# Implementation of Federal Prize Authority: Fiscal Year 2014 Progress Report

A Report from the

Office of Science and Technology Policy

In Response to the Requirements of the

America COMPETES Reauthorization Act of 2010

April 2015

## ABOUT THE OFFICE OF SCIENCE AND TECHNOLOGY POLICY

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## DEPARTMENT, AGENCY, OFFICE, AND DIVISION ABBREVIATIONS

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| AFRL | Air Force Research Laboratory (part of AF/DOD) |
| ASA | Office of the HHS Assistant Secretary for Administration (part of HHS) |
| ASPR | Office of the Assistant Secretary for Preparedness and Response (part of HHS) |
| CDC | Centers for Disease Control and Prevention (part of HHS) |
| CMS | Centers for Medicare & Medicaid Services (part of HHS) |
| CPSC | Consumer Product Safety Commission |
| CSR | NIH Center for Scientific Review (part of HHS) |
| 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 |
| DTRA | Defense Threats Reduction Agency (part of DOD) |
| EDA | Economic Development Administration (part of DOC) |

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| Education | Department of Education |
| EPA | Environmental Protection Agency |
| EERE | Office of Energy Efficiency and Renewable Energy (part of DOE) |
| 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 |
| NASA | National Aeronautics and Space Administration |
| NCI | National Cancer Institute (part of NIH/HHS) |
| NCIPC | National Center for Injury Prevention and Control (part of CDC/HHS) |
| NEA | National Endowment for the Arts |
| NEH | National Endowment for the Humanities |
| NIBIB | National Institute of Biomedical Imaging and Bioengineering (part of NIH/HHS) |
| NIC | National Institute of Corrections |
| NIGMS | National Institute of General Medical Sciences |
| NIH | National Institutes of Health (part of HHS) |
| NIJ | National Institute of Justice (part of DOJ) |
| NSF | National Science Foundation |
| OMB | Office of Management and Budget (part of the Executive Office of the President) |
| ONC | Office of the National Coordinator for Health Information Technology (part of HHS) |
| OSTP | Office of Science and Technology Policy (part of the Executive Office of the President) |
| PSBIO | Prize and Small Business Innovation Office (part of DHS) |
| State | Department of State |
| TSA | Transportation Security Administration (part of DHS) |
| USAID | United States Agency for International Development |
| USDA | Department of Agriculture |
| USSOCOM | U.S. Special Operations Command |
| WHIAAPI | White House Initiative on Asian Americans and Pacific Islanders |

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**EXECUTIVE SUMMARY**

On January 4, 2011, President Obama signed into the law the America COMPETES Reauthorization Act of 2010 (COMPETES). Section 105 of COMPETES added Section 24 (Prize Competitions) to the Stevenson-Wydler Technology Innovation Act of 1980 (Stevenson-Wydler), granting all agencies broad authority to conduct prize competitions to spur innovation, solve tough problems, and advance their core missions.

Prize competitions and challenges have an established record of spurring innovation in the private and philanthropic sectors. This report details examples of how well-designed prize competitions and challenges, integrated into a broader innovation strategy, have enabled Federal agencies to:

- Pay only for success and establish an ambitious goal without having to predict which team or approach is most likely to succeed;
- Reach beyond the "usual suspects" to increase the number of solvers tackling a problem and to identify novel approaches, without bearing high levels of risk;
- Bring out-of-discipline perspectives to bear; and
- Increase cost-effectiveness to maximize the return on taxpayer dollars.

The Obama Administration has taken important steps to make prize competitions and challenges a standard tool in every agency's innovation toolbox. The September 2009 *Strategy for American Innovation*[1] recognized the potential for prizes to mobilize America's ingenuity to solve some of the Nation's most pressing challenges. In March 2010, the Office of Management and Budget (OMB) issued a formal policy framework[2] to guide agency leaders in using prize competitions and challenges to advance their core missions. In September 2010, the Administration launched Challenge.gov[3], a one-stop shop where entrepreneurs and citizen solvers can find public-sector prize competitions and challenges. By March 2015, Challenge.gov had featured more than 396 prize competitions and challenges from over 72 Federal agencies, departments, and bureaus.

The prize authority provided by COMPETES supports this effort. By giving agencies a clear legal path, the legislation has made it dramatically easier for agencies to use prize competitions, subject to the availability of appropriations or other allowed sources of

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[1] http://www.whitehouse.gov/innovation/strategy and
http://www.whitehouse.gov/sites/default/files/microsites/ostp/innovationstrategy-prizes.pdf
[2] http://www.whitehouse.gov/sites/default/files/omb/assets/memoranda_2010/m10-11.pdf
[3] http://www.challenge.gov/

funds. By significantly expanding the authority of all Federal agencies to conduct prize competitions, the legislation enables agencies to pursue more ambitious prize competitions with robust incentives, and has inspired the use of other authorities to operate prize competitions and challenges.

Since the signing of COMPETES in January 2011, the Administration has laid the policy and legal groundwork to take maximum advantage of the new prize authority in the years to come. Policy and legal staff in the Office of Science and Technology Policy (OSTP) and Office of Management and Budget (OMB) jointly developed a Fact Sheet and Frequently Asked Questions memorandum,[4] issued in August 2011, which provided guidance to assist with implementation of the new, government-wide prize authority.

As many agencies expand their use of the prize authority provided to them under COMPETES, some agencies have continued to administer prize competitions and challenges developed under other pre-existing authorities, including agency-specific authorities, grant-making authority, and procurement authority, such as that provided by the Federal Acquisition Regulation (FAR), adding additional lessons learned and best practices regarding the use of prize competitions and challenges. In addition, some agencies have begun using the infrastructure and expertise developed as a result of running prizes under COMPETES to operate prize competitions and challenges under other authorities as well.

Agencies have established strategies and policies to accelerate widespread use of prize competitions and challenges. These agencies include the Department of Health and Human Services (HHS), the Environmental Protection Agency (EPA), the National Aeronautics and Space Administration (NASA), the Department of Homeland Security (DHS), Department of Interior (DOI), and the United States Department of Agriculture (USDA).  Some agencies, such as NASA, HHS, EPA, USDA, DHS, and the U.S. Agency for International Development (USAID), have also dedicated personnel to lead prize competition and challenge design and administration efforts at their agencies and to provide internal support to program managers interested in making use of prize competitions and challenges.

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[4] https://cio.gov/wp-content/uploads/downloads/2012/09/Prize_Authority_in_the_America_COMPETES_Reauthorization_Act.pdf

In addition, as called for in Section 24(n) of Stevenson-Wydler, in July 2011, the General Services Administration (GSA) launched a contract vehicle[5] to dramatically decrease the amount of time required for agencies to tap the private-sector expertise that is critical to early success. In addition, both the GSA Challenge.gov program and a government-wide Center of Excellence for Collaborative Innovation (CoECI), led by NASA, provide support to agencies conducting prize competitions and challenges. Through a partnership with DigitalGov University, the Challenge.gov program has developed a comprehensive, monthly in-person and digital training curriculum for the community, which has trained over 1,500 people across government. CoECI provided support to multiple agencies for the full lifecycle of their pilot challenges: from design to implementation, and through post-challenge evaluation.

The authority provided in COMPETES has led to significant new efforts, applying prize competitions and challenges to national priority areas including energy, public safety, health, cybersecurity, and infrastructure. Since its creation, 100 prize competitions have been offered through the authority provided by COMPETES by 30 agencies. In FY 2014, 34 prize competitions were conducted under COMPETES authority, as well as 63 challenges conducted using authorities other than COMPETES.

Seventeen agencies offered prizes in FY 2014 enabled by the prize authority provided by COMPETES – including the Department of Energy (DOE), the Department of Housing and Urban Development (HUD), the Department of State (State), the Federal Trade Commission (FTC), the National Endowment for the Arts (NEA), the Consumer Product Safety Commission (CPSC), the Defense Advanced Research Projects Agency (DARPA), the Department of Transportation (DOT), the General Services Administration (GSA), the National Institute of Corrections (NIC), and seven component agencies of HHS. Seven of these Agencies offered prizes under COMPETES authority for the first time, including CPSC, the Food and Drug Administration (FDA), the Office of the HHS Assistant Secretary for Administration, GSA, NIC, DARPA, and DOT.

A review of the 97 prize competitions and challenges conducted in FY 2014 under all authorities shows several trends in public-sector prizes:

- Increased ambition and sophistication of prize competition and challenge designs enabled by partnerships;

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[5]http://www.gsaelibrary.gsa.gov/ElibMain/sinDetails.do?scheduleNumber=541&specialItemNumber=541+4G

- More prize competitions and challenges to develop low-cost software and IT solutions;
- More prize competitions and challenges that focus on supporting entrepreneurship and commercialization; and
- New models for engaging the public and building communities during prize competitions and challenges.

A review of the 34 prize competitions conducted under COMPETES in FY 2014 shows that agencies continue to leverage this new authority to conduct their first prize competitions and to increase the ambition of their efforts. This report indicates that this ways this authority will continue to help agencies across the Federal Government to reap the benefits of high-impact prize competitions and challenges.

## INTRODUCTION

From the 1714 Longitude Prize that led to the world's first practical method to determine a ship's longitude, to the Orteig Prize that inspired Charles Lindbergh to fly nonstop from New York to Paris, to the 2011 Oil Cleanup XChallenge[6] that rewarded a company from Illinois for demonstrating more than four times the previous best tested recovery rate for cleaning oil from the ocean's surface, prizes have an established record of spurring innovation. A 2009 McKinsey report found that philanthropic and private-sector investment in prizes has increased significantly in recent years, including $250 million in new prize money between 2000 and 2007.[7]

Inspired by the success of philanthropic and private-sector prizes, the Obama Administration has taken important steps to accelerate public-sector adoption of these innovative tools. The Strategy for American Innovation recognized the potential for prize competitions and challenges to harness America's ingenuity to solve some of the Nation's most pressing challenges.[8] In March 2010, OMB issued a memorandum that provided a policy framework to guide agency leaders in using prize competitions and challenges to advance core missions.[9] In September 2010, the Administration launched Challenge.gov, a one-stop shop where entrepreneurs and citizen solvers can find and engage with public-sector prize competitions and challenges. By March 2015, Challenge.gov had featured more than 396 prize competitions and challenges from over 72 Federal agencies, departments, and bureaus. Tens of thousands of citizen "solvers" have participated in these competitions directly on Challenge.gov, with additional entrants joining the competitions through other means. A 2014 Deloitte report[10] found that between 2010 and 2014 "incentive prizes have transformed from an exotic open innovation tool to a proven innovation strategy" with $64 million in total prize money[11] being offered through Challenge.gov.

On January 4, 2011, President Obama signed COMPETES into law.[12] Section 105 of this Act added Section 24 (Prize Competitions) to Stevenson-Wydler, providing all agencies with broad authority to conduct prize competitions in order to spur innovation, solve

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[6] http://www.iprizecleanoceans.org/

[7] McKinsey & Company, "And the Winner Is..."; Capturing the promise of philanthropic prizes, 2009, http://www.mckinseyonsociety.com/downloads/reports/Social-Innovation/And_the_winner_is.pdf

[8] http://www.whitehouse.gov/innovation/strategy

[9] http://www.whitehouse.gov/sites/default/files/omb/assets/memoranda_2010/m10-11.pdf

[10] Deloitte University Press, "The Craft of Incentive Prize Design"; Lessons from the Public Sector, 2014. http://dupress.com/articles/the-craft-of-incentive-prize-design/

[11] Based on 319 challenges listed on challenge.gov between 2010 and 2014.

[12] Public Law 111-358

tough problems, and advance their core missions. By giving agencies a simple and clear legal path, the authority provided by COMPETES supports the Administration's effort to make prize competitions and challenges a standard tool in every Federal agency's toolbox. The legislation requires the White House Office of Science and Technology Policy (OSTP) to submit an annual report to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science and Technology of the House of Representatives on the activities carried out under this prize authority during the preceding fiscal year.

This report documents the benefits the Federal government has already reaped from using prize competitions and challenges, the steps the Administration has taken to establish a lasting foundation for use of the prize authority provided by COMPETES, and detailed examples from FY 2014 of how this and other authorities are increasing the number of agencies that use prize competitions and challenges to achieve their missions more efficiently and effectively.

The scope of this report includes a detailed description of every prize conducted in FY 2014 under the prize authority provided by COMPETES (as reported by Federal agencies to OSTP) and selectively summarizes prize competitions and challenges conducted under other authorities.

## Section 1. BENEFITS OF PRIZE COMPETITIONS AND CHALLENGES IN THE PUBLIC SECTOR

The unique benefits and diverse outcomes of prize competitions and challenges have been well documented in the private, philanthropic, and public sectors.[13] Early adopters in the public sector have seen the value of well-designed prize competitions and challenges over the last decade. For example, the Chief Technologist of the National Aeronautics and Space Administration (NASA) reports that "NASA recognizes the value of the public as a strategic partner in addressing some of the country's most pressing challenges. The Agency is working to more effectively harness the expertise, ingenuity, and creativity of individual members of the public by enabling, accelerating, and scaling the use of open innovation approaches including prizes, challenges and crowdsourcing. These methods present an extraordinary opportunity to inspire the development of transformative technologies by offering a means to engage with non-traditional sources of innovative ideas, all in a remarkably cost-effective way."[14]

New entrants to prize competitions and challenges also recognize their potential. For example, the Department of Homeland Security (DHS)'s Under Secretary for Science and Technology (S&T) reports that "S&T looks forward to implementing and expanding the prize competitions programs under the America COMPETES throughout the Department as a means to discover new talent, stimulate the marketplace, drive collaboration, power ideas into reality, and make the impossible possible."[15] Specifically, prize competitions and challenges have enabled the Federal government to:

**Establish an ambitious goal and pay only for success, without having to predict which team or approach is most likely to succeed**

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[13] See e.g., McKinsey & Company, "And the Winner Is..."; Capturing the promise of philanthropic prizes, 2009, http://www.mckinseyonsociety.com/downloads/reports/Social-Innovation/And_the_winner_is.pdf and Deloitte University Press, "The Craft of Incentive Prize Design"; Lessons from the Public Sector, 2014. http://dupress.com/articles/the-craft-of-incentive-prize-design/

[14] NASA Report to Office of Science and Technology Policy on Prize Competitions for Fiscal Year 2014, submitted by David Miller, NASA Chief Technologist, to the Office of Science and Technology Policy, January 30, 2015

[15] Implementation of Federal Prize Authority in the Department of Homeland Security: Fiscal Year 2014 Progress Report, submitted by Dr. Reginald Brothers, Under Secretary for Science and Technology, to the Office of Science and Technology Policy, December 2014.

Contracts and grants are awarded based on proposals for future work. Agencies are limited to the use of expert review of potential impact or past performance, at the expense of disruptive innovation to assess merit. However, with a focus on proven results, prize competitions and challenges empower new, untapped talent to deliver unexpected solutions to tough problems. In the Department of Defense's Report to Congress on the Prizes for Advanced Technology Achievements,[16] the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics states, "Although prize competitions are unlikely to replace the traditional acquisition process in the Department, for specific technology problems, they have demonstrated the ability to stimulate and incentivize a broad spectrum of individuals to offer solutions to problems of significant interest to our Nation's Warfighters."

NASA's Disruption Tolerant Networking Challenge Series (DTN): The DTN Challenge Series is an ambitious, multi-year series of challenges to develop data networking protocols that can extend the Internet into the Solar System. The challenges helped improve the security, performance, and application of network protocols that can withstand the time delays caused by the immense distances between planets and the disruptions and non-contiguous paths of the space communications links. This was accomplished at a remarkably low cost for the Agency: beyond the prize incentives, the 2014 challenges cost NASA only $114,000 in operational expenses. NASA considers this to be a considerable achievement that will provide the basis for security in future space communications architectures implemented using DTN.

The series of challenges included two completed challenges in 2013[17] and two additional challenges in 2014. The most significant challenge to close in 2014 was the Security Key Challenge, which began in 2013. This challenge devised a method by which cryptographic keys can be exchanged in a network, in order to maintain secure communications despite the connectivity disruptions or random topology changes that are possible in outer space. Sixty-six solvers submitted solutions for this challenge and more than $40,000 was awarded in prizes. The Security Key architecture that was completed in 2014 has produced a capability that was previously not available – no security organizations had figured out how to do it and it was unclear at the outset if it could be done. There are plans to add additional challenges to the DTN suite of challenges during early 2015.

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[16] Report to Congress on the Prizes for Advanced Technology Achievements: Title 10, United States Code, Section 2374a. March 2015.

[17] Reference from FY13 COMPETES report

**Reach beyond the "usual suspects" to increase the number of solvers tackling a problem and identify novel approaches, without bearing high levels of risk**

As Sun Microsystems co-founder Bill Joy once famously said, "No matter who you are, most of the smartest people work for someone else." Prize competitions and challenges are one tool to tap the top talent and best ideas wherever they lie, sourcing breakthroughs from a broad pool of both known and unknown sources of innovation in a given industry. As prize competition and challenge solutions are delivered prior to payment, the Government can benefit from these novel approaches without bearing high levels of investment risk.

CDC Predict the Influenza Season Challenge[18]: The Center for Disease Control (CDC)'s $75,000 Predict the Influenza Season Challenge was a competition designed to foster innovation in flu activity modeling and prediction. The challenge sought models which would successfully predict the timing, peak, and intensity of the 2013-2014 flu season using social media data (e.g., Twitter, Internet search data, web surveys). CDC currently monitors flu activity using flu surveillance systems that do not utilize social media data or predict flu activity. With this challenge, CDC hoped to encourage exploration into how social media data can be used to predict flu activity and supplement CDC's routine systems for monitoring the flu.

Academics, scientists in private industry, and experts in big data participated in the challenge. Eight out of the nine teams that completed the challenge were composed of individuals from multiple universities, while one team came from a private company. Participating universities represent most of the forecasting expertise in the United States. By hosting this challenge, CDC was able to receive and evaluate 13 influenza season forecasts based on a variety of digital data sources and methodologies. The high number of forecasts received through this challenge is in contrast to the number of forecasts that likely would have been received if a more traditional method of outside engagement available at CDC was utilized (e.g. traditional contracts or grants).

CDC is currently receiving seven forecasts each week from the challenge participants. Jeff Shaman, an assistant professor in the Department of Environmental Health Sciences at the Mailman School of Public Health at Columbia University, won the challenge. Dr.

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[18] Challenge Website: http://www.cdc.gov/flu/news/predict-flu-challenge.htm

Shaman's forecasting model used data from Google Flu Trends as well as CDC's influenza-like illness (ILI) data, which CDC publishes online each week during the flu season. Shaman worked to overcome the limitations of both data sources by testing their model against actual flu activity that had already occurred during the season to determine in real time the reliability of their forecasts. Shaman's team presented their forecasts in a similar manner to how a meteorologist provides the chance of rain for each day's weather forecast. This approach helped communicate flu forecasting in a way that was meaningful to both public health officials and the public.

**Bring out-of-discipline perspectives to bear**

Empirical research conducted at the Harvard Business School has found that breakthrough solutions are most likely to come from outside the scientific discipline or at the intersection of two fields of study.[19] Prize competitions and challenges often seek and enable these interactions.

IARPA's Investigating Novel Statistical Techniques for Identifying Neural Correlates of Trustworthiness (INSTINCT) Challenge: The $50,000 INSTINCT challenge[20], part of the Intelligence Advanced Research Projects Activity (IARPA)'s TRUST (Tools for Recognizing Useful Signals of Trustworthiness) program, asked members of the American public to develop algorithms that improve predictions of trustworthiness. Participants were provided neural, physiological, and behavioral data recorded during experiments in which volunteers made high-stakes promises and chose whether or not to keep them. Determining trustworthiness is essential for society in general—but particularly so in the intelligence community, where knowing whom to trust is often vital. Preliminary analyses of this data suggested that signals collected from one person might have untapped potential to predict trustworthiness in others. However, many possible analytic routes and techniques were available, and it was not *a priori* obvious which would be appropriate to pursue; thus, IARPA decided to run a challenge.

Over 450 solvers registered for the challenge and 39 solutions were submitted. The winning team connected focused expertise with broader interdisciplinary interests in neuroscience, data, and engineering. The application of the winning techniques to behavioral prediction was novel, improved on IARPA's predictive accuracy by 15

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[19] Jeppesen, Lars Bo, and Karim R. Lakhani. "Marginality and Problem-Solving Effectiveness in Broadcast Search." Organization Science 21 (September - October 2010): 1016-1033.
[20] https://www.innocentive.com/ar/challenge/9933465

percent over baseline, and will help IARPA to more appropriately follow up on TRUST program results. This challenge has also helped to jump-start IARPA's use of challenge techniques, with the ASPIRE speech recognition challenge underway in FY15 and other challenges in the planning or consideration stage.

**Increase cost-effectiveness to maximize the return on taxpayer dollars**

Compared to other procurement mechanisms, prize competitions and challenges can be more efficient and cost-effective approaches for identifying solutions from the private sector. For example, challenge managers can run series of discrete competitions, allowing the Agency to learn from earlier challenges and redefine requirements for subsequent challenges if desired. NASA challenge managers describe this serial challenge process as "more nimble and flexible" than traditional procurement methods.[21]

In addition, teams in prize competitions and challenges compete for not just the cash purse, but also the associated validation, prestige, and satisfaction that result from solving important problems. Therefore, prizes can incentivize significant additional private-sector and philanthropic investment, leveraging the prize purse's impact. In the Orteig Prize won by Charles Lindbergh in 1927, nine teams spent a cumulative $400,000 to win the $25,000 prize purse.[22] More recently, the $10 Million Ansari X PRIZE was won in 2004 by Burt Rutan and SpaceShipOne, after the 26 competing teams spent more than $100 million to win the prize.[23]

DOE Open Source Wave Analysis and Response Program (openWARP) Challenge: Wave energy converter (WEC) devices could extract 1170 terawatt-hours of electricity per year by harnessing ocean wave energy. By tapping into just 10 percent of the total extractable ocean wave energy, WEC devices could power 10 million American homes. With OpenWARP, DOE has launched a series of crowdsourcing contests offering $50,000 in prizes to link the needs of the ocean energy community to the algorithm development expertise of the coding community. The goal of the challenge series is to develop a capability that is essential to the blossoming offshore renewable energy community: open-source simulation tools that can predict the hydrodynamic coefficients that describe the behavior of floating bodies within a wave field.

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[21] Calandrelli, Emily. "An evaluation of short innovation contest implementation in the federal context". Massachusetts Institute of Technology Libraries. 2013. Page 79.
[22] http://www.innovationinthecrowd.com/examples/orteig-prize.pdf
[23] http://space.xprize.org/ansari-x-prize

Demonstrating the cost effectiveness of challenges, DOE has been able to accomplish a significant fraction of its objectives in less than half the time and budget allocated to the project. Conducting this development activity through a series of challenges, as opposed to a traditional contract, allowed DOE to accomplish its original goals quickly and cheaply. The challenge mechanism has provided the flexibility to adopt ideas, capabilities, and approaches from the coding community. Because of these savings, additional OpenWARP objectives have been added that will result in an even more complete user-friendly package than anticipated, including integrated web-based user interfaces that operate multiple modules, improved visualization, and a standardized input and output approach.

Agency use of prize competitions and challenges offer these benefits, as well as numerous other advantages, such as the ability for prize competitions and challenges to: inspire risk-taking by offering a level playing field, credible rules, and robust judging mechanisms; give entrepreneurs and innovators license to pursue an endorsed stretch goal that otherwise may have been considered overly audacious; and establish clear success metrics and validation protocols that themselves become defining tools and standards for the subject industry or field.

Prize competitions and challenges are not the right tool for every problem, but, if aligned with a broader strategy and used systematically within an agency, they can be a powerful mechanism for spurring innovation. The prize authority provided by COMPETES has been instrumental in unleashing that potential.

Section 4, Section 5, and Appendix 1 of this report focus on the prize competitions developed under the specific prize authority provided by COMPETES. Appendix 2 provides a brief summary of prize competitions and challenges conducted under other authorities. Reporting of prize competitions and challenges under other authorities is not comprehensive as agency reporting to OSTP on prize competitions and challenges under authorities other than that provided by COMPETES is voluntary.

**Section 2. SUPPORT FOR SCALING THE USE OF PRIZE COMPETITIONS AND CHALLENGES**

Since 2009, the Obama Administration has taken important steps that are helping scale the successful use of prize competitions and challenges across the entire Executive Branch. COMPETES plays a key role in the Administration's work to make prize competitions and challenges a standard tool in every agency's toolbox by granting clear, broad authority to all Federal agencies. The Administration has laid the policy and legal groundwork to take maximum advantage of the new authority in the years to come. Actions taken by the Administration include:

- The September 2009 *Strategy for American Innovation*[24] recognized the potential for prizes to mobilize America's ingenuity to solve some of the Nation's most pressing challenges.
- In March 2010, the Office of Management and Budget (OMB) issued a formal policy framework[25] to guide agency leaders in using prize competitions and challenges to advance their core missions.
- In September 2010, the Administration launched Challenge.gov,[26] a one-stop shop where entrepreneurs and citizen solvers can find public-sector prize competitions and challenges. By March 2015, Challenge.gov had featured more than 396 competitions from over 72 Federal agencies, departments, and bureaus.
- Policy and legal staff in OSTP and OMB jointly developed a Fact Sheet and Frequently Asked Questions (FAQ) memorandum, which was issued in August 2011.[27]
- In the Second Open Government National Action Plan (2013),[28] the Administration committed to "convene an interagency group to develop an Open Innovation Toolkit for Federal agencies that will include best practices, training, policies, and guidance on authorities related to open innovation, including approaches such as incentive prizes, crowdsourcing, and citizen science." The General Services Administration (GSA) and OSTP began collaborating with the Federal Community of Practice for Challenges and Prizes in FY 2014 to develop this government-wide toolkit.

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[24] http://www.whitehouse.gov/innovation/strategy and
http://www.whitehouse.gov/sites/default/files/microsites/ostp/innovationstrategy-prizes.pdf
[25] http://www.whitehouse.gov/sites/default/files/omb/assets/memoranda_2010/m10-11.pdf
[26] http://www.challenge.gov/
[27] Prize Authority in the America COMPETES Reauthorization Act:
http://www.cio.gov/documents/Prize%20Authority%20in%20the%20America%20COMPETES%20Reauthorization%20Act.pdf
[28] http://www.whitehouse.gov/sites/default/files/docs/us_national_action_plan_6p.pdf

Building on the support provided by the Administration, both GSA and NASA continue to provide support to the Federal prizes and challenges community through the Challenge.gov program and the Center of Excellence for Collaborative Innovation (CoECI), respectively.

**Assistance and Support from GSA**

GSA provides support and assistance to all Federal agencies operating prize competitions and challenges. In addition to managing the online platform Challenge.gov, the GSA program office manages a Federal community of practice of over 600 challenge practitioners and an active listserve. The program also provides a variety of resources, research, best practices, templates, and toolkits for the challenges community on DigitalGov.gov. Through a partnership with DigitalGov University, the program has developed a comprehensive, monthly in-person and digital training curriculum for the community, and has trained over 1,500 people across government.

Section 24(n) of Stevenson-Wydler called on GSA to "develop a contract vehicle to provide agencies relevant products and services, including technical assistance in structuring and conducting prize competitions to take maximum benefit of the marketplace as they identify and pursue prize competitions to further the policy objectives of the Federal Government." In response, GSA launched Sub-Schedule 541 4G, "Challenges and Competitions Services"[29] in July of 2011. Contractors on the schedule offer agencies options for technical assistance, prize platforms, and communities of individuals 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.

**Government Wide Center of Excellence for Collaborative Innovation**

In 2011, the Administration launched the Center of Excellence for Collaborative Innovation (CoECI), a NASA-led, Government-wide center of excellence to provide agencies guidance on all aspects of implementing prize competitions and challenges: from effective problem definition, to the design of incentives that attract solvers, to evaluation of submitted solutions. From its Centennial Challenges Program, to its CoECI,

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[29]http://www.gsaelibrary.gsa.gov/ElibMain/sinDetails.do?scheduleNumber=541&specialItemNumber=541 +4G

to the various education and open government challenges the Agency has conducted, NASA is a public-sector leader with breadth and depth of experience and experimentation with prize competitions and challenges. Through CoECI, NASA helps other Federal agencies follow in its footsteps. For select agency pilots conducted through inter-agency agreements or through informal support, CoECI leverages existing NASA open innovation infrastructure to provide a full suite of services, allowing agencies to rapidly experiment with these new methods before standing up their own capabilities.

During FY 2014, CoECI helped several agencies implement challenges, including Center for Medicare and Medicaid Services (CMS),[30] DOE,[31] and the Environmental Protection Agency (EPA).[32] Additionally, CoECI provided consulting services to DOJ, the Bureau of Reclamation, the Department of Veterans Affairs, DOD, and DHS as these agencies launched initiatives to understand how to effectively structure and launch successful challenge efforts of their own.

CoECI also captures and communicates best practices, case studies, and successful methodologies. CoECI has partnered with Harvard University to provide research, as well as operational guidance and consultation, which enhanced overall success of the NASA CoECI challenges. In addition to supporting NASA challenge development and execution, Harvard published peer-reviewed papers, developed five working papers and two case studies, and made over 15 academic presentations in FY 2014 based on CoECI's efforts.

Beyond these Federal Government-wide sources of assistance and support, several agencies have reported building various types of infrastructure to support developing and operating prize competitions and challenges at their agencies (summarized in Table 1) including:

**Issuance of department-wide policy or guidance on the use of prize competitions and challenges**

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[30] Summary report on "CMS Healthcare Fraud Prevention Partnership Data Exchange Network"; Summary report on "CMS Open Payments App Challenge"

[31] Summary report on "Open Source Wave Analysis and Response Program (OpenWARP)"

[32] Summary report on "Cyano Predictive Modeling & Mobile App"

Agencies have established strategies and policies to further accelerate widespread use of prize competitions and challenges. HHS has been at the forefront of agency implementation efforts of the new prize authority granted under COMPETES since 2012. On October 12, 2011, Secretary Sebelius issued a memorandum notifying HHS of the new prize authority, outlining the strategy to optimize the use of prize competitions, and calling on the heads of operating and staff divisions to forecast their future use of prize competitions to stimulate innovation in advancing the Agency's mission. The full set of policy statements, guidance, and resources are available online.[33] Further, in FY 2014 the HHS Office of the Assistant Secretary of Administration and the HHS IDEA Lab identified the major barriers to the institutionalization of prize activity across the Department after three years of experience and developed guidance and tools to address them. For example, HHS has instituted a series of three surveys for all competitions (a pre-competition survey, a post-competition survey, and an impact survey conducted one year after the competition ends) in order to guide the development of prizes, and evaluate their success.

In FY 2013, several other agencies issued agency-wide policy and guidance, including EPA and NASA.[34] Following HHS, EPA, and NASA's examples, additional departments and agencies have issued agency-wide policy and guidance. In FY 2014, USDA developed a new Departmental Regulation[35] on Prizes and Challenges (published in January 2015). In FY 2014, DHS Secretary Johnson delegated the prize authority granted under COMPETES to the DHS Science and Technology Directorate, which has developed a DHS Prize Competitions Directive and prize competition instruction, providing the Department with guidance and procedures for requesting and executing prize competitions. DHS has also developed a draft Prize Competition Guidebook and a Prize Competition Manager's Checklist. In addition, DOI developed a guidance memo during FY 2014 (published in April 2015) through an intradepartmental task force constituted by DOI's Working Group on Technology Transfer.[36]

**Common contract vehicles**

Leveraging the work done by GSA to develop the Sub-Schedule 541 4G, several agencies have developed agency-wide prize and challenge service contract vehicles to streamline

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[33] http://www.hhs.gov/idealab/what-we-do/hhs-competes/
[34] http://nodis3.gsfc.nasa.gov/displayDir.cfm?t=NPD&c=1090&s=1
[35] http://www.ocio.usda.gov/document/departmental-regulation-2405-001
[36] http://www.doi.gov/techtransfer/prize-competition-guidelines.cfm

access to vendors to support the design and implementation of prize competitions and challenges. These contract vehicles support the groups currently operating challenges, and also lower the barrier for new groups within the Agency who intend to develop challenges. For example, in December 2014, DHS released a prize competition support contract solicitation to the GSA Schedule 541 4G venders to provide 12 months of management and technical support to three prize competitions and provide two government engagements on competition fundamentals, the identification of pressing problems, and the development of a competition portfolio.

In 2013, HHS also created a common contract vehicle for prize management support and platform use. HHS made blanket purchase agreement (BPA) awards to three vendors on the GSA 541-4G Schedule, organized by prize type category—ideation, scientific, hardware, and outreach. The vehicle was immediately utilized by the Health Resources and Services Administration (HRSA) for its upcoming Word Gap Challenge (announced in October 2014[37]). More agencies at HHS are planning to use of this acquisition vehicle and steps are currently underway to expand the available vendors and services.

The Department of Education, which ran its first prizes in FY 2014 and anticipates running additional competitions in the coming years, has also developed an agency-wide contract vehicle that will allow any of its offices to access expertise and resources for conducting challenges and prize competitions. Additionally, EPA is working on a BPA in order to more efficiently work with GSA prize contractors. The Agency anticipates that the BPA will be signed in 2015. Finally, NASA is also working on a procurement activity expected to result in multiple Indefinite Delivery Indefinite Quantity contracts with a variety of challenge vendors; the Agency anticipates that the acquisition will be completed in June 2015.

**Internal communications tools**

Many agencies are proactively seeking to increase awareness of prize competitions and challenges as problem solving and innovation tools among employees. To do this, several agencies support internal communications tools to reach new users, to increase sophistication of use, and to network existing practitioners to ensure that best practices and lessons learned are shared. For example, EPA maintains a robust Intranet site that provides access to guidance and policy as well as a links to active and past challenges

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[37] https://www.whitehouse.gov/blog/2014/10/16/leveling-playing-field-all-children-federal-state-and-local-efforts-bridge-word-gap

conducted by the Agency. Further, EPA has established the "Challenge Review Team" (ChaRT), which provides Agency-level review of potential challenges and serves as a forum for identifying and addressing questions about challenges at EPA. Also, since its establishment in September 2014, DHS's prize team has established an internally-facing website, a monthly newsletter, and is utilizing an email distribution list. NASA supports a listserve with over 200 employee subscribers and holds quarterly Prize Community of Practice meetings to share lessons learned.

**Coordinated external communications**

As agencies increase the volume of prize competitions and challenges they support, some have developed coordinated communications strategies for engaging with solver communities across the various prize competitions and challenges they conduct. Agencies have used websites, listserves, and social media outreach to better promote opportunities to the public. For example, EPA maintains a public website that provides the public with links to EPA challenges. In addition, in September 2014, NASA announced the *NASA Solve* website, a one-stop shop where the general public can learn about and engage with the challenges, prize competitions, and crowdsourcing activities that aim to solve tough problems related to NASA's mission. The site has consistently generated approximately 30,000 unique visitors weekly and program managers have reported this portal to be a major point of entry for solvers. NASA also maintains *NASA Solve* social media accounts to reach members of the public interested in participating in NASA challenges.

**Dedicated, central prize and challenge leads**

Several agencies have dedicated personnel to lead prize and challenge design and administration efforts at their agencies and to provide internal support to program managers interested in making use of prize competitions and challenges. Prize design, management, and oversight are full-time jobs for these employees in response to the demand for the use of prize competitions and challenges within their agencies. They are often responsible for policy and guidance, internal and external agency communication strategies for prize competitions and challenges, the development of common contract vehicles, and consultation for specific prize and challenge designs. These employees also become stewards for best practices for their agencies and help shepherd the development of more ambitious and mission aligned challenges as agency knowledge, capacity, and experience in the use of prizes and challenges increases. As an example of this dedicated, centralized approach, the S&T Directorate of DHS established the Prize and Small

Business Innovation Office (PSBIO) within the Research and Development Partnership Group's Public-Private Partnerships Office. The Office has two Federal employees (one of whom is full time) dedicated to the administration, planning, and execution of the Department's America COMPETES Act prize competitions. Since its establishment in September 2014, the PSBIO has drafted a Prize Competition Guidebook, Prize Competition Manager's Checklist and internal communications infrastructure (described above).

**Identified agency prize and challenge point of contact**

Other agencies have identified agency points of contacts for prize competitions and challenges that have taken on responsibilities such as policy and guidance development, but who are not devoted full time to prize competitions and challenges. Both USDA and DOI have identified prize points of contact that led the development of their Agency's prize policies in FY 2014.

**Distributed networks of prize managers and points of contact within agencies**

At some agencies, personnel are distributed across groups engaged in operating prize competitions and challenges. As an example of the distributed approach, a group of prize practitioners at DOE identified the need for a prize forum to share lessons learned and best practices for prizes and challenges in FY 2014.  The scope of the group, known as the DOE Prize Community (PComm), is broad to allow for all DOE members involved with past, current, and future prizes, competitions, and challenges to focus on topics of interest such as prize design, performance metrics, legal challenges, financing, sponsorships, etc. The first DOE PComm meeting was held on November 6, 2014. There are over 100 members from a wide variety of offices and technology disciplines within DOE.

Employees across agencies are getting involved in the design and implementation of prize competitions and challenges in a variety of different ways. For example, learning from its previous experience with the implementation of solutions found through prize competitions, every ARFL competition now selects a Challenge Champion who will take any solution or idea to a point where it can be put into practice. This involves taking the idea, concept, or solution identified during a prize competition to a practical prototype that can be tested in a realistic environment by the user.

**TABLE 1. CHALLENGES AND PRIZES INFRASTRUCTURE: AGENCY PRACTICES**

| | |
|---|---|
| **Issuance of Department-Wide Policy or Guidance on the Use of Prize Competitions and Challenges** | HHS, EPA, NASA, DOI, USDA, DHS |
| **Common Contract Vehicles** | Education, HHS, DHS, EPA, NASA |
| **Internal Communications Tools** | HHS, DHS, EPA, NASA, DOE |
| **Coordinated External Communications** | NASA, EPA |
| **Dedicated, Central Prize and Challenge Leads** | NASA, HHS, USAID, DHS, EPA |
| **Identified Agency Prize and Challenge Point of Contact (Not Dedicated Full Time to Prizes)** | USDA, DOI, DOD |
| **Distributed Network of Prize Managers and Points of Contact Within the Agency** | HHS, NASA, HHS, USAID, DHS, EPA, USDA, DOE, DOD, AFRL |

While the number of agencies using the clear and broad authorities provided to them under COMPETES increased in FY 2014, numerous public-sector prize competitions and challenges continued to be administered under other pre-existing authorities, including: agency-specific authorities; procurement authority such as that provided by the Federal Acquisition Regulation (FAR); the authority to award grants, participate in cooperative agreements, or both; and authority related to "necessary expense" doctrine, among others. Some agencies used both COMPETES and other authorities. These prize competitions and challenges add additional lessons learned and best practices to the growing community of practice engaged in public-sector prize competitions and challenges.

In FY 2015, the use of the prize competitions and challenges likely will continue to increase as more agencies complete internal policies and strategies related to their implementation; as agency experience with prize competitions and challenges grows; as more resources for training of agency personnel and for the development, implementation, and promotion of challenges become available to agencies through GSA; and as CoECI continues to provide support for pilot programs at other agencies. These activities are expected to result in highly leveraged, open innovation programs that help agencies to address grand challenges[38] and meet their respective missions.

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[38] http://www.whitehouse.gov/grand-challenges

**Section 3. HIGHLIGHTS AND TRENDS FROM PRIZE COMPETITIONS AND CHALLENGES CONDUCTED IN FY 2014**

Aided by the support described in Section 2, agencies have expanded their use of prize competitions and challenges conducted under COMPETES and other authorities, with 97 prize competitions and challenges offered by 30 agencies in FY 2014. These competitions provide evidence for how prize competitions and challenges are helping agencies across the Federal government reap the benefits discussed in Section 1. A review of prizes conducted in FY 2014 reveals the following trends and best practices in using public-sector prize competitions and challenges to drive innovation:

**Increased ambition and sophistication of prize competition and challenge designs enabled by partnerships**

Agencies use prize competitions and challenges 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, stimulating markets, etc.

In FY 2014, the majority of challenges (79 percent) were designed to achieve multiple goals, and more than one-third were designed to produce multiple types of solutions. By increasing the number of goals a challenge is designed to accomplish, the complexity and design sophistication of those challenges increases. Nearly two-thirds of FY 2014 challenges sought to *engage new people and communities* as one of the stated goals. This is an indication of the increasing recognition by agencies that prize competitions and challenges are a powerful tool to tap into expertise in new communities and disciplines. Several challenge operators described connections with new academic and technical communities to be among the greatest positive impacts of the challenge. It is important to note that 94 percent of all prize competitions and challenges that had *engage new people and communities* as a goal also had another goal, most commonly, *finding innovative ideas, educating the public*, or *solving problems*. This indicates that engagement can be a means to help achieve another goal, in addition to being a valuable result in and of itself.

The most common types of solutions sought by FY 2014 COMPETES challenges were *Ideas* and *Software and Apps*, each of which were sought by nearly half of the challenges, followed by *Analytics*. While *Software and Apps*, and *Ideas* were also popular in FY

2013 COMPETES challenges, analytical solutions became 15 times more common in FY 2014 and creative solutions decreased from 34 percent to 26 percent of challenges. Also notable is the increase in the proportion of challenges seeking technology or scientific solutions, from 7 percent in FY 2013 to 24 percent in FY 2014.

In addition, in FY 2014, partnerships were utilized broadly. Partnerships with other Federal agencies, not-for-profit, and for-profit entities allow Agencies to be more ambitious in designing and executing challenges. In FY 2014, 56 percent of all prize competitions and challenges leveraged partnerships to expand their reach, impact, and scope.

As agencies learn how to use and design prize competitions and challenges most effectively, they are progressively becoming more ambitious in design through partnerships and complex goal setting. This trend is evident in a number of agencies including NASA, DOE, DOD, USAID, NIJ, EPA, and HHS. It is important to note that each of these agencies has a devoted, full-time prize coordinator or a point of contact for the prize community. A prize point of contact is critical to increasing the depth, breadth, and sophistication of prize competitions and challenges usage within an agency.

As a leading example of this trend, HHS has built off its four years of experience operating COMPETES challenges and, in FY 2014, increasingly used prize competitions and challenges to address the health concerns of American citizens and develop improvement to tools core to the missions of the HHS agencies. HHS's Chief Technology Officer reports that "Competitions at HHS have continued to evolve, with increasing complexity of design and problem statements better aligned with programmatic goals… competitions are now being designed to focus on implementing innovative solutions rather than merely soliciting them." In addition, HHS prize competitions are becoming progressively more ambitious. In FY 2014, the NIH and the Biomedical Advanced Research Projects Authority (BARDA) announced a commitment to design a $20 million challenge to advance the development and use of rapid, point-of-care diagnostic tests to be used by health care providers for identification and characterization of highly resistant bacterial infections. Having a diagnostic tool of this nature will equip health care providers with a critically needed tool to guide their usage of antibiotics and promote responsible use of antibiotics. This challenge is a key element of the Administration's

new Executive Order on Combating Antibiotic-Resistant Bacteria[39] and National Strategy for Combating Antibiotic-Resistant Bacteria[40].

