution Type(s) | Primary Goal(s) | Date Open | Date Complete | Entry #s | Prize #s | Total Prize Purse | Authority |
|---|---|---|---|---|---|---|---|---|---|
| ODNI | Functional Map of the World (FMOW) Challenge | Analytics | Highlight ideas; Advance science; Develop technology; Educate public; Engagement | September, 2017 | December, 2017 | 1408 | 10 | $112,500 | National Security Act, 50 USC 3024(n) |
| | Fusion of Face Recognition Algorithms (FOFRA) | Software | Solve specific problem; Advance science; Develop technology | 5/23/2018 | 8/6/2018 | 1 | 0 | $70,000 | National Security Act, 50 USC 3024(n) |
| | Geopolitical Forecasting Challenge | Analytics | Highlight ideas; Solve specific problem; Advance science | N/A | N/A | 17 | 46 | $200,000 | National Security Act, 50 USC 3024(n) |
| | Mercury Challenge | Ideas; Analytics | Highlight ideas; Solve specific problem; Advance science; Engagement | 8/7/2018 | 1/31/2019 | N/A | N/A | $100,000 | National Security Act, 50 USC 3024(n) |
| | MORGOTH'S CROWN (Modeling of Reflectance Given Only Transmission of High-Concentration Spectra for Chemical Recognition over Widely-Varying Environments) | Software | Highlight ideas; Solve specific problem; Advance science; Develop technology; Educate public; Engagement; Build capacity | 7/26/2017 | 9/20/2017 | 664 | 7 | $50,000 | National Security Act, 50 USC 3024(n) |
| | Nail-to-Nail (N2N) Fingerprint Challenge | Software | Solve specific problem; Advance science; Develop technology; Engagement; Stimulate market | 2/2/2017 | 9/22/2017 | 15 | 7 | $290,000 | National Security Act, 50 USC 3024(n) |

| Agency | Name | Solution Type(s) | Primary Goal(s) | Date Open | Date Complete | Entry #s | Prize #s | Total Prize Purse | Authority |
|---|---|---|---|---|---|---|---|---|---|
| ODNI | OpenCLIR (Open Crosslingual Information Retrieval) | Software; Ideas; Scientific | Advance science; Develop technology | 3/11/2019 | 3/29/2019 | N/A | N/A | $30,000 | National Security Act, 50 USC 3024(n) |
| | The ODNI-OUSD(I) Xamine Challenge: Machine Verification of Collected Information | Software; Ideas; Analytics | Highlight ideas; Advance science; Develop technology; Educate public; Engagement | 5/4/2018 | 7/2/2018 | 15 | N/A | $75,000 | N/A |
| | The ODNI-OUSD(I) Xpress Challenge: Machine Generation of Analytic Products | Software; Hardware; Analytics | Highlight ideas; Advance science; Develop technology; Educate public; Engagement | 4/6/2017 | 7/5/2017 | 15 | 2 | $500,000 | N/A |
| | The ODNI-OUSD(I) Xtend Challenge: Machine Evaluation of Analytic Products | Software; Ideas; Analytics | Highlight ideas; Advance science; Develop technology; Educate public; Engagement | 11/16/2017 | 1/15/2018 | 18 | 3 | $75,000 | N/A |
| | UG2 Prize Challenge | Software | Solve specific problem; Advance science; Develop technology; Other | 1/31/2018 | 4/15/2018 | 12 | 4 | $75,000 | National Security Act, 50 USC 3024(n) |
| USAID | EduApp4Syria Prize Competition | Software | Highlight ideas; Solve specific problem; Develop technology; Engagement | 1/29/2016 | 4/1/2016 | 78 | 5 | $1,700,000 | N/A |
| | Book Boost: Access for All Challenge | Software; Hardware; Business plans | Highlight ideas; Solve specific problem; Build capacity; Stimulate market | N/A | N/A | 15 | 6 | $360,000 | ADS 302.3.4.13 Grants Under Contracts (GUCs) |