Over the coming years, more agencies are likely to pursue progressively more sophisticated and ambitious prize designs that harness partnerships as Federal prize designers build off their early experience with more simplistic prize designs, such as app competitions. Despite this trend, it is important to note that the Federal Government could further expand the overall level of ambition present in the use of prize competition and challenges. A 2014 Deloitte Report[41] found that "while challenges are becoming more complex on the whole, the most ambitious outcomes on both spectra—market stimulation and inspire transformation—continue to make up a very small percentage of challenges on Challenge.gov, comprising less than two percent of outcomes sought [between 2011 and 2014]."

Examples of prize competitions and challenges conducted in FY 2014 with increasing levels of sophistication and ambition in design include:

NASA's Asteroid Data Hunter Challenge: The Asteroid Data Hunter Challenge, a series of contests with a $55,000 total prize purse, is the first open innovation project to be conducted in support of NASA's Asteroid Grand Challenge. The Asteroid Grand Challenge is a NASA-coordinated global effort to find all asteroid threats to human populations and know what to do about them. NASA partnered with Planetary Resources, Inc. to conduct this series of challenges leveraging Catalina Sky Survey data hosted on the Amazon cloud. The Asteroid Data Hunter Challenge had two objectives: (1) develop a more computationally efficient, general purpose algorithm to detect moving objects using imagery captured by ground-based telescopes—specifically, to increase the detection sensitivity, minimize the number of false positives, ignore imperfections in the data, and ensure that the algorithm can run effectively on all computers; and (2) develop a software application that is so easy to use that citizen scientists, hobbyist astronomers, and even professional institutions will want to download it. Thus the challenge sought both to provide scientific value to the asteroid detection community and to create a tool allowing citizen scientists to contribute genuinely to asteroid detection.

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[39] https://www.whitehouse.gov/the-press-office/2014/09/18/executive-order-combating-antibiotic-resistant-bacteria

[40] https://www.whitehouse.gov/sites/default/files/docs/carb_national_strategy.pdf

[41] Deloitte University Press, "The Craft of Incentive Prize Design"; Lessons from the Public Sector, 2014. http://dupress.com/articles/the-craft-of-incentive-prize-design/

This challenge was announced to the developer community at the 2014 South by Southwest Festival in Austin, TX, and it received significant press coverage. Throughout the 10 months of the challenge, over 1,200 solvers participated in submitting 700 solutions that resulted in the development of both a new algorithm and a software package. The algorithm has resulted in a 15 percent improvement over the current method of identifying asteroids in the main belt of Asteroids that orbit between Mars and Jupiter.

"The beauty of such archives is that the data doesn't grow stale, and with novel approaches, techniques and algorithms, they can be harvested for new information. The participants of the Asteroid Data Hunter challenge did just that, probing observations of the night sky for new asteroids that might have slipped through the software cracks the first time the images were analyzed," said Jose Luis Galache of the Minor Planet Center. "Moreover, this software can now be used to analyze new images and is available to any observer who wants to use it. The Minor Planet Center applauds these efforts to provide superior tools to all, and looks forward to receiving new asteroid observations generated with them."[42]

The results of this challenge continue to support the use of crowdsourced algorithms to advance NASA's image processing capabilities, as well as the continued use of open innovation in support of the Asteroid Grand Challenge. Furthermore, these results were obtained for a total project cost of less than $200,000, which is less than the salary for one full-time engineer for the same time period.

DOE's SunShot Prize: Race to 7-Day Solar: Prizes are being designed not only to accelerate the development of low-cost technologies, but also to address the soft costs associated with the deployment and installation of those technologies. Despite unprecedented cost reductions for solar hardware over recent years, the total price to install and commission residential and small-commercial scale solar energy systems remains high. Designing and implementing practices that enable reductions in the associated non-hardware costs of solar is now the greatest challenge to achieving national targets for attaining cost-competitive solar by 2020. Customers often wait as long as six months to flip the switch on a small residential solar system.

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[42] http://www.nasa.gov/press/2015/march/new-desktop-application-has-potential-to-increase-asteroid-detection-now-available/

The DOE's Sunshot Prize[43] seeks to spur faster, easier, and cheaper solar deployment in the United States and will offer a total of $10 million in cash awards to make permitting, installation, inspection, and interconnection (permit-to-plugin) processes more efficient than ever before. Every one-day cut due to process efficiency translates to $2 million of electricity sales at 2013 deployment level. Through this challenge, DOE seeks to increase process certainty and reduce the time of permit-to-plugin towards seven days (Small System Contest) or seven weeks (Large System Contest).

The SunShot Prize not only rewards results, it increases the number and the diversity of entities that are addressing this problem, especially cities, local governments, utility companies, and installers. The target audiences are teams consisting of numerous organizations such as solar developers, installers (large and small), state and local governments, utilities, property owners and managers, new housing builders, home service providers, trade associations, and new market entrants.

**More prize competitions and challenges to develop low-cost software and IT solutions**

More than half of the 34 prize competitions conducted in FY 2014 under the authority provided by COMPETES and 38 percent of all prize competitions and challenges conducted in FY 2014 sought software and/or analytical solutions such as applications (apps), data visualization tools, and predictive models and algorithms. Many of these challenges sought to develop complex software through crowdsourcing. Going beyond app contests, challenges can be structured to build software that addresses a variety of Government needs in a more cost-effective, agile, and creative way than through traditional Government contracts.

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[43] On September 19, 2014, DOE published a notice in the Federal Register (79 FR 56349) to announce its decision to suspend the original rules for the SunShot Prize that were released on September 19, 2012 and its intent to release revised competition rules before the end of the calendar year. DOE has reexamined the original rules in light of today's needs and conditions and determined that these rules do not create the necessary synergetic opportunities for collaboration among cities, installers, and utilities to bring process efficiency which ultimately lower prices. DOE has released, on October 22, 2014, a revised draft rule document of the program seeking public comments no later than November 28, 2014.

This use of challenges represents a new option for IT and acquisition professionals across the Federal Government to test requirements for IT acquisitions and even purchase software development services. In this way, challenges provide an entirely novel capability to the Federal IT community. Using this approach, software is being developed not by one or two full-time coders, but instead by potentially hundreds or thousands of specialized coders, developers, and designers that each participate in small parts of a software development project.

Examples of challenges conducted in FY 2014 that sought software development include:

NASA's Lunar Mapping and Modelling Portal (LMMP) Image Processing Challenge:

The purpose of the LMMP Image Processing Challenge was to develop a software application that performs image processing to transform the raw images taken by Lunar Reconnaissance Orbiter (LRO) into geo-referenced and "mosaicked" images that can be displayed on the Lunar Mapping and Modelling Portal. These rich visualizations are highly valuable for future mission planning and development. To create this product, the challenge series included 21 contests with 153 unique registrants for a total of 35 submissions. The LMMP Challenge delivered an online tool that reduced the time to process LRO images into a hi-resolution geo-referenced mosaic. The previous online service tool required 19 hours to process 29 images. The new solution reduced the time to process the images to three hours and allows for an additional reduction in time by adding additional nodes. This was accomplished with less than $13,000 in prize incentives and operational expenses of $55,000.

CMS Healthcare Fraud Partnership Data Exchange Network: The primary objective of this challenge was to build a data exchange network that enables healthcare insurance-paying entities in both the public and private sector to safely and securely share information for purposes of prevention and detection of fraud, waste, and abuse across partners. This application was built for the Healthcare Fraud Prevention Partnership through CMS. Over 1,400 people competed for $100,000 in prizes over the course of this challenge series. In this case, a challenge approach provided CMS with a low-cost way to test assumptions, understand state of the art software development capabilities, and refine the requirements for the product that they would ultimately procure in a much larger acquisition. This challenge series also helped CMS learn how they might, in the future, use challenges to replace a more traditional acquisition and contract process for software development.

**More prize competitions and challenges that focus on supporting entrepreneurship and commercialization**

Incentive prizes can be powerful tools for supporting entrepreneurs and small businesses by leveling the playing field and giving license to pursue an endorsed stretch goal that otherwise may have been considered overly audacious. NASA's Centennial Challenges Program is a leader in conducting challenges of this type. In keeping with the spirit of the Wright Brothers and other American innovators, NASA's Centennial Challenge prizes are offered to independent inventors including small businesses, student groups, and individuals. These independent inventors are sought to generate innovative solutions for technical problems of interest to NASA and the Nation and to provide them with the opportunity to stimulate or create new business ventures[44]. NASA's Centennial Challenges program has supported the development of several new small businesses now serving the aerospace industry including Flagsuit LLC, Final Frontier, LaserMotive, Masten Space Systems, and several others. To date, they have awarded more than $6 million in prize money to more than 15 different teams[45].

Challenges that seek to support the creation of new business and the commercialization of services also often provide more incentives to participating teams than just a cash purse. They support the creation of sustainable teams around the commercialization of solutions, and will often provide additional incentives to participants such as: mentoring access to subject matter experts, intellectual property, or other resources; exposure to venture capitalists and other potential funders; and training.

Learning from the successes of entrepreneurship-focused challenges such as those offered by the Centennial Challenges Program and others, several Federal agencies saw the impact in FY 2014 that prize competitions and challenges can have on spurring entrepreneurship on a range of fields including clean energy and health care. Examples of challenges conducted in FY 2014 that sought to spur entrepreneurship and commercialization include:

DOE's National Clean Energy Business Plan Competition (NCEBPC)[46]:  The NCEBPC aims to inspire clean energy innovation across the country by creating businesses from best in-class technology research, while inspiring and cultivating America's next

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[44] http://www.nasa.gov/directorates/spacetech/centennial_challenges/#.VRmKb0idySE

[45] http://www.nasa.gov/sites/default/files/files/10-24-12-LPC-Centennial-Challenges-FAQ.pdf

[46] Challenge Website: http://techportal.eere.energy.gov/commercialization/natlbizplan.html

generation of entrepreneurs to drive those businesses forward. The NCEBPC awards prizes to the teams with not just the best technology, but the premier teams developing early-stage companies to turn technology into products ready for the commercial markets.

Student-led teams compete in six DOE-sponsored regional competitions by submitting business plans supporting innovative clean energy technologies. In addition to competing for six $100,000 regional prizes across the country, students receive mentorship and training in preparation for the regional and national competitions, enhancing their entrepreneurial skills and preparing them to launch technologies from research institutions into the market. The NCEBPC culminates in a National Grand Prize event in Washington, D.C., where the six regional finalists compete for a suite of prizes sponsored by private-sector institutions.

Though only in its fourth year, the NCEBPC has a legacy of broad economic impacts. In the first three years, more than 70 ventures have incorporated, received more than $38 million in follow-on funding, and generated more than 120 jobs. The racial and gender diversity of the 2014 Competition was greater than in previous years, with women present on five of the six winning teams, and the National winning team coming from a minority-serving institution. For the third year, participants and finalists in the 2014 NCEBPC were recognized in the Forbes 30 under 30 list.

NIH Breast Cancer Startup Challenge (BCSC)[47]: The primary goals of the BCSC Challenge are to accelerate the process of bringing emerging breast cancer technologies to market and to stimulate the creation of start-up businesses around these inventions. The Challenge represents an innovative approach to moving NIH discoveries to market and is the first program focused on the creation of start-ups companies based on Federally-conceived and owned inventions. While NIH has the capacity to enable collaborative research or to license technology to existing businesses, some early-stage technologies are best suited for licensing by start-up companies to further develop them into commercial products.

The BCSC planning team, comprised of the National Cancer Institute Technology Transfer Center, the Center for Advancing Innovation, and the Avon Foundation for

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[47] Challenge Website: http://www.breastcancerstartupchallenge.com/

Women, identified a group of 10 NIH-owned breast cancer related inventions that would benefit from this new type of program. The challenge also represents an innovative partnership model. NIH contributed to this challenge by managing the inventions – including the patents, licensing process, and facilitating collaboration with the inventors. Meanwhile, a collaboration agreement with the Center for Advancing Innovation provided challenge participants with access to mentorship, training, and investors. The Avon Foundation provided funding and further outreach.

This challenge created 11 new startups that are giving 10 promising cancer inventions the opportunity to impact the fight against breast cancer, and help create new jobs. The challenge turned an existing business plan competition model on its head; it created a new channel to license inventions by crowdsourcing brilliant talent to establish new startups. Following the success of the Breast Cancer Startup Challenge, the Agency has initiated the Neuro Startup Challenge, which began at the end of FY 2014. The Neuro Startup Challenge presented 16 brain-related inventions, using the same partnerships and challenge design as the BCSC, and reports that 61 teams have joined the competition.

**New models for engaging the public and building communities during prize competitions and challenges**

In FY 2014, challenge managers continued to experiment with new ways to engage the public and develop new communities focused on challenge topics during prize competitions. These approaches included: soliciting public comment on draft rules; operating a pilot challenge to determine interest and gather feedback from in the target participant population; using scouting services to identify potential participants in challenges; inviting winners to present webinars on their solutions to the target participation population; using "co-design" platforms to integrate user needs and opinions into the design of solutions; announcing challenges at events where target participants already were (e.g. datapaloozas, DEFCON, SXSW, etc); publication of winning solutions as open-source resources; using crowdfunding to support entrants; and hosting physical and virtual forums that allowed entrants and stakeholders to discuss, develop, and improve solutions both during and after the challenge. Examples of prize competitions and challenges that included unique approaches to engaging the public and building a community include:

AFRL Synthetic Biology for Materials Challenge: The goal of the Air Force Research Lab (AFRL) $50,000 Synthetic Biology for Materials Challenge[48] was technically ambitious: to develop detailed, multi-disciplinary, innovative research and development plans that would advance today's science and engineering in synthetic biology to a level where it could enable both instantiation of pathways that control the large-scale synthesis of nanoparticles in living organisms and methods to assemble optically active materials (e.g. metal nanoparticles, chromophores) on chiral templates in vivo without external manipulation. A potential application of such materials could be in the fabrication of highly-ordered magneto-dielectric meta-material for broadband antenna applications. AFRL was unsure where the best ideas would come from, but due to the highly technical nature of the challenge, AFRL expanded on the usual participants reached through their challenges by engaging PreScouter[49] to identify key individuals in Universities and research labs to invite to the challenge. Over 350 individuals and teams registered for the Challenge and nine submissions were received. Despite the low number of submissions, the evaluation team found four novel research proposals and awarded $50,000 in prize money. The AFRL researchers are planning to invite the submitters to a collaborative forum to be held in Washington, D.C to further refine and expand on these ideas and create joint proposals for funding from the Office of the Secretary of Defense.

Education's Expanding Opportunity for Asian Americans and Pacific Islanders Challenge: The White House Initiative on Asian Americans and Pacific Islanders (WHIAAPI) called for submissions on great ideas for partnerships with the Federal Government that would expand opportunities for the Asian Americans and Pacific Islanders (AAPIs) community. The United States is home to 18.2 million AAPIs who are part of diverse communities with diverse needs. The AAPI population is on the rise in every region of the country. In fact, the population has increased by nearly 50 percent in just 10 years. The WHIAAPI is working with local leaders to provide the necessary tools for communities to keep up with this growth.

At the heart of this challenge is the goal for AAPIs to work across cultures and sectors to establish effective local services, and ultimately achieve prosperity nationwide. WHIAAPI received 30 applications from AAPI individuals and community-based organizations throughout the continental United States through this challenge. The five winners[50] of this challenge entered into memoranda of understanding with the

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[48] https://www.innocentive.com/ar/challenge/9933056

[49] http://www.prescouter.com

[50] https://www.whitehouse.gov/blog/2014/09/15/announcing-new-partnerships-expand-opportunity-aapis

Department of Education to partner on a project targeting an AAPI community to continue developing the idea and build communities. These partnerships will help to: establish a "boot camp" for small business owners; host webinars on capacity building for community-based organizations; support an innovative community-supported agriculture program; involve underserved AAPI high school students in STEM; and launch a national awareness campaign. Overall, the challenge helped strengthen strategies to increase public- and private-sector collaboration and community involvement in improving the health, education, nutrition, environment, and well-being of AAPIs.

**Section 4. HIGHLIGHTS FROM PRIZES CONDUCTED UNDER THE AUTHORITY PROVIDED BY COMPETES IN FY 2014**

In FY 2014, the number of competitions conducted through all authorities increased over prior years and is nearly twice the number conducted in FY 2012. Thirty agencies self-reported a total of 97 prize competitions and challenges conducted under all authorities (including that provided by COMPETES) in FY 2014, compared to 23 agencies in FY 2013 – a 30 percent overall increase year-to-year. Of these 97 challenges, 34 were conducted under the authority provided by COMPETES by 17 agencies. Since COMPETES was signed into law during FY 2011, 100[51] prize competitions from 30 agencies have been offered under the prize authority provided by the Act, and 43 agencies have reported on 226 prizes under all authorities.

**TABLE 2. PRIZES AND CHALLENGES CONDUCTED FROM FY 2011- FY 2014[52]**

|  | Number of prizes under COMPETES authority | Number of Agencies offering prizes under COMPETES authority | Number of prizes under all prize authorities | Number of agencies offering prizes under all authorities |
|---|---|---|---|---|
| FY 2011 | 7 | 7 | *Use of other authorities not reported* | *Use of other authorities not reported* |
| FY 2012 | 27 | 12 | 49 | 16 |
| FY 2013 | 41 | 15 | 90 | 23 |
| FY 2014 | 34 | 17 | 97 | 30 |

Also in FY 2014, seven agencies offered prizes for the first time using COMPETES. These agencies include CPSC, DOT, GSA, FDA, the Office of the HHS Assistant

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[51] This number includes all instances of annual competitions, but does not count competitions multiple times if they were reported more than once; it is therefore different from the sum of challenges reported each year.

[52] The method for calculating these numbers has been updated from the method used in previous reports. Component agencies are now counted separately if they use distinct infrastructure to operate challenges.

Secretary for Administration, DARPA, and NIC. Six agencies have reported on COMPETES challenges for at least three of the four years the authority has been available, and a further seven have reported on challenges under COMPETES or other authorities for at least three years, illustrating that there is healthy, continuous use of prize competitions and challenges by many agencies. The total number of agencies that have conducted prize competitions and challenges to date exceeds 72, according to Challenge.gov.

The total amount of prize money available in FY 2014 COMPETES challenges is five percent greater than the amount offered in FY 2013 – put another way, the average prize purse for a COMPETES challenge in FY 2014 has risen more than 30 percent compared to FY 2013.[53]

Highlights from the 34 prize competitions conducted through the authority offered by COMPETES in FY 2014 include:

DARPA Cyber Grand Challenge (CGC): In FY 2014, DARPA conducted its first prize competition under the authority provided by COMPETES. This prize competition has a very ambitious goal: to engender a new generation of autonomous cyber defense capabilities that combine the speed and scale of automation with reasoning abilities exceeding those of human experts. The CGC is the first-ever tournament for fully automatic network defense systems. CGC cash prizes will total up to $9.75 million. Following the CGC Qualifying Event (CQE) on June 3, 2015, up to eight finalists will each receive $750,000. Following the CGC Final Event (CFE) on August 4, 2016, prizes will be awarded to the first place ($2 million), second place ($1 million), and third place ($750,000) winners.

Currently, without automation, top computer security experts test their skill head-to-head in competitive "Capture the Flag" contests. These contests provide a competition rating for the ability of human experts to locate and comprehend security weaknesses. The CGC will utilize a series of competition events to test the abilities of a new generation of fully automated cyber defense systems. DARPA envisions CGC teams creating automated systems (vice human experts) that would compete against each other to evaluate software, test for vulnerabilities, and generate and apply security patches to protected computers on a network. To succeed, competitors must translate the theoretical results in program analysis research into software applications that automatically detect and fix

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[53] This analysis does not include the prize purse for the DARPA Cyber Grand Challenge which, at $9,750,000, represented a significant outlier.

flaws in programs. During a final competition event, automated cyber reasoning systems will compete against each other in real time.

The competition has drawn 104 teams to register comprised of top experts from across a wide range of computer security disciplines including reverse engineering, formal methods, program analysis, and applied computer security competition. Utilizing the authority provided by COMPETES is making it possible for DARPA to work with academic institutions and affiliated teams, large commercial interests not involved in defense contracting, small businesses, small teams of experts, and individuals, most of whom had not worked with DoD before.

HUD's Rebuild by Design Challenge: The authority provided through COMPETES has offered many unique benefits to agencies seeking to stimulate innovation through prizes and challenges. For example, the partnership and gift authorities offered through COMPETES enabled HUD to partner with two philanthropic foundations—the Rockefeller Foundation and the Community Foundation of New Jersey—to conduct Rebuild by Design, a multi-stage regional design competition to promote resilience in the region affected by Hurricane Sandy. Partnerships with non-profit organizations allowed philanthropic resources to be used for 100 percent of the prize awards as well as competition administration. Approximately $5 million was committed collectively on behalf of the six funding organizations (which includes approximately $2 million for the cash prize awards, $2.65 million for competition administration, and $350,000 for the project evaluation). The challenge attracted submissions from 148 teams from more than 15 countries and resulted in seven projects that are being implemented to increase resilience in Sandy-impacted communities in three states. HUD incentivized the implementation of winning designs by committing $930 million made available through the Community Development Block Grant Disaster Recovery (CDBG–DR) program to leverage other public and private funds.

DOT Data Innovation Challenge: In FY 2014, DOT offered their first prize competition under the authority provided by COMPETES. The purpose of the DOT Data Innovation Challenge was to find and highlight data-driven innovations – including web-based tools, data visualizations, mobile apps, or other innovative uses of technology – that address systemic transportation challenges. The incentives for this challenge were entirely non-monetary, including: innovation features on DOT's *FastLane* Blog, a letter of recognition from the Secretary of Transportation, and the winning teams being honored at a

Transportation Datapalooza held by DOT. DOT received 25 entries for this competition, and participants ranged from individuals and startups, to more established companies and academic institutions. The Data Innovation Challenge helped DOT interact with civic hackers, startups, and other new and different audiences who do not typically engage with the Agency through more traditional authorities like contracts, grants, and cooperative agreements.

Winning solutions provided DOT with new insight into the types of data-driven innovations that are being developed to address the Department's systemic transportation challenges including: *RideScout* – a mobile app that provides available transportation options in real time including transit, taxi, car share, bike share, parking, and walking directions; *Choices & Voices* – a web-based, long-range planning tool that educates users on the linkages between land use and transportation, the cost of maintenance, and the consequences of not investing in transportation; and the *FAST Dashboard* – a congestion analytics dashboard that provides an easy-to-understand online user interface allowing the public and transportation professionals access to real-time and historical freeway monitoring and performance data.

FTC's Zapping Rachel**:** The vast majority of telephone calls that deliver a prerecorded message trying to sell something to the recipient are illegal. As technology has advanced over the years, so have the number of these calls, many of which are marketing scams. In response to this rise in illegal activity, the FTC has unveiled a number of initiatives to protect consumers by curbing illegal robocalls. Following on the success of its first robocall challenge,[54] the FTC held its second robocall contest, "Zapping Rachel."[55] Zapping Rachel focused on promoting the further development of "honeypots", instruments that collect information about robocalls in order to enhance law enforcement efforts, advance technological solutions that will combat robocalls, and further the general understanding of robocaller tactics.

The FTC held Zapping Rachel over three days in August 2014 at DEF CON 22,[56] one of the most established conferences for information security specialists, to engage this particular community of experts. The challenge enabled FTC to engage this community

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[54] See FTC Robocall Challenge in "Implementation of Federal Prize Authority: Fiscal Year 2013 Progress Report"
https://www.whitehouse.gov/sites/default/files/microsites/ostp/competes_prizesreport_fy13_final.pdf

[55] http://www.ftc.gov/zapping-rachel

[56] https://www.defcon.org/html/defcon-22/dc-22-index.html

directly for the first time on this problem. The total cash prize amount offered for the challenge was $17,423 over three phases of the competition. Overall, there were 60 registrants, with 37 registered as members of a team, and 23 registered as individuals. Ultimately, 12 teams and individuals entered 13 submissions and the FTC awarded a total of $12,075 over the 3 phases.

There were numerous positive outcomes to this challenge. First, stakeholders involved in the fight against robocalls obtained new insights on honeypot design from the open-source solutions, improving the functionality of current honeypots. The new insights advance law enforcement efforts and help further stakeholders' understanding of robocaller tactics. Second, private-sector companies developing technical solutions to address robocalls can utilize the open-source solutions and the new insights to provide better protection to consumers from illegal robocalls. Third, Zapping Rachel recruited individuals who had not previously worked on cracking robocalls; many of the individuals or teams who participated in phase three did not have any prior experience working on telecom related issues.

GSA Travel Data Challenge: The GSA Office of Government-wide Policy sponsored the GSA Travel Data Challenge[57] to bring a quantitative approach to the travel data the Federal Government collects. This will help agencies make smarter business decisions and drive greater saving and cost efficiencies. Through the challenge, the public was asked to develop a technology-driven solution that could provide agencies with visibility into their travel spending and recommendations for cost-savings behaviors, as well as enhance internal transparency and hold agencies accountable for their spending – steps which help to save money for American taxpayers. The challenge competition offered up to a total of $90,000 in prizes for first, second, and third place, attracted around 200 interested parties, and received a total of 14 submissions from individuals and small groups. GSA selected one winner whose submission met all of the requirements. As they awarded only one winner, GSA only spent $35,000 of the planned $90,000 prize purse to encourage the development of a desired solution, an example of how prizes allow agencies to pay only for performance and results.

The winning entrant, Gregg Parish, designed an innovative technology tool (using open-source code which is freely available on GitHub[58]) to help agencies better visualize and understand their data, compare their travel spending against key benchmarks, and identify

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[57] http://gsatraveldata.challengepost.com/

[58] https://github.com/greggparrish/gsa/blob/master/apps/gsa_data/migrations/0001_initial.py

behaviors that can be taken to reduce costs on future travel. After continued internal development, a version of this tool will be rolled out to agencies to use in managing their travel programs. Currently the project is in a pilot phase, with GSA working with two Federal agencies to incorporate their data into the tool.

CDC's Million Hearts® Hypertension Control Challenge: In this $70,000 challenge, CDC relied heavily upon existing Million Hearts® partners to promote and judge the Challenge, enabled by the authorities provided under COMPETES. Million Hearts® is a national initiative to prevent one million heart attacks and strokes by 2017. Achieving this goal means that 10 million more Americans must have their blood pressure under control. Million Hearts® is working to reach this goal through clinical approaches as well as community approaches. The Million Hearts® Hypertension Control Challenge is intended to identify high performing large and small clinical practices and health systems and document the systems and processes that support hypertension control.

In the 2013 challenge, 61 nomination forms were received: eight were health systems; 7 were large providers (caring for more than 50,000 patients annually); and 43 were small providers (caring for fewer than 50,000 patients annually). Implementation of the challenge relied heavily upon existing Million Hearts® partners to promote and judge the challenge. Partners used their social media and web presence to promote and support the challenge. Two partner organizations, American Heart Association (AHA) and Walgreens supported the judging of the Challenge. Nine winners of the 2013 Million Hearts Hypertension Challenge were announced, including two individuals and seven private, local and Federal health care systems. This challenge was conducted again in 2014 with 30 new Champions recognized.

**Section 5. SUMMARY OF PRIZES CONDUCTED UNDER COMPETES IN FY 2014**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | **Summary of COMPETES Prizes** | | | | | |
| **Agency** | **Prize Name** | **Solution Type(s)** | **Primary Goal(s)** | **Date Open** | **Date Complete** | **Entry #s** | **Winner #s** | **Total Prize Purse** | **Non-Monetary Incentives** |
| CPSC | Carbon Monoxide Poster Contest | Creative | Engagement | 7/14/14 | 2/27/15 | 40 | 10 | $6,000 | None |
| | Consumer Product Safety Apps Challenge | Software | Improve government service delivery; Engagement | 2/1/14 | 5/23/14 | 9 | 4 | $4,000 | Recognition by the commission in a ceremony |
| DOD | DARPA Cyber Grand Challenge | Software | Solve a problem; Engagement; Build capacity | 10/29/13 | 8/4/16 | 104 | TBD | $9,750,000 | None |
| DOE | American Energy Data Challenge | Software; Ideas; Business Plans | Improve government service delivery; Educate public; Engagement | 11/4/13 | Multiple dates | 165 | 25 | $170,000 | Featured in the Energy Datapalooza, featured in DOE blogs and website |
| | National Clean Energy Business Plan Competition | Business Plans | Engagement; Build capacity; Stimulate Market | Multiple dates | Multiple dates | 234 | 7 | $600,000 | Mentorship, training, feedback from investors, feedback on presentations and pitches |

| Summary of COMPETES Prizes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Agency | Prize Name | Solution Type(s) | Primary Goal(s) | Date Open | Date Complete | Entry #s | Winner #s | Total Prize Purse | Non-Monetary Incentives |
| | SunShot Prize: Race to 7-Day Solar | Software; Ideas; Business Plans; Analytics | Engagement; Stimulate Market | TBD | TBD | TBD | TBD | $10,000,000 | TBD |
| | The SunShot Catalyst Program | Tech/Hardware; Business Plans | Specific problem; Engagement | 5/21/14 | 11/7/14 | 137 | 38 | $1,005,000 | A letter of commendation from DOE as a non-monetary prize. |
| DOT | Data Innovation Challenge | Software; Analytics | Highlight Ideas; Engagement | 2/22/14 | 4/30/14 | 25 | 3 | $0 | Features on US DOT FastLane Blog; Letter of recognition from the Secretary of DOT; Honored at the Transportation Datapalooza |
| FTC | Zapping Rachel Robocall contest | Software | Develop Technology | 8/7/14 | 8/9/14 | 13 | 5 | $12,075 | Publicity |

| | | | Summary of COMPETES Prizes | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Agency** | **Prize Name** | **Solution Type(s)** | **Primary Goal(s)** | **Date Open** | **Date Complete** | **Entry #s** | **Winner #s** | **Total Prize Purse** | **Non-Monetary Incentives** |
| **GSA** | Public Sector Program Management – a Vision for the Future Ideation Challenge | Ideas | Improve government service delivery; Highlight Ideas | 5/13/14 | 5/30/14 | 22 | 3 | $0 | Recognition |
| | Travel Data Challenge | Software; Business Plans | Highlight Ideas; Develop Technology; Build capacity | 2/14/14 | 4/11/14 | 14 | 1 | $35,000 | |
| **HHS** | ASA VizRisk | Software; Creative; Business Plans; Scientific | Educate public; Stimulate Market | 7/26/14 | 10/26/14 | 10 | 3 | $15,000 | To potentially produce influential visualizations of strategically important HHS data assets |
| | ASPR Ideation Challenge | Ideas | Specific problem; Engagement; Stimulate Market | 9/23/13 | 10/31/13 | Not available | 3 | $10,000 | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Summary of COMPETES Prizes** | | | | | | | | | |
| **Agency** | **Prize Name** | **Solution Type(s)** | **Primary Goal(s)** | **Date Open** | **Date Complete** | **Entry #s** | **Winner #s** | **Total Prize Purse** | **Non-Monetary Incentives** |
| | CDC Game On! HIV/STD Prevention Mobile Application Video Game Challenge | Software; Ideas | Develop Technology; Engagement; Stimulate Market | 8/1/13 | 1/1/14 | 12 | 2 | $30,000 | Acknowledgement on CDC website |
| | CDC Million Hearts Hypertension Control Challenge - 2013 | Nominations | Improve government service delivery; Highlight Ideas; Engagement | 7/31/13 | 9/30/13 | 60 | 9 | $70,000 | |
| | CDC Million Hearts Hypertension Control Challenge - 2014 | Nominations | Improve government service delivery; Highlight Ideas; Engagement | 8/20/14 | 10/10/14 | 42 | 30 | $60,000 | Recognition by CDC among peers and their service community |
| | CDC No-Petri-Dish Diagnostic Test Challenge | Software; Creative; Ideas; Tech/Hardware; Scientific | Educate public; Stimulate Market | 9/1/14 | 11/30/14 | 8 | 1 | $200,000 | |
| | CDC Predict the Influenza Season Challenge | Scientific | Engagement; Stimulate Market | 11/23/13 | 3/27/14 | 11 | 1 | $75,000 | Acknowledgement on CDC website |

| | | | Summary of COMPETES Prizes | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Agency | Prize Name | Solution Type(s) | Primary Goal(s) | Date Open | Date Complete | Entry #s | Winner #s | Total Prize Purse | Non-Monetary Incentives |
| | CDC Respirator Trusted-Source Mobile Application Challenge | Software | Specific problem; Engagement | 10/21/13 | 12/23/13 | 5 | 3 | $10,000 | |
| | FDA Food Safety Challenge - 2014 | Ideas | Educate public; Stimulate Market | 9/23/14 | 11/9/14 | 49 | TBD | $500,000 | |
| | HRSA Care Counts: Educating Women and Families | Software; Creative | Educate public | 7/31/13 | 9/30/13 | 21 | 4 | $25,000 | Certificates of recognition |
| | NIH DEBUT Challenge - 2014 | Ideas | Highlight Ideas; Develop Technology; Educate public; Engagement | 1/27/14 | 5/29/14 | 250 | 8 | $55,000 | Recognition |
| | NIH Follow that Cell | Tech/Hardware; Scientific | Advance science; Develop Technology; Engagement | 8/15/14 (Phase 1) 3/17/15 (Phase 2) | 12/15/14 (Phase 1) 3/30/17 (Phase 2) | 488 | Up to 8 | $500,000 | |

| | | | | **Summary of COMPETES Prizes** | | | | | |
| Agency | Prize Name | Solution Type(s) | Primary Goal(s) | Date Open | Date Complete | Entry #s | Winner #s | Total Prize Purse | Non-Monetary Incentives |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | NIH New Methods to Detect Bias in Peer Review | Ideas | Highlight Ideas; Engagement | 5/5/14 | 6/30/14 | 42 | 6 | $25,000 | |
| | NIH Stories of Basic Science to Medical Advances Challenge | Ideas | Specific problem | 7/21/14 | 10/20/14 | 7 | 0 | $5,000 | |
| | NIH Strategies to Strengthen Fairness and Impartiality in Peer Review | Ideas | Highlight Ideas; Engagement | 5/5/14 | 6/30/14 | 40 | 1 | $15,000 | |
| | ONC Data Supporting Decisions Code-a-Palooza | Software; Creative; Business Plans | Improve government service delivery; Highlight Ideas; Develop Technology; Educate public | 4/14/14 | 4/24/14 | 56 | 3 | $25,000 | |
| | ONC Digital Privacy Notice Challenge | Software; Creative | Improve government service delivery; Highlight Ideas; Specific problem | 2/7/14 | 4/7/14 | 14 | 1 | $25,000 | |

| | | | Summary of COMPETES Prizes | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Agency | Prize Name | Solution Type(s) | Primary Goal(s) | Date Open | Date Complete | Entry #s | Winner #s | Total Prize Purse | Non-Monetary Incentives |
| | ONC EHR Innovations for Improving Hypertension Challenge | Ideas; Business Plans | Engagement; Stimulate Market | 7/7/14 | 10/23/15 | 4 | 2 | $50,000 | Publicity and recognition |
| HUD | Innovation in Affordable Housing Student Design and Planning Competition - 2014 | Creative; Ideas; Business Plans | Improve government service delivery; Highlight Ideas; Specific problem; Build capacity | 1/6/14 | 1/20/14 | 7 | 2 | $15,000 | Trip to DC to present in front of experts, résumé experience |
| | Rebuild by Design | Creative; Ideas; Business Plans; Scientific | Improve government service delivery; Highlight Ideas; Specific problem; Educate public; Engagement; Build capacity; Stimulate Market | 6/20/13 | 7/19/13 | 148 | 6 | $2,000,000 | National and international exposure; potential for future paid involvement in a large-scale project |
| NEA | Presenting Arts Data Artfully | Software; Creative; Business Plans | Educate public; Engagement | 9/26/13 | 2/3/14 | 6 | 2 | $40,000 | NEA press release announcing the winners |

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| Summary of COMPETES Prizes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Agency | Prize Name | Solution Type(s) | Primary Goal(s) | Date Open | Date Complete | Entry #s | Winner #s | Total Prize Purse | Non-Monetary Incentives |
| State | Innovation in Arms Control Challenge - 2013 | Scientific | Highlight Ideas; Specific problem; Educate public; Engagement | 7/22/13 | 10/20/13 | 22 | 1 | $10,000 | |

**CONCLUSION**

Prize competitions and challenges have an impressive record of spurring innovation in the private and philanthropic sectors. More than 72 Federal agencies, departments, and bureaus had conducted over 396 prize competitions and challenges as of March 2015, including 34 competitions conducted by 17 agencies in FY 2014 under the prize authority provided by COMPETES. In support of their missions, these agencies have reaped the rewards of well-designed prize competitions and challenges integrated into a broader innovation strategy, and have shown what can be expected as Federal agencies continue to develop the expertise and capacity to use prize competitions and challenges strategically and systematically to advance their core missions.

The prize authority provided by COMPETES has been a critical step toward making prize competitions and challenges a standard tool in every agency's toolbox. By expanding the authority of all Federal agencies to conduct prize competitions, and by giving agencies a clear legal path, the legislation has made it easier for agencies to use prizes and enabled ambitious prizes with robust incentives.

The Administration has laid the policy and legal groundwork for agencies to continue to take advantage of the new prize authority in the years to come and has created support infrastructure for agencies, such as: training events and resources; a GSA contract vehicle that decreases the amount of time required for agencies to tap private sector expertise; and the Government-wide Center of Excellence for Collaborative Innovation through which NASA supports the design and implementation of pilot prize competition and challenge programs for other Federal agencies.

In FY 2014, agencies operating prizes under COMPETES and agencies using other authorities continued to institutionalize the use of challenges and prize competitions. Now with several years of experience, agencies are issuing policies, establishing formal roles with responsibility for operating challenges, and creating communication networks to support prize designers and reach solver communities. In FY 2014, agencies with three or more years of experience offered more challenges that attracted more entries and named more winners, and which were more likely to seek technology and hardware. Additionally, agencies that have newly begun to operate challenges are learning from best practices at more experienced agencies, and are also instituting infrastructural elements in anticipation of future prize competitions and challenges.

Prizes conducted under the authority provided by COMPETES unleashed significant new activity in national priority areas such as energy, public safety, health, and resilience. The 34 prize competitions conducted in FY 2014 under the prize authority provided by COMPETES offered more than $25 million in prize money, had more than 2000 entrants including teams and individuals, and achieved goals ranging from engagement with key stakeholder communities, to the development of products available for the public or the Federal Government, to rebuilding communities impacted by Hurricane Sandy. Continued use of the authority provided by COMPETES in the years to come is expected to allow the public and agencies across the Federal Government to reap the benefits of high-impact prizes for open innovation. The use of the prize authority provided by COMPETES will continue to engage citizen solvers, drive cost effectiveness, leverage public-private partnerships, and provide new pathways to successful implementation of innovative solutions.

The use of prizes driven by COMPETES has had the spillover effect of inspiring the use of other relevant authorities for operating prize competitions and challenges. This year saw more agencies operating prize competitions and challenges under agency-specific authorities, and four Departments operating challenges under both COMPETES and other authorities. The use of different authorities supports more varied competition designs tailored to the goal an agency is trying to achieve: in FY 2014, the average COMPETES prize competition offered a greater prize purse and pursued a more diverse set of goals and solutions types than a non-COMPETES prize or challenge. Meanwhile, non-COMPETES prizes and challenges attracted more entries on average, involved more partnerships, and were more likely to be tightly focused on science and technology solutions. As the use of both COMPETES and non-COMPETES prize and challenge authorities continue to expand, agencies will likely identify the authorities that enable them to pursue their identified goals with tailored prize and challenge designs and the best outcomes.

The prize authority provided by COMPETES, other relevant authorities, and the infrastructure developed by the Administration to support agency use of prizes have enabled challenges that are hugely diverse in scale, mission, and outcome – demonstrating both the flexibility of prizes as a tool for innovation and the ingenuity that Federal employees have employed in designing and implementing prizes. In the future, these direct and indirect impacts of the prize authority provided by COMPETES can be expected to broaden, as prize competitions and challenges become more ambitious and are further incorporated into fulfilling key aspects of agency missions.

# Appendix 1: Agency Programs Conducted Under the America COMPETES Reauthorization Act of 2010

This Appendix provides a complete summary of all prizes competitions conducted in FY 2014 under the prize authority provided to agencies in COMPETES and does not include any of the multiple prize competitions conducted under other authorities in FY 2014 or prior.

## List of Challenges

**A.   Consumer Product Safety Commission**

    **I.   Carbon Monoxide Poster Contest Challenge**

    **II.   Consumer Product Safety App Challenge**

**B.   Department of Defense**

    **I.   DARPA Cyber Grand Challenge**

**C.   Department of Energy**

    **I.   American Energy Data Challenge**

    **II.   National Clean Energy Business Plan Competition – 2014**

    **III.   The SunShot Catalyst Program**

    **IV.   SunShot Prize**

**D.   Department of Health and Human Services**

    **I.   ASA VizRisk**

    **II.   ASPR Ideation Challenge: System for Locating People Using Electricity Dependent Medical Equipment During Public Health Emergencies**

    **III.   CDC Million Hearts Hypertension Control Challenge - 2013**

    **IV.   CDC Million Hearts Hypertension Control Challenge – 2014**

    **V.   CDC Game On! HIV/STD Prevention Mobile Application Video Game Challenge**

    **VI.   CDC "No Petri Dish" Challenge**

    **VII.   CDC Predict the Influenza Season Challenge**

**H.  Department of Transportation**

    **I.  Data Innovation Challenge**

**I.  Federal Trade Commission**

    **I.  "Zapping Rachel" Robocall Contest**

**J.  General Services Administration**

    **I.  Travel Data Challenge**

    **II.  Public Sector Program Management - A Vision For the Future**

**K.  National Endowment for the Arts**

    **I.  Presenting Arts Data Artfully**

## Detailed Challenge Reports

### A.  Consumer Product Safety Commission

#### I.  Carbon Monoxide Poster Contest Challenge[59]

Summary: The Carbon Monoxide Safety Poster Contest is intended to educate middle school students in 6th, 7th and 8th grades about the dangers of carbon monoxide (CO) poisoning. Students are being challenged to create a poster that warns others about CO, also called the "invisible killer."

This challenge offers $500 each to nine finalists, including three in each grade chosen by a panel of CPSC judges, $500 to one finalist chosen by public vote on CPSC's website, and an additional $1,000 to the grand prize winner chosen by a panel of CPSC judges.

Educating 11 to 14-year-old students about carbon monoxide safety is anticipated to have long-term, lifesaving benefits. Students who participate in the poster contest will gain knowledge about how to prevent carbon monoxide poisonings in the future. It is CPSC's hope that they will use that knowledge to encourage their parents, relatives, and friends to protect themselves against CO by getting CO alarms, furnace checkups, operating portable generators safely and recognizing the symptoms of CO poisoning.

*Solution Type***:** Creative (design & multimedia)

*Primary Goals*: Engage new people and communities

*Results*: Final results will be reported in FY15.

Problem Statement: Each year, about 400 people die in the United States from unintentional carbon monoxide poisoning from fuel-burning appliances, such as furnaces, gas ranges, water heaters, portable generators, and charcoal grills, as well as motor vehicles. CPSC's carbon monoxide safety poster contest is designed to address this hazard by educating middle school students about carbon monoxide poisoning dangers and prevention. Students must review available information about CO and be creative in drawing a poster. Possible poster topics include:

- Facts about CO: You cannot see it or smell it. CO is an invisible killer;
- What steps you can take to protect against CO poisoning;
- How to recognize CO exposure and symptoms;
- How to install and test CO alarms and why they are important.