| Agency | Name | Solution Type(s) | Primary Goal(s) | Date Open | Date Complete | Entry #s | Prize #s | Total Prize Purse | Authority |
|---|---|---|---|---|---|---|---|---|---|
| USAID | Data-Driven Farming Prize | Software; Hardware; Business plans | Solve specific problem; Develop technology; Build capacity; Stimulate market | 2/9/2017 | 4/6/2017 | 143 | 4 | $300,000 | Department of State, Foreign Operations, and Related Programs Appropriations Act at P.L. 115-131 |
| | Fall Armyworm Tech Prize | Software; Creative; Hardware; Business plans; Analytics | Highlight ideas; Solve specific problem; Develop technology; Educate public; Engagement; Build capacity | 3/28/2018 | 5/14/2018 | 228 | 5 | $400,000 | Department of State, Foreign Operations, and Related Programs Appropriations Act at P.L. 115-131 |
| | Global Lighting and Energy Access Partnership (Global LEAP) Off-Grid Refrigerator Competition | Hardware; Business plans | Highlight ideas; Solve specific problem; Develop technology; Educate public; Engagement; Stimulate market | 9/22/2016 | 1/20/2017 | 55 | 2 | $600,000 | Department of State, Foreign Operations, and Related Programs Appropriations Act at P.L. 115-131 |
| | No Lost Generation Prize Competition | Software; Creative | Solve specific problem; Educate public; Engagement; Stimulate market | March, 2017 | 4/25/2017 | 6 | 2 | $100,000 | ADS 302.3.4.13 Grants Under Contracts (GUCs) |
| | Tracking and Tracing Books Prize Competition | Software; Hardware | Improve service delivery; Solve specific problem; Develop technology; Engagement | 1/23/2015 | 4/1/2015 | 10 | 2 | $100,000 | ADS 302.3.4.13 Grants Under Contracts (GUCs) |
| | WomenConnect Challenge | Software; Creative; Hardware | Solve specific problem | 3/8/2018 | 5/20/2018 | 531 | 9 | $1,000,000 | ADS 302.3.4.13 Grants Under Contracts (GUCs) |

## Summary of Crowdsourcing and Citizen Science Activities in Fiscal Years 2017 and 2018 Conducted Under Crowdsourcing and Citizen Science Act

| Agency | Name | Submissions | Data Availability |
|---|---|---|---|
| USDA | 4-H Guide for NASA GLOBE Observer Clouds | Images of sky through GLOBE Observer mobile app | https://vis.globe.gov/clouds |
| | Boise Multi-Party Monitoring, Boise, ID | N/A | Boise Forest Coalition website; the Idaho Forest Restoration Partnership website |
| | Científicos en Familia: A Program to Engage Diverse Communities in Citizen Science and Stewardship | Geotagged photos of plants and animals in the iNaturalist app | iNaturalist |
| | Citizen Science for Rangeland Health: Engaging Ranchers in Science | N/A | public will have the opportunity to engage in data interpretation via open meetings |
| | Collaborative Investigations at Admiralty Cove | Interview planning, digital recordings of interviews, interview catalogues, and partial transcriptions at National Records Center | Archaeological data will be shared with Tribal Council and Alaska State Office of History and Archeology. Participants will complete the project by designing an interpretive sign |
| | Culturally Responsive Citizen Science Development with Forest Inventory Analysis in Interior Alaska | N/A | www.globe.gov; https://apps.fs.usda.gov/fia/datamart/ |
| | Engaging Angler Scientists to Help Prioritize and Monitor the Effectiveness of Stream Reconnection Projects | N/A | data entered on developed by Southeastern Aquatic Resources Partnership (SARP) mobile app uploaded to their Regional Barrier Inventory |
| | Engaging Citizen Scientists in Field Research on American Pika, an Indicator Species for Alpine Ecosystem Integrity | Observations, data collection, and images | CitSci.org |
| | Location of Plants Traditionally Used by American Indian Tribes to Improve Management of Federal Lands on the Four Forest Restoration Initiative | N/A | open-access for USFS employees, selected researchers, and tribal members through the iNaturalist platform |
| | Monitoring the Status of the Columbia River Gorge Pika Population After the Eagle Creek Fire | wildlife observations and site data | Data freely available to management agencies following peer-reviewed publication |