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[59] Challenge Website: www.cpsc.gov/COContest

Proposed Goals: The primary objective of CPSC's poster contest is to prevent carbon monoxide poisoning injuries and deaths by increasing CO safety awareness and increasing residential use of CO alarms. CPSC seeks to engage and educate communities nationwide and on military bases around the world with this poster contest. The students will hopefully take this knowledge into the future as adults to prevent carbon monoxide poisoning in their future homes.

Why a Prize: CPSC is an independent Federal agency charged with protecting the public from unreasonable risks of injury or death associated with the use of consumer products. A major goal in CPSC's Strategic Plan for 2011-2016 is to raise awareness and promote a public understanding of product risks and CPSC's capabilities. CPSC uses a variety of communication tools to reach target communities with safety information. CPSC's poster contest is a community outreach program that targets children in 6th, 7th and 8th grades with safety information and provides a hands-on creative experience drawing a poster about carbon monoxide dangers.

In 2011, CPSC's CO safety poster contest offered prize money. This contest received more than 400 poster entries. The success of the 2011 contest and the large number of entries received served as the basis for offering prize money for the current contest.

Participants: Any child who is a citizen or permanent resident of the United States and is in grade 6, 7, or 8 is eligible to participate in this Contest. Children of CPSC employees are not eligible to enter the Contest. To win a prize, a contestant must comply with the requirements and rules of the Contest, including submitting a Contest Submission and Parental Consent Form.

Timeline: Contestants were asked to submit entries to the CPSC between July 14, 2014 and February 27, 2015.  CPSC received more than 700 entries.

Solicitation & Outreach: CPSC staff promoted the poster contest through a press release, tweets and a YouTube video. Staff directly contacted dozens of school districts nationwide and on military bases, targeting science and art teachers to encourage student participation in the contest. Fire safety officials nationwide also helped to promote the contest on their websites and in their newsletters. CPSC requested that the contest information and web link be posted on contest websites and school websites.

Incentives: CPSC's challenge offers $500 each to nine finalists, including three in each grade 6, 7 and 8, $500 to one finalist chosen by public vote on CPSC's website, and an

additional $1,000 to the grand prize winner. Prize money totals $6,000 and comes from the budget of CPSC's Office of Communications.

Evaluation and Judging: CPSC staff with an expertise in carbon monoxide poisoning will judge the poster contest. Posters will be evaluated on the basis of CO safety message clarity, visual appearance and design originality. Entries must be submitted electronically on CPSC's website. They are housed in CPSC's content management system and will be displayed for the judges based on grade level.

Partnerships: CPSC is the sole sponsor of the CO safety poster contest.

Resources: CPSC's CO contest was designed and operated primarily by the agency's Office of Communications (3 staff months) beginning in FY 2014. There has been significant participation by staff in CPSC's Office of the General Counsel (1 staff month), Office of Hazard Identification & Reduction (2 staff months), Human Factors (1 staff month), Health Sciences (1 staff month) and Economic Analysis (.5 staff months).

Results: CPSC's poster contest challenge is currently going through the judging process. Awards are expected to be announced in May 2015.

## II.    Consumer Product Safety App Challenge[60]

Summary: A key goal of the U.S. Consumer Product Safety Commission (CPSC) is to empower consumers with safety information about consumer products. CPSC is challenging developers to create applications and innovative tools that raise public awareness of consumer safety reports submitted to CPSC through its APIs, websites, and of recalls of consumer products.

*Solution Type***:** Software and apps

*Primary Goals*: Improve government service delivery; Engage new people and communities

*Results*: Developers in California, Tennessee, and Maryland designed and promoted apps that improve the ease and mobility of staying aware of recalls while in a toy store or in a thrift shop. The Challenge saved CPSC from having to expend funds to hire a contractor to build a new recalls app and yielded high quality submissions ranging from traditional iOS and Android apps to open source ideas that scanned emails. The winning apps are all

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[60] Challenge Website: http://productsafetyapps.challengepost.com/

free and have been downloaded by the public, a sign of success for the challenge and value for consumers.

Problem Statement: With hundreds of product recalls announced each year, CPSC looked to find innovative individuals and companies that could develop intuitive solutions to put lifesaving information into consumers' hands easily. The intent was to provide consumers with a more automated delivery of recall announcements for the products they own.

Contestants were asked to develop apps that raise awareness of consumer product safety information in the following categories:

1. *Best Mashup with Online Auction Sites***:** This category would combine CPSC data with information available on online auction sites.

2. *Best Mashup with Online Product Reviews*: This category would combine CPSC data with any product review information available on the Internet.

3. *Best Mashup with Search Tools*: This category would combine CPSC data with search results from search engines, searchable classified ads, or any other search tools.

4. *Most Innovative*: This category would use CPSC data to educate consumers creatively about product safety information.

Submissions could have been existing applications or applications developed specifically for the Contest. The applications were not to require the purchase of additional products to be fully operational. Additional requirements:

- Apps must have been designed for the Web, a personal computer, a mobile device (e.g., mobile phone, portable sensor), tablet, console, or any platform broadly accessible on the open Internet.

- Applications developed for mobile phones must have specified the specific operating system(s) on which the app runs and provide a site where the app can be downloaded.

- Applications must have been designed to upload data within 24 hours of its release by CPSC to keep information current.

Proposed Goals: Through the Consumer Product Safety Apps Challenge, CPSC sought applications and innovative tools that raise awareness of consumer product safety reports and recalls of consumer products. Because many consumers get consumer product safety information online, CPSC sought apps and tools that combine recalls and safety reports with online auction sites, online product reviews, search engines and other places where consumers get product information.

<u>Why a Prize</u>: CPSC staff determined that offering a prize would be cost effective and create friendly competition among the application development community. It would create greater awareness of SaferProducts.gov, increase reports of harm and potential harm publicly available for viewing, increase awareness of product recalls, and highlight the importance of reporting product safety incidents to the government.

<u>Participants</u>: There were 9 apps submitted as a result of this challenge. Entrants were predominantly individuals, but one entry was submitted by a tech firm based out of California. CPSC was pleased with the quality of submissions, as they ranged from traditional iOS and Android apps to open source ideas that scanned emails.

<u>Timeline</u>: The concept of the challenge was announced in January 2014 at the White House Office of Science and Technology Policy (OSTP) Safety Datapalooza in Washington, DC. The contest officially started in February and ran through May 2014. Judging of the 9 proposals lasted throughout the summer and into early fall. The four awardees were notified that they had won the challenge in late September and then a recognition event was held at CPSC headquarters in Bethesda, Md. on October 27, 2014.[61]

<u>Solicitation & Outreach</u>: Thanks to OSTP, CPSC was given a featured speaking role during the Safety Datapalooza in January. Following the prepared remarks, OSTP allowed agencies to use the event to host Safety Data Jams. CPSC's Jam session was promoted on Twitter, CPSC.gov, and a news release. The agency also partnered with OSTP to promote the event. Our Product Safety Challenge Data Jam was well attended and gave the agency invaluable insights into how developers were likely to react to the challenge and how to target interested innovators. ChallengePost proved to be a helpful tool to create conversations and interest in the program.

For the next challenge, CPSC may participate in Hack-a-Thons and Code For America events as more effective approaches to generate interest.

<u>Incentives</u>: A $1,000 prize was awarded to each of the four winners, for a total of $4,000. No private sector or philanthropic funds were secured for the prize purse; all funds were from the CPSC Budget. The apps challenge was funded from the agencies account for digital communications.

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[61] Further event description: http://www.cpsc.gov/en/Newsroom/Multimedia/?vid=70937

Evaluation and Judging: CPSC selected three judges with experience and expertise in technology and innovation. The judges participated pro bono and CPSC greatly appreciates their contributions to this contest and advancing consumer awareness of product safety recalls.

Contestants must have demonstrated to the satisfaction of the judges: Usefulness, innovativeness, usability, and potential reach and impact.

- "Usefulness" was defined as the ability to empower users to engage with, and act on, consumer product safety information on an ongoing basis. The best apps would provide this safety information, tailored to the needs of the user.

- For innovativeness, each entry was rated for the degree of creativity the entry brings to applications focused on consumer product safety. Innovative approaches to reaching large numbers of consumers scored highest. Bonus points were given for entries that added a "fun factor" to enhance users' knowledge about consumer product safety.

- "Usability" was defined as user-friendly and interactive. Entries should have been applicable and attractive to people who were not necessarily "high tech." Additional consideration was given for accessibility for people across diverse populations.

- For potential reach and impact, the top tools proved that they could engage a large number of consumers on a regular basis and would engage consumers in a way that encourages consumers to act upon the consumer product safety information.

CPSC staff matched the four applicants with the highest rankings to the appropriate category, with two of the winners being selected as "Most Innovative" and the other two winners selected as "Best Mashup with Search Tools."


Partnerships: The industry panel of judges for the contest included Jack Christin Jr., eBay Inc. Associate General Counsel, Government Relations/Global Asset Protection, David Tisch, TechStars Managing Director, and Jennifer Toney, Founder and CEO, We Make It Safer. CPSC has had long-standing relationships with Ms. Toney and Mr. Christin and their involvement in the contest provided a means of recognizing their importance to the agency as key stakeholders.


Resources: Staff hours were allocated by the Office of Communications, Office of Information Technology, and Office of the General Counsel to preparing the contest rules, drafting a Federal Register notice, briefing CPSC's Commissioners on the contest, reviewing security requirements of the CPSC IT systems, promotion of the campaign,

monitoring comments on ChallengePost, reviewing the proposals of the winners, dispensing the award funds, and organizing the recognition ceremony. No third party vendors or contractors assisted in the operations of the contest.

Results: Consistent with the counsel of OSTP, this Consumer Product Safety Challenge saved CPSC from having to expend funds to hire a contractor to build a new recalls app. CPSC has had a long-standing goal of increasing the responsiveness of consumers to recalls, especially among members of the public who do not know who CPSC is or what it does. To have developers in California, Tennessee, and Maryland design and promote apps that improve the ease and mobility of staying aware of recalls while in a toy store or in a thrift shop is a win for consumers. Although it is difficult to measure, CPSC's ultimate goal is for consumers to be empowered by the information contained on these apps in order to be proactive about protecting their families from violative and dangerous products in their homes.

To promote the usage of the winning solutions, CPSC has put out news releases about the winners and their apps and download instructions. In addition, the Compliance team at CPSC presented information about them at the ICPHSO (International Consumer Product Health and Safety Organization) 2015 Annual Meeting and Training Symposium. CPSC continues to work with those winners for feedback on new API improvements projects that are currently underway.

The four winners of the Consumer Product Safety Apps Challenge and their apps selected by an industry panel are:

1. "Safety Checker" App[62] by Tom Nguyen

Tom Nguyen, a full-stack developer and designer from Nashville, Tenn., created the app "Safety Checker," which won the award for "Best Mashup with Search Tools." "Safety Checker" empowers consumers with product safety information on the go. The app is designed to be simple and to enable finding SaferProducts.gov incidents and product recall information with just a few taps. When not on the go, the app actively scans for matching relevant safety information to keep consumers alerted to recall announcements and safety information related to the products they own and use every day. Consumers may fill out as little as three fields about a product to begin the process, or they may use the app to scan a product's bar code. With the app, consumers will be alerted to important messages from SaferProducts.gov that could potentially save lives.

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[62] This "Safety Checker" app is available at: http://voicethings.com for iOS and Android, and on Amazon at www.amazon.com/gp/mas/dl/android?p=com.inventivegadget.voicethings.

2.  "Recall Pro" App[63] by Zech Kottilil

Zech Kottilil is a full-stack developer from Germantown, Md. and is also recognized for "Best Mashup with Search Tools." The "Recall Pro" app uses a Google Chrome extension and allows a consumer who is shopping online to highlight a product for sale on the Web, right-click on the product, choose "RecallPro This," and have recall information displayed for that product.

3.  Slice App[64]

The team at Slice is made up of full-stack developers from Palo Alto, Calif. Inspired by the increasing popularity of e-receipts consumers receive from retailers, the "Slice" app was created for a target audience of online shoppers and was recognized as "Most Innovative." The "Slice" app organizes users' email inboxes with everything they have bought online and alerts them to delivery progress, price changes or a recall of that product. "Slice" is constantly checking products against CPSC's recall list, which enables parents to use the products they've purchased knowing confidently that the app will alert them if there is an issue.

4.  "Total Recall 101" App[65] by Xian Ke:

Xian Ke is a full-stack developer from San Francisco, Calif. and a co-founder at Pomello.com. Her entry "Total Recall 101" also won for "Most Innovative" app. This app checks the user's email inbox and archives for references to purchased products, including product receipts and conversations with friends. All emails remain private to the user. The "Total Recall 101" app matches the referenced products against CPSC's recalled products list, and is able to generate emails to alert users about recalls. These alert emails can be accessed on all devices, including desktops and mobile phones running iOS and Android.

This contest was a stand-alone challenge, but it is the intent of the agency to continue to evaluate its benefit to recall effectiveness and explore additional challenges in the future.

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[63] "Recall Pro" is available for Google Chrome free of charge at:
https://chrome.google.com/webstore/detail/recallpro/jdgmnnipocpdpldljkfdbjhcgmpabaoh

[64] The Slice app is available at: https://itunes.apple.com/us/app/slice-package-tracker-price/id475854271?mt=8 for iOS and at https://play.google.com/store/apps/details?id=com.slice for Android users.

[65] The prototype "Total Recall 101" app is free and open source and is available at:
https://github.com/xke/total-recall-101.

**B. Department of Defense**

### I. DARPA Cyber Grand Challenge[66]

Summary: The DARPA Cyber Grand Challenge is the first-ever tournament     for     fully automatic network defense systems.  Currently, top computer security experts   test   their skill head-to-head in competitive "Capture the Flag" contests.  These contests  provide  a competition rating for the ability of human experts to locate and comprehend       security weaknesses.  The CGC will utilize a series of competition events to test the  abilities  of  a new generation of fully automated cyber defense systems.  DARPA envisions CGC teams creating automated systems (vice human experts) that would compete against  each  other to evaluate software, test for vulnerabilities, and generate and apply security patches      to protected computers on a network.  To succeed, competitors must translate the theoretical results in program analysis research into software applications that automatically detect and fix flaws in programs.  During a final competition event, automated cyber reasoning systems will compete against each other in real time.  The CGC seeks to engender a new generation of autonomous cyber defense capabilities that combine the speed and scale of automation with reasoning abilities exceeding those of human experts.

*Solution Type***:** Software and Apps;

*Primary Goals*: Solve a specific problem; Build capacity; Engage new people and communities

*Results*: No prize competitions have taken place in the Cyber Grand Challenge to date. However, 104 teams have registered – including academic institutions, small businesses, and individuals, most of whom had not worked with DoD before, and have produced promising prototype systems.

Problem Statement: The Department of Defense (DoD) maintains information systems using a software technology base comprised of commercial off-the-shelf (COTS) operating systems and applications.  This COTS technology base is common to DoD, industry, and the Defense Industrial Base, and the continual discovery of potential vulnerabilities in this software base has led to a constant cycle of intrusion, compromise discovery, patch formulation, patch deployment, and recovery.  This defensive cycle is performed by highly trained software analysts; it is the role of these analysts to reason about the function of software and identify and remove novel threats.  Manual analysis of code and threats is an artisan process, often requiring skilled analysts to spend weeks or months analyzing a

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[66] Challenge Website: www.darpa.mil/cybergrandchallenge; www.cybergrandchallenge.com

problem. The size of the technology base contributes to the difficulty of manually discovering vulnerabilities.

At present, automated program analysis capabilities are able to assist the work of human software analysts. These automation technologies include dynamic analysis, static analysis, symbolic execution, constraint solving, data flow tracking, fuzz testing, and a multitude of related technologies. In the DARPA CGC, a competitor will improve and combine these semi-automated technologies into an unmanned cyber reasoning system that can autonomously reason about novel program flaws, prove the existence of flaws in networked applications, and formulate effective defenses. The performance of these automated systems will be evaluated through head-to-head tournament-style competition.

Entrants will field unmanned systems that will compete head-to-head in an isolated test environment. The results will determine the systems' ability to reason about and mitigate novel software flaws. Awards will be made to the best performing systems in a qualifying event and a final tournament. These two events will be held approximately 12 months apart.

DARPA provided two parallel paths for participating in the CGC: the Proposal Track and the Open Track Proposal Track teams were selected competitively on the basis of proposals submitted in response to a broad agency announcement (DARPA-BAA-14-05). Open Track teams were selected based on applications deemed qualified to compete per Title 15 U.S. C. § 3 719 and CGC rules.

This two-phase process included registration and the submission of an extended application per the CGC rules (see challenge website).

Proposed Goals: The goal of the DARPA CGC is to engender a new generation of autonomous cyber defense capabilities that combine the speed and scale of automation with reasoning abilities exceeding those of human experts. CGC will give DoD the ability to measure the real-world efficacy of unmanned cyber capabilities using a competition rating currently accepted as a measure of excellence for human analysts.

Why a Prize: The CGC will draw widespread attention to the technology issues associated with autonomous software comprehension and motivate entrants to overcome technical challenges to realize truly effective autonomous cyber defense. The competition will challenge the most capable and innovative companies, institutions, and entrepreneurs to produce breakthroughs in capability and performance. Utilizing prize authority under America COMPETES made it possible to work with academic institutions and affiliated teams, large commercial interests not involved in defense contracting, small businesses, small teams of experts and individuals, most of who had not worked with DoD before. In

addition, simple calculations will show that on a full time equivalent basis, the CGC will have instigated large research and development efforts at relatively low cost.

Participants: The CGC will encourage the most capable and innovative companies, institutions, and entrepreneurs to produce breakthroughs in capability and performance. The competition has drawn teams of top experts from across a wide range of computer security disciplines including reverse engineering, formal methods, program analysis and applied computer security competition. Eligibility requirements can be found in the CGC Rules Section 2.1 (see the challenge website). One hundred four entrant teams registered on the challenge website.

Timeline: The CGC was launched October 29, 2013. The two-phase registration process included initial applications due November 2, 2014, and extended applications due February 26, 2015.

| | |
|---|---|
| Scored Event #1 | December 1, 2014 |
| Scored Event #2 | April 16, 2015 |
| Qualification Event | June 3, 2015 |
| Trials Begin | March 14, 2016 |
| Trials End | April 3, 2016 |
| Final Event | August 4, 2016 |

Solicitation & Outreach: The DARPA CGC was announced through several methods including publication in Federal Register, web features, websites, national media, social media outlets, and conference presentations.

Incentives: To date, no cash prizes have been awarded; as a result, amounts have not yet been distributed to appropriation accounts. Because DARPA is the sole sponsor of the CGC, no private funds have been contributed to the program (nor will private funds be contributed as the program/competition progresses to its final conclusion). CGC cash prizes will total up to $9.75 million; non-monetary prizes are not offered. Following the CGC Qualifying Event (CQE) on June 3, 2015, up to eight finalists will each receive $750,000. Following the CGC Final Event (CFE) on August 4, 2016, prizes will be awarded to the first place ($2 million), second place ($1 million), and third place ($750,000) winners.

Evaluation and Judging: No prize authority-enabled events have yet occurred; thus, evaluation and judging have not yet occurred. Due to the potentially subjective nature of judging and evaluation, the CGC is scored and ranked via software automation. Several "dry run" practice events have been conducted to prepare for the qualifying event on June 3, 2015; the results of these dry runs have been beneficial for competitors and organizers.

Partnerships: DARPA is funding various entities within DoD (Space and Naval Warfare Systems Command, Air Force Research Laboratory, Naval Postgraduate School) as well as Federally funded research and development centers (MIT Lincoln Lab) for contracting and specialized technical support in conducting the CGC competition. To raise awareness of the state of the art of automated cybersecurity competition, DARPA entered into a Cooperative Research and Development Agreement with the DEF CON Hacking Conference.

Resources: The DARPA CGC is being organized by Government staff members and support contractors managing logistics, security, infrastructure, administration, information technology services, planning, execution, production, visualization, and software development. The CGC is not being executed by a single entity; rather a cross-disciplinary team of experts from across the United States was assembled to build the software base of the Challenge and develop its automated scoring mechanisms and software platform.[67] Visualization experts from the computer gaming industry were contracted to build novel visualization capabilities for CGC.

Funds were drawn from the Program Element (PE) and projects as follows:

| PE | Project | Title | FY14 |
|---|---|---|---|
| 0602303E | IT-05 | Cyber Grand Challenge (CGC) | $10.438M |

Results: No prizes have been awarded in the Cyber Grand Challenge to date. The CQE will take place on June 3, 2015, and the CFE is scheduled for August 4, 2016. An initial assessment of the competition to date indicates that prototype systems are being built capable of finding software flaws and patching them on timescales available only to machines. In the DARPA CGC Scored Event #1, competitor systems found and fixed software flaws never before seen by humans.

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[67] The Cyber Grand Challenge software platform is available as open source software: https://github.com/CyberGrandChallenge/

## C.    Department of Energy

### I.    American Energy Data Challenge[68]

Summary: The U.S. Department of Energy (DOE)'s American Energy Data Challenge is a four-part, year-long Challenge to invite public input and innovation around public data resources offered by DOE and the Green Button Initiative. AEDC offers prizes to innovators and software developers for the best new ideas, apps and designs that help uncover new value from open energy data and personal Green Button energy usage data.

*Solution Type*: Software and apps; Analytics, visualizations, and algorithms; Ideas

*Primary Goals*: Inform and educate the public; Engage new people and communities; Improve government service delivery

*Results*: Though the challenge has not yet been completed, it has initiated partnerships with a number of organizations inside and outside of the Federal government to successfully generate interest and engagement in the target community. There have been over 100 idea submissions, more than 50 application submissions, 15 information design submissions, and the competition itself attracted over 5,000 registrations.

Problem Statement: The Department of Energy acts as a steward of vast amounts of scientific and statistical data about energy – almost all of which is available to the public. While DOE enjoys a respectable user base for this data, there is much more that can be done. Public innovation is one avenue to explore, not only to diversify the uses for data, but to develop insights into how DOE data might be structured or offered for greater usability. Green Button, an open standard for sharing electricity data that is available to millions of utility customers, is an additional source of data that contestants will be invited to mash up with public data sources to help homeowners and businesses take action, understand their usage, and make better-informed decisions.

Proposed Goals: The goal of this challenge was to introduce the public to the valuable data and resources offered by the Department, to solicit feedback about the data, to amplify the energy data available to consumers today under the Green Button Initiative and to create new ways to visualize and discover energy data, and to spur the development of new tools

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[68] Challenge Website: http://energychallenge.energy.gov/

and services that leverage this data. The Challenge consists of four parts, with each building on the other and engaging different segments of the American public.

Why a Prize: This competition sought to inspire innovative use of DOE Open Data resources and Green Button data. Prizes allow DOE to leverage private sector work without predefining the types of applications they would like to see. Additionally, the competition structure has an existing following among the community of independent software developers, a key target community for the DOE goal of creating an active energy–focused developer community. Finally, the competition itself provided an opportunity to raise awareness of the existence and value of Green Button data.

Participants: The primary target audiences were energy-conscious innovators, software developers who were not already engaged in the energy sector, and companies who were engaged in the energy sector but unfamiliar with the Green Button format.

Timeline: The competition was launched in November of 2013, and will commence with the final contest by March 2015. Over the course of that time, four contests will have run.

Solicitation & Outreach: DOE used an extensive public engagement campaign focused on targeted outreach to prominent tech and energy influencers on Twitter, and facebook to a lesser extent. DOE also managed to get a number of stories about the competition in online technology and energy press. Energy.gov and the challenge website were used as hubs for frequent competition updates and active support, so that competition followers were more likely to submit high quality work. Finally, DOE worked with a number of professional organizations to alert their memberships about the opportunity to submit.

Incentives: The primary incentive was $170,000 in prize money. $75,000 was provided by the Office of the Chief Information Officer – Chief Technology Officer, $30,000 by Office of Electricity and Energy Reliability, $35,000 by the Office of Energy Efficiency and Renewable Energy, $10,000 by the Energy Information Administration, and $20,000 by the private sector. For the non-monetary incentives, some winners were included in the 2014 Energy Datapalooza event, and their app was featured on the contest website.

Evaluation and Judging: The judging panel consisted of experts and managers from DOE, the sponsoring organizations, energy industry, and the software design and development industry, and selected the winning submissions based generally upon the following criteria:

- Impact: The strength of its potential to help individuals, organizations, and communities make informed decisions about their electricity use.

- Creativity and Innovation: The degree of new thinking it brings to applications for the energy sector, and the creativity shown in designing for impact.

- Implementation: User experience and interactive capabilities. Preference will be given to applications that are easily accessible to a range of consumers, including those with disabilities.

Each judge ranked the submissions independently and the rankings were combined to determine the winner.

Partnerships: DOE partnered formally with GRID21, the GridWise Alliance and Iberdrola to sponsor a portion of the prizes and to administer part of the contest. They provided monetary and marketing and outreach support. DOE partnered informally with a great number of organizations to improve outreach abilities, including the National Institute of Standards and Technology, Code for America, Innocentive, Environmental Protection Agency, Department of Commerce, and various educational organizations.

Resources: DOE primarily used its own internal resources to run the contests, but relied upon IdeaScale for the contest platform.

Results: The competition resulted in a large number of submissions: 100+ idea submissions, 50+ application submissions, 15 information design submissions, and final contest submissions are not available yet. The competition itself attracted over 5,000 registrants.

## II. National Clean Energy Business Plan Competition – 2014[69]

Summary: The U.S. Department of Energy (DOE) National Clean Energy Business Plan Competition (NCEBPC) is a unique national business plan competition, designed to build a network of student-focused business creation contests across the country. Student-led teams compete in six DOE-sponsored regional competitions by submitting business plans supporting innovative clean energy technologies. In addition to competing for six $100,000 regional prizes across the country, students receive mentorship and training in preparation for the regional and national competitions, enhancing their entrepreneurial skills and

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[69] Challenge Website: http://techportal.eere.energy.gov/commercialization/natlbizplan.html

prepare them to launch technologies from research institutions and into the market. The NCEBPC culminates in a National Grand Prize event in Washington, D.C., where the six regional finalists compete for a suite of private sector-sponsored prizes.

*Solution Type*: Business Plans

*Primary Goals*: Engage new people and communities; Build capacity; Stimulate a market

*Results*: Though only in its fourth year, the NCEBPC has a legacy of broad economic impacts. In the first three years, more than 70 ventures have incorporated, have received more than $38 million in follow-on funding and generated more than 120 jobs. The racial and gender diversity of the 2014 Competition was greater than in previous years, with women present on 5 of the 6 winning teams, and the National winning team coming from a minority-serving institution. For the third year, participants and finalists in the 2014 NCEBPC were recognized in the Forbes 30 under 30 list.

Problem Statement: Start-ups and innovative technologies are critical to the growth of the clean energy economy in the United States and abroad. However, there exist persistent gaps between innovative technology developers and entrepreneurs. While university student business creation competitions have long been an active source of new U.S. start-ups and a training ground for some of America's best entrepreneurs, at the time of establishing the NCEBPC, there were few competitions or incentives focused on clean energy entrepreneurship.

The NCEBPC aims to inspire clean energy innovation across the country by creating businesses from best in-class technology research, while inspiring and cultivating America's next generation of entrepreneurs to drive those businesses forward. The NCEBPC awards prizes to the teams with not just the best technology, but the premier teams developing early-stage companies to turn technology into products ready for the commercial markets.

The National Competition is comprised of two steps: (1) regional competitions; (2) national event. The National Clean Energy Business Plan Competition program was competed out in 2011 to fund regional competitions, and six regional organizers were selected through a Funding Opportunity Announcement. The six regional DOE-funded business plan competitions will send a finalist to Washington, D.C. to compete for the Grand Prize in DOE's National Competition.

*Regional Competition Guidelines*

The NCEBPC is comprised of six regional annual business plan competitions. The six regional competitions, and the lead organizations, are as follows:

- Northeast Region – MIT Clean Energy Prize[70], Massachusetts Institute of Technology (Cambridge, MA)

- Southeast Region – ACC Clean Energy Challenge[71], University of Maryland (College Park, MD)

- Eastern Midwest Region – Clean Energy Student Challenge[72], Clean Energy Trust (Chicago, IL)

- Western Midwest Region – CU Cleantech New Venture Challenge[73], University of Colorado – Boulder (Boulder, CO)

- Western Southwest Region – Rice Business Plan Competition[74], Rice University (Houston, TX)

- Western Region – First Look West[75], California Institute of Technology (Pasadena, CA)

In the Funding Opportunity Announcement, DOE established guidelines that defined the geographical scope of the NCEBPC competitions, while still preserving the integrity of ongoing national competitions:

- Regional competitions may solicit applications nationwide. However, each competition shall focus its outreach and sponsorship efforts regionally. Success or failure to garner regional interest and long-term support may affect continuation applications (go/no-go decisions) at the end of year one.

- Regional competitions are encouraged to communicate and collaborate with other regional organizers in order expand network connections.

- Regional competitions should occur in a coordinated manner and all competitions must be completed by early-May.

*Competition Entrant Requirements*

Scope of Business Plans

All business plan proposals must fall within DOE's Office of Energy Efficiency and Renewable Energy (EERE) mission and technology portfolio, as defined in the Funding

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[70] http://cep.mit.edu/

[71] http://www.accnrg.com/

[72] http://www.cleanenergytrust.org/challenge/

[73] http://nvc.cucleantech.org/

[74] http://alliance.rice.edu/rbpc.aspx

[75] http://flow.caltech.edu/

Opportunity Announcement (FOA)[76]. Business plans must fall within EERE's purview, but they may be based upon technical or service-based solutions or products.

Acceptable technology areas are represented by EERE's ten program offices:

1. Building Technologies
2. Advanced Manufacturing
3. Vehicle Technologies
4. Federal Energy Management Program
5. Weatherization and Intergovernmental
6. Biomass Program
7. Geothermal Technologies
8. Fuel Cells Technologies
9. Solar Energy Technologies
10. Wind and Hydropower Technologies

*Competition Entrant Limitations and Eligibility*

As a program whose goals include the development of the next generation of entrepreneurs, NCEBPC requires that students be highly involved in each competition's management and execution.

The composition of business plan teams shall follow the following criteria:

- Awarded competitions must include and enforce a criterion for competitor eligibility stating that in order to participate in the proposed regional competition, at least 50% of any participating team's "formal team members" must be actively enrolled in an accredited U.S. university or college. "Formal team members" are defined as those individuals eligible to directly receive prize money or services awarded by the competition.

- Regional competitions should follow university policies of the student applicants to define "enrollment" and "student" status.

- Formal team members may be citizens of foreign countries. However, at least one U.S. citizen must be a formal team member.

- U.S. citizens attending universities abroad may participate in the competitions, given that the overall makeup of the formal team members meets all other criteria.

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[76] http://www.eere.energy.gov

- Business plan teams may enter multiple regional competitions.
- No regional competition business plan can win more than one DOE-sponsored competition at the regional level (title and money).

*IP Status*

DOE promotes openness and transparency by requiring all competition entrants to disclose the status of all intellectual property (IP) used in the competitions. Competitions must demonstrate an effort to cultivate and recruit business plans based on technologies derived from U.S. universities and/or national labs.

*Stage of Business Development and Ownership*

To ensure a level playing field among business plan teams nationwide, all entrants must be early stage venture investments.

Proposed Goals: The NCEBPC goals include:

- Inspire students to engage in clean energy entrepreneurship;
- Build regional networks through the competitions that create linkages between technologists, academics, and investors;
- Enable the launch of innovative cleantech startups by providing seed funding and in-kind services to young entrepreneurs; and
- Advance clean energy technologies, like those championed by DOE EERE, by engaging students, innovators, and technologists to bring innovative technologies to market.

Why a Prize: The NCEBPC seeks to bridge the investor, technology and academic communities by inspiring cleantech entrepreneurship in students. By working with the private sector, through in-kind sponsorships, cash prizes, and having the business and investor community serve as judges and mentors, the competition brings together the communities in a way that could not be done through a grant alone.

The DOE funds each regional competition's annual grand prize of $100,000, attracting high-caliber technologies and teams. Using prizes as a catalyst for company formation has been a tested and proven model, demonstrated through quantitative and qualitative evidence. By enabling open competition, the best technologies in all categories are eligible for consideration by using a prize at the regional competitions, rather than creating a single technology-focused grant. And the use of prizes creates additionality for the competition organizers as well, as competitions have successfully fundraised for additional prizes from the private sector.

Participants: The NCEBPC, through its six regional competitions, targets student entrepreneurs and technologists launching clean energy ventures. Registration took place at the regional competitions. In total, the six regional competitions received 234 applications nationwide. The team size ranged based on the number of formal team participants.

Timeline: The NCEBPC launched in 2011. The Competition in 2014 was the third year of the Competition. Entry dates for each regional competition varied by competition, ranging from January to March. Regional competitions took place between March and May of 2014. The final event – the National Competition - took place June 11-12, 2014 in Washington, DC. National Competition finalists were the winners of each of the six regional competitions.

The key dates for the regional competitions in 2014 were as follows:

MIT Clean Energy Prize

- Application Date: February 13, 2014
- Regional Competition Date: April 28, 2014

ACC Clean Energy Challenge

- Application Date: February 14, 2014
- Regional Competition Date: March 26, 2014

Clean Energy Trust Clean Energy Student Challenge

- Application Date: January 8, 2014
- Regional Competition Date: April 3, 2013

CU Cleantech New Venture Challenge

- Application Date: March 4, 2014
- Regional Competition Date: April 18, 2014

Rice Business Plan Competition

- Application Date: February 21, 2014
- Regional Competition Date: April 10-12, 2014

Caltech First Look West

- Application Date: March 3, 2014
- Regional Competition Date: May 7, 2014

Solicitation & Outreach: The NCEBPC multiple media methods to disseminate information broadly about the National Competition and its winners. This included social media, traditional press, energy.gov through the EERE and Secretary's blog, and challenge.gov. A total of six blog posts highlighting each winner after each regional competition were released, and connected to social media – including Facebook and Twitter. Prior to the national event, a video voting competition launched on Energy.gov, where the general community voted on videos submitted for each competition. The winner of the People's Choice (video voting) was featured on a blog post on Scientific American's website. The voting was highly successful, attracting more than 80,000 votes in a week. The lead-up to the national event also included blog posts and broad distribution. To enhance media and awareness, the NCEBPC has several partners that are recognized as Media sponsors for the National Competition.

To attract entrants, each region executed their own outreach strategy.

Incentives: The NCEBPC has several prizes associated with the entire competition. DOE directly sponsors the six regional competition prizes of $100,000, for a total of $600,000. The prizes were distributed by regional organizers. The funding was allocated through a cooperative agreement, awarded originally in 2011. Each region received $120,000 annually for their respective competition, which includes the $100,000 grand prize. Each regional competition had other prizes, sponsored by a variety of private and non-profit organizations.

The prizes for the National Competition, operated by DOE and paid for through private sector sponsorship, included in-kind services, valued at approximately $50,000. The in-kind prizes include legal services, commercialization assistance from a national lab, media exposure, and speed mentoring with venture capitalists.

In the 2014 National Competition, there were three categories of sponsors: National Sponsors; Team Sponsors; and Media and Outreach Sponsors.

*National Sponsors*

National Sponsors provide cash prizes for the National Competition, support the event by hosting the National Grand Prize events, and provide catering and other services for the National Grand Prize events. The following organizations provided prizes in this category:

- Mintz Levin: sponsored the Cleantech Forum and provided space, catering and the reception for the first day of the event.

- Battelle: sponsored the lunch of the Grand Prize event.

- BASF: sponsored the lunch of the Grand Prize event.

- Clean Energy Trust: sponsored the finalist team and judges dinner and provides the judging platform.

- Invenergy: sponsored the finalist team and judges dinner.

- World Wildlife Fund: provided the event space for the Grand Prize event.

*Team Sponsors*

Team Sponsors provided the winning and regional finalists teams with in-kind services and prizes. The 2014 Team Sponsors included:

- Bloomberg New Energy Finance: provided access to their database for the regional winners prior to the Grand Prize Event, and awarded the National winner a year license to their data and analytical news resources.

- Cleantech Open: awarded scholarships to the six regional finalists and assistance for all semi-finalists in the National Clean Energy Business Plan Competition.

- Mintz Levin: awarded 30 hours of free legal service to the winner of the National Prize.

- National Renewable Energy Laboratory: provided entry into the Industry Growth Forum for the finalist teams, and provided commercialization assistance for the Grand Prize winner.

- National Venture Capital Association: NVCA featured an interview with the winner of the Audience Investor Choice Award winner on their site.

- Scientific American: The winner of the People's Choice Award was interviewed for Scientific American's Plugged In site.

*Media and Outreach Partners*

Media and Outreach Partners publicize and amplify the regional and National Competition and provide additional support for the event, including agenda formulation and speakers. The 2014 Partners were:

- National Venture Capital Association

- Pew Charitable Trusts

- Scientific American


Evaluation and Judging: The NCEBPC judging criteria is outlined in a policy memo that remained constant through the three year process. The NCEBPC used a software platform provided by a non-profit, the Clean Energy Trust. Each judge had online software. The submissions for the National Competition are the regional winners from each competition.

At the regional level, each competition determines selection independently, with the guidelines instructed through the eligibility requirements. Independent reviewers hailing from multiple sectors, including finance, business and non-profits, serve as judges at the application and competition stages. While the regions can determine their own judging criteria, their criteria are subject to DOE approval.

The National Competition assesses the following criteria to select a winner: value proposition; market differentiation; barriers to competition; technical feasibility; feasibility of go-to-market plan; customer access and traction; scalability; quality; team commitment and chemistry; gaps and action plans; and impact on EERE mission.

Partnerships: The partnerships and sponsors are detailed in Incentives.

Resources: To execute the regional prizes, in 2011 the DOE released a competition solicitation to determine the administrators of the prizes. Each regional organizer selected received a total of $360,000 for the three year program. In each fiscal year, $100,000 was required to be directed as a prize, while $20,000 remained for any administrative or overhead costs. The award instruments used were cooperative agreements. Each region fundraised for other prizes and administrative support. Many competitions have other prizes alongside the DOE competition.

The national prizes and all funding for the event (catering, space) are provided through private sector sponsors. The only DOE resources, at least up until 2014, have been staff time.

Results: Since its inception, the NCEBPC has catalyzed the launch of companies, attracted attention and private sector support for competitions, and created jobs. In the first three years, more than 70 ventures have incorporated that received more than $38 million in follow-on funding and generated more than 120 jobs. The graduate startups from the Competition have seen enormous success. In the past year, companies have been acquired, secured joint development agreements with major corporates, attracted crowdfunding and traditional investment, and been accepted into prestigious accelerators and incubators.

In addition to the commercial success of the companies that participated over the three years, the 2014 Competition was more diverse than any previous year. The 2014 Competition featured more women than any previous finalist competitors. Of the six finalist teams in the National Competition, five teams had women on their teams; this represented an increase from one team of six in 2013. The winning team, REEcycle, hailed from a minority serving institution – the University of Houston – and was the first national winning team of all undergraduate students.

Further notable results of the Competition:

*Prize Launches Beer to Algae Pilot[77]*

Superior Ecotech – a startup from the University of Colorado Boulder – developed an advanced methodology to capture $CO_2$ emitted from breweries in order to accelerate the growth of algae. In 2014, Superior Ecotech decided to enter into business plan competitions to raise capital to install a pilot system. In April, Superior Ecotech took the top prize at the University of Colorado Cleantech New Venture Challenge. Work is underway to on their pilot at Upslope Brewery.

*2013 National Clean Energy Business Plan Competition Winner Secures Funding and Development Partner[78]*

SiNode Systems, an advanced anode battery company and the 2013 winner of the NCEBPC, received a $1 million DOE Small Business Innovation Research Phase II grant[79] and announced a Joint Development Agreement to commercialize graphene-based materials for lithium-ion batteries with AZ Electronic Materials – a business unit of Merck KGaA, Darmstadt, Germany. This marks SiNode's second agreement with a major corporate partner.

*Solar Startup Acquired by SunPower*

Dfly Systems, a solar power electronics startup founded by Stanford University students, has been acquired by SunPower. Dfly Systems placed third in the 2013 and 2014 Caltech First Look West Competition (FLoW). This is the second FLoW competitor to be acquired by SunPower – Greenbotics, developer of robots that clean solar panels and the runner-up winner in the 2012 competition, was acquired in November 2013.

*Picasolar Commercializing Solar Technologies[80]*

Picasolar Inc., a solar start-up company that won the 2013 MIT Clean Energy Prize and was a finalist in the 2013 NCEBPC, raised $1.2 million in equity investments. The company raised $600,000, which was matched by the state of Arkansas. The investment round came shortly after the company secured $800,000 from the SunShot Incubator program at DOE, bringing their total funding from the Incubator to $1.3 million. The company plans to produce their first commercial units in 2015.

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[77] http://www.bizjournals.com/denver/print-edition/2014/10/03/algae-could-be-growing-answer-to-brewery-emissions.html?page=all

[78] http://energy.gov/eere/articles/small-business-innovation-research-projects-make-big-impact-clean-energy-economy

[79] http://energy.gov/oe/technology-development/small-business-innovation-research-sbir

[80] http://newswire.uark.edu/articles/25992/picasolar-raises-1-2-million-in-equity-investments

*Forbes 30 Under 30*

For the third year in a row, participants and finalists in the 2014 NCEBPC were recognized for their entrepreneurial energy efforts in Forbes' annual 30 Under 30 list. The companies and individuals included: KAir Battery[81] from the Ohio State University, the developer of an advanced potassium-air battery; kinetic-powered mobile charging device company, AMPY[82], from Northwestern University; and Casey McNeil[83], the CEO of the 2014 national winning team REEcycle from the University of Houston.

### III. The SunShot Catalyst Program[84]

Summary: SunShot Catalyst is an open innovation program that aims to catalyze the rapid creation and development of products and solutions that address near-term challenges in the U.S. solar marketplace. Through a series of prize challenges, SunShot Catalyst makes it faster and easier for American innovators to launch cutting-edge solar companies, while tackling time-sensitive market challenges - Tomorrow's Solar Startups Launched by People like You.

*Solution Type*: Ideas; Software and apps; Analytics, visualizations, and algorithms; Business plans

*Primary Goals*: Engage new people and communities; Stimulate a market

*Results*: Though the challenge is not yet completed, it has already demonstrated success in outreach to and engagement of innovators from outside the solar industry. To date, there are over 5,300 active members in the Catalyst community. In addition, DOE was able to initiate the Catalyst program very quickly – it was conceived, approved, and launched in less than six months, and prizes for the Catalyst Business Innovation contest were awarded within 6 weeks of the submission deadline

Problem Statement: Solar is a relatively new industry that is growing rapidly, but continued growth will be dependent on several issues including cost competitiveness with other energy sources. Through the SunShot Catalyst prize program, communities of innovators use software, data, algorithms, and automation to drive down non-hardware solar soft costs

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[81] http://www.forbes.com/pictures/mef45efmhf/damian-beauchamp-28-xiaodi-ren-27-kate-fisher-29/

[82] http://www.forbes.com/pictures/mef45efmhf/tejas-shastry-25-alex-smith-29-mike-geier-28/;
http://www.getampy.com/blog/looking-ahead-to-a-very-ampy-2015

[83] http://www.forbes.com/pictures/mef45efmhf/casey-mcneil-25/

[84] Challenge Website - http://catalyst.energy.gov; Challenge Video - http://youtu.be/PA0KI77G05U

– like permitting, financing, and customer acquisition – that today make up more than half of the cost of a solar electricity system.

Since its inception, SunShot has helped hundreds of innovators bring mature solar solutions to the marketplace. Catalyst's prize challenge framework introduces the business community to the vast array of tools, capabilities, data assets and additional resources developed by DOE and the national laboratories. Catalyst's open, fast-paced innovation cycle allows crowd-sourced engagement and frequent partnerships with the nation's growing networks of technology mentors, incubators, and accelerators.

*The Catalyst Process*

The Catalyst program consists of four steps with value awarded to all winning contestants totaling $1,000,000, including about $500,000 in cash prizes.

|  | Winners | Awards | Timeline |
|---|---|---|---|
| Step 1: Ideation | Up to 5 | $1,000 cash per winner | May 21 – August 25, 2014 at 11:59pm ET |
| Step 2: Business Innovation | Up to 20 | $25,000 in services per winner | September 8 – December 19, 2014 at 11:59pm ET |
| Step 3: Prototype | Up to 20 finalists | All finalists advance to Incubation | January 19 – April 17, 2015 at 11:59pm ET |
| Step 4: Incubation | Up to 5 | Up to $100,000 prize package per winner | First cash prizes announced May 21, 2015. See detailed timeline below. |

*Step 1: Ideation*

The ideation contest focuses on generating and aggregating pressing U.S. solar market needs and problem statements that can be solved through automation, algorithms, data, and software, especially by leveraging available data assets, tools, capabilities, and resources. Anyone can participate by submitting problem statements online or by voting on problem statements submissions from others. A contestant with a problem statement may win $1,000 in cash prizes when a team, who adopted this problem statement in their business solution, has been selected among top five winners by a panel of judges in accordance with the rules of the incubation contest.

*Step 2: Business Innovation*

The business innovation contest is designed to help teams form and explore business solutions to the most compelling problems identified during ideation. Anyone can participate by submitting a business plan package online, including a five-minute video describing the proposed business plan. Up to 20 winners will be given the opportunity to move forward in the Catalyst process and work directly with a crowd-centric performance-

based software development platform to develop the product proposed in their business plan and to create minimum viable products (MVPs).

*Step 3: Prototype*

The prototype phase is designed to help business plan contest winners rapidly develop MVPs using a crowd-centric performance-based software development platform. During the contest, teams will be provided with $25,000 worth of support from a DOE-provided software developer over a 60-day period. Each team will formulate their requirements and scope of work for one MPV, working closely with the software developer.

*Step 4: Incubation*

The Incubation contest is designed to help teams with MPVs start their businesses and accelerate offering new products and services in the solar marketplace. To win cash awards, teams will participate in a DOE-hosted Demo Day to showcase their MPVs, market entry execution strategy, and six-month growth plan. During Demo Day, teams will be evaluated by judges according to pre-established criteria. The top five winning teams will receive up to $100,000 in cash prizes.

Proposed Goals:

- Support *new entrants* into the solar "founder's club"
- Bring *non-traditional entrepreneurs and human capital* into solar industry
- *De-risk technology development* for applicants by providing *rapid* prototyping
- Provide *pre-seed stage prize funding*, integrating well with other SunShot funding opportunities especially SunShot's Incubator program

Why a Prize: It's in the spirit of American ingenuity and invention that the SunShot Initiative has invited the public to participate in a new solar prize challenge and find solutions to the solar energy industry's most pressing problems.

Software development happens rapidly and SunShot needed to create a program that is nimble and allows the participants to rapidly create products to address near-term issues in the US solar marketplace.

For this particular effort, a competitive grant would be more restrictive. If a traditional grant were used, all problem statements and proposed business solutions would have to be made confidential.

A prize program gives SunShot the greatest flexibility to solicit both problem statements and software solutions to those challenges in a transparent and open fashion, with little overhead.

Participants: Within the Catalyst ecosystem, Catalyst has reached entrepreneurs, coders, software and data experts, investors, mentors, designers, students, utilities, and solar professionals. The program has enjoyed an enthusiastic response regarding government programs just like this one that can help them launch a startups while also helping DOE drive down the cost of solar energy today.

Timeline: (tentative & subject to change)

*Step 1*

- Submission Period Begins: Wednesday May 21, 2014 at 11:59 AM ET
- Submission Period Ends: Friday June 20, 2014 at 11:59 PM ET
- DOE and Public Voting Period Begins: Wednesday June 25 at 11:59 AM ET
- Public Voting Period Ends: Monday August 25, 2014 at 11:59 PM ET

*Step 2*

- Submission Period Begins: Monday September 08, 2014 at 11:59 AM ET
- Submission Period Ends: Friday November 07, 2014 at 11:59 PM ET
- Winners Announced: Friday December 19, 2014 at 11:59 AM ET

*Step 3*

- Teams Orientation: January 19 - 23, 2015
- 60-Day Prototyping Period Begins: Friday February 13, 2015 at 11:59 AM ET
- 60-Day Prototyping Period Ends: Friday, April 17, 2015 at 11:59 PM ET

*Step 4*

- Demo Date: May 14 - 21, 2015
- Seed Round & 1st Tranche Cash Awards Announcement Date: Thursday May 21, 2015
- 6-month Assessment Period Ends: Monday November 09, 2015 at 11:59 PM ET

Progress Round Awards & 2nd Tranche Cash Prizes Announcement Date: December 14 - 20, 2015

<u>Solicitation & Outreach</u>: By actively participating in the Catalyst community, an individual or team has the opportunity to turn an idea into a funded startup on a national stage. In order to develop this community of active participants in a cost effective manner, the following three channels were opened and maintained for future rounds of Catalyst: direct in-person engagement, digital channels, member to member, and press media.

*Direct In-Person Engagement*

The main mechanism for initiating direct person engagement is the Road Show. The Road Show usually consisted of co-sponsoring an anchor event and conducting additional SunShot Catalyst Jamathons near that anchor event. By conducting the Road Show, the core team, current SunShot awardees, and supporting staff generated excitement and awareness about the Catalyst program in regions of the US. This strategy was piloted in three cities: San Francisco CA, Austin TX, and Washington DC.

*Digital Channels*

The Catalyst platform and its open nature enable a variety of web, media, and digital channels to connect with its growing community of active users. Email, web video, and social media tweets/Facebook posts are used by the Catalyst team to communicate announcements and opportunities. These communication channels can be used both vertically (Catalyst team and community) as well as horizontally (member to member).

Social Media Strategy*:* during the site launch and near major contest deadlines Facebook/LinkedIn sharing, tweets, and DOE blog posts[85] are critical to reaching portions of the target audience. Retweets greatly enhanced the visibility and reach of the Catalyst messaging.

*Person to Person*

A critical component in maximizing the value of the Catalyst ecosystem is the ability for active members to communicate with each other both virtually and in-person. Virtually, Catalyst members are able to contact one another via the online platform as well as comment/vote on ideas.

*Press*

Press Release: "Energy Dept. Announces New Prize Challenge to Drive Down the Cost of Solar Power," May 20, 2014[86]

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[85] http://energy.gov/eere/articles/sunshot-catalyst-new-prize-challenge-aims-accelerate-solar-solutions; http://energy.gov/eere/articles/creating-future-solar-energy-today

[86] http://energy.gov/eere/sunshot-summit/articles/energy-department-announces-new-prize-challenge-drive-down-solar-costs

Gigaom "To Reduce the Cost of Solar Look to Everything but the Hardware," May 20, 2014[87]

Cleantechnica "SunShot Catalyst Takes Aim at Solar Soft Cost," May 21, 2014[88]

TechCrunch "The Department of Energy Needs your Help to cut the Soft Cost of Solar," November 5, 2014[89]

Incentives: The primary incentive is a $1,000,000 total in prize awards given across the 4 steps of Catalyst prize program. A portion of the prize awards will be designated for software developments services.

Evaluation and Judging:

*Ideation Evaluation Criteria*

During the submission period and prior to the beginning of the voting period, DOE will initially screen submissions for compliance with the objectives and rules of this contest. Submissions that pass the initial compliance screening will be published on the contest website and will be open for public voting. DOE will publish a list of all eligible statements at the end of step 1.

*Non-Monetary Prize Evaluation*

The screened submissions will be evaluated based on the two scoring criteria listed below. Any eligible submission that gets a SunShot Thumbs Up and is among the top 25 in terms of total public votes may be granted a letter of commendation from DOE as a non-monetary prize.

Scoring Criteria # 1 - Sunshot Thumbs Up: A submission will receive the SunShot Thumbs Up vote if SunShot determines that the answer to each of the following questions is "Yes":

- Is the Problem Statement clearly defined and well-articulated?

- Does the problem statement reflect a timely and a compelling solar market need in the U.S. whose solution will have a great and measurable impact consistent with SunShot goals?

- Does the problem statement have the potential to be solved using highly scalable business processes, automation, data, or software?

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[87] https://gigaom.com/2014/05/20/to-reduce-the-cost-of-solar-look-to-everything-but-the-hardware/

[88] http://cleantechnica.com/2014/05/21/sunshot-catalyst-takes-aim-at-solar-soft-costs/

[89] http://techcrunch.com/2014/11/05/the-department-of-energy-needs-your-help-to-cut-the-soft-costs-of-solar/

- Do potential solutions to the problem statement have viable monetization pathways with high probability for yielding market-driven self-sustaining or profitable businesses?

Scoring Criteria # 2 - Public Votes: The public can participate in the voting in this contest by casting no more than one vote per submission during the active public voting period. To qualify for non-monetary prizes a submission must receive a total number of public votes that places them among the top 25 publically voted submissions during the voting period and as determined by DOE.

*Basis For Monetary Prize Awards*

To win a monetary prize in an Ideation contest (Step 1), the problem statement of a contestant in Step 1 has to be the referenced problem statement of a winning contestant of a subsequent Incubation contest (Step 4). The winning contestant in Step 4 may be related or unrelated to the contestant in Step 1. All monetary prizes for Step 1 are equal in the amount of $1,000 per award and not exceeding $5,000 in total.

*Business Innovation Contest Evaluation Criteria And Judging*

DOE will initially screen submissions for compliance with the objectives and rules of this contest. Submissions that pass the initial compliance review will be evaluated and scored by a panel of judges. Submissions will be judged according to four scoring criteria: Novelty & Impact Potential; Business Plan Scope & Quality; Team Experience & Abilities

*Incubation Evaluation Criteria*

Seed Round Scoring Criteria:

- MVP Quality & Impact
- Market Entry
- Growth Strategy
- Team Success Potential

Prize awards are only available to the top five selected Winners in Step 4 Seed Round.

Progress Round Scoring Criteria: If DOE determines that the answer to each of the following questions is "Yes", then contestant will receive the 2nd tranche cash prize award of $70,000

- Did the contestant demonstrate substantial progress to build market confidence and with strong potential for impactful market adoption and growth?
- Did the contestant show high adaptability to uncertainties described in its execution strategy in order to realize relevant and key success metrics necessary for a future success?

- Does the contestant's Score Card show successful satisfactory completion of its top five success metrics with high confidence in the implemented success verification methods?

Partnerships: Through an innovative partnership with the National Renewable Energy Laboratory (NREL) and topcoder, winners of the Catalyst Business Innovation Contest have the opportunity to use the topcoder platform and developer community to create software prototypes. Teams will demo their prototypes before a panel of investors, judges and their peers in May 2015. Up to 5 winning teams will receive $30k on the spot, and up to an additional $70k in follow-on funding from DOE as they grow and scale their innovative solar solution.

Resources: In addition to the $1,000,000 prize money, the competition may require up to $700,000 per round to fund and support outreach activities, co-prize administration, and software development vendor support services.

Results: The Catalyst program has made great strides to reach innovators from outside the solar industry. The program leveraged social media, software and technology community events and conferences, and media relations to engage and build the Catalyst community. Over five million people have been reached via Twitter with approximately 10% of active members coming from social media. To date, there are over 5,300 active members in the community, responsible for submitting more than 130 problem statements, and nearly 1400 votes from the online community. SunShot has enjoyed media coverage including TechCrunch, support from the Secretary of Energy[90], and mentions by the White House[91] and the White House Office of Science and Technology Policy blog[92].

Finally, it is notable how quickly these results have been achieved. The program was conceived, approved, and launched in less than six months. Prizes for the Catalyst Business Innovation contest were awarded within 6 weeks of the submission deadline – this includes evaluation of submissions and announcement.

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[90] http://youtu.be/NpcStxOq2Ug?t=1h59m16s

[91] http://www.whitehouse.gov/the-press-office/2014/09/18/fact-sheet-white-house-announces-executive-actions-and-commitments-acros

[92] http://www.whitehouse.gov/blog/2014/05/30/new-strategy-drive-down-soft-costs-solar

### IV.    SunShot Prize[93]

Summary: Despite unprecedented cost reductions for solar hardware over recent years, the total price to install and commission residential and small-commercial scale solar energy systems remains high. Designing and implementing practices that enable reductions in the associated non-hardware costs of solar is now the greatest challenge to achieving national targets for attaining cost-competitive solar by 2020. Customers often wait as long as six months to flip the switch on a small residential solar system that could be grid-connected simply and easily if these steps were improved. This competition will spur faster, easier, and cheaper solar deployment in the U.S. and will offer a total of $10 million in cash awards to make permitting, installation, inspection and interconnection (permit-to-plug-in) processes more efficient than ever before. Every one day cut due to process efficiency translates to $2 million of electricity sales at 2013 deployment level. A positive customer experience in the U.S. will lead to a strong cascading network effect for accelerated solar deployment.

*Solution Type*: Business plans; Technology demonstration and hardware

*Primary Goals*: Solve a specific problem; Engage new people and communities

*Results*: DOE has responded to the perspectives of prospective participants and is reformulating the original 2012 rules. The contest will recommence in 2015, better structured to create synergetic opportunities for collaboration among cities, installers, and utilities.


Problem Statement: DOE's $10 million SunShot Prize challenges the ingenuity of America's businesses and communities to make it faster, easier, and cheaper to install solar energy systems. The goal is to significantly improve the customer experience of "going solar."

DOE will run two contests in this competition for 18 months. One is targeted at small solar systems (1 - 100 kW) and another targeted at large solar systems (101-1,000 kW), the "Small System Contest" and the "Large System Contest" respectively. The winner of the Small System Prize will successfully install and connect to the U.S. grid a minimum total of 10 MW of qualifying PV solar energy generation equipment during the performance period of 18 months. The winner of the Large System prize will successfully install and connect to the U.S. grid a minimum total of 15 MW of solar during the performance period of 18-months.

The challenge has been significantly reformulated. In September 2012, DOE released the original rules for the SunShot Prize program. Successful competitors were expected to

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[93] Challenge Website: http://energy.gov/eere/sunshot/sunshot-prize-race-7-day-solar

achieve a $1 per watt non-hardware cost using innovative, replicable, and verifiable business processes. However, there was doubt that any team would submit a full application before the program ended in December 2014. In September 2014, DOE announced its decision to suspend the original rules and its intent to release revised competition rules before the end of the calendar year. DOE has reformulated the original rules in light of today's needs and conditions and in order to create the necessary synergetic opportunities for collaboration among cities, installers, and utilities to bring process efficiency which ultimately lower prices.[94]

Proposed Goals: DOE aims to increase process certainty and reduce the time of permit-to-plugin towards 7 days (Small System Contest) or 7 weeks (Large System Contest).

Why a Prize: The SunShot Prize not only rewards results, it increases the number and the diversity of entities that are addressing this problem, especially cities, local governments, utility companies, and installers. In addition, DOE expects the industry overall, to invent and deploy new concepts and models, during a period of two years. This will help market players to participate, excel, and improve while focusing on their core value proposition to end consumers.

Participants: The target audiences are teams consisting of numerous organizations such as solar developers, installers (large and small), state and local governments, utilities, property owners/managers, new housing builders, home service providers, trade associations, and new market entrants. The prize is open to all U.S. citizens or permanent residents and to all public and private organizations such as a private or publicly traded company or an institution of higher education, an association, or other non-profit organization, that maintains the U.S. as a primary place of business.

Timeline:
(tentative & subject to change)

| | |
|---|---|
| Draft Rules Announcement | Wednesday, October 22, 2014 |
| Public Comments Due | Friday, November 28, 2014 |
| Release of Official Rules | Friday, January 23, 2015 |
| Letter of Intent Due (optional) | Monday, March 22, 2015 |

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[94]http://energy.gov/sites/prod/files/2014/10/f18/SunShot%20Prize%20Draft%20Rules%20Final%20Release%2010202014_0.pdf

| | |
|---|---|
| Initial Registration Due (optional) | Monday, May 24, 2015 |
| Entrance Application Due | Wednesday, July 22, 2015 |
| Announcement of Teams & Change Prize Candidates | Tuesday, September 22, 2015 |
| Performance Period Begins | Tuesday, September 22, 2015 |
| Candidates First Progress Report Due | Tuesday, January 19, 2016 |
| Candidates Second Progress Report Due | Monday, March 20, 2016 |
| Performance Period Ends | Monday, January 15, 2017 |
| Performance Application Due | Monday, January 15, 2017 |
| Announcements of Grand Prizes | Thursday, April 27, 2017 |

Solicitation & Outreach: Challenge organizers have hosted three webinars to promote the release of the draft rules and solicit feedback and comments from the public before the release of final rules in January 2015. After the rules of the official rules challenge organizers will apply targeted engagement campaign using webinars, email blasts, blog posts, and web updates that target hundreds of communities and organizations. Challenge organizers plan to publish a number of press releases about the competition in technology, media, and energy press online. The SunShot Initiative website, Energy.gov, and Challenge.gov will also be used as hubs for frequent competition updates and active support to potential contenders. Challenge organizers have partnered with the College of Nanoscale Science and Engineering at State University of New York at Albany (CNSE), to promote and provide ongoing outreach through annual workshops dedicate to the SunShot Prize and its potential contenders.

Incentives: The primary incentive is $10,000,000 total in cash award given to up 20 Change Prize winners and a number of Grant Prize winners. The Grant prizes will be $4 million each for the winner of the Small System Contest and the Large System Contest. Up to 20 entrants may each win up to $100,000 in Change Prizes. These prizes will reward contestants for taking meaningful steps towards satisfying the qualifying requirements of the Small System Contest or the Large System Contest.

Evaluation and Judging: DOE will use statistics based approach evaluation and rely on an Evaluation Review Committee (ERC) composed of Federal and non-Federal subject matter experts, including third-party organizations, to review entries submitted under this competition and determine winners. In addition, DOE will use third-party auditing services to conduct record validation in order to assist the ERC in making its selections.

There are three main criteria in judging final applications:

1. Repeatability: The repeatability criteria measure a team's ability to complete PV systems in set time durations repeatedly. Shorter time durations translate to higher points. Two metrics are used to evaluate this criteria: Time-adjusted capacity (in MW) and Normalized time-adjusted capacity (in %)

2. Time Performance: The time performance criteria measure a team's ability to consistently reduce the Total Time for PV system and increase the certainty of going solar. Two metrics are used to evaluate this criteria: Total Time expected value (in days) and Total Time variability (in days)

3. Replicability: Replicability criteria measure a team's ability to apply their innovation for time reduction and increased process certainty across wide geographical areas in the U.S. One metric is used to evaluate this criterion: Diversity of Authority Having Jurisdictions (in %).

Partnerships: Challenge organizers partnered formally with the College of Nanoscale Science and Engineering at State University of New York at Albany, to promote and provide ongoing outreach activities.

Resources: In addition to the $10,000,000 prize money, the competition may require up to $50,000 annually to fund and support outreach activities.

Results: DOE released the draft rules of the SunShot Prize: Race to 7-Day Solar on October 2014. During the public review period that ended on November 28, 2014, DOE received detailed feedback from the public. The comments were positive and reflective of overall sense of excitement about the program. Comments confirmed that the goals are challenging but attainable within the proposed duration. The comments favored and understood the statistics-based evaluation approach, recommended using a geographic diversity metric as a core criteria instead of a bonus criteria. Comments also validated the importance of the seed funding as well as the sufficiency of the proposed funding levels for the anticipated efforts. Comments also recommended specifying auditing rights as a condition of participation to insure fair and equitable competition among all potential contenders. DOE is currently redrafting the rules to address these comments and plan to release the final rules document in January 2015.

**D. Department of Health and Human Services**

### I. ASA VizRisk[95]

Summary: VizRisk is the first behavioral-health visualization challenge hosted by the US Department of Health and Human Services (HHS) to foster increased utilization, innovation, and analyses of government data to help inform personal and health policy decisions through critical analyses and applications of the data.

This 3-month challenge will call on talented designers, coders, government officials, healthcare providers, and experts from around the country to analyze, organize, and visualize behavioral health risk data from CDC's Behavioral Risk Factor Surveillance System (BRFSS) data. Participants will be challenged to combine this data with other publicly available government data sets to provide key insights and show compelling relationships.

All submissions will be evaluated on the four criteria of innovation, relevance, scientific excellence, and design.

*Solution Type*: Software and apps; Creative (design & multimedia); Analytics, visualizations, and algorithms; Scientific

*Primary Goals*: Stimulate a market; Inform and educate the public

*Results*: The competition results were not announced in FY14. However, the competition achieved its goals to reach out to new data visualization communities, improve the data visualization capabilities of HHs, and learn more about the data visualization community to facilitate long term interactions and engagement.

Problem Statement: Visualize (using pre-made or de novo software) and cross-analyze BRFSS data with other government datasets.

Proposed Goals: [See Summary]

Why a Prize: HHS wanted to recruit a broad range of skillsets in developing visualizations, and stimulate interest in behavioral health data among academic, public health, nonprofit, and private circles. Creating a challenge would foster collaboration among diverse groups of people and allow for an exchange of ideas across disciplines.

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[95] Challenge Website: http://www.hhsvizrisk.org/

Participants: Students, technologists, public health experts, and data experts were targeted.

Timeline:

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|---|---|
| Planning Phase Initiation | 6/1/2014 |
| Federal Register Notice Publication | 7/21/2014 |
| Submission Open | 7/26/2014 |
| Submission Close | 10/26/2014 |
| Judging Open | 10/27/2014 |
| Judging Close | 11/22/2014 |
| Winner(s) Announced | 1/7/2015 |

Solicitation & Outreach: HHS utilized networks through Health Data Consortium, IDEA Lab, the Federal prize community; social media with challenge-specific twitter handle and facebook page; word of mouth communications through external judges, mentors, and other friends of the competition.

Incentives: $15,000 was offered in total prizes and there were up to 7 different awards possible. One non-monetary incentive was the capability to produce influential visualizations of strategically important HHS data assets.

Evaluation and Judging: There were 12 reviewers from HHS, other Federal employees, and outside government. Submissions were scored individually according the following numerical criteria and then averaged for ranking:

- Scale of 1-5 to score each of the projects on the four criteria listed below:

  o 25% Innovation – Is the tool showing novel combination of data, or suggesting important new uses?

  o 25% Design – Is the tool visually appealing, elegant, and intuitive?

  o 25% Relevance – Does the tool contain data relationships and insights relevant to behavioral health topics and decisions?

  o 25% Scientific Excellence – Does the tool rigorously measure relationships relevant to scientific inquiry?

Partnerships: VizRisk did not have any formal organization partnerships, but took advantage of partnerships through contributors of data to the competition (CDC, HRSA, US Census).

Resources: About 120 hours of intern time and 40 hours of GS-14 time were used in the planning and execution of this prize.

Results: One goal was to reach out to new "dataviz" communities that don't normally work closely with HHS. 9 of 10 applicants were individuals or small teams that neither had contracts nor grants with HHS. Another goals was to improve the dataviz capabilities of HHS through inclusion of external talent. The submissions were, by and large, marked improvements over how the featured datasets were currently visualized, both internally and on the public website. Lastly, another goal was to use a pull mechanism to discover more about the dataviz community, in the hopes of establishing long term interactions and engagements. Through the prize competition, ASA learned quite a bit about the dataviz community, and, more importantly, learned more about their motivations and expertise. This information will be used to design future competitions, programs, and acquisitions to improve the overall dataviz capabilities of HHS.

## II. ASPR Ideation Challenge: System for Locating People Using Electricity Dependent Medical Equipment During Public Health Emergencies[96]

Summary: The goal is to identify novel solutions for a system for monitoring the location and status of life-sustaining durable medical equipment (DME) during a prolonged power outage or disaster situation. This information would be used by a network of family and friends, formal caregivers, emergency responders and others responding to a disaster to better assist individuals who are dependent on DME. This is part of a larger effort to ensure that these people get the necessary help as quickly as possible.

*Solution Type*: Ideas

*Primary Goals*: Solve a specific problem; Engage new people and communities; Stimulate a market

*Results*: Three solutions were developed to collect and disseminate information about durable medical equipment during a power outage.

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[96] Challenge Website: https://www.innocentive.com/ar/challenge/9933433

Problem Statement: To goal is to identify novel solutions for a system for monitoring the location and status of life-sustaining durable medical equipment (DME) during a prolonged power outage or disaster situation. This information would be used by a network of family and friends, formal caregivers, emergency responders and others responding to a disaster to better assist individuals who are dependent on DME. This is part of a larger effort to ensure that these people get the necessary help as quickly as possible.

Submissions include a detailed description of the system (process and/or device) that will be used under routine and emergency conditions to:

- Uniquely identify DME;
- Report the current power status of the device, to include remaining battery time;
- Report the location of the device;
- Determine the operational status of DME; and
- Identify a way to contact the DME user.

Submissions also include the rationale for the solution, and specific ideas to address the following questions.

- How would people obtain the system?
- How could they register?
- How will data be transferred to recipients?

The solution most likely includes a device, but ASPR is interested in a versatile submission that would benefit people from all socioeconomic backgrounds.


Proposed Goals: [See summary]


Why a Prize: ASPR sought fresh, new ideas that could be developed into new technologies or integrated with currently available technologies to help solve the problem.


Participants: Software developers and other solvers belonging to the InnoCentive solver community were utilized.


Timeline:

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|---|---|
| Planning Phase Initiation | 5/15/2013 |

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|---|---|
| Federal Register Notice Publication | 9/20/2013 |
| Submission Open | 9/23/2013 |
| Submission Close | 10/31/2013 |
| Judging Open | 11/10/2013 |
| Judging Close | 12/15/2013 |
| Winner(s) Announced | 2/20/2014 |

Solicitation & Outreach: The competition was marketed through InnoCentive channels and those of FEMA. Additionally, the competition was posted on PHE.gov blog and challenge.gov. An announcement by InnoCentive to their solver community led to the highest number of page hits.

Incentives: $10,000 was offered in total prizes, with $5,000 for first place, $3,000 for second place, and $2,000 for third place

Evaluation and Judging: The challenge was internally judged, with one official judge.

Partnerships: None.

Resources: The services of an outside competition vendor, InnoCentive, including their web-based platform were obtained through the GSA contracting vehicle 541 4G: Challenges and Competitions Services. Additionally, a FTE at ASPR served as a project POC.

Results: Leo Angelo Gumpas and Xadean Ahmasi from Laurel, Md., partnered as a team in the idea challenge to grab first place with the creation of an integrated, internet-based system which automatically monitors and transmits essential data from DME devices to caregivers and responders to provide actionable information in support of emergency planning and response operations.

Stan Barrack from Forest Park, Ill., came in second with the idea to create an integrated set of tools that could use inexpensive technology, such as a cellular phone application, to securely share critical information on the status of DMEs in impacted areas with existing data centers where specific patient information is stored.

Third place was awarded to An-Hu-Li and his son David-Li from Commack, N.Y., who developed an idea for a cost-effective wireless DME status reporter based on two-way radio technology. The device would send and receive vital information between a patient DME unit and authorized users, such as caregivers and first responders, operating on the same radio frequency. The technology would include security features to prevent interception of confidential patient data.

### III.    CDC Million Hearts Hypertension Control Challenge - 2013[97]

Summary: Million Hearts® is a national initiative to prevent one million heart attacks and strokes by 2017. Achieving this goal means that 10 million more Americans must have their blood pressure under control. Million Hearts® is working to reach this goal through clinical approaches such as using health information technology to its fullest potential and integrating team-based approaches to care, as well as community approaches such as strengthening tobacco control, reducing smoking, and improving nutrition through decreased sodium and artificial trans-fat consumption. Million Hearts® has identified key clinical levers and has substantial scientific evidence around the types of system changes that improve hypertension control. What is lacking is implementation experience with those systems and processes in order to promote best practices. The Million Hearts® Hypertension Control Challenge reaches out to clinicians, practices and health systems that are able to demonstrate high levels of hypertension control within their patient population. Through the challenge CDC will:

1. Identify large and small clinical practices and health systems with hypertension control rates greater than 70%. The national hypertension control rate is 46 percent.

2. Identify Federal health care providers that document hypertension control rates greater than 70%.

3. Document usual and innovative system-level processes or approaches used by high performers to achieve exemplary hypertension control rates.

The challenge reaches small practices and health systems that may achieve extraordinary hypertension control results but do not have the resources to publish their findings or promote their results. It creates a sense of urgency around hypertension control and spurs a sense of competitiveness among providers and health systems to share their achievements. This challenge will allow Million Hearts® to get a glimpse into the

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[97] Challenge Website: http://millionhearts.hhs.gov/newsevents/hypertension_control_champions.html

implementation of sustainable changes to inform future activities and key levers, and shines a spotlight on exemplary performance by clinicians and health systems.

*Solution Type*: Nominations

*Primary Goals*: Improve government service delivery; Find and highlight innovative ideas; Engage new people and communities

*Results*: 9 Champions were announced as winners of the 2013 Million Hearts Hypertension Control Challenge, representing individuals, small and large medical practices, and federal agencies from across the country.

Problem Statement: Currently, about 67 million American adults have high blood pressure and less than half (46 percent) have it adequately controlled. High blood pressure is one of the leading causes of heart disease and stroke. Of the 800,000 deaths in the United States each year from cardiovascular disease, 600,000 are from heart disease and 130,000 are from stroke. While heart disease and stroke can be fatal, they can also result in serious illness, disability, and decreased quality of life. Further, hypertension and its associated diseases pose $156 billion in medical and lost productivity costs each year.

Million Hearts® is a national initiative to prevent 1 million heart attacks and strokes by 2017. Achieving this goal means that 10 million more Americans must have their blood pressure under control. Million Hearts® is working to reach this goal through clinical approaches, such as using health information technology to its fullest potential and integrating team-based approaches to care, as well as community approaches, such as strengthening tobacco control, reducing smoking, and improving nutrition through decreased sodium and artificial trans-fat consumption. Doctors, nurses, pharmacists, and community health workers play a key role in helping Americans control their blood pressure. They provide high-quality clinical care and encourage patients to make healthy lifestyle changes.

The Million Hearts® Hypertension Control Challenge is intended to identify high performing large and small clinical practices and health systems and document the systems and processes that support hypertension control.

Participants completed a nomination form that provides basic information about the practice or health system, the hypertension control achieved approximately one year apart, and a brief description of the systems or processes that support hypertension control. Participants with a recent hypertension control rate greater than 70% were eligible to apply. Participants were scored on the control rate reported, the population served, and the systems or processes used by the practice. A panel of judges reviewed the data and recommended finalists. Each Champion will participate in the development of a 1-2 page brief that will share their success and how it was achieved. These briefs will be widely

available through the Million Hearts® website to share successful strategies to improve blood pressure control.

The Challenge is one tool of many used by Million Hearts to improve control as a key lever to reduce heart attacks and strokes. Additional tools include training, identification and dissemination of success stories and best practices and provider toolkits and predictor tools.


Proposed Goals: [See Summary]


Why a Prize: Million Hearts™ has identified key levers to reach the initiative's goal and has substantial scientific evidence around the types of system changes that improve hypertension control. What is lacking is implementation experience with those systems and processes in order to promote best practices. A potential means of identifying high performing practices was working through national reporting agencies that collect data for payment purposes; these are often burdensome and expensive. Recognition programs such as Bridges to Excellence or the National Committee on Quality Assurance base recognition on a very different set of criteria than the Challenge, and application can be quite costly. The expense and unknown return to providers to participate in these reporting and recognition initiatives may discourage small providers or health systems from participating, which greatly limits the CDC's ability to learn from this important constituent group.

The Million Hearts™ Hypertension Control Challenge was open to any private health care clinician, medical practice, or health system providing primary care services. A challenge creates a sense of urgency around hypertension control and spur a sense of competitiveness among providers and health systems to share their achievements. A challenge also reaches small practices and health systems that often achieve extraordinary results, but don't have the resources to publish their findings or promote their results.

The Challenge spurs a sense of competitiveness among providers and health systems to improve and share their achievements while protecting the anonymity of providers not recognized by the Challenge. The cost to participate is nominal, requiring only staff time to complete the form and participate in data validation. The prize is nominal and is not sufficient to generate much response if offered through a contract as a means to collect and validate data and participate in the development of a 2-page brief. Additionally, the provider groups of special interest to CDC are likely to be tracking Federal contract opportunities.


Participants: Intended participants included clinicians, practices and health systems, both large and small, serving both rural and urban settings. Registration was open from August

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9 – September 30, 2013. Sixty one nomination forms were received: eight were health systems; seven were large providers (caring for more than 50,000 patients annually); and 43 were small providers (caring for fewer than 50,000 patients annually). In addition, three nominations were accepted from Federal entities. Federal nominees were eligible for recognition only – no prize is awarded. Nominees provide direct clinical care in 24 states in addition to one Federal nominee that provides direct clinical care nationwide. In total, nominees provide care for over 15 million adults.

To be eligible to win the Challenge, the nominee must

I.    Be a US licensed clinician, practicing in any setting, who provides continuing care for adult patients with hypertension. In the case of an individual, whether participating singly or in a group, the individual must be a citizen or permanent resident of the United States.

II.    Or be US medical practice, defined as any practice with two or more US licensed clinicians who by formal arrangement share responsibility for a common panel of patients, practice at the same physical location or street address, and provide continuing medical care for adult patients with hypertension.

III.    In the case of a private entity, the private entity shall be incorporated in and maintain a primary place of business in the United States.
Or be a health system that provides continuing medical care for adult patients with hypertension

    a.    In the case of a private entity, the private entity shall be incorporated in and maintain a primary place of business in the United States.

In addition, nominees:

    a.    Must treat all adult patients with hypertension in the practice seeking care, not a select subgroup of patients.

    b.    Must treat a minimum of 500 adult patients annually.

    c.    Must have completed the nomination form in its entirety.

    d.    Must have a hypertension control rate of at least 70% during the 12-month reporting period among the practice's hypertensive patient population. Must have a data management system (electronic or paper) that allows for verification of data submitted.

    e.    Must agree to

    1.    Participate in a data validation process to be conducted by a reputable independent contractor. To the extent applicable law allows, data will be kept confidential by the contractor and will be shared with the CDC in aggregate form only (i.e., the hypertension control rate for the practice not individual hypertension values).

    2.    Accept the award if selected and participate in award activities as described more fully below.

3. Provide information through a 60-minute, or other similar, interview about their clinical strategies and protocol implementation and develop a success story document. The success story will be posted on the Million Hearts® website and acknowledged as a Champion recipient.

    f. Individual nominees and individuals in a group practice must be free from convictions or pending investigations of criminal and health care fraud offenses such as felony health care fraud, patient abuse or neglect; felony convictions for other health care-related fraud, theft, or other financial misconduct; and felony convictions relating to unlawful manufacturing, prescribing, or dispensing of controlled substances as verified through the Office of the Inspector General List of Excluded Individuals and Entities. Individual nominees must be free from serious sanctions, such as those for misuse or mis-prescribing of prescription medications. Such serious sanctions will be determined at the discretion of the agency consistent with CDC's public health mission. CDC's contractor may perform background checks on individual clinicians or medical practices.

    g. Health systems must have a policy in place to conduct periodic background checks on all providers and take appropriate action accordingly. The background check should ensure that staff are free from convictions or pending investigations of criminal and health care fraud offenses such as felony health care fraud, patient abuse or neglect; felony convictions for other health care-related fraud, theft, or other financial misconduct; and felony convictions relating to unlawful manufacturing, prescribing, or dispensing of controlled substances as verified through the Office of the Inspector General List of Excluded Individuals and Entities. The policy must ensure that staff are free from serious sanctions, such as those for misuse or mis-prescribing of prescription medications. Such serious sanctions will be determined at the discretion of the agency consistent with CDC's public health mission. In addition, a health system background check will include a search for The Joint Commission sanctions and current investigations for serious institutional misconduct (e.g., attorney general investigation). CDC's contractor may request the policy and any supporting information deemed necessary.

    h. Centers for Disease Control and Prevention (CDC) employees are not eligible to apply. Contractors working on a CDC campus are not eligible. Neither the judges nor any individuals or entities participating in the development or implementation of the Challenge are eligible.

    i. May not be a federal entity or federal employee acting within the scope of their employment.

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|---|---|
| Federal Register Notice Publication | 7/31/2013 |
| Submission Open | 8/9/2013 |
| Submission Close | 9/30/2013 |
| Judging Open | 10/28/2013 |
| Judging Close | 11/27/2013 |
| Winner(s) Announced | 2/19/2014 |

Solicitation & Outreach: The agency marketed the challenge primarily through Million Hearts partners in order to effectively reach the most appropriate and high quality nominees. The Challenge was prominently displayed on the Million Hearts® website. A flyer and badge were created and distributed to provide easy access to the Challenge site. Dr. Frieden, Director of the CDC, contacted 23 key leaders of agencies and organizations such as the American Medical Association, asking them to contact their constituents and encourage them to apply. The Million Hearts Executive Director and Division for Heart Disease and Stroke Prevention contacted 117 organization leaders, such as the American College of Cardiology with a similar ask and all 50 state health department directors were notified. Following are highlights of how some partners distributed the announcement:

- HRSA posted the notice in their Primary Care Digest reaching Federally Qualified Health Centers.

- Sermo, an online community for physicians, posted an article and a participation poll on their website

- The American Medical Group Association forwarded the letter to all member groups, promoted through their monthly webinar, shared through their social media channels, posted the Challenge badge on their website, and included a notice about the Challenge in Inside AMGA and Public Policy e-newsletters.

- CMS sent it to all 49 of the Quality Improvement Organizations across the country and promoted the Challenge at a phone call for members

- Dr. Farzad Mostashari, Director, Office of the National Coordinator for Health Information Technology (ONC), contacted the ONC Regional coordinators, Beacon Community leaders, and ONCMillion Hearts® Fellows. The Challenge was also announced at member meeting of 115 attendees.

- American College of Cardiology sent out a note to the PINNACLE practices that have high control rates to encourage them to submit and posted the Challenge announcement in cardio source news.

- American College of Physicians posted the Challenge in their Internist Weekly newsletter.

- Daniel Wolfson – Executive Vice President & Chief Operating Officer at the American Board of Internal Medicine Foundation posted the badge on his site[98]

- The Challenge appeared in AAFP - News in Brief: Week of Aug. 1-23

- American Heart Association posted the Challenge in their State of the Heart Newsletter sent to 500 advocacy persons and their Quality Improvement newsletter to 25,000 health care quality contacts.

- Dr. Frieden's promotion was included on the front page of the Huffington Post blog.

- The Dr. Oz Show posted the Challenge badge on their website. This was a very effective strategy to reach the very specific group of individuals intended for participation. Future Hypertension Control Challenges will use this same method, and will promote the Challenge through relevant conferences and journal notifications.

Incentives: Recognition by Million Hearts, CDC and HHS as a 2013 Hypertension Control Champion and up to $70,000 in prizes. Funds were allocated from 2013 general revenue appropriation.

Evaluation and Judging: Judges came from both within the CDC and external groups. Nominations were scored using the following criteria:

- 90% of the overall score was attributed to the reported hypertension control rate

- 5% of the score was attributed to the extent that a challenging population was served based on peer responses

- 5% of the score was based on the systems and process reported that supported hypertension control

The nomination was autoscored as it was received. A panel of judges reviewed the top 14 nominations to approve their selection as finalists and to identify questions for further investigation. Each finalist is participating in a process to validate the data submitted conducted by an independent contractor (underway at this time). For this type of challenge,

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[98] https://twitter.com/WolfsonD/status/368063018560946176

a more extensive review and minimal validation of the hypertension control rate reported is required.

Partnerships: Implementation of the Challenge relied heavily upon existing Million Hearts® partners to promote and judge the Challenge. Partners were very responsive in using their social media and web presence to promote and support the Challenge. Two partner organizations, American Heart Association (AHA) and Walgreens supported the judging of the Challenge and AHA has committed support for the announcement of Champions. In future challenges, partners should be engaged much earlier to plan and promote the challenge and perhaps as a partner in funding and recognizing the champions.

Resources: Both fiscal and human resources were required to plan and carry out the challenge. $70,000 was obligated to pay up to 14 cash prizes of $5,000 each to private sector applicants. $83,000 was awarded to an 8A vendor to develop the web portal for nomination, a database to store and score the nominations, and a platform for judging. $100,000 in unspent funds from an existing cooperative agreement was used via contract to identify and engage an organization to validate data reported by finalists. Three FTE were engaged over a 12 month period to manage and execute the challenge. 50% FTE was required in the 30 days preceding launch and 30 days preceding the announcement for promotional planning and activities.

Results: Improving hypertension control will directly reduce the number of fatal and non-fatal strokes that occur each year in the US. Antihypertensive therapy is probably the main reason why stroke fatalities have dropped dramatically in the United States over the past 50 years, according to an American Heart Association study published Dec. 5, 2013 in Stroke by DT Lackland, MD.

9 winners of the 2013 Million Hearts Hypertension Challenge were announced, including two individuals and 7 private, local and federal health care systems. Winners successfully engaged in the following strategies to achieve greater hypertension control:

1. Implemented Electronic Health Records to track patients and improve health outcomes
2. Team-Based Care that involved reception staff, medical assistants, and physicians in hypertension control efforts
3. Staff Incentives to reward successful improvements in patients' hypertension control
4. Designating Hypertension Champions among the staff

5.      Staying Connected to Patients with information cards, social media, and other communication tools

## IV. CDC Million Hearts Hypertension Control Challenge – 2014

Summary: [See CDC Million Hearts Hypertension Control Challenge – 2013]

*Results*: 30 Champions were announced in the 2014 Million Hearts Challenge. The Challenge received nearly 4000 page views during the nomination period, and the Million Hearts partners indicated a high level of engagement. Early conversations with finalists have yielded a number of innovative ideas and processes applied to hypertension control that can be shared and adopted and adapted by providers.

Problem Statement: [See CDC Million Hearts Hypertension Control Challenge – 2013]

Proposed Goals: [See Summary]

Why a Prize: [See CDC Million Hearts Hypertension Control Challenge – 2013]

Participants: Forty-two nominations were received for the 2014 Challenge. Nominees practiced or were headquartered in 25 states. Twenty-two were small providers and 8 were health systems. Nominee practices cover 7,386,688 lives. Nine were FQHC/CHCs.

The Challenge anticipates recognizing 30 Champions in February 2015.

Champions previously recognized through the 2013 Million Hearts Hypertension Control Challenge retain their designation as a "Champion" and are not eligible to be named a Champion in the 2014 Challenge. [For full eligibility criteria, see CDC Million Hearts Hypertension Control Challenge – 2013]

Timeline:

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|---|---|
| Submission Open | 8/20/2014 |
| Submission Close | 10/10/2014 |
| Data Validation Completed | 12/30/2014 |
| Champion Selection | 1/15/2015 |
| Champions Announced | February 2015 |

Solicitation & Outreach: Outreach was conducted primarily through direct outreach to partners with potentially high performing contacts or members. This was a lesson learned through the 2013 Challenge.