| Agency | Name | Submissions | Data Availability |
|---|---|---|---|
| USDA | Neighbors to Nature: Cache Creek Study | data on plant phenology and wildlife sightings | Friends of Pathways database; USA National Phenological Network database; Wildflower Watch database; Nature Mapping Jackson Hole database |
| | Potomac Highlands Cooperative Weed and Pest Management Area Non-Native Invasive Species Citizen Science Program | N/A | EDDMapS application |
| | Tracking the Vernal Window with a Low-Cost Instrumentation Suite | N/A | Snow depth and phenophase data available at www.cocorahs.org and www.naturesnotebook.org, respectively; vernal window indicators centralized in a single GitHub repository |
| DOC | Urban Heat Island Mapping Campaign | 75,000 data points from thermocouple devices mounted on participants' cars | data will be freely shared |
| DHS | FEMA Crowdsourcing Unit and Playbook for Emergency Management | FEMA's Crowdsourcing Unit facilitated a daily coordination call | Still under development |
| DOI | Project eTrout | data on fish abundance, behavior, and habitat use from 360-degree underwater videos | N/A |
| NASA | Backyard Worlds: Planet 9 | online classifications of image sets from Wide-Field Infrared Survey Explorer (WISE) mission and Near Earth Asteroid-WISE (NEOWISE) project | publication in scientific literature; public archive of useful false positives |
| | Landslide Reporter | location, date, time, description, type, trigger, fatalities and injuries, and surrounding environment of a landslide | Landslide Viewer (https://landslides.nasa.gov/viewer) |

## Summary of Crowdsourcing and Citizen Science Activities in Fiscal Years 2017 and 2018 Conducted Under Authorities Other than the Crowdsourcing and Citizen Science Act

| Agency | Name | Authority | Submissions | Data Availability |
|---|---|---|---|---|
| USDA | Invasive Mosquito Project | 7 U.S.C. 2272 (Volunteers for Department of Agriculture Programs) | participant observation data, mosquito eggs, mosquito larvae, and adult mosquito samples | maintained as paper records |
| | Collaborative Adaptive Rangeland Management (CARM) | 7 U.S.C. 2272 (Volunteers for Department of Agriculture Programs) | observations of cattle behavior, grassland birds, and vegetation | https://www.ars.usda.gov/plains-area/fort-collins-co/center-for-agricultural-resources-research/rangeland-resources-systems-research/docs/near-real-time-data/ |
| | FarmLab | 7 U.S.C. 2272 (Volunteers for Department of Agriculture Programs) | (1) bluebird monitoring; (2) invasive species management; (3) heirloom apple inventory and stewardship; (4) farm biomass models | to be made available to the public |
| DOC | Cyclone Center | Weather Service Organic Act, 15 U.S.C. § 313 | participants view tropical cyclone images and respond to prompts/questions | data available to public upon request |
| | Meteorological Phenomema Identification Near the Ground | Weather Service Organic Act, 15 U.S.C. § 313 | precipitation type, flooding severity, wind damage severity, hail size, visibility restrictions, and tornado and waterspout observations | data available publicly via web display or a public API key |
| | Old Weather | Weather Service Organic Act, 15 U.S.C. § 313 | transcribed marine-meteorolgical data and other environmental observations from U.S. Federal ship logs | data are available from ICOADS (Deck 710) and ISPD. Primary source images are integrated into the National Archives digital catalog https://www.archives.gov/research/catalog |
| | Community Collaborative Rain, Hail and Snow (CoCoRaHS) Network | Weather Service Organic Act, 15 U.S.C. § 313 | primary data are 24-hour precipitation measurements (rain, hail, and snow); additional options include real-time hail and intense precipitation reports, evapotranspiration, drought condition monitoring, soil moisture, frost, optics (e.g., rainbows), thunder, and snowflake type | data are made available to the public online (www.cocorahs.org) |

| Agency | Name | Authority | Submissions | Data Availability |
|---|---|---|---|---|
| DOC | CrowdMag | Coast and Geodetic Survey Act, 33 U.S.C. § 883a et seq. | time stamp, lat-long location, location accuracy, magnetic data, and phone's make | data saved at NCEI-CO internal database; data provided to public via ESRI web-maps |
| | Crowdsourced Bathymetry | Coast and Geodetic Survey Act of 1947 | observations of water depth/bathymetry, location, and time | the International Hydrographic Organization (IHO) Data Centre for Digital Bathymetry (DCDB) Data Viewer (https://maps.ngdc.noaa.gov/viewers/iho_dcdb/) |
| | Steller Watch | Endangered Species Act | classifications of images | imagery and classification information collected from participants is public; selected images can be viewed on the Steller Watch website |
| | Hawaii Bottomfish Heritage Project: Tracing Traditions and Preserving Culture | MSA NS-8; MSRA Section 318, Regional Priorities and Management Needs | N/A | web story and blog series has been initiated at https://www.fisheries.noaa.gov/feature-story/hawaii-bottomfish-heritage-project; Videos will be available through the "Voices from the Fisheries" website: https://www.st.nmfs.noaa.gov/humandimensions/voices-from-the-fisheries/index |
| | Cooperative Research Provides New Data for ESA-listed Rockfish in Puget Sound, WA | Magnuson Stevens Act Sec 318 (Sec 318, MSA, 16 USC 1867) | anglers were asked to catch fish | raw genetic data has been published on the website of the National Center for Biotechnology Information (https://www.ncbi.nlm.nih.gov/bioproject/PRJNA451040) |
| | NWS Cooperative Observer Program | Organic Act of 1890 | weather observations of daily maximum and minimum temperatures and/or daily precipitation, as well as snowfall in some locations | data available via National Center for Environmental Information websites |
| DOE | The Open PV Project | Unknown | information about participants' solar installations | https://openpv.nrel.gov/search |
| HHS | Crowdsourcing Optimal Cancer Treatment Strategies that Maximize Efficacy and Minimize Toxicity | NIH UH2 Exploratory/Developmental Cooperative Agreement | N/A | N/A |