Incentives: From the 2103 Challenge CDC learned that recognition as a Champion was of high value to participants. In the 2014 Challenge, CDC will identify more opportunities to promote Champions and engage the CDC Director and other senior leaders more heavily in that recognition.

Each non-Federal Champion received a $2,000 cash prize. The total prize awarded will be $58,000. One Champion provided services to a large Native American population and is prohibited from receiving these additional funds.

$60,000 in Challenge prize funds were obligated using general appropriation funds.

Evaluation and Judging: Nominations were judged based on the hypertension control data submitted. These data were validated through an external and well-respected entity. A panel of internal judges reviewed the validation data and selected Champions based on that data.

Million Hearts learned that data validation is a critical step in selecting Champions.

Partnerships: Million Hearts engaged partners to identify potential Champions and promote the Challenge through their networks. Engaging these partners increased the validity of the Challenge and provided an opportunity for those partners to leverage the recognition of high performers in their constituency.

Resources: Both fiscal and human resources were required to plan and carry out the challenge.

- $60,000 was obligated to pay up to 30 cash prizes of $2,000 each to private sector applicants.
- $62,146.11 was awarded to an 8A vendor to develop the web portal for nomination, and develop a data base to store and score the nominations.
- $150,000 was used via cooperative agreement (FOA OT13-1302) to identify and engage an organization to validate data reported by finalists. The funds included carry over funds and new funds.

- .3 FTE was engaged over a 12-month period to manage and execute the challenge.
- .5 FTE was required in the 60 days preceding launch and 30 days preceding the announcement for promotional planning and activities.

The award made to the Challenge Vendor was reduced by $20,000 by eliminating tasks related to promotion of the Challenge.


Results: Based on questions received and the number of website hits, there was great interest in the challenge and in demonstrating the achievement of exceptional hypertension control. There were 3,977 page views of the challenge web site during the nomination period and 360 users. In addition, the support received from partners in promoting the challenge and encouraging member participation was an indication of their interest and support of the challenge.

Early conversations with finalists yielded a number of innovative ideas and processes applied to hypertension control that can be shared and adopted and adapted by providers. Profiles that highlight successful practices and processes will be completed and posted on the Million Hearts® website.

30 Champions were announced as winners of the Challenge. They used the following strategies to achieve exemplary hypertension control rates:

- Designating hypertension champions within a practice or organization, providing feedback to individual clinicians and clinic sites on hypertension control rates, providing incentives for high performance, and recognizing high performers.
- Taking action to improve medication adherence, including patient rewards for medication adherence; prescribing once-daily regimens, fixed-dose combination pills, or 90-day medication refills; and frequent follow-ups.
- Implementing consistent, strategic use of electronic health records that include clinical decision support tools, patient reminders, and registry functionality.
- Using team-based care models to engage a broad scope of care providers, including but not limited to pharmacists and nurses, and expanding the team-based care model to include staff trained in blood pressure measurement techniques who can assist in obtaining patients' blood pressure readings.
- Promoting patient self-measured blood pressure monitoring with clinical support, in which patients monitor their blood pressure at home, communicate the readings to their clinician, and receive medication adjustments or lifestyle modifications.

- Staying connected to patients by conducting outreach and providing supports, through using patient portals, implementing steps to improve appointment adherence, and following up about blood pressure checks.

### V. CDC Game On! HIV/STD Prevention Mobile Application Video Game Challenge[99]

Summary: Video gaming is very popular among youth and could be an effective strategy for getting youth the information they need about HIV and other Sexually-Transmitted Diseases (STDs). The Game On! HIV/STD Prevention Mobile Application (App) Video Game Challenge is to develop a video game for smartphones that educates youth (13-18 years of age) or young adults (18-24) on the importance of HIV/STD prevention information in an entertaining, fun, and engaging way. The video game can be any genre as long as it includes at least one or more of these five key HIV/STD prevention messages: Get the facts, Speak up, Use condoms, Get tested, and Get treated. Developers are encouraged to treat youth and young adults as distinct audience/player segments in the design of the game.

*Solution Type*: Software and apps; Ideas

*Primary Goals*: Develop technology; Engage new people and communities; Stimulate a market

*Results*: Two free mobile games were named winners, and are available for the public to download. They are anticipated to advance the CDC mission to educate youth and young adults about sexually transmitted diseases. CDC is in the process of working with the developers to release the games in the public app stores.

Problem Statement: Young people (aged 13 to 24) in the United States are at significant risk of HIV and other sexually transmitted diseases (STDs). One in four new HIV infections are in young people aged 13 to 24 years, about 1,000 youth are infected with HIV every month, and about 60% of those infected are not aware they have HIV and are not receiving treatment (CDC, 2012).

Young people aged 15 to 24 years make up nearly half of the 19 million new STD diagnoses each year (CDC, 2010). Young women in this age group have the highest rates of chlamydia and gonorrhea (CDC, 2010). People with STDs are at least two to five times more likely than people without STDs to get HIV if they are exposed to the HIV through sexual contact (CDC, 2010). Given the high rates of HIV infection and STDs, it is critical

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[99] Challenge Website: gameon.challengepost.com

to educate young people about behaviors and actions they can take to reduce their HIV and STD risk.

CDC's mission is to protect the health of the nation through health promotion, prevention of disease, injury and disability, and preparedness for new health threats. It is important for CDC to develop programs and messages that are accurate and appropriate for the target population. Therefore, to address HIV and STD risk among adolescents (13 to 17 years) and young adults (18 to 24 years), CDC must develop innovative, appealing and relevant ways to reach youth with important health information and resources.

Proposed Goals: [See Summary]

Why a Prize: CDC wanted the game to come from the game playing/developing community, not CDC researchers. Presumed challenge community would be more creative and in touch with what was popular amongst the target population. Lastly, limited funding prohibited the use of a costly contract.

Although prizes can be easier, it's so new and untraditional for the Center that it ended up being harder than a contract.

Participants: The participant community was primarily students and amateur video game developers.

Timeline:

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|---|---|
| Planning Phase Initiation | 04/01/2013 |
| Federal Register Notice Publication | 06/01/2013 |
| Submission Open | 08/01/2013 |
| Submission Close | 01/01/2014 |
| Judging Open | 01/01/2014 |
| Judging Close | 03/01/2014 |
| Winner(s) Announced | 04/01/2014 |

Solicitation & Outreach: CDC announced the contest on the agency Facebook and Twitter accounts and sent email blasts to game development professional organizations and universities with game development degree programs. There was no marketing evaluation plan in place to evaluate the effectiveness of these strategies. As a result, there were no lessons learned.

CDC also hosted a webinar a few months after the contest opened. During the webinar potential applicants could log on to learn about the contest and ask questions.

Incentives: First place winners received $20,000 while second place received $10,000. All winners were acknowledged on the CDC website.

Evaluation and Judging: There were three rounds of judging.

1. The first round was comprised of Gaming Experts (9 judges). The goal of this round was to gain an industry perspective that could be used to inform CDC judges in the selection of a winning game. The nine experts included professional gamers, professors of gaming, and gaming company executives. Experts completed rubrics scoring games on content, game play, and appeal.

2. The second round was comprised of six youth judges aged 14 – 21 years. The goal of this round was to gain insight on the acceptability of games amongst adolescents and youth, the target populations. Youth completed qualitative questions about what they liked and did not like. Youth also responded "yes/no" to the following two questions: "Would you recommend the game to a friend?" and "Would you download this game?". Youth also provided a quantitative rank score ranging from 1 "not fun at all" to 5 "very fun."

3. The third round was comprised of ten judges from CDC, including Full Time Employee staff from Division of HIV/AIDS Prevention and Division of STD Prevention, CDC Health Gaming listserv, CDC Office of Associate Director Communication, CDC Innovation Lab, and National Center for HIV/AIDS, Viral Hepatitis, STD, and TB leadership. The top five games according to scores from the Expert Judges and the Youth Panel were reviewed by the panel of CDC judges. The goal was to use input from expert and youth judges to select winning games that aligned with CDC HIV/STD prevention standards and could effectively reach the intended target population.

Partnerships: No partnerships were formed for this competition. A contractor was responsible for marketing the contest, monitoring the challengepost.com website, triaging questions, hosting a webinar, facilitating the judging process, and distributing the honorarium to judges and prize money to winners.

Resources: The agency worked with a vendor to administer the competition. The contractor was responsible for marketing the contest, monitoring the challengepost.com website,

triaging questions, hosting a webinar, facilitating the judging process, distributing honorarium to judges and prize money to winners. In retrospect, more money should have been budgeted for a contractor, or the competition should have been run in house rather than using a contractor.

The process itself of running the challenge is not hard. CDC has strong leadership supporting the mechanism but the Centers are still learning the ropes.

Results: CDC's mission is to protect the health of the nation through health promotion, prevention of disease, injury and disability, and preparedness for new health threats. The competition addressed CDC's mission by spurring the development of educational HIV/STD prevention games for young people aged 15 to 24 years of age.

Two winners were selected by a CDC judging panel and awarded prize money. CDC is in the process of working with the developers to release the games in the public app stores. The second place winning game was released in the apple store in February 2015, and the first place winner is hoping to release his game later on this year. At this time, there are no formal plans for education and outreach initiatives.

**First Place**: ($20,000)

Game: Rogue-Like Researcher[100]

Developer: Michael Garrett (LavaBean Studio)

The game play can be described as a blend between minesweeper and rogue-like role playing games. The goal is to collect research papers that have been scattered around the city. On the main screen for gameplay, the player clicks on tiles to explore a city, looking for research papers (STD facts), finding money, and a bus ticket. The Player runs into STDs while exploring which weaken the immune system as it fights off the infection. As you explore the city you find stores, pharmacies, libraries, and partners which help boost your immune system. Players can use in-game money to buy condoms which protect against STDs, or to buy pills at clinics which treat STDs. If you run out of health your game ends because "you do not have enough health to continue".

**Second Place**: ($10,000)

Game: STD Dodger[101]

Developer: Luke Wilson (TheFunkyOne)

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[100] http://www.youtube.com/watch?v=K1ln7YMUvuI&feature=player_embedded

[101] http://www.youtube.com/watch?feature=player_embedded&v=bWzlqF2y_n0;
https://itunes.apple.com/us/app/std-dodger/id837049889?mt=8

The objective is to control a ship and dodge as many falling STDs (chlamydia, gonorrhea, syphilis, herpes, and HIV) as possible. Players collect bombs (condoms) and shields (act of getting STD tested) for protection. If the player fails to dodge the STD and is not protected by a condom, the player is infected with the STD. It is an endless game, so the goal is to get as far as possible. Players unlock facts about STDs each time they hit an STD, encouraging them to keep playing and learning. The goal is to find all 88 facts throughout the game. After incorporating feedback from CDC experts, the developer released a new and improved, free version of this game in February 2015.

## VI. CDC "No Petri Dish" Challenge[102]

<u>Summary</u>: Describe a novel or innovative method to straintype and characterize pathogenic organisms directly from a complex clinical sample without the need for culture or culture-based amplification.

*Solution Type*: Software and apps; Creative (design & multimedia); Ideas; Technology demonstration and hardware; Scientific

*Primary Goals*: Stimulate a market; Inform and educate the public

*Results*: During FY15, CDC will be working with the winner of the challenge to assess the utility of the software for the analysis of primary clinical and environmental samples.

<u>Problem Statement</u>: New laboratory approaches that do not depend on isolates or culture for subtyping and characterization of microbes are needed to maintain and improve important public health activities across a range of pathogenic organisms. CDC is challenging inquisitive researchers to develop a new or innovative method to straintype and characterize Shiga toxin-producing Escherichia coli (STEC) without using culture-based methods. The innovative straight-to-strain method will be able to isolate STEC from stool (a complex clinical sample) in a way that will make information immediately available for public health use.

<u>Proposed Goals</u>: With this challenge, in addition to developing a no-petri-dish solution, CDC was also looking to encourage research and innovative thinking around some of the issues facing infectious disease public health surveillance – in particular, the challenges of point-of-care and rapid molecular diagnostic testing imposes. Fewer cultured isolates

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[102] Challenge Website: http://www.cdc.gov/amd/cidtchallenge; https://www.challenge.gov/challenge/no-petri-dish-diagnostic-test-challenge/

reaching the public health system means a greater challenge for surveillance and public health monitoring.

Why a Prize: The objective was to encourage innovation around an emerging public health challenge: namely, the growing importance of culture-independent diagnostic testing in clinical practice.

Participants: A total of 12 groups expressed interest in the challenge, 9 groups ultimately registered for the challenge, and 7 groups submitted valid proposals. Applicants included early-phase and mid-phase startups and research groups from large universities. The communities matched the target for solicitation very well.

Timeline:

| | |
|---|---|
| Planning Phase Initiation | 08/01/2013 |
| Federal Register Notice Publication | 08/28/2014 |
| Submission Open | 09/01/2014 |
| Submission Close | 11/30/2014 |
| Judging Open | 12/01/2014 |
| Judging Close | 12/14/2014 |
| Winner(s) Announced | 12/15/2014 |

Solicitation & Outreach: Outreach was achieved via several mechanisms, in addition to the challenge.gov posting, including: Twitter announcements and reminders from the CDC NCEZID, CDC OID and CDC OPHG twitter addresses, and presentation and discussion by AMD program staff – including mentions at scientific conferences.

Incentives: The challenge had a single, $200,000 grand prize for the winning submission.

Evaluation and Judging: Prize competition still in progress; will report in FY2015

Partnerships: None.

Resources: From the CDC side, virtually no resources have been used, other than the award, and some in-kind support for consultation and analysis. In future challenges, some

additional CDC staff resources will be included to help administer the challenge. A number of the participants put significant time and effort into their submissions

Results: After careful scientific and technical review, and successful completion of a synthetic challenge set to confirm their performance claims, CDC awarded the prize to Reference Genomics Inc, a Bay-area Ycombinator-backed startup. They demonstrated a customized version of their OneCodex platform, cloud-based metagenomics tool that allows for the rapid analysis, comparison and visualization of metagenomic data.

During FY15, CDC will be working with Reference Genomics through the CDC AMD Metagenomics working group to assess the utility of the software for the analysis of primary clinical and environmental samples.

This working group involves roughly 20 CDC infectious disease program laboratories, who are all working on similar problems related to metagenomics and the analysis of complex samples. This group is currently assessing different sample processing, sequencing, and bioinformatic approaches to identify and characterize various types of pathogens from blood, sputum and stool to determine some optimal strategies that can be shared across multiple programs. Reference Genomics visited CDC in March 2015 to present their software, and to discuss features that may make it more useful for public health analysis. The primary operator of the challenge at CDC is currently meeting with the co-founders on a roughly quarterly basis.

## VII.    CDC Predict the Influenza Season Challenge[103]

Summary: CDC Predict the Influenza Season competition encourages the use of social media to predict flu.

*Solution Type*: Scientific

*Primary Goals*: Stimulate a market; Engage new people and communities

*Results*: The teams provided forecasting methods, and CDC is currently receiving 7 forecasts each week from the challenge participants. Following the challenge, the CDC has maintained engagement with the participants, who have helped inform future efforts by sharing their lessons learned, the forecasting methodologies, and certain data sets.

Problem Statement: Multiple scientific papers have been published that show digital-based surveillance has good correlation when compared to existing traditional influenza

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[103] Challenge Website: http://www.cdc.gov/flu/news/predict-flu-challenge.htm

surveillance programs. However, most of the studies were retrospective. Forecasting is needed if modeling is to be of assistance in guiding the implementation of prevention and control measures for seasonal and pandemic influenza.

Proposed Goals: [See Summary]

Why a Prize: A challenge will create a sense of urgency and excitement around predicting the influenza season before it begins and will send a broad message that CDC is interested in supporting this work and ignite a sense of competitiveness among the researchers in the influenza modeling community. A challenge will also allow inclusion of investigators who are relatively new to the field of influenza prediction or who have not yet published their results in scientific journals.

Participants: Academics, scientists in private industry, experts in big data participated. Sixteen individuals or teams initially registered for the challenge. 15 entered at least one forecast, 11 submitted nine biweekly forecasts, and 9 submitted forecasts for all required milestones (fully completing the challenge). Eight out of the 9 teams that completed the challenge were composed of individuals from multiple universities; one team was from a private company. These universities represent most of the forecasting expertise in the United States.

Timeline:

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|---|---|
| Planning Phase Initiation | 08/07/2013 |
| Federal Register Notice Publication | 11/22/2013 |
| Submission Open | 11/23/2013 |
| Submission Close | 03/27/2014 |
| Judging Open | 03/28/2014 |
| Judging Close | 05/30/2014 |
| Winner(s) Announced | 06/18/2014 |

Solicitation & Outreach: Solicitation methods included email blasts and a web announcement.[104]

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[104] http://www.cdc.gov/flu/news/predict-flu-challenge.htm

Incentives: There was a single $75,000 cash prize for the grand prize winner. A non-monetary incentive was an acknowledgement on CDC website. No partnerships.

Evaluation and Judging: The selection of the winner was based on an evaluation of the methodology used to make the forecast and the accuracy of the forecast. Contestant submissions were judged by a panel of reviewers that included two CDC staff outside the Influenza Division and one faculty member from a noncompeting university. Judges scored submissions on a scale of 0 to 100 points using the following criteria: the strength of the methodology (25 points); the accuracy, timeliness, and reliability of the forecasts for the start, peak week, and intensity of the influenza season (65 points); and the scope of the geography (US plus one or more HHS Regions within the US) that the source data represented (10 points). Up to 50 bonus points were awarded to any contestant that submitted forecasts for the 10 HHS regions; the number of bonus points was based on the number of regions with a forecast and the judging criteria that was previously described.

Partnerships: No partnerships were formed for this competition.

Resources: No contractors were utilized for the prize competition. One FTE was required to run the challenge.

Results: The Predict the Influenza Season Challenge represents a successful utilization of the COMPETES Act. By hosting this challenge, CDC was able to receive and evaluate 13 influenza season forecasts based on a variety of digital data sources and methodologies. These forecasts were submitted by teams that were affiliated with a diverse set of organizations including universities and private industry. The high number of forecasts received through this challenge is in contrast to the number of forecasts that likely would have been received if a more traditional method of outside engagement available at CDC was utilized (e.g. traditional contracts or grants). The challenge mechanism allowed CDC to seek solutions for accurately forecasting influenza season milestones without having to choose the forecasting methodologies, and allowed CDC to evaluate forecasts for accuracy and quality prior to awarding of the challenge prize. The teams provided forecasting methods and have helped inform future efforts by sharing their lessons learned, the forecasting methodologies, and certain data sets. CDC is currently receiving 7 forecasts each week from the challenge participants.

Jeff Shaman, an assistant professor in the Department of Environmental Health Sciences at the Mailman School of Public Health at Columbia University, won the challenge. Dr. Shaman's forecasting model used data from Google Flu Trends as well as CDC's influenza-like illness (ILI) data, which CDC publishes online each week during the flu season. Shaman worked to overcome the limitations of both data sources. Shaman's team tested their model against actual flu activity that had already occurred during the season. By looking at the immediate past, Shaman and his team fine-tuned the model to better predict the future. Each week, Shaman's team ran between 15-18 forecasts and analyzed the outcomes. By observing whether the forecasts "converged" towards a similar outcome or "diverged" towards varying results, his team was able to determine in real time the reliability of their forecasts. Shaman's team presented their forecasts in a similar manner to how a meteorologist provides the chance of rain for each day's weather forecast. This approach helped communicate flu forecasting in a way that was meaningful to both public health officials and the public.

In August of 2014, a meeting was held with participants to continue to discuss collaboration on this public health project. The objectives of the meeting were to bring together the participating teams and CDC employees to discuss the lessons learned from the challenge, the methods each teams used to forecast the flu season, and the next steps for forecasting influenza. The meeting was attended by 26 participants, including representatives from each of the 9 teams that completed the challenge, and 10 CDC staff. The outcome of the meeting was a decision to host a collaborative challenge to forecast the 2014–15 influenza season; this contest has no financial incentive, and the objectives and evaluation criteria were co-developed by CDC and the participating teams.

Another outcome was the decision to publish a peer-reviewed journal article describing the results of the challenge. The manuscript is currently under review at PLOS ONE. Finally, select teams decided to share their data sources with the forecasting community in order to improve overall forecasting models.

### VIII.    CDC Respirator Trusted-Source Mobile Application Challenge[105]

Summary: The Centers for Disease Control and Prevention (CDC), National Institute for Occupational Safety and Health (NIOSH) located within the Department of Health and Human Services (HHS) is challenging teams of developers to design a mobile application (app) that will be used by the public to query the NIOSH trusted source site[106] for specific criteria and display all relevant information on the web page in an easy to view format on

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[105] Challenge Website: http://www.resp-mobile-app.challengepost.com/

[106] http://knowits.niosh.gov

a mobile device. The NIOSH Trusted-Source web page is the one-stop resource to get reliable respirator information. The goal is to create a mobile app that can run on multiple platforms, such as Apple iOS, Windows and Android, and that makes the Respirator Trusted-Source content selectable and easy-to-use, reaching users with portable technology.

*Solution Type*: Software and apps

*Primary Goals*: Solve a specific problem; Engage new people and communities

*Results*: This competition delivered a mobile application that allows the millions of working men and women relying on personal protective equipment to easily search the Respirator Trusted-Source website. NIOSH achieved this quickly, and with a resource commitment of only 120 staff hours.

Problem Statement: The NIOSH Respirator Trusted-Source web page[107] is the one stop resource to get reliable respirator information. The website includes content to address three specific sections of information as follows: 1.) Information on understanding the various types of respirators, how to identify approved models, and outlets for purchase; 2.) Information on how to implement the use of respirators in the workplace and use them appropriately; 3.) Ancillary respirator information, such as commonly asked questions and answers, respirator myths, science of respirator function and performance, and respiratory protective devices not approved by NIOSH.

In this challenge, CDC/NIOSH is seeking an app that will be used by the public to query the NIOSH trusted source site for specific criteria and display all relevant information on the web page in an easy to view format on a mobile device. The app should be capable of conducting searches of all information on the website and providing all the info relevant to the criteria selected for display. The purpose of this app is to query the site for specific criteria and display it in an easy to view format.

Proposed Goals: [See Summary]

Why a Prize: The prize competition was the logical solution to achieve these goals because it provided a quick, cost effective and competitive way to use available resources to the fullest.

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[107] http://knowits.niosh.gov

Participants: NIOSH/NPPTL hoped to mobilize the technology savvy smart phone community.


Timeline:

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|---|---|
| Federal Register Notice Publication | 9/30/2013 |
| Submission Open | 10/21/2013 |
| Submission Close | 12/23/2013 |
| Judging Open | 12/23/2013 |
| Judging Close | 2/12/2014 |
| Winner(s) Announced | 1/13/2014 |

Solicitation & Outreach: NPPTL posted the challenge on its webpage, used a Federal Register Notice, sent out emails through its list serve and through challenge.gov. These were effective methods that lead to 31 registrants and 5 submissions. A lesson learned is that sometimes you need to go outside the box of typical users to achieve results.


Incentives: The total prize purse was $10,000, with $8000 for the first prize and $1000 for each of two honorable mentions.


Evaluation and Judging: An expert panel of judges evaluated each Submission on the following four criteria: User Interface, Ease of Use, Innovation in Design, Functionality and Accuracy.


Partnerships: For this competition NIOSH/NPPTL didn't seek any partnerships, since the key source of information was under its purview.


Resources: NIOSH/NPPTL relied on its own internal people and funding to execute this challenge. It required one staff (40 hours) to oversee the challenge and about three staff to put the package together (80 hours).


Results: The National Personal Protective Technology Laboratory (NPPTL) was created to be the division of NIOSH charged with preventing disease, injury, and death for the

millions of working men and women relying on personal protective equipment. The Respirator Trusted-Source content was already available to stakeholders through a web browser, but users had to do drill down through multiple pages to get the information they were are seeking. This competition delivered a mobile application that allows NPPTL stakeholders to easily search the Respirator Trusted-Source website where they work.

Winners:

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|---|---|
| 1st Place Winner: | Respirator Mobile – Peter Brower / $8,000 |
| Honorable Mention: | resProtect- Dave Vockell / $1,000 |
| Honorable Mention: | Breathe Safe – Ramesh Nair / $1,000 |

## IX.    FDA Food Safety Challenge - 2014[108]

Summary: The 2014 FDA Food Safety Challenge is a call to scientists, academics, entrepreneurs, and innovators from all disciplines to submit concepts applying novel and/or advanced methodologies to foster revolutionary improvements in foodborne pathogen detection. Specifically, concepts should apply cutting-edge techniques to achieve significant improvements in the speed of the FDA's detection methods for Salmonella with identification to the subtype/serovar level in minimally processed fresh produce.

*Solution Type*: Ideas

*Primary Goals*: Stimulate a market; Inform and educate the public

*Results*: The competition will be completed in FY15. This is the first challenge that FDA is running under the America COMPETES authority. FDA is hopeful that it will pave the way for other challenges, both in the food safety arena and other FDA programs.

Problem Statement: While the American food supply is among the safest in the world, the Centers for Disease Control and Prevention (CDC) estimates that one in six Americans is sickened by foodborne illness annually, resulting in about 3,000 deaths and $77 billion in additional health care costs and lost productivity each year. Salmonella alone represents the leading cause of deaths and of hospitalizations related to foodborne illness. Contaminated produce is responsible for nearly half of foodborne illnesses and almost a quarter of foodborne-related deaths.

In the Food Safety Challenge, FDA is most interested in concepts that explore the acceleration or elimination of sample preparation and/or enrichment in the testing process,

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[108] Challenge Website: www.foodsafetychallenge.com

and/or those that employ novel or revolutionary techniques to achieve pathogen detection. Concepts may combine new techniques with existing methodologies such as polymerase chain reaction (PCR), and must describe where time savings are achieved in the testing process as well as expected time from unprepared food sample to verifiable result. FDA will consider winning concepts for inclusion in the design of next-generation detection processes.

In Phase I, participants will submit concepts. In Phase II, the Field Accelerator phase, finalists from Phase I will improve on their concepts in order to present them at a Demo Day, where they will be judged and winners will be announced. Before Demo Day, finalists will receive mentorship from FDA subject matter exports (SMEs) and be invited to a Boot Camp to receive hands-on guidance from FDA SMEs and Luminary Labs.

Proposed Goals: [see summary]

Why a Prize: There are a number of benefits to this approach, as opposed to funding grants or other means to support R&D, including:

- New solvers: Engaging a broad group of solvers including industry, academia, and citizen scientists, can lead to novel solutions.

- Engagement: Reaching out to the American public for food safety solutions is resonant with President Obama's emphasis on open government and its component themes of transparency, collaboration, and participation.

- Rapid turnaround: Challenges often are designed so they can be solved, or a proposal submitted, within a period of several months

- Increased awareness: Launching challenges would increase awareness of government efforts in food safety.

Participants: Scientists, academics, entrepreneurs, and innovators from all disciplines were sought as participants. There were additional eligibility requirements imposed on this competition beyond those set forth by the COMPETES Act:

Employees of FDA, the U.S. Department of Agriculture's Food Safety and Inspection Service (USDA/FSIS), the CDC, Luminary Labs, LLC, each of their affiliates, and/or any other individual or entity associated with the development, evaluation, or administration of the Challenge as well as members of such persons' immediate families (spouses, children, siblings, parents), and persons living in the same household as such persons, whether or not related, are not eligible to participate in the Challenge.

Timeline:

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|---|---|
| Phase I Submission Open | 9/23/2014 |
| Phase I Submission Close | 11/9/2014 |
| Phase I Winners Announced | TBA |
| Phase II Submissions Open | TBA |
| Phase II Submissions Closed | TBA |
| Phase II Judging Open | TBA |
| Phase II Judging Closed | TBA |
| Phase II Winner(s) Announced | TBA |

Solicitation & Outreach: Both FDA and the contractor, Luminary Labs, have used various outlets and social media for outreach, including posting blogs on the challenge website as well as providing updates via facebook, twitter and selected listservs.

Incentives: The total prize pool for the Challenge is $400,000. From the $400,000 prize pool, up to 5 finalists will be awarded $20,000 each at the end of the open submission phase. After the Field Accelerator Phase and final judging, the winner(s) will receive the remainder of the prize money.

Evaluation and Judging: Prize competition still in progress; will report in FY2015. USDA and FDA will be providing judges.

Partnerships: USDA/FSIS will be collaborating on submission evaluation.

Resources: Luminary Labs, LLC was contracted to help design and manage the competition. Additional details will be provided in FY2015.

Results: The prize competition still in progress and further results will be reported in FY2015. This is the first challenge that FDA is running under the America COMPETES authority. FDA is hopeful that it will pave the way for other challenges, both in the food safety arena and other FDA programs.

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## X.    HRSA Care Counts: Educating Women and Families Challenge[109]

Summary: To help make adult women in the U.S. and territories, particularly those living in medically underserved communities or experiencing difficulty accessing health care, aware of the important benefits available to them and their families through the Affordable Care Act, HRSA in partnership with the HHS Office on Women's Health and the HHS Coordinating Committee on Women's Health launched the Care Counts: Educating Women and Families Challenge. This Challenge provided the opportunity for teams to create an innovative, educational tool to inform women about enrollment in their State or Federally Facilitated Marketplace as well as key provisions of the Affordable Care Act designed specifically to improve their health and that of their families. The tool was required to refer to two or more of the twenty-two covered preventive services for women and refer consumers to www.HealthCare.gov (English) or www.CuidadoDeSalud.gov (Spanish) as well as the toll-free call center numbers (including the TTY/TTD number) to promote and respond to questions about enrollment in the Marketplace.

*Solution Type*: Software and apps; Creative (design & multimedia)

*Primary Goals*: Inform and educate the public

*Results*: Winning tools - posters and flyers - have been utilized with community health centers and other HRSA grantees to assist with enrollment of women in the Marketplace; additionally the tools were utilized by the HRSA Office of Regional Operations staff to inform Agency custodial staff about enrollment in the Marketplace and key preventive benefits afforded to them without copay.

Problem Statement: Women are often at the center of healthy and resilient families; they make approximately 80 percent of all family health care decisions and are more likely to be the primary caregivers for children and elderly parents. Yet many women are not aware of the benefits afforded to them by the Affordable Care Act and, as a result, may not be taking advantage of Affordable Care Act provisions that directly benefit them and their families. Through this Challenge, women now have the tools to understand important benefits of the Affordable Care Act for themselves and their families.

Proposed Goals: To create simple, easy to read and understand tools to inform and educate adult women, particularly those in medically underserved areas, about enrollment in their State or Federally Facilitated Marketplace as well as key preventive services provided through the Affordable Care Act without co-pay.

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[109] Website Challenge: http://carecounts.challengepost.com/

Why a Prize: The challenge mechanism was utilized because it encourages innovation and fosters cross-sector collaboration. Additionally, this mechanism encourages participation from public entities, the private sector, and academia. The use of Challenge.gov also supports President Obama's Strategy for American Innovation, which directs Federal agencies to increase their use of challenges.

Participants: Eligible entities included teams of at least two (2) persons, 18 years or older at the time of entry and U.S. Citizens/permanent residents of the U.S. or entities incorporated in and with a primary place of business in the U.S.

There were 32 submissions of which 21 were deemed "eligible" based on eligibility criteria outlined in the Challenge rules. Entrants included individuals as well as organizations, primarily community based organizations interested in educating adult women in medically underserved areas. Submissions came from all sections of the country, particularly the south, southwest, and midwest, both urban and rural.

Timeline:

| | |
|---|---|
| Federal Register Notice Publication | 7/31/2013 |
| Submission Open | 7/31/2013 |
| Submission Close | 9/30/2013 |
| Judging Open | 10/28/2013 |
| Judging Close | 11/27/2013 |
| Winner(s) Announced | 2/19/2014 |

Solicitation & Outreach: HRSA shared the competition and prize winners through grantee and stakeholder distribution lists as well as through the HHS Coordinating Committee on Women's Health Agency/OpDivs and StaffDivs grantee and stakeholder distribution lists. HRSA conducted two Q&A sessions for prospective participants to ensure terms and requirements of the challenge were understood.

Ideally competitions of this nature would include a means of tracking success including not only how many links to the tools there are, but also whether the winning participants used their tools in accordance with their promotion plans. Tracking which HRSA stakeholders used the tools in their outreach and enrollment efforts would also be useful to document.

Incentives: Two first place winners (English and Spanish) were awarded $7,500 each. Two second place winners (English and Spanish) were awarded $5,000 each. In addition, all winners received a certificate with the HRSA Administrator's signature.

The HHS Office on Women's Health provided the total prize money ($25,000) for this Challenge to HRSA through an inter-agency agreement.

Evaluation and Judging: HRSA OWH staff did the initial screening of entries for eligibility based upon the rules and eligibility requirements. A panel of five Federal judges selected first and second place winning submissions in English and Spanish based on three criteria: design and ease of use; clarity of Affordable Care Act-related information; and the promotion/outreach plan.

It was useful for the judges to confer on the finalist selection. This was done through two conference calls in advance of final selection. The HRSA Administrator provided final approval on the winners.

Partnerships: HRSA OWH partnered with the HHS Office on Women's Health and the HHS Coordinating Committee on Women's Health (CCWH). No private sector entities were involved. HHS OWH provided the $25,000 in prize money for the Challenge, HRSA OWH staffed the Challenge from start to finish, and the HHS CCWH provided subject matter expertise on an as needed basis.

Resources: The agency used personnel equivalent to one full time FTE. OWH staff developed, implemented and managed this Challenge from start to finish. Funding for the prizes was provided to HRSA by the HHS Office on Women's Health through an interagency agreement. Prizes were awarded through direct pay, electronic transfer.

Results: This Challenge advanced HRSA's role in improving access to health care services for people who are uninsured, isolated or medically vulnerable. In addition, the Challenge advances the Department's and Administration's interest in educating the public about the Affordable Care Act and enrollment in the Marketplace.

Although no reporting was required of Challenge winners, HRSA knows that the winning tools - posters and flyers - have been utilized with community health centers and other HRSA grantees to assist with enrollment of women in the Marketplace; additionally the tools were utilized by the Office of Regional Operations staff to inform Agency custodial staff about enrollment in the Marketplace and key preventive benefits afforded to them

without copay. HRSA is also aware that one of the winning entities planned to use their prize money to incorporate their tool in a women's health campaign.

## XI.    NIH Design by Undergraduate Biomedical Teams (DEBUT) 2014 Challenge - 2014[110]

Summary: The National Institute of Biomedical Imaging and Bioengineering (NIBIB) is challenging undergraduate student teams to develop technologies to address unmet needs in healthcare.

*Solution Type*: Ideas

*Primary Goals*: Develop technology; Inform and educate the public; Engage new people and communities; Find and highlight innovative ideas

*Results*: This is the 3rd year of this challenge. Many of the winners from the past 3 years of the competition have taken their projects forward with the financial resources as well as the prestige and recognition provided by the challenge, forming start-up companies or applying for patents.

Problem Statement: The NIBIB's DEBUT Challenge is open to teams of undergraduate students working on projects that develop innovative solutions to unmet health and clinical problems. Students are asked to submit a description of the problem, their plan to address it, and proof that their project works – including measurements, graphs, and video.

The goals of the challenge are to 1) provide undergraduate students valuable experiences such as working in teams, identifying unmet clinical needs, and designing, building and debugging solutions for such open-ended problems; 2) generate novel, innovative tools to improve healthcare, consistent with NIBIB's purpose to support research, training, the dissemination of health information, and other programs with respect to biomedical imaging and engineering and associated technologies and modalities with biomedical applications; and 3) highlight and acknowledge the contributions and accomplishments of undergraduate students.

Proposed Goals: [See Problem Statement]

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[110] Challenge Website: http://www.nibib.nih.gov/training-careers/undergraduate-graduate/design-biomedical-undergraduate-teams-debut-challenge

Why a Prize: NIH wanted to appeal to the competitive side of students and professors in order to encourage them to take on increasingly sophisticated projects and expand their boundaries.


Participants: There were 63 undergraduate student teams from Biomedical Engineering and other engineering and life sciences departments. These teams represented 33 universities in 18 states.

| State | Entries |
|-------|---------|
| CA | 12 |
| TX | 8 |
| MA | 7 |
| GE | 4 |
| SC | 4 |
| WI | 4 |
| TN2 | 4 |
| MD | 3 |
| WA | 3 |
| MO | 2 |
| NC | 2 |
| NY | 2 |
| OH | 2 |
| VA | 2 |
| CO | 1 |
| IL | 1 |
| OR | 1 |
| PA | 1 |
| TOTAL | 63 |


Timeline:

| Planning Phase Initiation | 09/01/2013 |
|---|---|

| | |
|---|---|
| Federal Register Notice Publication | 12/19/2013 |
| Submission Open | 01/27/2014 |
| Submission Close | 05/29/2014 |
| Judging Open | 06/10/2014 |
| Judging Close | 07/25/2014 |
| Winner(s) Announced | 08/12/2014 |

Solicitation & Outreach: Facebook, Twitter, Email Blasts, Press Releases, Direct Communication, Challenge.gov.

Outreach via direct messages to Biomedical Engineering department chairs and Capstone Design course professors provided results. Holding the award ceremony at the national meeting of the Biomedical Engineering Society also ensures that both professors and students are familiar with the challenge which has been held annually for the last 3 years.

Incentives: A total of $45,000 was originally offered in prizes: $20,000 for 1st place, $15,000 for 2nd, and $10,000 for 3rd. However, due to a tie for 3rd place, two $10,000 prizes were awarded, bringing the total to $55,000. 6 Honorable Mentions were given as non-monetary incentives. In addition to these prizes, each winning team and honorable mention received support (up to $2k per team) to attend the award ceremony at the Biomedical Engineering Society Conference in San Antonio. A plaque was given to each winning team recognizing their winning projects and the place won.

Evaluation and Judging: There were 9 judges total, all within HHS. An initial review of the submissions was conducted to form a shortlist, followed by an in-depth discussion of the shortlisted applications to choose winners. This works well.

The winning entries were selected based on the following criteria:

- Significance of the problem addressed—Does the entry address an important problem or a critical barrier to progress in clinical care or research?

- Impact on potential users and clinical care—How likely is it that the entry will exert a sustained, powerful influence on the problem and medical field addressed?

- Innovative design (creativity and originality of concept)—Does the entry utilize novel theoretical concepts, approaches or methodologies, or instrumentation?

- Working prototype that implements the design concept and produces targeted results—Has evidence been provided (in the form of results, graphs, photographs, films, etc.) that a working prototype has been achieved?

Partnerships: The challenge did not include partnerships, but NIH is looking into it for future years.

Resources: $62,964.82 was obligated against a single account under NIBIB's Direct Appropriation – this includes the prize money and the support given for travel assistance to the Biomedical Engineering Society Conference. This competition did not use a contractor or vendor.

Results: DEBUT has generated a lot of excitement in BME departments. The student teams developed sophisticated design projects aimed to address unmet clinical needs[111]. These include a device to reduce the incorrect placement of screws during spinal surgery, a sensory substitution glove for the blind, a device to improve the delivery of fat nutrients to tube-fed infants, and an inexpensive sensor for infant dehydration or bacterial infection. In addition to the educational value for the students, the resultant projects address the mission of NIBIB.

Many of the winners from the past 3 years of the competition have taken their projects forward, forming start-up companies or applying for patents, with the financial resources as well as the prestige and recognition provided by the challenge. For example, the 2012 3rd place winners formed a company around their low-cost spirometer that measures lung function for the diagnosis and monitoring of respiratory diseases[112].

## XII.    NIH Follow that Cell Challenge[113]

Summary: This Challenge is searching for novel methods for analyzing dynamic states of individual cells that can serve as the basis for predicting alterations in cell behavior and function over time.

*Solution Type*: Technology demonstration and hardware; Scientific

*Primary Goals*: Develop technology; Engage new people and communities; Advance scientific research

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[111] http://www.nibib.nih.gov/training-careers/undergraduate-graduate/design-biomedical-undergraduate-teams-debut-challenge/2014-design-biomedical-undergraduate-teams-debut-challenge-winners

[112] http://www.sparolabs.com/

[113] Challenge Website: https://www.innocentive.com/ar/challenge/9933618

*Results*: The prize competition still in progress. The marketing strategy has been successful, reaching almost 20,000 individuals. 488 solvers from the United States have registered on the InnoCentive platform, in addition to over 200 international solvers (though they are not eligible for the prize).

Problem Statement: To find new approaches to single cell analyses which were needed to uncover fundamental biological principles and ultimately improve the detection and treatment of disease, NIH established the Single Cell Analysis Program (SCAP) within the Common Fund to accelerate the discovery, development and translation of cross-cutting, innovative approaches to analyzing individual cells that can serve as the basis for predicting alterations in cell behavior and function over time.

The SCAP initiated several programs, including studies to evaluate cellular heterogeneity using transcriptional profiling of single cells through U01 grants, projects to develop exceptionally innovative tools and technologies for single cell analysis through R21 grants, and efforts in accelerating the integration and translation of technologies to characterize biological processes at the single cell level through R01 grants. While these efforts are already advancing the field of single cell analysis, the SCAP working group wanted to know if there were other ways to stimulate efforts from a broader and more diverse community. Ultimately, SCAP decided to run a Challenge to provide another avenue for seeking innovation.

Technological breakthroughs are needed that would allow researchers and physicians to identify rare cells in a mixed population, such as individual cells that can transform and become cancerous, cells that are latently infected with a pathogenic virus, or cells that develop resistance to drugs over time.

Phase 1 sought theoretical solutions, and Phase 2 is a "Reduction to Practice" of the Phase 1 Solution.

Proposed Goals: The ultimate goal is to develop new tools and methods that allow time-dependent measurements at the single cell level in a complex tissue environment to assess functional changes, provide information on the health status of a given cell, and help guide diagnosis and therapeutic treatments related to human disease states.

Why a Prize: It allows the agency to pay only for results and to mobilize new populations of solvers (engineers).

Participants: Almost 20,000 individuals were reached, and over 700 individuals opened project rooms on the InnoCentive platform. However, it is important to note that only 488 solvers were registered from the United States and a specific eligibility criteria of the America COMPETES Act requires Solvers to have U.S. citizenship or be a permanent residence.

Timeline:

| | |
|---|---|
| Federal Register Notice Publication | 8/11/2014 |
| Phase I Submission Open | 8/15/2014 |
| Phase I Submission Close | 12/15/2014 |
| Phase I Judging Open | 12/16/2014 |
| Phase I Judging Close | 2/16/2015 |
| Phase I Winners Announced | 3/16/2015 |
| Phase II Submissions Open | 3/17/2015 |
| Phase II Submissions Closed | 3/30/2017 |
| Phase II Judging Open | 3/31/2017 |
| Phase II Judging Closed | 6/30/2017 |
| Phase II Winner(s) Announced | 7/31/2017 |

Solicitation & Outreach: A marketing strategy was developed to define targeted methods that would be used to attract solvers at the launch and during the open period of the Follow that Cell challenge. The marketing plan was designed to attract a large number of varied solvers for Phase 1 that could theorize innovative research tools, technologies or other breakthroughs that would allow identification/manipulation/ measuring of relevant biological changes at the single cell level.

The marketing strategy for Phase 1 was deemed highly successful (see Participants).

Incentives: As determined by the judges, up to six prizes may be awarded for Phase 1 solutions from a total prize award pool of $100,000, and up to 2 prizes may be awarded for Phase 2 solutions from a total pool of $400,000.

Evaluation and Judging: Prize competition still in progress; update will be provided in FY2015.

Partnerships: Prize competition still in progress; update will be provided in FY2015.