| Agency | Name | Authority | Submissions | Data Availability |
|---|---|---|---|---|
| HHS | Applying Protein Databases to Crowdsourcing Structural Protein Design | NIH UH2 Exploratory/Developmental Cooperative Agreement | participants fold digital models of protein structures | N/A |
| | OMics Compendia Commons | Public Health Services Act | participants annotate samples in published gene expression studies (e.g., cell types) and create comparison groups between case and control samples | data available at https://omicc.niaid.nih.gov/ Initial results of analyses published at https://f1000research.com/articles/5-2884/v1. Articles about OMiCC |
| | NIDCR 2030: Envisioning the Future, Together | Unknown | requested ideas, comments, and votes on what it will take to reach specific NIDCR research and training goals | https://nidcr2030.ideascale.com/a/index |
| | Community Mapping Project: Engaging Students in Citizen Science for Safe Routes to School | NLM operating budget | Students tracked and mapped safe routes to school and neighborhood libraries using GIS and Mappler mobile app | http://www.immappler.com/srtsnashville/ |
| | NNLM Wikipedia Edit-a-thon | Unknown | N/A | available on the NNLM Wikipedia Edit-a-thon project page |
| DOI | Battle of the Atlantic Expedition | National Historic Preservation Act (NEPA) | observations, data, video, still photography, historical research, and drawings of sites by recreational SCUBA divers | https://marinecadastre.gov/espis/#/search/study/100056 and https://oceanexplorer.noaa.gov/explorations/16battlefield/ |
| | Aquatic Insect Monitoring in Grand Canyon | Organic Act of 1879; The Grand Canyon Protection Act of 1992 (Public Law 102-575) | light trap samples of emergent aquatic insects | available at https://www.sciencebase.gov/catalog/item/570fe1a6e4b0ef3b7ca3580c |
| | Archaeology Citizen Science at Fort Vancouver | 54 U.S.C. 100101, 54 U.S.C. 100301, 54 U.S.C. 100701-706, and 54 U.S.C. 103102(4) | 223 digital excavation level and feature forms, 21 iDraw digital excavation profiles, 248 digital cemetery headstone recording forms, 1,666 digital images, and 4,937 archaeological laboratory recording form lines of data | parties interested in the results may contact the park cultural resources branch |

| Agency | Name | Authority | Submissions | Data Availability |
|---|---|---|---|---|
| DOI | Biodiversity Discovery and Phenology in Acadia National Park | National Park Service Organic Act | observations on species occurrence and information on timing of seasonal life cycle events | public databases managed by iNaturalist, eBird, USA National Phenology Network, and Hawk Count (Hawk Migration Association of North America) |
| | Dragonfly Mercury Project: Engaging Citizens with Resource Conservation | NPS Organic Act (54 U.S.C. 100101(1916)) | 4,270 dragonfly larvae samples for mercury analysis, 300 field data forms, and 30 observations on iNaturalist | https://www.nps.gov/articles/dragonflymercury-map.htm; summary data release at https://doi.org/10.5066/P9TK6NPT; other data products at: https://irma.nps.gov/DataStore/Collection/Profile/4082 |
| | Glacier National Park Common Loon Citizen Science | National Park Service Organic Act | 178 observational data and images submitted | National Park service Integrated Resource Management Applications (IRMA) data portal: https://irma.nps.gov/DataStore/Reference/Profile/2194764; full dataset provided to interested parties upon request |
| | Did You Feel It? (DYFI) | Organic Act of 1879; The National Earthquake Hazards and Reduction Program (NEHRP), 42 U.S.C § 7701 | participants answered up to 15 questions about earthquake experience and provided information on their location during and the time of the earthquake | The DYFI data is available at: https://earthquake.usgs.gov/data/dyfi/ and is integrated into other official earthquake data data at https://earthquake.usgs.gov through the USGS Earthquake Program Comprehensive Earthquake Catalog (ComCat). |
| | iCoast - Did the Coast Change? | Organic Act of 1879; National Climate Program Act of 1978; Coastal Zone Management Act of 1976 | image comparison pre- and post-Hurricane Sandy or Hurricane Joaquin | A Data Release containing the Hurricane Sandy iCoast classifications is available at https://coastal.er.usgs.gov/data-release/doi-P93A9MPE/. iCoast data for Hurricane Joaquin will be made available in the future |
| | Nature's Notebook | Organic Act of 1879 | on-the-ground observations and locations of plants and animals | https://www.usanpn.org/data/observational and are also accessible via the Phenology Observation Portal |
| | The National Map Corps (TNMCorps) | Organic Act of 1879 | participants update and verify locations, names, and addresses for geospatial structures data | https://www.usgs.gov/core-science-systems/national-geospatial-program/national-map |