Resources: InnoCentive was hired to manage the competition.


Results: Prize competition still in progress; update will be provided in FY2015


### XIII.    NIH New Methods to Detect Bias in Peer Review[114]

Summary: The Center for Scientific Review (CSR) is looking for the best ideas for detecting possible bias in NIH peer review.

*Solution Type*: Ideas

*Primary Goals*: Engage new people and communities; Find and highlight innovative ideas

*Results*: The NIH was praised for addressing racial disparities in R01 grants. The process opened communication between the NIH and the public, and the ideas NIH received were very creative; many were unique and had not been previously considered by CSR.


Problem Statement: The Center for Scientific Review (CSR) is the gateway for NIH grant application. It strives to ensure that all applications receive fair and impartial reviews, free of inappropriate influences, and to increase the number of researchers from minority groups as there is still a shortage compared to the U.S. population. Recent research (Ginther et. al., 2011; 2012) has shown that African American researchers are less likely than White researches to receive grant funding. These findings have raised concerns regarding the degree to which reviewers are demonstrating impartiality and fairness.

Therefore, new strategies or methods are needed for detecting potential bias. As a result, NIH's Center for Scientific Review (CSR) launched an America COMPETES Act challenge to help identify new methods to detect bias in peer review.


Proposed Goals: [See Summary]


Why a Prize: The prize mechanism was selected for several reasons. (1) It sent a message to the broader community of stakeholders that the NIH was interested in their input on the sensitive topic of racial disparities in grant funding. (2) It was a simple way to tap the ideas of the broader scientific community who have had experience with the NIH peer review

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[114] Challenge Website: http://public.csr.nih.gov/Pages/Challenge1.aspx

process. (3) It allowed NIH to access a broad range of ideas that could lead to a future contract or grant. (4) It stimulated creative ideas among NIH staff to implement the winning ideas. (5) It provided a venue for concerned citizens to voice their opinions regarding perceived problems with the NIH peer review process.

Participants: Participants were members of the scientific community – particularly, Federal employees interested in peer review, stakeholders affected by racial disparities in peer review, peer review experts, and non-scientists with creative ideas. There were 42 submissions.

Timeline:

| | |
|---|---|
| Planning Phase Initiation | 09/15/2013 |
| Federal Register Notice Publication | 05/05/2014 |
| Submission Open | 05/05/2014 |
| Submission Close | 06/30/2014 |
| Judging Open | 07/16/2014 |
| Judging Close | 08/11/2014 |
| Winner(s) Announced | 09/02/2014 |

Solicitation & Outreach: Email Blasts, Press Releases, Direct Communication, NIH Listservs, Professional Societies, NIH IC Blog Posts, Links to Webpage

The effectiveness of the outreach and solicitation methods is exemplified by the participation rate in the two Challenge contests, feedback from the scientific community regarding NIH plans to conduct the two competitions, the evaluation of the members of the Subcommittee on Peer Review who served as Technical Evaluation Panel for the competitions, and input from other Federal agencies regarding these methods. Overall, the responses were quite positive. The NIH was praised for addressing difficult questions about racial disparities in R01 grants, and received a substantial number of contest submissions (42) with thoughtful suggestions. The process opened communication between the NIH and the public. Overall, the contests made clear to all stakeholders that their input was welcomed.

Incentives: $25,000 total cash prize. Prizes were offered in two categories: Best Empirically-Based Submission and Most Creative Submission. For each category, a first prize of $10,000 and the second prize of $5,000 will be awarded. Any given submission could receive only one award. However, the judging process did not recommend awarding

all of the prizes. As a result, two first prizes of $10,000 each for best empirically-based and most creative categories and one second prize of $5,000 for the best empirically-based submission.

No non-monetary incentives.

Evaluation and Judging: 9 judges total from within HHS and NSF.

The judges were required to submit a report on each submission to maximize the efficiency of the process. It can be helpful in making the final selection of the winners if each rating of high impact is accompanied by a brief justification.

Partnerships: No partnerships were formed for this competition.

Resources: Cash prizes of $25,000 was awarded by Center for Scientific Review's Diversity Initiatives obligated by OFM. This competition did not use a contractor or vendor.

Results: There were 42 submissions which overall provided many unique recommendations that included assessment of reviewer performance with feedback; reviewer training on implicit bias, culture and diversity; control of the score range and the creation of algorithm to adjust scores; grammar and spelling corrections. The ideas received were very creative; many were unique and had not been previously considered by CSR. Two projects recommend methods for anonymizing grant applications, which is in the process of being implemented.

Winners[115]:

**First Prize: Best Empirically Based Idea for Detection of Bias in Peer Review**

David and Mia Budescu, Ph.D., Measuring the net effect of "identity cues" on the review of NIH applications

They proposed to assess bias in peer review by asking three groups of reviewers to review, in different orders, the sections of grant applications that contain cues to a PI's minority status. A control group would review grant applications in the usual way.

**Second Place: Best Empirically Based Idea for Detection of Bias in Peer Review**

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[115] http://public.csr.nih.gov/Pages/Challenge.aspx;
http://public.csr.nih.gov/Documents/LearnMoreabouttheWinningIdeas.pdf

Wendy Williams & Stephen J. Ceci, Ph.D., Do Investigator Race and/or Ethnicity Of Topic Influence Research Evaluations?

They proposed a study that would assess possible reviewer bias related to the minority status of NIH applicants, as well as the race/ethnicity of their research topics. To do this, four different groups of reviewers would review an application supposedly submitted by either a Black or White investigator who propose to study a Black or White population. The judges were impressed with the uniqueness of this proposal to study the possible bias related to both the race of the investigator and the race of the target population to be studied.

**First Prize: Most Creative Idea for Detection of Bias in Peer Review\***

Carole J. Lee & Elena A. Erosheva, Ph.D., Identifying Commensuration Bias in Grant Review

There is scientific data to suggest that converting heterogeneous qualities into a single metric can be influenced by bias. The prize winning researchers suggested that such a bias might occur in peer reviews when reviewers factor their overall impact scores. To test this hypothesis, they proposed a study to see if Black and White investigators receiving comparable criterion scores received significantly different overall impact scores. Judges were impressed with the uniqueness of this approach.

\*A second place prize was not provided in the creative category per recommendations of the panel of Federal judges.

### XIV.    NIH Stories of Basic Science to Medical Advances Challenge[116]

<u>Summary</u>: To identify past advances funded by the National Institute of General Medical Sciences (NIGMS) that are serving to improve human health and well-being.

*Solution Type*: Ideas

*Primary Goals*: Solve a specific problem

*Results*: The prize competition received 7 entries. Although no winners were announced, the Institute's desire for such stories was broadly communicated, and they continue to receive unsolicited stories from the community.

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[116] Challenge Website:
   http://www.nigms.nih.gov/About/NIGMSAdvanceTracingChallenge/Pages/default.aspx

Problem Statement: Identify major advances funded by NIGMS that have led to improvements in human health, well-being or other tangible benefits to the public and/or economy.

Submissions are limited to 2,500 words and should be clearly written in English, substantially free of scientific jargon and understandable by readers without scientific or technical backgrounds. A submission should include:

- A brief historical background that puts the research in context. For example, why were scientists studying the system(s)? What were the most pressing research questions in the field at the time? What was already known prior to the key discovery? Were there competing hypotheses?

- The advance(s), the researchers most responsible for them and the relevant NIGMS-funded projects that supported the work. Include references to seminal papers.

- An explanation of how the advance(s) led to the application(s). Reference relevant papers, collaborations, synergies or other factors that catalyzed the development of the application(s). Include the role of other funding sources.

- A description of the impact of the application(s) on people's lives. If possible, provide quantitative information on economic impact and/or return on investment. Measures could include reduced mortality, reduced health care costs, improvements in quality of life, tangible contributions to the U.S. economy, etc.


Proposed Goals: The goal was to identify past advances that are serving to improve human health and well-being that may have a major impact in the future. NIGMS will use these examples in outreach to explain their mission and the importance of basic science research. These stories will fill out the historical context of scientific breakthroughs and NIGMS' role in supporting them, and augment ongoing efforts to link advances in human health, well-being and economic growth to taxpayer-supported basic research.


Why a Prize: NIGMS needed solutions more quickly than a contract or grant could deliver.


Participants: Targeted groups are investigators familiar with NIGMS-supported research.


Timeline:

| | |
|---|---|
| Federal Register Notice Publication | 7/23/2014 |

| | |
|---|---|
| Submission Open | 7/21/2014 |
| Submission Close | 10/20/2014 |
| Judging Open | 10/21/14 |
| Judging Close | 11/20/14 |
| Winner(s) Announced | 12/04/14 |

Solicitation & Outreach: NIGMS used various social media platforms (Facebook, Twitter) as well as the NIGMS website to broadly advertised the Challenge. NIGMS also contacted various scientific organizations, science funding agencies, and other broad scientific groups whose mission overlaps with NIGMS. Many of these groups then published the availability of the Challenge via their media outlets.

Incentives: This challenge will have up to 10 winning submissions; each willing submission will receive $500; the total prize purse is $5000.

Evaluation and Judging: Submissions were judged by an internal NIGMS committee with broad expertise in the areas of science that the Insitute funds. This was very effective and efficient.

Partnerships: No partnerships were utilized.

Resources: This Challenge was run using only internal NIGMS resources. These included 100 hours of personnel time, and IT resources.

Results: The challenge received 7 entries. No awards were made for this Challenge. However, NIGMS' interest in these type of stories was advertised to a broad community. Since the end of the Challenge, the Institute has received unsolicited stories and ideas to follow up.

### XV.  NIH Strategies to Strengthen Fairness and Impartiality in Peer Review[117]

Summary: Center for Scientific Review (CSR) is offering a prize for the best idea for strategies to strengthen fairness and impartiality.

*Solution Type*: Ideas

*Primary Goals*: Engage new people and communities; Find and highlight innovative ideas

*Results*: The NIH was praised for addressing racial disparities in R01 grants. The Challenge opened communication between the NIH and the public, who provided unique recommendations on a range of aspects of the peer review process.

Problem Statement: [See NIH New Methods to Detect Bias in Peer Review: Problem Statement].

There is limited empirical evidence on how to improve fairness and impartiality in peer review; therefore, this challenge requested ideas about how to strengthen fairness.

Proposed Goals: [See Summary]

Why a Prize: [See NIH New Methods to Detect Bias in Peer Review: Why a Prize]

Participants: [See NIH New Methods to Detect Bias in Peer Review: Participants]. There were 40 submissions

Timeline:

| | |
|---|---|
| Planning Phase Initiation | 09/15/2013 |
| Federal Register Notice Publication | 05/05/2014 |
| Submission Open | 05/05/2014 |
| Submission Close | 06/30/2014 |
| Judging Open | 07/16/2014 |
| Judging Close | 08/11/2014 |
| Winner(s) Announced | 09/02/2014 |

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[117] Challenge Website: http://public.csr.nih.gov/Pages/Challenge2.aspx

Solicitation & Outreach: Email Blasts, Press Releases, Direct Communication.

The effectiveness of the outreach and solicitation methods is exemplified by the participation rate in the two Challenge contests, feedback from the scientific community regarding NIH plans to conduct the two competitions, the evaluation of the members of the Subcommittee on Peer Review who served as Technical Evaluation Panel for the competitions, and input from other Federal agencies regarding these methods. Overall, the responses were quite positive. The NIH was praised for addressing difficult questions about racial disparities in R01 grants, and received a substantial number of contest submissions with thoughtful suggestions. The process opened communication between the NIH and the public. Overall, the contests made clear to all stakeholders that their input was welcomed.

Incentives: $15,000 total cash prize. No non-monetary incentives. No partnerships were formed. This competition did not use a contractor or vendor.

Evaluation and Judging: 9 judges total from within HHS and NSF.

An initial review to form a shortlist, followed by an in-depth discussion of the shortlisted applications to choose winners works well.

Partnerships: No partnerships were formed for this competition.

Resources: A cash prize of $10,000 was awarded by Center for Scientific Review's Diversity Initiatives obligated by OFM.

Results: There were 40 submissions which overall provided unique recommendations that include improvement of reviewer and selection; anonymization of applications; how to randomly select grantees and raise funding levels; applicant feedback; and policies based on choice of applications for discussion and how appeals are handled. The ideas received were very creative; many were unique and had not been previously considered by CSR.

## XVI.    ONC Data Supporting Decisions Code-a-Palooza[118]

Summary: Create interactive data visualization tools using newly-released Centers for Medicare and Medicaid Services (CMS) provider data that supports consumers making value-based decisions

*Solution Type*: Software and apps; Creative (design & multimedia); Analytics, visualizations, and algorithms

*Primary Goals*: Find and highlight innovative ideas; Improve government service delivery; Develop technology; Inform and educate the public

*Results*: The challenge advanced the mission of HHS and the Office of the National Coordinator for Health Information Technology (ONC) by increasing awareness of the 2012 Medicare data set and the ways it can be used, including for cost transparency. The Challenge partnered with the Health Data Consortium to successfully engage a diverse range of solvers, from graduate students to members of the private sector to people highly respected in the health data community. Winning solutions will help patients make health care decisions by providing them with information about cost and quality across hospitals. Solutions have been integrated into mobile apps, provided for free online, and been awarded a National Science Foundation Small Business Innovation Research grant.

Problem Statement: CMS data made publicly available for the first time has great potential to further the nation's understanding of healthcare spending and physician practice patterns. Because this data exists in raw forms that require interpretation and context, to have an impact for the average consumer it must be parsed and presented in ways that they can understand. Only then can consumers use the data to help make health choices that are the most appropriate for their specific, individual needs. This challenge seeks the creation of interactive data visualization and infographic tools that communicate complex data from multiple sources in ways that support consumer decision making for value based health care.

Proposed Goals: [See Summary]

Why a Prize: The challenge was an opportunity to spread awareness of recently released Medicare data and spur development of new ideas for what that data can be used for and how it can be presented.

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[118] Challenge Website: http://healthdatapalooza.org/get-involved/code-a-palooza-at-health-datapalooza-2014/

Participants: This challenge was run as part of the Datapalooza conference organized by HDC, which targets developers, data analysts, and designers. Most of the proposals received were on behalf of groups as opposed to individuals working by themselves. In Phase 1 (of 2), 57 submissions, in the form of written proposals, were received. The top 10 were selected to move on to phase 2.

Timeline:

There were two phases, the first asking for written proposals for web tools/visualizations. The top 10 submissions are selected by an internal review team to move on to phase 2, in which they develop the tool. These top ten present their apps at the live judging event at the Health Data Consortium (HDC) Datapalooza. The winners were announced on the main stage of the conference later that day.

| | |
|---|---|
| Federal Register Notice Publication | 04/10/2014 |
| Phase 1 Submission Open | 04/14/2014 |
| Phase 1 Submission Close | 04/24/2014 |
| Phase 2 | 04/24/2014-06/02/2014 |
| Judging Open | 06/02/2014 |
| Judging Close | 06/02/2014 |
| Winner(s) Announced | 06/03/2014 |

Solicitation & Outreach: Email Blasts, Press Releases, Direct Communication, Competition Site.

Running a challenge in conjunction with a major conference whose attendees are the target audience, and therefore using its registration site, was very helpful in increasing awareness of the challenge. It was featured prominently on the website, making it difficult for anyone visiting the site to miss.

The challenge submission page was hosted on Datapalooza's conference registration website run by HDC. This gave the challenge substantial visibility among exactly the population ONC was most interested in reaching out to. This led to a quantity of submissions that was on the higher end of expectations

Incentives: There were three prizes – 1st place received $20,000, 2nd place $10,000, and 3rd place $5000. There were no non-monetary incentives.

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Evaluation and Judging: There were 5 judges total, including representatives of HHS, non-profit, corporate, academia, and high profile individuals. At the event, each participant was given 5 minutes to demo their live apps in front of the five reviewers, which was followed by 3 minutes of reviewer Q&A. The winners were announced on the main stage of the conference later that day.

The review criteria for Phase 1 were (1) Strength of use case for consumers, (2) How well will solution address use case, (3) Proposed use of data, and (4) Quality of data sources. The criteria for Phase 2 were similar, but adjusted for reviewing a developed app instead of a written proposal: (1) Utility for consumers, (2) Interactivity and customization by user, (3) Use of data sources, and (4) Visual appeal.

There are important potential negatives to take into account when considering the use of live judging and Q&A - the unplanned nature of it can allow for untactful or even unnecessarily harsh statements, and complicates time management.

Partnerships: A partnership was formed with the Health Data Consortium. HDC helped market the challenge, identify reviewers, received registrations and submissions, and provided a venue for winner announcement.

Resources: There were three prizes – 1st place received $20,000, 2nd place $10,000, and 3rd place was $5000. The challenge was filed under a cooperative agreement notice with NASA[119].

HDC provided the submission webpage for the challenge, collected the submissions, provided significant communications and marketing of the challenge and provided the venue for the live judging event and the announcement of the winners

Results: The challenge advanced the mission of HHS and ONC by increasing awareness of the 2012 Medicare data set and the ways it can be used, including for cost transparency. The majority of the initial 56 responses to Phase 1 of the challenge were considered to be of higher quality than a typical submission pool. The diversity of respondents was also impressive, including newly-formed groups of graduate students, startups that had successfully released other products into the market, notable individuals within the health IT/open data scene, and far-flung teams who formed just to participate.

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[119] http://www.gpo.gov/fdsys/pkg/FR-2011-01-25/html/2011-1447.htm

First place was awarded to a company called Lyfechannel, which makes a suite of patient applications. The solution was called *My Health Hero*, which analyzed and presented cost data to help patients make health decisions, and has likely been integrated into at least one of their apps. Second place was a grad student team called Accordion Health from University of Texas-Austin, which developed algorithms to analyze individuals' hospital utilization, transitions, and health outcomes. Accordion Health have since gone on to win an NSF SBIR grant. Third place was a small company called Karmadata, from Hingham, MA, which created *my health.io*, which helps patients find surgeons based on volume and quality of affiliated hospitals.

## XVII.    ONC Digital Privacy Notice Challenge[120]

Summary: The Office of the National Coordinator for Health IT (ONC) is awarding prizes for the creation of the best online notice of privacy practices that is readable and understandable by patients.

*Solution Type*: Software and apps; Creative (design & multimedia)

*Primary Goals*: Improve government service delivery; Find and highlight innovative ideas; Solve a specific problem

*Results*: The winning submission met the Challenge goals by providing a solution that was mobile responsive, provided customization for different types of entities, and was available in both English and Spanish.

Problem Statement: The HIPAA Privacy Rule gives individuals a fundamental right to be informed of the privacy practices of health plans and health care providers, as well as to be informed of their privacy rights with respect to their personal health information. Health plans and covered health care providers are required to develop and distribute a notice that provides a clear, user friendly explanation of these rights and practices. In practice, however, many patients have found that these notices can be difficult to read and they are poorly comprehended.

Proposed Goals: [See Summary]

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[120] Challenge Website: http://oncchallenges.ideascale.com/a/pages/digital-privacy-notice-challenge

Why a Prize: The challenge was an opportunity to engage the developer community around an important topic in a way that was less costly and time-consuming than a contract, and the requirement was not suitable for a grant or cooperative agreement.

Participants: The challenge has received 13 submissions. Since the subject matter of this challenge dealt with helping users of personal health record applications understand their rights to their information under HIPAA (Health Insurance Portability and Accountability Act), ONC marketed the challenge to software developers and other individuals/entities who worked or had an interest in data privacy and security. With this marketing emphasis, those were the types of groups who ended up participating. There was one participant that was a college professor, but the rest were small groups that either formed in response to the challenge or who had worked together in the past but not as part of a business entity.

Timeline:

| | |
|---|---|
| Submission Open | 02/07/2014 |
| Submission Close | 04/07/2014 |
| Judging Open | 04/14/2014 |
| Judging Close | 04/28/2014 |
| Winner(s) Announced | 06/02/2014 |

Solicitation & Outreach: Twitter, Email Blasts, Direct Communication.

Considering the topic, IP policy (open source), and other parameters such as the timeline, the methods used were effective.

Incentives: There were three prizes – 1st place received $15,000, 2nd place $7000, and 3rd place $3000. There were no non-monetary incentives.

Evaluation and Judging: There were 7 judges total from HHS, corporations, and universities. Submissions were evaluated on five criteria: 1) Accurate use of model Digital Privacy Notice content (this was the information required to be presented in the module), 2) Use of best practices in presenting web content for consumption, including use of plain/understandable writing, 3) Visual appeal, 4) Capacity for entity to customize content, and 5) Results from public voting period.

Partnerships: No partnerships were formed for this competition.

Resources: As part of a contract that tasked them with managing 3 prize challenges, Capital Consulting Corporation prepared and maintained the challenge information and submission site and assisted in communications and marketing. The contract value was just under $250,000.

Results: The competition addressed ONC's mission by increasing awareness of model notices of privacy practices, which explain patients' rights with regard to their patient health data and what their providers' data practices are. While 14 submissions may generally be on the lower end of challenge expectations, the prize award was relatively small and the IP policy was that submissions were to be open source and freely available on GitHub, which can depress interest.

Ultimately, the winning submission[121] provided a solution that was mobile responsive, provided customization for different types of entities, and was available in both English and Spanish. Since the end of the challenge, the winner has continued to participate in ONC events and other opportunities to spread awareness.

## XVIII.    ONC EHR Innovations for Improving Hypertension Challenge[122]

Summary: The Office of the National Coordinator for Health Information Technology (ONC) seeks to uncover the practices that have used clinical decision support to implement the most successful evidence-based blood pressure treatment protocols.

*Solution Type*: Ideas; Analytics, visualizations, and algorithms

*Primary Goals*: Engage new people and communities; Stimulate a market

*Results*: Prize competition still in progress; will report in FY2015

Problem Statement: The EHR Innovations for Improving Hypertension Challenge (1) seeks to identify the practices that have used clinical decision support (CDS) to implement the most clinically successful examples of an evidence-based blood pressure treatment protocol; (2) gather details about these tools and their implementation; and (3) reward

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[121] https://github.com/anatolyg/onc_ppn
[122] Challenge website: http://millionhearts.hhs.gov/newsevents/hypertension_control_champions.html

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organizations that can spread use of the successful tools to the most providers. The challenge focuses on the use of Electronic Health Records (EHRs)

Proposed Goals: The EHR Innovations for Improving Hypertension Control Challenge sought to identify the best processes that use electronic health records (EHRs) and their functionalities, and attempt to spread implementation of these to more providers.

Why a Prize: Neither a grant nor a cooperative agreement was suitable to achieve the objectives of the project, based on budget or method of execution.

Participants: Healthcare providers who have implemented or plan to implement protocols in their practices to improve patient hypertension rates.

Timeline:

| | |
|---|---|
| Federal Register Notice Publication | 07/09/2014 |
| Submission Open | 07/07/2014 |
| Submission Close | 10/06/2014 |
| Judging Open | 10/07/2014 |
| Judging Close | 10/21/2014 |
| Winner(s) Announced | 10/27/2014 |

Solicitation & Outreach: Prize competition still in progress; will report in FY2015

Incentives: Prize competition still in progress; will report in FY2015

Evaluation and Judging: Prize competition still in progress; will report in FY2015

Partnerships: Prize competition still in progress; will report in FY2015

Resources: Prize competition still in progress; will report in FY2015

Results: The challenge has been a mix of successful and less successful so far. In Phase 1, ONC received only 4 submissions, which may have been partially due to the CDC Million Hearts Challenge that had a similar late 2014 timeline and was less complex. On the other hand, ONC has received significant positive feedback on the winning solutions from private and Federal partners and numerous requests for content and links. These solutions were also sufficiently different to provide a range of technical and workflow/process improvements that are adoptable for many types of provider settings.

## E.    Department of Housing and Urban Development

### I.    Innovation in Affordable Housing Student Design and Planning Competition – 2014[123]

Summary: The annual HUD Innovation in Affordable Housing Student Design and Planning Competition (IAH) challenges multi-disciplinary graduate student teams to respond to a real life affordable housing design and planning issue. HUD's Office of Policy Development and Research (PD&R) partners with a public housing authority (PHA) to identify a PHA site that needs redevelopment and students from architecture, planning, business, and real estate submit proposals as to how to redevelop the site and meet the needs of the community.

*Solution Type*: Ideas; Creative (design & multimedia); Analytics, visualizations, and algorithms

*Primary Goals*: Improve government service delivery; Find and highlight innovative ideas; Solve a specific problem; Build capacity

*Results*: The competition succeeded in introducing the next generation of architects, planners, and others to the important and expansive nature of affordable housing. The jury decided on four finalist teams that were then invited to participate in a project site visit and a final competition event in Washington, DC where they presented their final proposals to the jury. Following the presentations by each team, the jury deliberated and former HUD Secretary Shaun Donovan announced the winners. The runner-up, who received $5,000, was a joint team from New York University and Columbia University. The winning team, who received $10,000, was from Ohio State University.

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[123] Challenge Website: http://www.huduser.org/portal/challenge/past_competitions.html

Problem Statement: The need for quality, affordable housing has never been greater. At its best, housing can help strengthen the social and physical fabric of communities and neighborhoods. It is the hope of HUD and PD&R that by initiating and funding this competition, a new generation will advance the design and production of livable and sustainable housing for low- and moderate-income people through research and innovation.

PD&R worked with the Office of Public and Indian Housing to issue a call for interested public housing authorities (PHAs). The PHAs were evaluated on a first-come, first-serve basis. For the inaugural 2014 competition, HUD partnered with the Housing Authority of Bergen County (HABC).

HABC offered a challenging project for the competition- a historic American Legion building situated on 1.5 acres. HABC wished to maintain this historic building while providing affordable housing for homeless veterans. IAH student participants needed to consider design, community development, and financing elements in order to provide an all-encompassing plan and solution that would allow HABC to meet its goal. They also needed to understand the needs of the intended residents, the zoning restrictions, and leveraging opportunities. The types of solutions sought through the competition were ideas and visualizations related to architecture, landscape architecture, planning, urban design, and real estate finance.

The competition ran in two phases:

*Phase I*

Multidisciplinary teams of graduate students submitted their first round electronic proposals. A schematic design level site plan as well as a schematic floor plan, section and building massing were required. The evaluation criteria emphasized understanding of and provision for community services, planning context (including zoning), and economic considerations related to affordable housing development (including financing, first cost, maintenance and operation, rental subsidies, etc.), as well as design. The submissions were to include a narrative of two to four pages and two electronic design boards.

The panel of jurors evaluated all submissions and chose four finalist teams to move on to Phase II of the competition.

*Phase II*

Finalists were challenged to further refine their solutions, incorporating more detail, developed floor plans, and analyses (economic, energy, etc.). The finalists traveled to the site for a walk-thru and meeting with HABC staff. The site visit offered finalists the opportunity to examine the site first hand and speak with local officials and community members.

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The final jury and award ceremony was held on May 6, 2014, at HUD headquarters in Washington, DC. Student finalist teams each prepared a fifteen minute presentation and two design boards. They presented in front of a live audience, a webcast audience, and the panel of jurors. After all the finalists presented, the jurors deliberated and former HUD Secretary Shaun Donovan announced the winners.

Proposed Goals: In addition to aiding HABC, the competition aimed to encourage research and innovation in quality affordable housing design that strengthens the social and physical fabric of low and moderate-income communities and neighborhoods, raise practitioner and future practitioner capacity to produce more livable and sustainable housing for low- and moderate-income people through disseminating best practices, and foster cross-cutting team-work within the design and community development process.

Why a Prize: A prize competition was necessary in order to incentivize graduate students to participate and garner nationwide interest. It was deemed the best way to engage the intended audience of participants, as contracts are not an appropriate vehicle for soliciting student work.

Participants: The participants were graduate students from a wide range of disciplines. Each team had to include three to five students and at least one had to be from a non-design background. Examples of eligible disciplines include architecture, urban planning, law, public policy, business, finance, real estate, and engineering. In order to be eligible to participate in the competition each student must be enrolled in a graduate degree program from an accredited educational institution in the United States. Students must also be citizens or permanent residents of the United States.

Timeline:

| | |
|---|---|
| 01-06-2014 | Competition launch; Phase I information released |
| 01-20-2014 | Deadline for teams to register |
| 02-10-2014 | Deadline for teams to submit Phase I |
| 02-24-2014 | Finalists announced; Phase II information released |
| 03-12-2014 | Site visit for finalists |
| 05-06-2014 | Final jury presentations; winners announced in Washington, DC |

Solicitation & Outreach: A webpage dedicated to the competition was created on HUDuser.org. An initial announcement of the competition was sent to PD&R's listserv and recipients could sign up on the webpage to receive further competition updates. Throughout the recruitment phase, information was sent to these self-selected individuals. HUD also hired a contractor to help with the competition and aid in solicitation and outreach. The contractor researched contacts at architecture and urban planning graduate schools and sent them the electronic information as well as posters to display in the school. Twitter, Facebook, and LinkedIn accounts of both HUD and the contractor were used to reach out to students and keep them informed of competition developments as well.

Both before the registration deadline and during the competition, blogs were posted on the HUDdle[124] to keep the general public and the potential student participants informed. Articles covering the competition site visit and the final awards ceremony were included in the Edge, PD&R's online magazine. HUD also issued press releases announcing the finalists, and later the winners.

The competition team learned that more outreach to graduate schools was needed in future years, because some students claimed they did not know about IAH until after registration closed. In addition, the schedule was revised for the second annual competition in 2015 to better accommodate academic schedules.

Incentives: The total cash prize for IAH 2014 was $15,000. A prize of $10,000 was awarded to the winner and $5,000 went to the runner-up.

Non-monetary incentives were also used to motivate participants. Finalists were invited to travel to Washington, DC (two members of each team received travel funds) and present in front of a panel of esteemed experts in the field of architecture, affordable housing, and community development. This was an excellent opportunity for the finalists to put on their résumé as they entered the job market.

All prize money and travel expenses were paid out of the contracted obligations from PD&R's Research and Technology funds.

Evaluation and Judging: HUD recruited a jury of five experts in the field of architecture, affordable housing, and community development. The jury was asked to evaluate the proposals on three main factors: environmental, financial, and social. Each main factor contained seven to eight sub factors. The jurors were also encouraged to look for innovation

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[124] www.blog.hud.gov

throughout the proposal. In the future, HUD will designate a head juror who can guide the process.

Partnerships: HUD entered into a formal partnership with the Housing Authority of Bergen County (HABC), a public housing authority. HABC provided the competition site in Emerson, New Jersey, upon which the first year of the competition was based. They also provided staff time during the site visit. HABC benefitted from positive publicity as well as student ideas received during the competition.

Resources: HUD contracted Steven Winter Associates (SWA) for assistance in executing the competition. SWA provided assistance and technical expertise in all areas of the competition. The $163,443.00 contract with SWA (which included the $20,000 in prize money) was funded through FY 2013 Research and Technology funds. About 1/3 FTE of HUD staff time was used for the Challenge.

Results: The competition succeeded in introducing the next generation of architects, planners, and others to the important and expansive nature of affordable housing. The jury decided on four finalist teams that were then invited to participate in a project site visit and a final competition event in Washington, DC where they presented their final proposals to the jury. Following the presentations by each team, the jury deliberated and former HUD Secretary Shaun Donovan announced the winners. The runner-up, who received $5,000, was a joint team from New York University and Columbia University. The winning team, who received $10,000, was from Ohio State University.

The acting Executive Director of HABC attended the final presentations, and many staff members viewed it via webcast. The ideas presented by finalists are being kept in mind as HABC works with architects and developers on the site.

## II. Rebuild By Design: a multi-stage regional design competition to promote resilience for the Hurricane Sandy-affected region[125]

Summary: In June 2013, the President's Hurricane Sandy Rebuilding Task Force launched Rebuild by Design, a multi-stage regional design competition to promote resilience in the Sandy-affected region. The goal of the competition is to attract world-class talent, promote innovation, and develop projects that will actually be built. The competition was sponsored

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[125] Challenge Website: www.rebuildbydesign.org

and administered by HUD (the HUD Secretary served as the Chair of the Task Force). The competition consisted of four stages, each with its own process, timeline and deliverable:

- Stage One: Request for qualifications and selection of 10 finalist interdisciplinary design teams to participate in the competition

- Stage Two: Analysis of the region through collaborative process among all teams and identification of three to five key design opportunities by each team

- Stage Three: Selection of design opportunities/sites to pursue; development of design solutions and community/partner engagement

- Stage Four: Designation of winning proposals by HUD (implementation by local/state government with dedicated HUD funding to follow)

*Solution Type*: Ideas; Creative (design & multimedia); Business plans; Other (collaborative partnerships, and community engagement strategies)

*Primary Goals*: Improve government service delivery; Find and highlight innovative ideas; Solve a specific problem; Inform and educate the public; Engage new people and communities; Build capacity; Stimulate a market for private investment to leverage significant public investment

*Results*: Partnerships with non-profit organizations allowed philanthropic resources to be used for 100 percent of the prize awards as well and competition administration. The challenge attracted submissions from 148 teams from more than 15 countries, and resulted in 7 projects that are being implemented to increase resilience in Sandy-impacted communities in three states.


Problem Statement: In June 2013, The President's Climate Action Plan identified building stronger and safer communities and infrastructure as one of the three major initiatives to better prepare America for the impacts of climate change. This included using competitions to spur innovation in approaches to resilience and to advance lessons learned from Hurricane Sandy and previous natural disasters. The third National Climate Assessment (released for public review in early 2013) noted that sea-levels will continue to rise, which will be accompanied by an increase in frequency and intensity of extreme weather events. This sobering awareness, together with the landfall of the second-costliest hurricane in U.S. history in 2012, reinforces that we must fundamentally re-think how we build in order to be prepared to meet the risks of the future.

Natural hazard risk exists at a regional scale, and approaches to address the risk of flooding, in particular, require both innovation and collaboration to increase the resilience of communities. In response, Rebuild by Design was initiated to use the Sandy region and the rebuilding process as an opportunity to focus public attention on this critical issue and

engage the greatest minds in helping to develop innovative projects that can actually be built—increasing resilience and lowering risk in vulnerable areas. The types of solutions sought through the competition were planning and design ideas, analytics, visualizations, financing strategies, collaborative partnerships, and community engagement strategies.

Submission Requirements:

*Stage One*

Applicants were required to submit a short proposal, detailed in the RBD Request for Qualifications, which summarized their interdisciplinary expertise and presented an initial approach toward increasing resilience. Applicants were required to submit an idea on their intended approach to problem identification and development of design solutions as well as their initial thinking on the issues at stake and the possible concepts that might emerge. Applicants were asked to illustrate these concepts in regard to what vulnerabilities their team anticipated focusing on.

Team submissions were required to include professional expertise in at least three fields, and applicants were required to have demonstrable experience in interdisciplinary research, analysis, and design—especially related to the spatial impacts of ecological, economic, and social development on the regional scale.

While by no means exhaustive, a Starter Kit of helpful information about the region was compiled and was also available on the HUD Rebuild by Design website. It contained a preliminary list of relevant datasets, general analyses, and existing plans in the region.

*Stage Two*

Each of the 10 RBD design teams were asked to submit between 3 to 5 Design Opportunities, as well as research and analysis of the region. A "design opportunity" was the identification of key areas where high risk and vulnerability converge (derived from the regional analysis), together with a proposed conceptual approach for how to address. In total, they submitted 41 Design Opportunities.

*Stage Three*

Required final deliverables are a PDF "Briefing Packet", public materials for website, materials for public presentation, and materials for presentation to the Jury that include the following:

- Research and Analysis
- Demonstration of Participatory Design Process / Stakeholder Coalition
- Design Solution / Proposal
- Implementation Strategy and Benefit-Cost Analysis

Additional Information Required for Final Submission:

- Project Scalability

- Timelines

- Grantee Support

- Interdependency

- Financing Strategy

- Technical Feasibility

Proposed Goals: The competition seeks to bring local, regional, and international knowledge to bear in order to:

1. Contribute to a better understanding of the region's vulnerabilities, strengths, and interdependencies;

2. Generate design proposals that focus on regionally applicable solutions, increase resilience, develop and promote innovation, and integrate local efforts in the region;

3. Build capacity of local communities and Federal agencies while promoting an integrated regional approach;

4. Connect to local efforts and strengthen the collaboration within governments and between government, business, academic, non-profit, and other organizations;

5. Ignite innovation, outside-the-box perspectives, and address new trends; and

Execute world-class projects with regional impact (either large scale or replicable across the region).

Why a Prize: The use of a prize competition was selected to help provide solutions to problems that are larger or more complex than individual jurisdictions have the capacity to solve independently. The regional focus helps provide a better understanding of the many interconnected systems (infrastructure, ecological, social, climate, economic, and others) in the Sandy-affected region as well as examine problems from a multi-jurisdictional perspective. Given the regional and complex nature of the problem, HUD was in a unique position to use its convening power to bring the various assets and subject matter expertise of other Federal agencies to help inform and complement that at the local and state level as well as that from the nonprofit sector and academia.

The use of a prize competition also is able to leverage the resources of philanthropy and the nonprofit sector to derive a substantial return on investment in terms of time and expertise dedicated to defining and solving complex regional problems. According to an

evaluation released by the Urban Institute in October 2014, finalist design teams contributed between three to six times the amount of the cash prize awards they received to participate in the competition and produce their respective design proposals. This substantial in-kind pro-bono contribution from the finalist teams, however, came at great risk to small firms or nonprofit institutions that could not carry such losses (and in the event of not having a winning proposal, these firms would not have a direct opportunity to earn back the losses).

A lesson learned would be to: 1) increase the amount of the prize award to better offset participant losses and/or 2) more clearly and definitively articulate at the beginning of the competition the degree to which time and resources would be required to fully participate in a process that involves such in-depth community outreach and engagement as well as collaboration with local, state, and Federal agencies. Firms have become increasingly sensitive to the trend of "design competition abuse," where more and more opportunities are being solicited via design competitions where participants (or at least losing participants) are not compensated for their work and which require a substantial commitment of resources to compete.

RBD was also unique in that winning teams were not presented with any additional compensation or guarantee of being procured to advance and realize their proposals. Since HUD project implementation grants were made to state and local government under separate authority, the Department was unable to mandate that grantees procure the design teams (though they were strongly encouraged to do so). In the Federal Register Notice governing the CDBG-DR project grants, HUD explicitly permitted grantees to use sole-source procurement of the design teams. However, if grantees elect to use competitive means to procure professional services for the projects, then design teams must compete for the opportunity the same as other firms. While RBD produced "million dollar proposals" for the cost of $200,000, some finalist teams and team members may be wary of participating in future competitions of this nature due to the significant risk involved with such a substantial commitment of resources.

Participants: Approximately 148 teams from more than 15 countries submitted proposals, representing the top engineering, architecture, design, landscape architecture and planning firms as well as research institutes and universities worldwide.

The 10 interdisciplinary design teams selected are the following:

I.   BIG TEAM

   - BIG (Bjarke Ingels Group) with One Architecture, Starr Whitehouse, James Lima Planning + Development, Project Projects, Green Shield Ecology,

AEA Consulting, Level Agency for Infrastructure, Arcadis, and the Parsons School of Constructed Environments

4. HR&A Advisors, Inc. with Cooper, Robertson & Partners

   - HR&A Advisors, Inc. with Cooper, Robertson & Partners; Grimshaw Architects; Alamo Architects; Langan Engineering; W Architecture; Hargreaves Associates; and Urban Green Council

5. Interboro Team

   - Interboro Partners / Apex / Bosch Slabbers / Deltares / H+N+S / Palmbout / IMG Rebel with Center for Urban Pedagogy, David Rusk, NJIT Infrastructure Planning Program, Project Projects, RFA Investments, TU Delft

6. MIT CAU + ZUS + URBANISTEN

   - MIT CAU + ZUS + URBANISTEN with Deltares; 75B; and Volker Infra Design

7. OMA

   - Office of Metropolitan Architecture with Royal Haskoning DHV; Balmori Associates; and HR&A Advisors

8. PennDesign/OLIN

   - University of Pennsylvania School of Design /OLIN with HR&A Advisors, eDesign Dynamics, Level Infrastructure, Barretto Bay Strategies, McLaren Engineering Group, Philip Habib & Associates, Buro Happold 10

9. Sasaki/Rutgers/Arup

   - Sasaki Associates with Rutgers University and ARUP

10. SCAPE / Landscape Architecture

   - SCAPE/LANDSCAPE ARCHITECTURE with Parsons Brinckerhoff, Dr. Philip Orton / Stevens Institute of Technology, Ocean & Coastal Consultants, SeArc Ecological Consulting, LOT-EK, MTWTF, The Harbor School and Paul Greenberg.

11. WB unabridged w/ Yale ARCADIS

   - Waggonner and Ball; unabridged Architecture; the Gulf Coast Community Design Studio; Yale's Urban Ecology and Design Laboratory; ARCADIS

12. WXY/WEST 8

- WXY Studio, West 8 Urban Design & Landscape Architecture with Dr. Alan Blumberg, Dr. Sergey Vinogradov, Dr. Thomas Herrington, Stevens Institute of Technology; Daniel Hitchings, ARCADIS; Andrew Kao, AIR Worldwide; Kate John-Alder, Rutgers University; Kei Hayashi, BJH Advisors; Maxine Griffith, Griffith Planning & Design; Yeju Choi, NowHere Office; William Morrish, Parsons the New School for Design; Jesse Keenan, CURE.

Timeline:

| | |
|---|---|
| Hurricane Sandy hits the Unites States | October 29, 2012 |
| President Obama creates the Hurricane Sandy Rebuilding Task Force by Executive Order and appoints the HUD Secretary to serve as the Chair | December 7, 2012 |
| HUD Secretary announces design competition; application process and other materials (e.g., design brief) available on HUD website | June 20, 2013 |
| Applications due for teams to compete | July 19, 2013 |
| Publication of Federal Register Notice (78 FR 45551) – Competition Description | July 29, 2013 |
| Conclusion of Stage One – Kick-Off Meeting with Teams | August 8-10, 2013 |
| HUD Secretary announces selection of design teams to proceed in competition | August 9, 2013 |
| Hurricane Sandy Rebuilding Task Force releases Rebuilding Strategy. Recommendation #3 is to create a design competition to develop innovative resilient design solutions that address the Sandy-affected region's most pressing vulnerabilities. HUD is identified as the lead agency. | August 19, 2013 |
| Framing meeting with teams and partners to define process and workflow | August 20, 2013 |
| Publication of Federal Register Notice (78 FR 52560) – Announcement of Selection of Design Teams to receive cash award and proceed/participate in competition. | August 23, 2013 |
| Regional site visit + public meeting – Manhattan | Sept. 11-12, 2013 |
| Regional site visit + public meeting – New Jersey Shore | Sept. 18-19, 2013 |

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|---|---|
| Regional site visit + public meeting – Staten Island, Jamaica Bay | Sept. 26-27, 2013 |
| Conclusion of Stage Two – Regional analysis and design opportunities due | October 28, 2013 |
| Selection of design opportunities for each team to pursue in Stage Three | Nov. 14, 2013 |
| Conclusion of Stage Three – Public Presentation of Final Design submissions in New York and New Jersey | April 3, 2014 |
| Team presentations and jury deliberation | April 4-5, 2014 |
| HUD Secretary announces overall allocation amounts to help fund implementation of RBD projects | May 30, 2014 |
| HUD Secretary announces the six winning teams/proposals and the respective amount of CDBG-DR funding dedicated to each (conclusion of the competition) | June 2, 2014 |
| Publication of Federal Register Notice (79 FR 62182) identifying requirements for CDBG-DR grantees related to RBD project implementation | October 16, 2014 |

Solicitation & Outreach: HUD used its network of project partners (both administrative and funders) to help market the prize competition. It also used media specializing in design (e.g., Next City, etc.) as well as professional associations and universities. It also marketed the competition through the NEA's mature network of design-focused stakeholders and interest groups. The resulting methods were successful as the quality of proposals was extraordinarily high and represented some of the best design talent in the U.S. and internationally. Subsequent outreach has also been effective as RBD has been named number one of ten on the "CNN 10: Ideas" list of the best and most innovative ideas.

Stage Two activities also included outreach to community leaders and stakeholder groups to provide their unique insights and understanding of the region to the teams. This was done through public meetings, facilitated field visits, and one-one-one discussions. Local community outreach was a major component of Stage Three activities. The competition as a whole engaged 535 organizations and 181 government agencies in 141 neighborhoods and cities through more than 350 small group meetings and 64 community events.

Incentives: Incentives for participation in the competition were a $200,000 cash prize award for each team and widespread recognition, along with the opportunity to develop the proposal for a large-scale resilience project that could actually be built. A major incentive

for the design teams is also the potential for future involvement with the development/implementation of their ideas through state or local jurisdictions.

HUD incentivized the implementation of winning designs by committing funds made available through the Community Development Block Grant Disaster Recovery (CDBG–DR) program to leverage other public and private funds. CDBG-DR grants have now been made to state and local government, not winning design teams, to implement projects. HUD grantees are now encouraged to contract with the design teams to further advance the projects. HUD's allocation of $930 million in CDBG-DR funds is discussed under "Results" later in this report.

HUD CDBG-DR grants are not the competition's prize award, as the teams are competing for recognition as having a winning design that gets funded and all receive a cash prize award to help offset their contributions. Total funding for the cash prize awards was $2,000,000 ($200,000 per team x 10 teams). These funds were transferred to HUD from two philanthropic foundations ($1 million from the Rockefeller Foundation and $1 million from the Community Foundation of New Jersey). A program-specific Funds Control Plan was established for RBD and approved by the HUD CFO.

Funds were accepted by HUD once all financial controls were in place. The account was established as Rebuild by Design Program 86X8093. Funds were allotted and managed through HUD's Office of Economic Resilience (formerly the Office of Sustainable Housing and Communities) within the Office of Community Planning and Development.

Prize awards were paid to the teams via electronic funds transfer according to the four-phase disbursement schedule noted below. Each team received $100,000 to participate in Stage Two and $100,000 to participate in Stage Three (cash prize awards were made in four $50,000 disbursements – one at the beginning and one upon conclusion of each stage).


Evaluation and Judging:

*Stage One*

Agency designees from the Hurricane Sandy Rebuilding Task Force served as the Stage One Selection Committee, which informed the HUD Secretary's selection of 10 finalist design teams to participate in the competition and receive cash prize awards. The Task Force made up of executive-level representation from more than 20 Federal departments and agencies including White House offices. The HUD Secretary, serving as Chair of the Task Force, made the final selection.

The ten selected finalist teams were invited to participate in Stages Two and Three, at which point they entered into a participation agreement with HUD and provided a Scope of Work at the outset of each stage. All finalist design teams selected to advance from Stage One were expected to continue to participate through the end of Stage Three. However,

HUD reserved the right to remove participants that failed to comply with the Scope of Work and competition participation agreement.

Teams were selected to proceed based on the following criteria:

1. Team composition

    a. Depth of interdisciplinary experience

    b. Capacity to work collaboratively on interdisciplinary teams

2. Quality of past work

    a. Demonstrated excellence in each of the team member's respective disciplines.

    b. Commitment to participatory design and public engagement—especially to underserved populations.

    c. Relevance of the team's experience to the proposed research focus and design approach.

    d. Track record of publically-funded, built projects

3. Clarity, style, and thoroughness of proposal

*Stage Two*

Evaluation at the end of Stage Two involved the selection of which design opportunities would be pursued and fully developed in the next stage of the competition. Criteria were consolidated into five key areas:

1. Quality of Research and Analysis

2. Degree to which the Design Opportunity is reflective of innovation

3. Potential to catalyze transformative change

4. Degree to which the Design Opportunity ad dresses key focus areas

5. Potential impact (both site-based and overall)

The criteria did not attempt to evaluate each Design Opportunity as an accomplishment; rather they focused on evaluating the potential within each opportunity to increase resilience through innovation and catalyze transformative change.

While the selection of which key design opportunities to pursue was ultimately made by the HUD Secretary, this decision was informed by discussion with each HUD CDBG-DR grantee regarding their goals, priorities, and preferences. Discussions were also held with individual teams regarding their capacity relative to potential scope.

The following sites/areas were selected:

| State | Team | Area(s) of Focus | Approach |
|---|---|---|---|
| NY | BIG | Manhattan, NYC | Integrated flood protection, urban edge |
| NJ | MIT+ZUS+ URBANISTEN | Meadowlands, NJ Jersey City, Kearny | Mixed-use resiliency district |
| NJ | OMA | Hoboken, NJ | Comprehensive flood protection /multiple projects |
| NY | PennDesign/OLIN | South Bronx, NY (Hunt's Point) | Comprehensive flood protection /multiple projects |
| CT | unabridged Coastal Collective | Bridgeport, CT | Comprehensive flood protection /multiple projects |
| NY | Interboro | Nassau County, NY | Comprehensive flood protection /multiple projects |
| NJ | Sasaki | Tom's River, NJ Asbury Park, NJ Keansburg/Union Beach, NJ | Comprehensive flood protection /multiple projects |
| NY | SCAPE | Staten Island, NY | Coastal flood protection / Ecological restoration |
| NY NJ | HR&A Advisors | Brooklyn (Red Hook), Queens (Rockaways), Asbury Park, NJ | Retail corridors, Financing strategies |
| All | WXY/West 8 | NY, NJ, CT (off-shore in harbor) | Large-scale natural flood control barriers |

*Stage Three*

The RBD Jury consisted of 11 professionals with great expertise (local, regional, national, international) and experience (government, science, business, non-profit) of high standard in the fields that are relevant to the competition. The RBD Jury was a mix of women (4) and men (7), from the region (6), national (2), international (3). The Jury took into account all information distributed or made public through the RBD process.

The jury served as a professional committee and judging entity for evaluating the competition's final submissions based on criteria established for the competition. The jury also considered feedback on the proposals from Federal agencies, HUD disaster recovery grantees (state/local government), community stakeholders, and the general public.

The role of the Jury Vice-Chair was to help facilitate the deliberation process and ensure critical elements and issues are addressed in discussion. The role of the Jury Chair was to evaluate the individual judgment of each juror and make a final decision as to which proposals would be designated as winning proposals.

As stated in the memorandum *Guidance on the Use of Challenges and Prizes to Promote Open Government* issued by the Office of Management and Budget, dated March 8, 2010, "The Federal Advisory Committee Act (FACA) may also apply when Federal agencies receive input from non-Federal employees unless the agencies solicit advice from a group of individuals or entities on an individual basis, rather than the group as a whole." In order to ensure that RBD was consistent with the applicability of FACA and its compliance, the jury deliberation process served as a forum for jurors to provide their advice on an individual basis, and the group as a whole was not be asked to form a consensus opinion or determination. The determination of winning proposals was be made exclusively by the Jury Chair (*i.e.*, HUD Secretary).

While the RBD jury deliberations were confidential, the team presentations to the jury accommodated all voices from the team, coalition partners, stakeholders, Federal agencies, and HUD grantees. This was to ensure that the jury was as well-informed as possible.

Selection Process for Winning Proposals:

In addition to the use of standard evaluation criteria, an iterative deliberation process was used to produce an outcome that is able to clearly demonstrate why winners are winners – *e.g.*, demonstrate how winning proposals clearly achieved a winning standard and "met the bar." The back and forth process of elimination, deduction, and confirmation tends to produce a clear and mutually understood standard by which to identify winners.

The Rebuild by Design Competition, as administered by HUD under the authority of the America Competes Act, concluded on June 2, 2014, with the designation of winning proposals by the HUD Secretary (Jury Chair). The final installment of the cash awards was issued to each team following the presentation of their proposal to the jury, which completed their participation requirements.


Partnerships:

Managing/Administering Partners

While the competition was launched under the auspices of the Hurricane Sandy Rebuilding Task Force, lead responsibility resided with HUD as the Task Force expired on September 30, 2013. HUD's Office of Economic Resilience served as the Department's technical administering entity handling the receipt of funds for prize awards from philanthropy and issuing award payment to the teams.

The National Endowment for the Arts (NEA) leant their expertise to advise the Task Force and HUD in management and design of the overall process. NEA has a history of supporting and facilitating design competitions and NEA's involvement helped ensure the success of the launch of the competition. In addition, many other Federal departments and agencies were involved in the process both through the Task Force and in subsequent stages.

Administration of the competition is led by a partnership consisting of:

- HUD

- New York University Institute for Public Knowledge

- Regional Plan Association

- Municipal Art Society of New York

- Van Alen Institute

The decision to have external partners administer the competition on behalf of the Department was a critical one. The various partner organizations were assembled for their respective talents and resources which complemented one another to provide the appropriate scope of assistance from expertise in community outreach to expertise in regional planning and design.

The surge capacity needed to administer a competition of this type/scale is significant and most public agencies lack such excess and highly-skilled personnel to fully dedicate. In addition, the use of philanthropic funds, and not Federal agency funds, to administer the competition allowed the process to be much more flexible, responsive, and nimble. The necessary speed at which things must be procured (facility rental and communications services, for example) cannot be attained using Federal taxpayer funds. Navigating the regulatory and financial management/reporting requirements for even the smallest of activities (such as providing food at a community meeting) makes the use of Federal funds impossible for administering this type of competition.

Funders

No Federal funds were used in either the awarding of cash prizes or the administration of the competition. The Rockefeller Foundation is the lead funding partner for the competition. The partnership of funders consisted of the following:

- The Rockefeller Foundation

- Deutsche Bank Americas Foundation

- Hearst Foundation

- Surdna Foundation

- The JPB Foundation

- The New Jersey Recovery Fund

The Rockefeller Foundation and the JPB Foundation also funded an evaluation of the competition, which was conducted by the Urban Institute and released in October 2014.

HUD's partnership with the Rockefeller Foundation has since proven to be a very solid one as HUD has again partnered with the foundation to provide millions in technical assistance and capacity building for applicants of the Department's National Disaster Resilience Competition (NDRC). The NDRC is building on the lessons learned from RBD and Rockefeller is hosting a series of regional "resilience academies" across the U.S. to help ensure that the proposals that are ultimately submitted to the NDRC are informed by best practices and the latest science as well as community goals and priorities.

Resources: Philanthropic resources were used for 100 percent of the prize awards as well and competition administration. Approximately $5 million was committed collectively on behalf of the six funding organizations (which includes approximately $2 million for the cash prize awards, $2.65 million for competition administration, and $350,000 for the project evaluation). The Rockefeller Foundation contributed approximately $3 million of the $5 million total.

While administration of the competition was paid for by philanthropy, the scope and structure of the project's administration was articulated in a Memorandum of Understanding (MOU) between HUD and the Rockefeller Foundation. Philanthropy then contracted directly with the four nonprofit organizations to serve as HUD's administering partners. HUD's leadership role in the overall management of the competition was articulated in the HUD/Rockefeller MOU.

HUD resources consisted primarily of staff time (primarily that of Scott Davis at roughly 0.75 FTE and Henk Ovink, who is on loan to the Department from the Dutch government, which is providing his salary). Agency funds were also used for competition-related travel to the region for these two individuals.

Results: Upon conclusion of its deliberation on April 5, 2014, the jury internally identified six proposals to be designated as "winning" proposals. HUD staff subsequently engaged with CDBG-DR grantees to discuss project specifics and remaining unmet disaster recovery needs as well as with the winning teams regarding cost estimates and phasing

alternatives. On June 2, 2014, the HUD Secretary announced the allocation of a total of $930 million in CDBG-DR funding to help support the implementation of the six winning proposals as well as one non-winning finalist proposal in Bridgeport, CT (the allocation to Bridgeport was to leverage significant contributions already made by the city and State and ensure that these investments resulted in the protection of the most vulnerable public housing stock in the city).

Allocations for the funded proposals are below:

| Grantee | Proposal | Location | CDBG-DR Funds |
|---|---|---|---|
| State of New Jersey | New Meadowlands | Meadowlands | $150,000,000 |
| State of New Jersey | Resist, Delay, Store, Discharge | Weehawken/Hoboken/Jersey City | $230,000,000 |
| State of New York | Living with the Bay | Nassau County | $125,000,000 |
| State of New York | Living Breakwaters | Staten Island | $60,000,000 |
| New York City | The Big U | Manhattan/Lower East Side | $335,000,000 |
| New York City | Hunts Point Lifelines | South Bronx/Hunts Point | $20,000,000 |
| State of Connecticut | Resilient Bridgeport | Bridgeport | $10,000,000 |

## F.   Department of Justice

### 1.   NIC Green Corrections Challenge[126]

Summary: Green corrections is what happens when green principles are applied to everyday practices in corrections. Simply put, it's applying what is known to help people save money, energy, and time in their personal lives, and applying it wisely to relevant processes throughout America's jails, prisons, and community corrections facilities.

The National Institute of Corrections (NIC) Green Corrections Challenge fosters innovation and information sharing among correctional agencies. The challenge crowdsources the best ideas from people working in the field and then provides a way to share those ideas through federally funded educational programs. All stakeholders with an interest in corrections were eligible to enter the challenge when partnering with a public or private correctional facility. Federal, state, local, and private correctional facilities could

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[126] Challenge Website: www.nicic.gov/greencorrectionschallenge

participate. Entries highlighting programs fueled by the efforts of community organizations and volunteers were encouraged equally with programs originating from correctional facilities themselves. Conducting the challenge in this way allowed NIC to receive only entries that accounted for the specialized security needs of correctional facilities while making the challenge accessible to the broadest range of participants.

Challenge entries consisted of a presentation of 7 minutes or less where the entrant described their green corrections program or practice. Each entry could be submitted to one of three primary categories (correctional facilities, education and training, and reentry programs) and one additional category for new green concepts (for ideas that do not fit neatly into one of the three other areas). Creators of each of the winning presentations are asked to share their idea or practice in a webinar hosted by NIC.

The Green Corrections Challenge is unique in that it is the only federal challenge addressing issues in corrections, including the reentry of justice-involved individuals from prison and jail to their home communities, and it is the only challenge to date that addresses specifically the green construction of correctional facilities and education and job training for people involved in the criminal justice system.

*Solution Type*: Ideas

*Primary Goals*: Find and highlight innovative ideas; Solve a specific problem; Develop technology; Inform and educate the public; Engage new people and communities

*Results*: Final results will be reported in FY15. Outreach efforts reached 10,000 people, as a measurement of general interest expressed about the challenge and the number of people who received information. The challenge has also had the unexpected benefit of introducing NIC to new federal and nonprofit partners that may require technical assistance in the future.


Problem Statement: "Through crowdsourcing, the backbone of the challenge, we hoped to capture fresh examples of modern innovations for doing corrections well in a sustainable world"

NIC recognized that, while green programs were being implemented, there was no mechanism for supporting and encouraging their widespread implementation. There was also no definitive body of research that addressed the broad array of programming possibilities available, though green programming was and is an issue affecting thousands of facilities throughout the country.

To address this issue, NIC created the Green Corrections Initiative. Its tangible outcomes to date included a series of technical assistance projects, Web-based educational materials, a live television broadcast, and the creation of a green corrections reference guide titled The Greening of Corrections: Creating a Sustainable System. While comprehensive, these

materials touched only the surface of possible avenues available in green corrections. There were many more programs and processes to be discovered and shared.

The Green Corrections Challenge was one way to fill the gap in knowledge about what was currently being done in green corrections as well as to explore what new innovations were being implemented through lesser known programs in the correctional field. Through crowdsourcing, the backbone of the challenge, we hoped to capture examples of modern innovations for doing corrections well in a sustainable world. The challenge would be NIC's first strategic effort to engage stakeholders through crowdsourcing (soliciting ideas from large groups of people outside of traditional communities).

For the challenge, entrants were asked to create and submit a 7-minute presentation that either outlined their existing green corrections program or proposed a new one. Key to each entry was that it had to be replicable, because NIC wanted others in corrections to see how feasible it might be to start or improve a green corrections program in their own jurisdiction. Another key to each entry was that submissions had to be submitted in partnership with a correctional facility. So, while the challenge was open to everyone, the requirement that a correctional agency or facility be involved acted as a filter to screen for programs that could jeopardize public safety.

From the challenge, NIC hoped to acquire a collection of new and creative ideas for implementing green programs in corrections. The best entries would be ones that were supported by data and had tangible, quantifiable outcomes. Winners of the challenge could be any person or organization sponsored by a correctional facility.


Proposed Goals: The goals of the challenge were threefold: (1) soliciting creative ideas about how green programs could be implemented in corrections, (2) demonstrating for stakeholders how green programs could be implemented with success, and (3) spurring conversation throughout the field of corrections about the many benefits of pursuing green corrections programming in their own area.

Other residual goals included the following:

I.    Improving government service delivery by means of technical assistance. The challenge helped NIC to identify and understand the areas where additional service is needed. NIC can now be more strategic in providing technical assistance to help jurisdictions start or improve their own green corrections programs.

II.   Solving the specific problem of how to make correctional facilities more environmentally friendly. As microcosms of the larger communities in which they are located, jails and prisons experience the same challenges with energy usage, waste reduction, and workforce development that cities, states, and individual

households experience every day. The challenge was a way to find green solutions appropriate for correctional environments.

III. Advancing scientific research in the study of green corrections. Environmental studies is a relatively new topic for the population at large, and it is especially new to the field of corrections. Research suggests that green environments can have positive effects on the people who live and work in those areas. By requiring that all submissions be supported by data attesting to the efficacy of programs, NIC has laid the foundation for that research in future initiatives.

IV. Inform and educate the public about the role of corrections as a partner in their communities. More than just the place where justice-involved individuals serve their sentences or await trial, correctional facilities are places of learning, rehabilitation, and public service. They are good stewards of the communities they serve in many ways, including through their conscious environmental efforts.

V. Engage new people and communities by soliciting ideas from all business sectors and encouraging their partnership with corrections as a requirement for entry into the challenge. In this way, diverse stakeholders are encouraged to learn more and interact with this sector of the criminal justice system.

VI. Build capacity among correctional staff of those who are aware of and have the knowledge to implement a green corrections program successfully. It is the hope of NIC that training programs empower corrections staff to learn the skills they need to engage in this type of work and then apply their skills in the workplace.

VII. Develop technology and stimulate a market for business and government capabilities in green corrections. The technology and security needs of correctional facilities are necessarily unique, and through the challenge, NIC has been able to highlight the need for the development of specialized programs (and tools) that will address these needs.

Why a Prize: Following the award of cooperative agreements associated with green corrections in the past, NIC awarded a prize through a federal challenge because it was the most appropriate and cost effective method available for meeting a number of its goals (soliciting creative ideas, demonstrating implementation success for stakeholders, and spurring conversation about green corrections throughout the field of corrections). The challenge prize is non-monetary, thus achieving maximum returns in the way of participation and stakeholder interest with minimal financial investment.

Winners of the Green Corrections Challenge receive the opportunity to present their ideas and programs in a national webinar hosted by NIC. As an agency whose mission includes the training and professional development of the nation's correctional workforce, NIC

often hosts webinars and other educational activities for the public. Stakeholders from a variety of sectors can join these webinar sessions to learn about the positive, innovative ways that corrections contributes to making local communities safer and more livable.

The challenge webinars will be hosted live in fiscal year 2015.


Participants: Submissions were accepted from stakeholders from a variety of fields. The only requirement was that they also be sponsored by a correctional facility to participate. The challenge was conducted in this manner to account for the operational and security needs specific to corrections. NIC anticipates that ideas that might jeopardize public safety or the welfare of correctional staff and inmates were filtered out by having this requirement. Thus, students, volunteers, community organizations, families with a loved one involved in the criminal justice system were all eligible with sponsorship from a jail, prison, or community corrections facility, which could have included day reporting centers, halfway houses, juvenile detention centers, and more. As a result, the challenge received entries from a broad range of sectors. The number of entries will be reported in FY15.


Timeline: The challenge launched and began accepting entries in April 2014. In all, key milestones of the challenge included the following:

| | |
|---|---|
| Promotion | April – October 2014 |
| Submission Open | 4/1/2014 |
| Submission Close | 11/3/2014 |
| Judging | November 2014 |
| Winner(s) Announced | November 2014 |
| Innovation Webinars | January – April 2015 |

Solicitation & Outreach: Marketing the prize competition successfully relied on the outreach of a network of partners with stakeholders and interests that aligned with the objectives of the challenge. These partners shared print materials, e-mail messages, blog and forum posts, and presentation slides with their respective audiences. NIC also submitted articles for publishing to trade and association journals in the field of corrections.

Upon award of the challenge in fiscal year 2015, outreach and marketing of the challenge will extend to the promotion of Innovation Webinars (the award incentive for entering the challenge). They will be promoted using the methods that were used to market the open entry phase of the challenge.

NIC estimates that they were able to reach about 10,000 people. Engagement is measured in terms of general interest and the number of people who were reached with information about the challenge.

Incentives: Winners are given the opportunity to share ideas and successes in national NIC webinars and case studies. There is no monetary prize.

Evaluation and Judging:  The judges were all external, some from other federal agencies with missions that would relate the challenge, including the departments of education and labor.

Presentations were judged on the following criteria:

- Overall innovation of program or practice.

- Ability to describe an innovative program or practice.

- Ability to demonstrate success of program or practice through measurable outcomes.

- Creativity and originality.

Partnerships: Strategic partnerships were essential to the challenge due to partners' abilities to engage external stakeholders and enhance communications. A variety of government, nonprofit, and corporate organizations are participating, including the U.S. Department of Energy and the U.S. Department of Education, whose staff assisted in judging the challenge; the Correctional Education Association, U.S. Green Building Council, Center for Law and Social Policy, and The Corps Network, which represents key stakeholders; and one private architecture firm. The partnerships are most successful because the roles and responsibilities for each partner were clearly defined from the start and are respected throughout the project.

Resources: $8,869.16 was allocated by NIC to complete program objectives during fiscal year 2014.

Results: True to its goals, the Green Corrections Challenge is heightening awareness of and engagement with green corrections programming among its stakeholders. It builds on previous work and promotes existing resources, thus enhancing the availability of information and spurring dialogue within the correctional field. The challenge also has the

unexpected benefit of introducing the National Institute of Corrections to new federal and nonprofit partners that may require technical assistance in the future. Winners of the challenge will be announced November 2015 at a Thought Leader Symposium at the National Institute of Corrections headquarters office in Washington, D.C. Attendees will include challenge winners as well as executive-level officials in corrections. Outcomes of the symposium and challenge winner presentations will both be posted to the agency website in 2015.

## G.    Department of State

### 1.    Innovation in Arms Control – 2013: FY14 Update

The Department of State reported on this Challenge in FY13[127]. The following short update is provided to describe results realized in FY14:

Summary: In 2013, the U.S. Department of State's Bureau for Arms Control, Verification and Compliance launched the 2013 Innovation in Arms Control Challenge. Through the InnoCentive platform, this challenge asked the general public for proposals on what information technology tools and concepts can support future arms control inspections. For arms control treaties, on-site inspections are critical to bolstering confidence and increasing transparency among partners, but current methods may be enhanced by newer inspection tools and processes. For example, U.S. inspectors are exploring the possibility of using RFID technology to improve tracking capabilities during inspections.

*Solution Type:* Scientific

*Primary Goals:* Find and highlight innovative ideas; Solve a specific problem; Inform and educate the public; Engage new people and communities

*Results*: The U.S. Department of State received interest from more than 200 potential solvers around the United States. Mr. Michael Ricciardi was awarded the prize of $10,000 for his proposal to use visible light communications (VLC) to improve and expedite arms control inspections. Mr. Ricciardi's proposal described using VLC for indoor navigation within a facility of interest where the data is fed to fixed lighting sources so that wherever the inspectors go they will have access to instant continuous navigation data. This

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[127] See: "2013 Innovation in Arms Control Challenge" in Appendix A of *Implementation of Federal Prize Authority: Fiscal Year 2013 Progress Report* at
http://www.whitehouse.gov/sites/default/files/microsites/ostp/competes_prizesreport_fy13_final.pdf

challenge demonstrated one way the Department of State is exploring new ideas to shape its understanding of modern capabilities that can support diplomacy in the 21$^{st}$ century.

## H. Department of Transportation

### I. Data Innovation Challenge[128]

Summary: The purpose of the U.S Department of Transportation (DOT) Data Innovation Challenge was to find and highlight data-driven innovations – to include web-based tools, data visualizations, mobile apps, or other innovative uses of technology – that address systemic transportation challenges. The challenge was specifically targeted toward technologists, including civic hackers and startup companies, focused on using open data and technology in novel ways. The innovations could be useful to the public, to policy makers, or both.

*Solution Type*: Software and apps; Analytics, visualizations and algorithms

*Primary Goals*: Find and highlight innovative ideas; Engage new people and communities

*Results*: Winning solutions[129] include a web application, a mobile app, and a data analytics software platform. The Data Innovation Challenge helped DOT interact with new and different audiences, such as civic hackers and startups, who do not typically engage with the agency through more traditional authorities like contracts, grants and cooperative agreements. Contact with innovative startup companies and technologists provided DOT with new insight into the types of data-driven innovations that are being developed to address the Department's systemic transportation challenges.

Problem Statement: DOT sought to identify data-driven innovations that focused on three systemic issues in the transportation system:

- Safety – develop tools to address and/or identify safety concerns and challenges

- Transportation Access – develop tools to show how transportation connects people to jobs, school, housing, and community resources

- Traffic Management and Congestion– develop tools to understand and reduce traffic and congestion

Challenge participants were asked to develop web-based tools, data visualizations, mobile apps, or other innovative uses of technology that address these systemic transportation challenges. Specifically, the challenge sought:

- Software and apps

- Technology demonstration and hardware

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[128] Challenge Website: http://www.dot.gov/datachallenge

[129] http://www.dot.gov/fastlane/dot-data-innovation-challenge-attracts-talented-field

- Analytics, visualizations and algorithms

Winners were judged on:

- Technical and operational feasibility – The successful operation of the proposed application or visualization tool will depend both upon the soundness of the application and tool itself and its relationship to the rest of the transportation system, and the data that is used during its development. How plausible is it that this Concept could be implemented? What risks or challenges exist, and how could they be overcome?

- Potential for widespread adoption – Widespread adoption of the application and/or visualization tool will depend upon a system of interrelated decisions made by various stakeholders in the transportation network. Stakeholders' incentives toward action must be aligned with their capabilities for adoption to occur. How likely is it that this application or visualization tool would be widely adopted or go viral, if it were developed? What are the challenges facing broad adoption, and how could they be overcome?

- Innovation – To what degree does the tool present a novel idea or approach?

- Social benefit – How much would this idea benefit transportation users or society at large? Emphasis is on improvements to transportation safety, mobility, reliability, accessibility and/or environmental impact.

Proposed Goals: The primary goals and outcomes of DOT Data Innovation Challenge were:

- Find and highlight innovative ideas

- Engage new people and communities

Why a Prize: The use of a prize competition was well-suited to the agency's goals. The format helped the agency reach new and different audiences, such as civic hackers and startups. Civic hackers and startups do not typically engage with the agency through more traditional authorities like contracts, grants and cooperative agreements.

Participants: DOT hoped to reach civic hackers, startups, and other technologists through the Data Innovation Challenge. The eligibility requirements were as stated in the challenge rules.[130] DOT received 25 entries for this competition, ranging from some individuals to startup companies to more established companies and academic institutions.

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[130] http://www.dot.gov/mission/challenges/datachallenge-rules

Timeline: The competition ran from February 22, 2014 to April 30, 2014.

Solicitation & Outreach: DOT solicited participants through a number of channels, including traditional e-mail lists and social media. DOT also held a conference call with key stakeholders to help raise awareness and answer any questions. E-mail remains one of the most effective ways to DOT to reach its audience.

Incentives: No cash prizes or monetary incentives were offered for this competition, nor were any private-sector or philanthropic funds contributed. Participants were offered the following non-monetary incentives:

- Innovation features on US DOT FastLane Blog

- Letter of recognition from the Secretary of Transportation

- Honored at the Transportation Datapalooza

Evaluation and Judging: DOT convened 15 employees to participate in applicant reviews. The DOT review team evaluated each proposal for compliance with the competition rules and made initial evaluations (using the judging criteria) to assign proposals as highly recommended, recommended, or not recommended

The review team convened to discuss their initial evaluations and to develop a consensus evaluation, rating applications in the same three categories. The review team's recommendations were forwarded to the Secretary of Transportation for review and approval.

Partnerships: Not applicable.

Resources: No contracts were issued for this competition. Estimates of staff time are assumed to be small.

Results: The Data Innovation Challenge provided DOT with new insight into the types of data-driven innovations that are being developed to address the Department's systemic transportation challenges. DOT made contact with innovative startup companies and

technologists with whom the agency did not previously have connections. The winners of the challenge were announced on the DOT blog[131] and were:

- RideScout[132] – a mobile app that provides available transportation options in real time including transit, taxi, car share, bike share, parking, and walking directions. It is available for free for Apple and Android phones.

- Choices & Voices[133] – a web-based, long range planning tool that educates users on the linkages between land use and transportation, the cost of maintenance, and the consequences of not investing in transportation

- FAST Dashboard – a congestion analytics dashboard that provides an easy-to-understand online user interface allowing the public and transportation professionals access to real-time and historical freeway monitoring and performance data. It is available to the Federal government through GSA.

## I.   Federal Trade Commission

### I.   "Zapping Rachel" Robocall Contest[134]

Summary: As part of its ongoing campaign against illegal prerecorded telemarketing calls, the Federal Trade Commission challenged the public to build the next-generation robocall honeypot, circumvent a honeypot, and analyze data from a honeypot. A honeypot is an information system that attracts robocalls and helps law enforcement, academics, and stakeholders in the private sector understand and combat these illegal calls. The agency offered $17,423.10 in cash prizes for the best open-source solutions.

*Solution Type*: Software and apps

*Primary Goals*: Develop technology

*Results*: The challenge led to the development of open-source solutions that can be used by public and private stakeholders to provide better protection to consumers from illegal robocalls.

Problem Statement: The vast majority of telephone calls that deliver a prerecorded message trying to sell something to the recipient are illegal. As technology has advanced over the

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[131] http://www.transportation.gov/fastlane/dot-data-innovation-challenge-attracts-talented-field

[132] http://www.ridescoutapp.com/

[133] http://www.dvrpc.org/choicesandvoices/

[134] Challenge Website: www.ftc.gov/zaprachel

years, so have the number of these calls, many of which are marketing scams. In response to this rise in illegal activity, the FTC has unveiled a number of initiatives to protect consumers by curbing illegal robocalls. One such initiative is using public challenges to stimulate the development of technological solutions that address this prevalent issue. In 2012, the FTC announced its first robocall challenge, which led to the development of Nomorobo, a product currently available that helps consumers block unwanted calls.

Following on the success of its first challenge, the FTC held its second robocall contest, "Zapping Rachel". Zapping Rachel focused on promoting the further development of honeypots, an instrument that will enhance law enforcement efforts, advance technological solutions that will combat robocalls, as well as further the general understanding of robocaller tactics.

Zapping Rachel was divided into three phases, and contestants could enter one or more phase as individuals or teams of individuals. For phase one, the "Creator" phase, contestants designed a honeypot that (1) identified incoming phone calls containing inaccurate call detail information such as spoofed caller IDs, or (2) categorized incoming phone calls and identified likely robocalls. For phase two, the "Attacker" phase, contestants identified methods of circumventing or tricking a honeypot so that the honeypot could not collect information on incoming calls. For phase three, the "Detective" phase, contestants analyzed data from a honeypot and developed algorithms that predicted which calls are likely robocalls.

Eligible phase one submissions were judged on the following criteria:

- Building Knowledge: did the honeypot function as required? (70%)

- Explaining the Scheme: did the submission provide interesting insights? (20%)

- Innovation: was the submission innovative? (10%)

Eligible phase two submissions were judged on the following criteria:

- Hitting the Target: did the submission successfully circumvent the honeypot? (50%)

- Explaining the Scheme: did the submission provide interesting insights on circumvention techniques? (20%)

- Rebuilding: did the submission provide insights on building a better honeypot? (10%)

- Innovation: was the submission innovative? (20%)

Eligible phase three submissions were judged on the following criteria:

- Uncovering the Truth: did the submission accurately identify likely robocalls? (70%)

- Explaining the Scheme: did the submission provide interesting insights? (20%)
- Innovation: was the submission innovative? (10%)

For more information on the Judging Criteria please see below.

Proposed Goals: Main Goal: Develop the next-generation robocall honeypot that can help solve the robocall problem.

Supporting Goals:
- Learn new insights from information security specialists experienced with honeypots in other contexts that will augment future robocall honeypot design.
- Gain new partners — including private sector, academia, or law enforcement — from a community of information security experts.
- Drive and stimulate the development of private sector solutions that block or otherwise address illegal robocalls.
- Promote public awareness about FTC goals and initiatives around stopping illegal robocalls.

Why a Prize: A prize competition was preferred to realize the goals above for the following reasons:
- The FTC could not identify a currently available commercial product or service that fulfills the same function as the next-generation robocall honeypot. The FTC's goal was to attract a diverse array of technically savvy individuals to tackle this issue without predetermining their approaches. The agency also desired to provide an award for the development of only those solutions that would likely work.
- The FTC did not intend to procure, own, or directly develop or administer the next generation robocall honeypot, but did wish to stimulate the development of a more advanced robocall honeypot that could enhance private sector solutions to robocalls. A prize competition created incentives for multiple innovators in the private sector to work on such solutions.
- A prize competition also had advantages in promoting awareness of the robocall problem on a large scale. Many of the more traditional methods for meeting the main goal, such as using contracted solvers or grants, would not necessarily provide the widespread problem exposure achieved through a public competition.

Participants: Zapping Rachel was intended to mobilize individual or teams of information security specialists, which included those already working on addressing the robocall problem, as well as new solvers.

To be eligible to win a prize, participants (individuals and all team members) had to be 18 years of age or older, be citizens or permanent residents of the United States, have no familial or business relationships with the Judges, have never been convicted of a felony, and be physically present at DEF CON 22. Corporations (including nonprofit organizations), limited liability companies, partnerships, and other legal entities were not eligible to enter.

Eligibility was limited to the first 50 individuals or teams who registered for phase one, 25 individuals or teams who registered for phase two, and 50 individuals or teams who registered for phase three. Overall, sixty teams and individuals registered across all three phases —21 for phase one, 25 for phase two, and 50 for phase three. Of the sixty registrants, 37 registered as members of a team and 23 registered as individuals. Twelve teams and individuals entered 13 submissions.


Timeline: The timeline for Zapping Rachel was as follows:

| | |
|---|---|
| Contest Announced | 06/16/2014 |
| Contest opened | 07/18/2014 |
| Submission period began | 08/07/2014 |
| Phase 1 Submission Close | 08/08/2014 |
| Phase 2 Submission Close | 08/09/2014 |
| Phase 3 Submission Close | 08/09/2014 |
| Judging for Phase 1 | 08/08-10/2014 |
| Judging for Phase 2 | 08/09-10/2014 |
| Judging for Phase 3 | 08/09-10/2014 |
| Winner(s) Announced | 08/28/2014 |


Solicitation & Outreach: The FTC held Zapping Rachel at DEF CON 22, one of the oldest conferences for information security specialists, to engage this particular community of experts. To promote the contest at DEF CON 22, the FTC worked with DEF CON organizers to post the contest on DEF CON's website, Facebook page, and Twitter feed; ran a FTC-created PSA about the contest on DEF CON 22 radio; and posted videos of contest updates on DEF CON 22's Facebook page. The FTC also achieved significant community outreach at DEF CON 22 using a variety of promotion materials including a banner, stickers, fliers, posters, cutouts, badges for contest participants, and informational handouts regarding the FTC and its robocall initiatives. The marketing and branding approach that the FTC utilized enabled the FTC to successfully establish relationships with members of this community.

The agency also promoted Zapping Rachel to the general public through press releases announcing the contest and the Official Rules, along with multiple blog posts on the FTC's Tech@FTC, consumer, and business blogs, and posting on websites such as Challenge.gov. The FTC also hosted a social media "chat" about the contest on Twitter, and conducted broad outreach via relevant email listserves and Twitter feeds. The FTC's efforts resulted in substantial media coverage including by major print outlets (e.g., AP, Washington Post), technology blogs and websites (e.g., Network World, Ars Technica), other widely read websites (e.g., Time, Forbes, PC Magazine), national radio shows, and television programs. The FTC's contest website, press releases, and blog posts resulted in 40,627 unique page views, and its social media campaign resulted in 323,543 impressions from 67 tweets and outreach to 14,864 people from 4 Facebook posts.

Incentives: The total cash prize amount offered for the challenge was $17,423.10. This cash prize was divided into three potential awards for each phase – the winner with the best overall solution and two honorable mentions. The winners of the best solution for each phase received $3,133.70. For phase three, two contestants also received the honorable mention prizes of $1,337 each. The FTC awarded a total of $12,075.10. All five winning teams or individuals also received recognition and publicity by the FTC. The prize money came from FTC appropriations, as authorized by the America COMPETES Reauthorization Act. All solutions are open-source and the Federal Trade Commission made the winning solutions for phases 1 and 3 available online.

Evaluation and Judging: Zapping Rachel was judged according to the following process:

Submissions were reviewed and judged by an expert panel including:

a. Dr. Mustaque Ahamad, Professor of Computer Science, Georgia Institute of Technology, Professor of Engineering at New York University Abu Dhabi;

b. Jonathan Curtis, then-Director of Solutions and Intelligence, Compliance Enforcement Sector, Canadian Radio-television Telecommunications Commission; and

c. Dr. Matthew Blaze, Professor of Computer Science, University of Pennsylvania School of Engineering and Applied Science.

The rules provided that eligible submissions for phase one would be judged on the following criteria:

- Building Knowledge (70% of total score)

- Did you succeed in identifying inaccuracies in the data captured? Inaccurate data could include, but is not limited to, false caller ID number or date of the call.

- Did your honeypot successfully categorize calls based on the likelihood that the calls are robocalls?

- Is your honeypot scalable? For each distinct method that your honeypot uses to categorize or verify the accuracy of the data collected,

- Explaining the Scheme (20% of total score)

  - What insights did your submission demonstrate with respect to setting up an effective robocall honeypot?

  - What insights did your submission demonstrate in determining the accuracy of the data captured?

  - What insights did your submission demonstrate in determining how to categorize calls based on the likelihood that the calls are robocalls?

- Innovation (10% of total score)

  - How innovative was your submission?

The rules provided that eligible submissions for phase two would be judged on the following criteria:

- Hitting the Target (50% of total score)

  - Did you succeed in circumventing the robocall honeypot?

- Explaining the Scheme (20% of total score)

  - What insights did your submission demonstrate about how attackers might circumvent a robocall honeypot, including by placing undetected calls?

  - What theoretical techniques did your submission describe for how attackers might circumvent a robocall honeypot?

- Rebuilding (10% of total score)

  - What insights did your submission demonstrate about building a better robocall honeypot?

- Innovation (20% of total score)

  - How innovative were your actual or proposed methods of circumventing the honeypot?

The rules provided that eligible submissions for phase three would be judged on the following criteria:

- Uncovering the Truth (70% of total score)

    o Did you correctly predict whether the calls in the second honeypot data set were likely to be robocalls? To assess this, the Judges will compare your predictions with real-world information about which calls are likely to be a robocall.

- Explaining the Scheme (20% of total score)

    o What insights did your submission demonstrate with respect to the analysis of honeypot call records?

- Innovation (10% of total score)

    o How innovative was your submission?

Partnerships: The FTC drew on partner relationships from a diverse array of experts as it formulated Zapping Rachel. The FTC's partners included Telephone Science Corporation d/b/a Nomorobo, prior Robocall Challenge winner Aaron Foss's company, and VOIP service provider Twilio, Inc. Aaron Foss partnered with the FTC on all three phases of Zapping Rachel, including by providing the means of testing the honeypot submissions for phase one, creating the honeypot for phase two, and providing the honeypot data for analysis in phase three. Twilio partnered with the FTC for phases one and two by providing credit for contestants to build their honeypots on the Twilio platform for phase one, and credit to utilize the Twilio platform to attack or circumvent the honeypot in phase two.

The Canadian Radio-television Telecommunications Commission, Federal Communications Commission, the White House, the General Services Administration, and academic advisors also assisted in providing guidance on designing the challenge. Moreover, DEF CON 22 organizers provided assistance with marketing and promotion.

Resources: Resources used for the development, execution, promotion, management, and follow-up tasks related to this challenge included staff time from the FTC's Bureau of Consumer Protection, the Office of Public Affairs, the Office of the General Counsel, and the Office of the Executive Director. Administrative costs for the contest (not including the prize money) were $14,500 in total and 2 FTE for four months. Administrative costs and the prize money were funded from agency appropriations, pursuant to the America COMPETES Reauthorization Act.

Results: The FTC considers Zapping Rachel a success on multiple levels. First, stakeholders involved in the fight against robocalls obtained new insights on honeypot design from the open-source solutions, improving the functionality of current honeypots. The new insights advance law enforcement efforts and help further stakeholders'

understanding of robocaller tactics. The judges were surprised by the insights gleaned from the phase 3 data algorithm contest, and are hoping to test the results for replicability.

Second, private sector companies developing technical solutions to address robocalls have expressed interest in utilizing the open-source solutions and the new insights to improve their product design, thus providing better protection to consumers from illegal robocalls.

Third, Zapping Rachel recruited individuals who had not previously worked on cracking robocalls. For example, many of the individuals or teams who participated in phase three did not have any prior experience working on telecom related issues. Winners are mostly from the private sector, in industries from telemarketing to computer games.

Fourth, the FTC engaged a community of information security experts that had not yet applied their unique expertise to the robocall problem. Approximately 20,000 people attended DEF CON 22, and through its contest, the FTC conducted effective outreach with thousands of conference attendees on the purpose of Zapping Rachel, the robocall problem, and the FTC's technological initiatives to address it. To illustrate the FTC's outreach efforts, the FTC handed out 143 paper copies of the official rules; 281 fact sheets covering general information about the FTC, the FTC's Do Not Call program, and the robocall problem; 190 infographics illustrating how a robocall works; 500 fliers on the Zapping Rachel contest; 3,000 stickers directing individuals to the Zapping Rachel contest website; and 20 large Zapping Rachel posters. The Zapping Rachel promotion materials (stickers, fliers, posters, banner, and cutouts) directed conference attendees to the contest website, which provides the contest rules; during the short contest period, the contest website received over 500 unique views.

Many DEF CON attendees unable to participate in the contest were interested in learning more about robocalls, and offered numerous promising ideas of addressing this thorny issue. Since Zapping Rachel concluded, the FTC has gained several new partners from DEF CON 22 who are now currently working with the FTC and other industry stakeholders through the London Action Plan International Do Not Call Forum and the Messaging, Malware and Mobile Anti-Abuse Working Group on creating solutions to illegal calls and related topic of fraudulent caller ID information. Additionally, the FTC has heard from entrepreneurs and other DEF CON attendees, including retired telecom engineers, that the contest highlighted a potential opportunity for them to apply their skills to this interesting but difficult matter.