| Agency | Name | Authority | Submissions | Data Availability |
|---|---|---|---|---|
| EPA | Building Capacity to Measure Air Pollution Mitigation Strategies at Schools | Clean Water Act (Section 103) | N/A | N/A |
| | Crowdsourcing to Monitor Private Wells and Assess Contaminant Sources | N/A | water quality data | data will be made available to public as confirmed by the owners of the wells |
| | Cyanoscope: EPA collaborative partnership on monitoring harmful algal blooms | N/A | images of harmful algal blooms; microscopic images of individual organisms; fluorometric data | image data posted at https://www.inaturalist.org/projects/cyanoscope and https://www.citsci.org/CWIS438/Browse/Project/Project_Info.php?ProjectID=822&WebSiteID=7 |
| | EPA/US Coast Guard Auxiliary Partnership for HAB Monitoring | N/A | physical observations and data from CyanoScope HAB identification | data will be made available using existing Cyanobacteria Monitoring Collaborative webpage |
| | HiveScience: A Citizen Science Project for Beekeepers | N/A | survey using mobile app about and honey sample from individual hives | some data available on Geoplatform public webpage |
| | Kansas City Transportation and Local Scale Air Quality Study (KC TRAQS) | N/A | data collected using AirMapper air monitoring package | data to be made available on website |
| | Marine/Water Contact Sanitary Survey Workshops in California | Beaches Environment Assessment and Coastal Health (BEACH) Act | N/A | current app allows user to collect and export sanitary survey data, but EPA does not collect this information |
| | Measuring Coastal Acidification in New England Estuaries | N/A | water samples to be analyzed for total alkalinity; instrument readings of pH | EPA plans to utilize existing resources such as NECAN, Northeastern Regional Association of Coastal Ocean Observing Systems, and the Ocean Acidification Information Exchange |
| | Micro CSI-Urban Edition: A Microbial Citizen Science Initiative in Urban Watersheds | Clean Water Act | water samples shipped or delivered to the EPA | data from each site available through website of local partner |

| Agency | Name | Authority | Submissions | Data Availability |
|---|---|---|---|---|
| | Using Citizen Science to Analyze Underwater Videos in the Great Lakes | Clean Water Act § 104, 33 U.S.C. § 1254 | participants answered three questions about images from 52 sites | https://www.zooniverse.org/projects/USEPA/deep-lake-explorer |
| | Using Citizen Science to Improve Drinking Water Epidemiology Studies in Puerto Rico | N/A | 198 participants will provide stool/saliva at start of study and when gastrointestinal illness occurs | data will be made publicly available when study is complete |
| | Low Cost Sensors for Real-time Continuous Water Quality Monitoring in Georgia | Clean Water Act | observations on equipment, ease of use, durability, and technical issues | data shared at discretion of cooperating organizations |
| | Smoke Sense | N/A | participants report smoke observations and symptoms | summary statistics are shown in the Smoke Sense app under weekly statistics and posted online at https://www.epa.gov/air-research/smoke-sense |
| EPA | Air Sensor Toolbox | Clean Air Act | N/A | https://www.epa.gov/air-sensor-toolbox |
| | Community-led Air Sensor Evaluation in North Carolina | Clean Air Act | tabulated data documenting sensor measurements and technical feedback on tools | https://www.epa.gov/air-sensor-toolbox/evaluation-emerging-air-pollution-sensor-performance |
| | Regional Sensor Loan Program | Clean Air Act | planning sensor collocation and deployment locations, deploying and operating sensors, weekly data retrievals, and/or data analysis and interpretation | data to be released in FY19 |
| | Ironbound Neighborhood Air Monitoring | Clean Air Act | air quality data weekly from four sensor pods | https://edg.epa.gov/metadata/catalog/search/resource/details.page?uuid=%7BDFEDA959-0DBB-434C-B736-0249DD083473%7D and the paper can be accessed at https://doi.org/10.23719/1407516 |

| Agency | Name | Authority | Submissions | Data Availability |
|---|---|---|---|---|
| EPA | The Efficacy of Citizen Science Air Monitoring for Building Public Awareness of Exposures in a US Caribbean Urban Neighborhood Impacted by Heavy Industrial Contamination | Clean Air Act | weekly data collected from air quality sensor pods and weather monitors at selected sites | data will be obtainable at the EPA environmental dataset gateway at https://edg.epa.gov; the dataset can be retrieved by searching for The Peñuelas Project-SCID:A-K99b |
| NASA | Globe Program | 51 USC § 20111, et seq. | measurements of atmosphere, biosphere, hydrosphere, and pedosphere | GLOBE web portal |
| | Students' Cloud Observations on-Line (S'COOL) | 51 USC § 20111, et seq. | cloud observations | https://scool.larc.nasa.gov/database.html shows cloud observations with corresponding satellite cloud retrievals |
| | Aurorasaurus | N/A | the time/date/location/photo of aurora | https://zenodo.org/record/1255196#.W79tlxNKjs0 |
| | Disk Detective | 51 USC § 20111, et seq. | classifications of movie images | https://mast.stsci.edu |
| | Globe Observer | 51 USC § 20111, et seq. | observations, location, and photographs | https://datasearch.globe.gov/ |
| | Image Detective | | (1) the geographic coordinates for the centerpoint of a given astronaut photograph of Earth; (2) an estimation of the cloud cover percentage in the image; and (3) the geographic metadata for features visible in the image | Gateway to Astronaut Photography of Earth (https://eol.jsc.nasa.gov/) |
| SI | City Nature Challenge DC 2018 | N/A | 22,931 images and sound files were submitted on 1,808 identified species | data available through the iNaturalist City Nature Challenge DC 2018, iNaturalist, and Global Biodiversity Information Facility websites |
| | Chesapeake Bay Parasite Project | N/A | data and observations | available upon request |

| Agency | Name | Authority | Submissions | Data Availability |
|---|---|---|---|---|
| SI | Environmental Archaeology at the Smithsonian Environmental Research Center | N/A | data and observations | available upon request |
| | eMammal | N/A | Images and associated metadata | eMammal website |
| | Fossil Atmospheres | N/A | classified images of leaf cells | results will be shared online at Zooniverse |
| | Global Change Research Wetland Plant Census | N/A | data and observations | available on the project website |
| | Invader ID | N/A | 48,542 classifications | preliminary data shared upon request |
| | Leafsnap | N/A | N/A | N/A |
| | Neighbor Nestwatch | N/A | observations on bird nests and color-banded birds | technical data are not made available until such data are analyzed, published, and disseminated online |
| | Smithsonian Transcription Center | N/A | transcriptions and reviews of digitized Smithsonian archival, library, and museum collections | transcribed content available at transcription.si.edu |
| | Smithsonian Transcription Center - Biodiversity Collection Records and Specimen Labels | N/A | transcriptions and reviews of digitized specimen labels and collection information | transcribed content available at transcription.si.edu |
| | Smithsonian Transcription Center - Project PHaEDRA: Preserving Harvard's Early Data and Research in Astronomy | N/A | transcriptions and reviews of digitized log books and notes of the Harvard-Smithsonian Center for Astrophysics | transcribed content available at transcription.si.edu |
| | Smithsonian Transcription Center - Transcription of Science-related Archival Documents | N/A | transcriptions and reviews of digitized archival materials related to science and biodiversity | transcribed content available at transcription.si.edu |

| Agency | Name | Authority | Submissions | Data Availability |
|---|---|---|---|---|
| SI | Virginia Working Landscapes: Grasslands Biodiversity Survey | N/A | ecological monitoring data, photographs, and plant and animal specimens collected from the field | Data are not released due to sensitive nature of private property; published aggregated data will be released with associated publication |