Finally, Zapping Rachel's broad media attention has continued to promote public awareness of the FTC's technical initiatives. In particular, the media's interest in the topic gave the agency an opportunity to convey its consumer education messages about illegal telemarketing calls to a broad audience.

**J. General Services Administration**

### I. Travel Data Challenge[135]

Summary: The GSA Office of Government-wide Policy launched a Federal challenge competition around travel data on February 14th, 2014. This competition is one element of GSA's wider effort to serve agencies and drive cost savings, while leveraging the ability of data to enhance decision-making and management practices across the Federal government.

*Solution Type*: Software and apps; Analytics, visualizations, and algorithms

*Primary Goals*: Build capacity; Develop technology; Find and highlight innovative ideas

*Results*: The winning entrant, Gregg Parish, designed an innovative technology tool using open source code available on GitHub[136] to help agencies better visualize and understand their data, compare their travel spending against key benchmarks, and identify behaviors that can be taken to reduce costs on future travel. While currently in the pilot phase, GSA plans to leverage the design and functionality of this tool on a government-wide scale in the future.

Problem Statement:

The U.S General Services Administration (GSA) manages a broad portfolio of key, government-wide operations and policies. In managing this portfolio, GSA has access to extensive government operations data – data which may hold potential solutions to some Federal agencies' most pressing problems. GSA's Office of Government-wide Policy (OGP), sponsored the GSA Travel Data Challenge to bring a quantitative approach to the data the Federal government collects in order to help agencies make smarter business decisions, and to allow them to drive greater saving and efficiencies. Pursuing this goal supports several of GSA's highest priorities in serving their partners, including delivering better value and savings, and leading with innovation.

One of the key purposes of the challenge was to attain a tool that could provide agencies with visibility into their travel spending and recommendations for cost-savings behaviors, as well as enhance internal transparency and hold agencies accountable for their spending – steps which help to save money for American taxpayers. Through the GSA Travel Data Challenge, the public was asked to develop a technology-driven solution using GSA travel

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[135] Challenge Website: http://gsatraveldata.challengepost.com/

[136] https://github.com/greggparrish/gsa/blob/master/apps/gsa_data/migrations/0001_initial.py

data that could be replicated across government to every agency, using their own travel data.

A second part of the GSA Travel Data Challenge asked the public to identify specific gaps in the travel data collected by the government, and to provide recommendations for how the government can improve insights into Federal travel spending through additional data collection. The purpose for this request was to gain an understanding of what the government could do with additional data elements, if those data elements were to be collected by agencies. This information can help increase awareness of needed improvements in data collection, and further the goal of leading greater transparency into government spending.

OGP provided registered solvers with three sample data sets containing GSA internal travel data from fiscal years 2011 through 2013. Sample data sets included voucher data, reservation data, and Smartpay transaction data. The requirements for successful submissions included the capability to update the tool with data from other agencies and other sources in the future. In addition, successful solutions needed to answer several questions regarding how the government can improve its collection and use of travel data to drive cost savings and create efficiencies.

Proposed Goals: The following are the goals of the competition per the question above. #1-#3 list the primary goals suggested in the guidance.

1. Build capacity
2. Develop technology
3. Find and highlight innovative ideas
4. Other Goals (in no particular order):
   - Leverage data to deliver insights.
   - Drive cost savings by helping agencies to focus on specific cost-saving travel behaviors.
   - Drive improvements through increased visibility into agency data that will lead to greater effectiveness in travel management.

Why a Prize: OGP used a Challenge in order to reach a different audience from that reached through traditional sourcing methods. Targeted groups included: students, researchers, university teams, and small businesses. By leveraging the technical expertise and creativity of the target groups, GSA hoped to attain an innovative technological solution at a cost much less than purchasing a commercial off-the-shelf type of solution.

Participants: The agency hoped to mobilize individuals and groups with technical skills and experience in coding and software/app development. The challenge competition attracted around 200 interested parties, with a total of 14 submissions from individuals and small groups. Per COMPETES guidance, only citizens and permanent residents of the United States were eligible to win the prize money.

Formal eligibility requirements were included in the details on the challenge website and are excerpted below.

In addition to the requirements for eligibility detailed in COMPTES, to participate in the GSA Travel Data Challenge and win a prize the following additional requirement applied to individuals/ entities:

- An individual or entity shall not be deemed ineligible because the individual or entity used Federal facilities or consulted with Federal employees during a competition if the facilities and employees are made available to all individuals and entities participating in the competition on an equitable basis.

Entrants were also advised that diligent care must be taken to avoid the appearance of Government endorsement of Entrant's competition participation and submission.

Timeline: The competition was launched on February 14th, 2014 and closed on Aril 11th, 2014. The winner was announced on May 9th, 2014.

Solicitation & Outreach: In addition to listing the challenge on challenge.gov, OGP worked with GSA's Office of Communications and Marketing to promote the challenge competition through blog posts and news outlets. GSA also made a video about the challenge which was posted along with the competition details on the Challenge Website, and referred to in blog posts. Furthermore, OGP contacted top university public policy and computer science programs to encourage students to participate in the competition.

Finally, because GSA utilized ChallengePost, emails were sent to ChallengePost's list of subscribers promoting the challenge and encouraging people to apply.

Incentives: GSA offered up to three prizes: a grand prize of $35,000, a runner up prize of $30,000, and an honorable mention prize of $25,000 for any solutions that met the requirements and would be used by GSA. However, GSA only ended up awarding a single prize of $35,000 since only one submission met all of the requirements and would be used by GSA in the future.

Evaluation and Judging: The judging panel consisted of six (6) GSA Federal employee judges and one (1) technical advisor, Sam Gilliland of Sabre, Inc. Judges used a rubric that was made available to the public via the details of the competition on ChallengePost. Judges were asked to review and fill out a rubric for each solution prior to meetings in which each solution was discussed. Judges were then given a chance to finalize their scores after each discussion. After the scores for each submission were recorded, judges were asked to revisit and further discuss each of the five highest-scoring submissions. Finally, the judges determined to award one prize for the winning submission.[137]

Partnerships: This challenge competition did not utilize any partnerships; however, other agencies were consulted regarding their experiences with running challenge competitions. Furthermore, as mentioned above, GSA leveraged the expertise of Sam Gilliland of Sabre, Inc. as a technical advisor.

Resources: The agency used funding from OGP's FY 2014 budget in the amount of $35,000 which was the full amount awarded in prizes.

Additional Federal employee personnel time was devoted to supporting this project, including 60% of one FTE (GS-11, Step 1) for 16 weeks estimated at a total of $11,608.32, and 10 hours for each of six GSA executive judges estimated at GS-15 level hourly rates for an estimated total of $3,593.40.

Finally, OGP utilized an existing contract with ChallengePost managed in GSA's Office of Citizen Services and Innovative Technology. The estimated hourly rate for consultation with a customer support manager is listed at $82.99 on GSAAdvantage, for a total of $1244.85 for 15 hours of consultation.

Results: The winning entrant, Gregg Parish, designed an innovative technology tool using open source code available on GitHub[138] to help agencies better visualize and understand their data, compare their travel spending against key benchmarks, and identify behaviors that can be taken to reduce costs on future travel. Mr. Parish is a freelance web developer, and he had not worked with GSA before. The user interface tool provides visualization, flexibility and configurability using fully leveraged GSA and publicly available data sources. After continued internal development, a version of this tool will be rolled out to

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[137] Winning Submission: http://challengepost.com/software/gsa-data-analytics

[138] https://github.com/greggparrish/gsa/blob/master/apps/gsa_data/migrations/0001_initial.py

agencies to use in managing their travel programs. Currently the project is in a pilot phase, with GSA working with two agencies to incorporate their data into the tool.

Measures of success include:

1. Gaining a tool that meets the basic requirements listed in the challenge:

   - The solution must be an online, interactive tool that meets the goals and objectives provided in this document.

   - The solution must be in open source code.

   - The solution must include documentation of all data sources used.

   - The solution must include a description of how the tool can be updated with additional data from other agencies.

   - The solver must provide recommendations to enhance Government insights through improvements in data collection.

2. Technical competence and capabilities: The tool addresses the primary goal of the challenge. It is a finished product that can provide insightful analysis and show agencies how and where they are spending money on travel. The tool can provide recommendations for cost-savings behaviors. The tool can be easily updated with new data by the back-end user.

3. Use of data to provide effective outcomes: The tool aggregates, synthesizes and displays travel data in a way that is easy to understand, visually appealing, and will help drive understanding of current trends as well as recommendations for future savings.

4. Creativity and Innovation: The tool exceeds any internal capability that GSA has for analysis of travel data through its incorporation of creative design elements and innovative capabilities.

5. Valuable Insights and Information regarding data: The solver provided recommendations for additional data elements to be collected by the Government. The solver identified gaps in the data and utilized external data sources and research to aid the government in setting future data collection policies.

These measures were met with the functionality of the winning submission; however, they will need to be demonstrated on a government wide scale for the overall objectives of the project to be fully accomplished. While currently in the pilot phase, GSA plans to leverage the design and functionality of this tool on a government-wide scale in the future.

## II.    Public Sector Program Management - A Vision For the Future[139]

Summary: The purpose of this competition was to ideate on and describe where the field of public sector program management will be in 25 years. The competition was open to the public, and challenged them to imagine how the work of government program managers will evolve, and describe what they envision.

*Solution Type*: Ideas

*Primary Goals*: Find and highlight innovative ideas; Improving government service delivery

*Results*: The Challenge allowed GSA to engage outside thinkers to bring fresh perspectives to the dialogue. These ideas included innovative uses of data and technology, blurring lines between agencies with the government divided along business lines rather than agencies, cross-agency teams, and a more flat organizational structure.

Problem Statement: Planning, project management, financial management, employee engagement, and reporting are among the key responsibilities of today's public sector program managers. The approach to each of these and so many others is defined, in part, by the state of existing technology, access to data, and the ability of a skilled workforce to take full advantage of those resources. Today's tools and resources both enable and limit program managers' ability to deliver the best service to the public, efficiently and within budget, while adjusting to changes in political direction and mission focus.

Given the critical importance of communication and information processing technology, the value of timely and quality data, and the cost of recruiting, training, and retaining top quality talent, challenge participants were asked to help shape the conversation about the coming direction of public sector program management. How will the work of public sector program managers change over the next 25 years? How should it change? How can it change with thoughtful steering?

The challenge sought ideas that could be further discussed and refined in both the near- and long-term future. The requirements were to think about the field of public sector program management in 25 years, not merely to describe the problems of today.

Proposed Goals: The goal was to find and highlight innovative ideas for the future of program management with the secondary goal of improving government service delivery if the ideas from the participants could be readily implemented.

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[139] Challenge Website: http://www.challenge.gov/challenge/public-sector-program-management-a-vision-for-the-future/

Why a Prize: No prize was offered. The reason to do a challenge was to attempt to engage thinkers outside GSA's sphere of influence in order to bring fresh perspectives to the dialogue.

Participants: This challenge was open to the public. The challenge had 22 eligible entries. The vast majority of the entrants were individuals, but the winner of the Most Original prize consisted of a team of three people.

Timeline: Competition launched on May 13, 2014, with all submissions received by May 30, 2014. The public voting was held from May 13, 2014, and ended June 6, 2014. Winners were announced on June 30, 2014.

Solicitation & Outreach: Outreach was minimal. It included email to the GSA listserv, a request that the judges and advisors share with their networks, posting to the GSA LinkedIn company page, presentations to three in-person audiences (a GovExec conference, a performance community meeting, and a Performance Ambassador program day), and an interview with a reporter from GovExec who published an article on the challenge. Unfortunately there was a technical issue with the link so GovExec readers were not able to access the article when it was released.

Incentives: No monetary prizes were awarded as part of this challenge. It was strictly a recognition prize with three different recognition awards – Best Overall, Most Popular, and Most Original.

Evaluation and Judging: The judging panel consisted of three people, all of whom were Federal employees, and two technical advisors from IBM Center for The Business of Government and the Partnership for Public Service. The judging criteria were 35 percent for Originality, 35 percent for Clarity, and 30 percent for Presentation.

Partnerships: None.

Resources: None.

Results: The challenge garnered 22 separate and distinct entries, all of which contained diverse ideas on the future of Federal program management. These ideas included innovative uses of data and technology, blurring lines between agencies with the government divided along business lines rather than agencies, cross-agency teams, and a more flat organizational structure. While the efficacy of these approaches, as well as the rapidity with which they could be implemented is still to be determined, the submissions illustrated that these ideas can and should be discussed.

## K. National Endowment for the Arts

### I. Presenting Arts Data Artfully[140]

Summary: The NEA sought help in developing interactive data visualizations for the flagship arts participation data from the NEA Survey of Public Participation in the Arts (SPPA). Winning work could be featured at arts.gov and promoted to arts organizations everywhere.

*Solution Type*: Software and apps; Creative (design & multimedia); Analytics, visualizations, and algorithms

*Primary Goals*: Inform and educate the public; Engage new people and communities

*Results*: The main impact the competition has had on the NEA to date is to raise the profile of the data in the SPPA by broadening the base of individuals who are exposed to and become familiar with those data.

Problem Statement: The National Endowment for the Arts (NEA) supports artistic talent and creativity in the United States and provides Americans with rich and diverse opportunities to experience art. Like every other organization, business, or government agency, NEA relies on data to know how to serve its mission more effectively. The Survey of Public Participation in the Arts (SPPA) is the NEA's flagship dataset and includes a host of demographic, geographic, and behavioral variables about U.S. adults (ages 18 and over) and how they participate in arts activities. Last fielded in 2012, the nationally representative survey has occurred six times since 1982.

Now that the 2012 SPPA data have become available through the U.S. Census Bureau, NEA wanted innovative thinkers, data crunchers, and graphic artists to paint pictures that

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[140] Challenge Website: artsdata.challengepost.com

can reveal hidden or unexpected value from the raw numbers. How can information about the arts events that people experience yearly--and the types of art they otherwise consume or create--be used to tell people who they are as Americans and how they relate to one another? How can the information be linked to other datasets to profile behavior patterns within a geographic area, and how can arts and cultural managers use such data to improve their services and outreach capabilities?

Proposed Goals: By issuing this challenge, the NEA sought the design and development of one or more interactive data visualization applications to showcase the SPPA data in exciting and previously unimagined ways. NEA wanted arts organizations, arts patrons, and the general public to engage with these data in ways they never have before and to use the data to better understand their audiences and communities. Beyond this, the agency wanted visualization applications that are works of art in their own right; works of art that can become the centerpiece of the NEA's presentation to the public of this valuable data resource.

Why a Prize: The NEA expected that through the interactive data visualization tools of the type that are envisioned here, the reach and impact of the SPPA would go beyond what has been possible in previous years, when glossy reports and raw data were all that were typically made available.

However, the NEA does not have the resources in-house to create such visualizations. The Agency considered more traditional contracting options and determined that a contest made more sense for two reasons. First, part of the purpose of the undertaking is to foster additional interest in, awareness of, and familiarity with the SPPA data themselves. A challenge seemed more likely to achieve these objectives than did a traditional contract. Second, the Agency does not have a specific vision in mind for the approach to visualizing the data. Rather, the Agency wanted to present multiple approaches to visualization of the data and to allow contestants to be as creative as possible in developing them.

Participants: The Agency hoped to mobilize "innovative thinkers, data crunchers, and graphic artists" to create the visualization(s). Registration was open to the American public. The eligibility requirements, as spelled out in the challenge, were as follows:

To be eligible to win a prize under this competition, you: a) must be a citizen or permanent resident of the United States and 18 years of age or older before the submission period ends; b) may not be a Federal employee acting within the scope of your employment; c) may be a private entity, such as a corporation or other organization, that is incorporated in and maintains a primary place of business in the United States. Individuals submitting on

behalf of corporations, nonprofits, or groups of individuals (such as an academic class or other team) must meet the eligibility requirements for individual contestants. An individual may join more than one team, corporation, or nonprofit organization; and d) may not be an employee of NEA or an immediate family member (spouse, parents or step-parents, siblings and step-siblings, children and step-children, and household members).

If you are a Federal grantee, you may not use Federal funds to develop applications for this competition unless such use is consistent with the purpose of your grant award.

If you are a Federal contractor, you may not use Federal funds from a contract to develop or fund efforts in support applications for this competition.

You may use Federal facilities or consult with Federal employees during the competition if the facilities and employees are made available to all contestants participating in the competition on an equitable basis.

You may submit more than one entry.

The NEA received six submissions, one of which was a four-person team effort; all other submissions were individuals. Entrants were from Virginia, Washington DC, California, Georgia, and New York.

Timeline:

| | |
|---|---|
| Submission Open | 09/26/2013 |
| Submission Close | 2/03/2014 |
| Winner(s) Announced | 3/12/2014 |

Solicitation & Outreach: The competition was widely advertised through a combination of emails to NEA contacts and to various service organizations and associations, press releases, notices posted to social media (NEA's social media following includes 30,230 Facebook likes and 42,305 Twitter followers), and public presentations. Many of these notifications were made in the context of the official release of *How a Nation Engages with Art: Highlights from the 2012 Survey of Public Participation in the Arts (2013)*.

Incentives: The NEA offered two cash prizes: $30,000 for the first prize and $10,000 for the selected honorable mention.

Evaluation and Judging: As spelled out in the challenge post, judges evaluated the submissions on the basis of the following criteria:

- Creativity: Is the application creative, interesting, and easy to use?

- Artful Design: Is the application functional, artfully designed, and visually appealing?

- Statistical Validity: Does the application properly account for definitions of variables, statistical sampling procedures and weights, and differences across time, data sources, and data collection procedures?

- Use of Required Data: Does the application use the required 2012 SPPA?

- Technical Implementation: Is the application functional, elegant, and accessible on any internet accessible platform, including personal computers, tablets, and mobile devices? Does the application require purchase or downloading of a tool to use it? Is the application compatible with the NEA website, which utilizes a Drupal 7 content management system?

The NEA's Office of Research & Analysis deemed that criteria were adequate and the composition of judges were sufficiently balanced to address both the technical and aesthetic qualifications of the entries.

Partnerships: The NEA did not form any formal or informal partnerships in regards to this competition.

Resources: To date, the Agency has only used personnel resources required to coordinate the launch of the competition. These include personnel from the Office of Research & Analysis, the Office of the General Counsel, and the Budget Office. The funds for the competition were obligated from the Program Budget for the Office of Research & Analysis.

Results: The main impact the competition has had on the NEA to date is to raise the profile of the data in the SPPA by broadening the base of individuals who are exposed to and become familiar with those data. This is, in and of itself, a major accomplishment in terms of one of the NEA's Strategic Goals: *To promote knowledge and understanding about the contributions of the arts*. The NEA expects that this impact will be even more strongly felt with continuous availability of the application to the public through the NEA and as innovative new interactive visualizations of the data emerge from use of this application.

# Appendix 2: Agency Programs Conducted Under Authorities Other than the America COMPETES Reauthorization Act of 2010

This Appendix provides a summary of select prizes and challenges conducted in FY 2014 under agency prize authorities other than COMPETES. Agency reporting on prizes conducted under non-COMPETES prize authorities was optional, so the list of challenges here may be incomplete.

## List of Challenges

**A.    Department of Commerce**

      **I.    Strong Cities, Strong Communities Challenge**

**B.    Department of Defense**

      **I.    AFRL Ideas for Annual Computational Cognition Challenge**

     **II.    AFRL LabHACK**

    **III.    AFRL Non GPS Navigation**

    **IV.    AFRL Synthetic Biology for Materials**

     **V.    CTNSP Disaster Apps Challenge**

    **VI.    CTNSP Explosive Remnants of War and Landmine Reporting Apps Challenge**

   **VII.    DARPA Forecasting Chikungunya Challenge**

  **VIII.    DARPA Spectrum Challenge**

    **IX.    USSSOCOM Reducing Digital Optics Latency**

C. **Department of Education/ White House Initiative on Asian Americans and Pacific Islanders**

    I. **Proposal Challenge: Expanding Opportunity for Asian Americans and Pacific Islanders**

    II. **E3! Challenge: Educate, Engage, and Empower Young AAPI Leaders**

D. **Department of Energy**

    I. **#BioenergizeME Virtual Science Fair**

    II. **GeoEnergy Is Beautiful – 2014**

    III. **Open Source Wave Analysis and Response Program (OpenWARP)**

E. **Department of Health and Human Services**

    I. **CMS Healthcare Fraud Partnership Data Exchange Network**

    II. **CMS Open Payments App Challenge**

    III. **NIH Breast Cancer Startup Challenge**

    IV. **NIH Neuro Startup Challenge**

F. **Department of Homeland Security**

    I. **TSA New Bag Tracking and/or Tagging for Risk Based Security of Checked Baggage Screening**

    II. **TSA Next Generation Design and Queue Model**

G. **Department of Justice**

    III. **NIJ Delivering Mission Critical Voice Communications for Law Enforcement and Public Safety Responders in the COTS LTE Environment**

**K.   National Science Foundation**

      **I.   Comet ISON Photo Contest**

      **II.   Community College Innovation Challenge**

      **III.   Visualization Challenge (The Vizzies)**

**L.   United States Agency for International Development**

      **I.   Big Ideas@Berkeley "Mobiles for Reading" Prize Competition**

      **II.   The Desal Prize**

      **III.   Enabling Writers Prize Competition**

      **IV.   GEO Appathon 2014**

      **V.   Intel ISEF – USAID Special Award**

## Summary Reports of Challenges

### A.  Department of Commerce

#### I.  Strong Cities, Strong Communities Challenge[141]

Summary: The Strong Cities, Strong Communities (SC2) Visioning Challenge is a competition sponsored by the Economic Development Administration (EDA), in partnership with the cities of Greensboro, North Carolina, Hartford, Connecticut, and Las Vegas, Nevada, as well as prize competition consultants from The Common Pool. EDA's SC2 Visioning Challenge is designed to generate innovative ideas, strategies, and perspectives that cities can use to advance economic development planning in their city and region. EDA designed the SC2 Visioning Challenge to help eligible U.S. cities create economic development plans by leveraging innovative ideas from diverse teams. The challenge is divided into two phases: Phase 1, in which any eligible team may compete, and Phase 2, in which only the finalists from Phase 1 may compete. The total amount of prize money offered by all three cities in both Phases of the competition is $2.8 million.

*Solution Type*: Ideas; Business plans

*Primary Goals*: Engage new people and communities; Find and highlight innovative ideas

*Results*: All three cities have recently completed Phase 1 of the competition, and are now underway with Phase 2. So far, the results from Phase 1 have been impressive. A total of 502 teams registered for the competition across all three cities, with 26 of these teams being selected as Phase 1 finalists to compete in Phase 2 (Hartford: 10 finalists; Greensboro: 6 finalists; Las Vegas: 10 finalists).

 Hartford.Health.Works (HHW) provides an example of the economic development work engaged in by the Finalist teams. The Hartford-based team is an industry-led collaboration whose founding partners include Rising-Tide Health Care, BEACON, and Movia Robotics. Their mission is to increase the number of high-quality jobs in Hartford by fostering healthcare technology development and manufacturing. To attract existing medical technology companies and foster new companies, HHW is creating an FDA-approved, ISO-certified medical device prototyping and manufacturing plant in Hartford. The team also plans to implement targeted programs to improve access to expertise, capital, and markets. Additionally, HHW is developing biomedical engineering and precision manufacturing education and job training programs at the K-12, college, and graduate school levels.

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[141] Challenge Website: http://www.eda.gov/challenges/sc2challenge/.

The Phase 2 competition is expected to be completed between mid-June and mid-August of 2015, and winners will be announced by each city.

## B.    Department of Defense

### I.    AFRL Ideas for Annual Computational Cognition Challenge

Summary: Developing cognitive models with the requisite computational architecture to extract content from video is an important future capability for the USAF. It underpins technology that will be critical for developing autonomous capabilities to perceive and understand action. This challenge was sponsored by a tri-service team with AFRL/RH as the lead. The objective of this ideation challenge is to stimulate innovative, integrative, scientific, and technological advances at the intersection of cognitive modeling and artificial intelligence. There is a rich history of interaction between these disciplines, but in recent years the tendency has been toward increasing fractionation and sub-specialization, with decreasing methodological, scientific, and technological cross-fertilization and integration. The purpose of this ideation challenge is to stimulate a reversal of this trend. The challenge was run on the InnoCentive platform.

*Solution Type*: Ideas

*Primary Goals*: Advance scientific research; Engage new people and communities

*Results*: This highly specialized challenge was advertised through the two professional societies for Cognitive Modeling and Artificial Intelligence. This challenge had 301 interested participants and 52 submissions. Three awards were paid, with a total prize purse of $8500, and the participants were invited to present their ideas at the annual CogSci conference. The team was well pleased with the results and the Cognitive Competition concepts are being incorporated into the Tri-service group's plans.

### II.    AFRL LabHACK

Summary: In this Theoretical challenge, Air Force researchers at the Air Force Research Lab (AFRL) were looking for detailed, multi-disciplinary, innovative research and development plans that would advance today's science and engineering in synthetic biology to a level where it could enable:

1.  Instantiation of pathways that control the large-scale synthesis of nanoparticles in living organisms. A potential application of such materials could be in the

fabrication of highly-ordered magneto-dielectric meta-material for broadband antenna applications. Or

2. Methods to assemble optically active materials (metal nanoparticles, chromophores) on chiral templates *in vivo* without external manipulation. Higher precision in making large quantities of chiral structures for visible-infrared wavelengths was a key Challenge to be addressed.

This highly technical area required AFRL to expand on the usual participants reached by the online InnoCentive platform, so PreScouter was engaged to identify key individuals in Universities and research labs to invite to the challenge.

*Solution Type*: Ideas

*Primary Goals*: Advance scientific research; Develop technology; Engage new people and communities

*Results*: The Challenge had 354 project room but only 9 submissions. However the evaluation team found four research proposals that they found interesting and awarded $50,000 in prize money. The AFRL researchers are planning to invite the submitters to a collaborative forum to be held in Washington D.C to further refine and expand on these ideas and create joint proposals for OSD funding. The Synthetic Biology Material solutions will be used by AFRL/RX in their future research planning and will be the basis of an OSD workshop.


### III.    AFRL Non GPS Navigation

Summary: This theoretical challenge operated by the Air Force Research Lab (AFRL) was looking for a solution to provide a robust zero-GPS precision navigation capability that can be automated in a system. This challenge was a joint challenge between AFRL and the Office of the Deputy Assistant Secretary of Defense (OSD), Emerging Capability and Prototyping. The challenge was run on the InnoCentive platform.

*Solution Type*: Ideas

*Primary Goals*: Solve a specific problem; Find and highlight innovative ideas; Engage new people and communities

*Results*: There were 341 people that responded to this challenge and showed interest in providing solutions. Of the 32 concepts that were submitted, the challenge owner thought that two solutions had merit and paid $7.5K for 1st place and $2.5K for 2nd place. The first system would automatically triangulate current position and deduce displacement by tracking high-contrast optically-derived benchmarks in the environment. Current position is deduced based on the accumulated displacement from the starting position. Novel

approaches to triangulate position from optical information in the environment were described. The Second approach uses a leapfrogging approach with at least 2 vehicles. AFRL/RY is assisting OSD in further developing and accessing these approaches.

### IV. AFRL Synthetic Biology for Materials

Summary: In this Theoretical challenge, Air Force researchers at the Air Force Research Lab (AFRL) were looking for detailed, multi-disciplinary, innovative research and development plans that would advance today's science and engineering in synthetic biology to a level where it could enable:

1. Instantiation of pathways that control the large-scale synthesis of nanoparticles in living organisms. A potential application of such materials could be in the fabrication of highly-ordered magneto-dielectric meta-material for broadband antenna applications. Or

2. Methods to assemble optically active materials (metal nanoparticles, chromophores) on chiral templates *in vivo* without external manipulation. Higher precision in making large quantities of chiral structures for visible-infrared wavelengths was a key Challenge to be addressed.

This highly technical area required AFRL to expand on the usual participants reached by the online InnoCentive platform, so PreScouter was engaged to identify key individuals in Universities and research labs to invite to the challenge.

*Solution Type*: Ideas

*Primary Goals*: Advance scientific research; Develop technology; Engage new people and communities

*Results*: The Challenge had 354 registrations but only 9 submissions. However the evaluation team found four research proposals that they found interesting and awarded $50,000 in prize money. The AFRL researchers are planning to invite the submitters to a collaborative forum to be held in Washington D.C to further refine and expand on these ideas and create joint proposals for OSD funding. The Synthetic Biology Material solutions will be used by AFRL/RX in their future research planning and will be the basis of an OSD workshop.

## V. CTNSP Disaster Apps Challenge[142]

Summary: From the earthquake in Haiti to the recent typhoon in the Philippines, the use of mobile applications for disaster relief has shown great promise in increasing the efficiency and response time of the humanitarian sector. The National Defense University's Center for Technology and National Security Policy's (CTNSP) launched the Disaster Apps Challenge under the National Defense Authorization Act (NDAA) to increase awareness and to find innovative ways to improve and refine existing disaster relief applications.

The Disaster Apps challenge addressed the growing development and use of mobile apps for emergencies. Through their research, the National Defense University observed a number of shortcomings in the development of disaster apps. In order for these apps to be truly effective in the field, first responders and civilians need to be aware of their existence and functionality before a natural disaster strikes. In recent years programmers have developed numerous apps, but finding and using the right apps during or just prior to a crisis is a hit or miss proposition. Furthermore, apps are often developed during or immediately after a disaster, making it difficult to pre-train operators on the system and alert the public of their functions.

The goal of the Disaster Apps Challenge was to bring together the developer and emergency response communities to develop and publicize the most effective apps for use before, during, and after a disaster strikes. The National Defense University wanted to simultaneously improve existing applications with a solution that is sustainable beyond the end of the competition, while also bringing recognition to disaster apps that are accessible, interoperable, and sustainable. Although new pilot apps were not excluded, the purpose of this challenge was to encourage refinement/improvement of those that already exist.

This challenge was operated on ChallengePost, and all solutions were posted on GitHub.

*Solution Type*: Software and apps

*Primary Goals*: Find and highlight innovative ideas; Inform and educate the public; Engage new people and communities

*Results*: Over 60 people registered for the Disaster Apps Challenge, with eight final submissions. $5000 total was awarded to the creators of the 4 winning apps, which help users find shelter, fill out forms, track local environmental conditions, and send location coordinates.

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[142] Challenge Website: http://disasterapps.challengepost.com/

## VI.   CTNSP Explosive Remnants of War and Landmine Reporting Apps Challenge[143]

Summary: Each year, a large number of civilians are killed and injured by unexploded weapons such as artillery shells, land mines, mortars, grenades and bombs. These explosive remnants of war (ERW) regularly disrupt daily civilian life in post-war and conflict zones. The National Defense University's Center for Technology and National Security Policy's (CTNSP) launched the Explosive Remnants of War and Landmine Reporting Apps Challenge. The competition challenged developers to come up with a mechanism to keep "eyes on the street" and transform ordinary citizen's mobile devices into tools that could be used to report ERW and landmines to the appropriate authorities. Participants were asked to create open-source applications, as well as to leverage existing apps. All submissions had to demonstrate how the new or improved application could produce or improve ERW or landmine reporting, and how the solution would be sustained following the completion of the competition.

This challenge was operated on ChallengePost.

*Solution Type*: Software and apps

*Primary Goals*: Find and highlight innovative ideas; Inform and educate the public

*Results*: The CTNSP ERW and Land Mine Reporting Apps Challenge received 50 challenge registrations, and 5 submissions. The winner, receiving $3000, is an easy to use and easy to understand solution that could be incorporated into any smartphone. The second place winner, receiving $1500, has complementary features for phones that are only SMS-capable, and CTNSP intends to advertise both solutions and potentially offer them as a package to interested parties. USAFRICOM staff are potentially interested in converting the wining app into a medical reporting system for Ebola-like contingencies. The third place winner received $500 for an ERW detector.

## VII.   DARPA Forecasting Chikungunya Challenge144

Summary: Chikungunya viral infection (CHIKV) is a mosquito-borne viral infection of humans. The recent introduction of chikungunya into the Caribbean has caused substantial morbidity in the population and concern about further spread in the region. As of December 19, 2014 the Pan American Health Organization (PAHO) reports over 24,000 confirmed and one million suspected CHIKV cases in the Americas including over 2,000 cases in the United States. The Department of Defense's (DoD) role in global health includes conducting timely, relevant, and comprehensive health surveillance to promote, maintain,

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[143] Challenge Website: http://erwlandmineapps.challengepost.com/

[144] Challenge Website: https://www.innocentive.com/ar/challenge/9933617

and enhance the health of military and associated populations. Mathematical and statistical models are useful in predicting the course of infectious disease spread, but no models to date have successfully predicted infectious disease events with sufficient accuracy.

This DARPA Challenge seeks methods to forecast outbreaks and the potential spread of CHIKV throughout the Americas. The forecast will include the number of suspected and confirmed cases and time course in currently-affected islands, as well as the outbreak and course of infection in new locations (including Caribbean, Central, South, and North America). This Challenge also seeks to develop forecasting capabilities for infectious diseases, with the intent of applying these capabilities to the mitigation of infectious diseases outbreaks.

*Solution Type*: Ideas; Analytics, visualizations, and algorithms

*Primary Goals*: Solve a Specific Problem; Analytics, visualizations, and algorithms

*Results*: The challenge is not yet complete, and final results will be reported in FY15. 444 solvers have registered, and a total prize purse of $500,000 is offered.

## VIII.    DARPA Spectrum Challenge

<u>Summary</u>: As the use of wireless technology proliferates, radios often compete with, interfere with, and disrupt the operations of other radios. The DARPA Spectrum Challenge called on participants to demonstrate radio protocols that can best utilize a given communication channel in congested and contested environments, in support of military operations. The techniques employed by the participants are expected to be representative of next-generation adaptive radio protocols that will be seen in future military and commercial communications systems.

Awards will be made to the best performing systems in two tournament scenarios:

- Competitive Scenario - Two teams attempt to simultaneously transmit a data file from one of their radios to the other. This tests their ability to design a radio that can best overcome interference.

- Cooperative Scenario - Three teams are grouped together with the objective that each team transmit a data file across their radio pair while causing minimal disruption to the other two teams. This tests their ability to design a radio that can operate in the presence of other radios while causing minimum disruption.

Teams compete head-to-head in a structured test environment, using identical radio hardware, to determine the most capable algorithms, as measured by how quickly a block of data can be transmitted from one radio to another.

The Challenge consisted of two tournament events: The Preliminary Challenge Event was held on September 11 and 12, 2013, with prizes of $25,000 awarded to the winners of the Competitive and Cooperative tournaments. The Final Challenge Event was held March 19 and 20, 2014, with $150,000 awarded in prize money: first place was awarded $50,000 and second place was awarded $25,000 for each of the Competitive and Cooperative tournaments.

*Solution Type*: Technology demonstration and hardware

*Primary Goals*: Solve a specific problem; Engage new people and communities; Develop technology

*Results*: To date, the DARPA Spectrum Challenge has achieved its goals and stimulated interest in the programs and projects of interest to the DoD science and technology community. 94 teams registered for the Challenge. Sixty-six teams completed the first hurdle, 59 completed the second, and 45 completed the third. The top 15 teams were selected to participate in the Preliminary Challenge Event, and the remaining teams competed for three additional spots. The event attracted a pool of nontraditional and enthusiastic participants, mostly within the academic community that would traditionally not engage in government research and development programs. The techniques developed and demonstrated by the participants are expected to drive the design of next-generation adaptive radio protocols for future military communications systems.

## IX.    USSSOCOM Reducing Digital Optics Latency

Summary: The Joint Acquisition Task Force - Tactical Assault Light Operator Suit (JATF-TALOS) project office within the U.S. Special Operations Command (USSOCOM) launched the challenge with the primary goals of identifying new approaches to reducing the optical latency of digital night vision designs and to identify new partners for potential collaboration. The latency of the digital systems can have adverse physiological effects (mostly nausea) on the operator due to the measurable delay. While digital performance has been improved by ongoing developments, deliberate efforts to resolve optical latency may require substantial investments over a long period of time.

JATF-TALOS is seeking to digitally fuse multi-spectral and other sensor data to optimize the operator's situational awareness and ability to maneuver in all conditions. The prize challenge competition could provide an opportunity to identify innovative design approaches to reduce latency, and to identify new potential partners in the effort to develop novel battle helmet systems with integrated multi-spectral sensors.

Additional goals of the challenge are to inform the JATF-TALOS team as to the efficacy of using a prize challenge to help resolve a hard technical problem, and provide the JATF-

TALOS team insight for the resources necessary to prepare, execute, and fund future prize challenges. The challenge was run on the InnoCentive platform.

*Solution Type*: Ideas; Technology demonstration and hardware

*Primary Goals*: Advance scientific research; Find and highlight innovative ideas; Engage new people and communities

*Results*: Several novel approaches were identified that warrant additional exploration, and four winners were awarded a total of $12,500. Following the evaluation and award determinations, the judges expressed a desire to have follow-on discussions and invite the award winners to participate in upcoming digital optics development solicitations. In addition, the JATF-TALOS team learned a great deal from this activity, the team's first prize challenge competition.

## C. Department of Education/ White House Initiative on Asian Americans and Pacific Islanders

### I. Proposal Challenge: Expanding Opportunity for Asian Americans and Pacific Islanders[145]

<u>Summary</u>: America is home to 18.2 million Asian Americans and Pacific Islanders (AAPIs) who are part of diverse communities with diverse needs. They speak numerous languages, represent several cultures, and all are part of America. It's a time of extraordinary growth for the AAPI community. The AAPI population is on the rise in every region of the country. In fact, the population has increased by nearly 50% in just 10 years. The White House Initiative on Asian Americans and Pacific Islanders (WHIAAPI or Initiative) is working with local leaders to provide the necessary tools for communities to keep up with this growth.

WHIAAPI is calling for submissions on great ideas to work in partnership with the Federal government to expand opportunities for the AAPI community. Proposals may include innovation, enhanced infrastructure, or a solution for a hot topic issue to achieve effective outcomes during a focused amount of time (e.g. one year) on a project of choice. At the heart of this work is the desire for AAPIs to work across cultures and sectors to establish effective local services, and ultimately achieve prosperity nationwide.

*Solution Type*: Ideas

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[145] Challenge Website: https://www.challenge.gov/challenge/proposal-challenge-expanding-opportunity-for-asian-americans-and-pacific-islanders/

*Primary Goals*: Find and highlight innovative ideas; Inform and educate the public; Improve government service delivery

*Results*: The Challenge has allowed WHIAAPI to better work towards its mission of improving the quality of life of AAPIs.[146] WHIAAPI received 30 applications from AAPI individuals and community-based organizations throughout the continental U.S. While this was an ideation challenge that was completed upon determination of the winners, WHIAAPI then decided to take an additional step after the conclusion of the challenge to engage in real partnership activities as outlined in the winning submissions.

5 winners[147] received a memorandum of understanding (MOU) with the Department of Education to partner on a project targeting an AAPI community. These partnerships will help to establish a "boot camp" for small business owners, host webinars on capacity building for community-based organizations, support an innovative community-supported agriculture program, involve underserved AAPI high school students in STEM, and launch a national education awareness campaign.

Overall, the Challenge helped strengthen strategies to increase public and private sector collaboration, and community involvement in improving the health, education, nutrition, environment, and well-being of AAPIs.

## II.    E3! Challenge: Educate, Engage, and Empower Young AAPI Leaders[148]

Summary: E3! is a new Ambassadors Program that "Educates, Engages, and Empowers" the next generation of leaders committed to advocating for Asian Americans and Pacific Islanders (AAPIs). The mission of the E3! Ambassador Program is to Educate, Engage, and Empower young leaders to increase awareness around critical issues facing the AAPI community and to highlight key Federal programs and resources in which AAPIs may be underserved.

Applicants are directed to craft an original, innovative plan to increase outreach and awareness within your campus or community around the following four issue areas: education, mental health, pathways to public service, and Deferred Action for Childhood Arrivals (DACA).

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[146]http://www.whitehouse.gov/sites/default/files/imagefield_thumbs/image_image_file/2009aapi1.eo_.rel_.pdf

[147] https://www.whitehouse.gov/blog/2014/09/15/announcing-new-partnerships-expand-opportunity-aapis

[148] Challenge Website: https://www.challenge.gov/challenge/whiaapi-e3-challenge-educate-engage-and-empower-young-aapi-leaders/

Once selected, E3! Ambassadors are encouraged to conduct outreach within their campuses and communities – whether it's setting up a table to share resources at a campus fair, facilitating a workshop during a conference, or even utilizing social media – with the goal of improving the quality of life and opportunity for young AAPIs.

*Solution Type*: Nominations

*Primary Goals*: Engage new people and communities; Inform and educate the public; Find and highlight innovative ideas

*Results*: 35 individuals were selected as E3! Ambassadors from an applicant pool of 126. The Challenge has allowed the White House Initiative on AAPIs to better work towards its mission of improving the quality of life of AAPIs.[149] It has helped strengthen strategies to increase public and private sector collaboration, and youth involvement in improving the health, education, environment, and well-being of AAPIs

## D.   Department of Energy

### I.    #BioenergizeME Virtual Science Fair[150]

Summary: The Bioenergy Technologies Office (BETO) sponsored a beta run of the BioenergizeME Virtual Science Fair—a high school competition where student teams of up to four 9th through 12th graders research a bioenergy topic and then create and share an infographic about bioenergy concepts. This challenge is unique because it combines the use of scientific research, graphic design, and social media technologies and strategic social media campaign planning to engage future workforce and leadership. In addition, it has the goal of improving energy literacy surrounding the promises and challenges of bioenergy, one of several renewable energy resources that are part of a growing U.S. energy portfolio.

Participants received the #BioenergizeME Virtual Tool Kit, which the Energy Department and Library of Congress collaborated in preparing, to provide teachers, leaders, and students with classroom-ready tools to engage in a national bioenergy dialogue. The tool kit includes all Challenge rules; research topics and prompts; and guidance on doing research, creating infographics, and developing a social media campaign. The kit also provides rubrics for the teachers/leaders and research references, search phrases, and links to government-funded publications.

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[149]http://www.whitehouse.gov/sites/default/files/imagefield_thumbs/image_image_file/2009aapi1.eo_.rel_.pdf

[150] Challenge Website: http://www.energy.gov/eere/bioenergy/virtual-science-fair

*Solution Type*: Creative (design & multimedia)

*Primary Goals*: Inform and educate the public; engage new people and communities; find and highlight innovative ideas.

*Results*: A volunteer focal group of student teams from five high schools across the United States used the Virtual Tool Kit to create infographics[151] on bioenergy-focused topics that included history, policy, science and technology, careers, and environmental impacts. 18 of the 23 teams participated in a two-week social media campaign, and 3 teams were named winners. Combined, all teams' infographics received nearly 2,400 unique page views. There was no monetary prize.

Using the information gathered from this beta-run, a national pilot will be launched January 15, 2015, and will culminate with a national bioenergy social media campaign leading up to and including Earth Day 2015. Following the national pilot, DOE will determine if the challenge will be issued annually, and if so, will launch in May of 2015 for the 2015-2016 school year.

## II.     GeoEnergy Is Beautiful 2014[152]

<u>Summary</u>: Student teams from leading colleges and universities as well as high school seniors were invited to create concepts for high-quality, high-impact infographics and outreach materials that convey the important role of geothermal energy in the nation's energy mix. Energy production can be a complex topic to explain to a broad public audience, especially energy that comes from a subsurface environment that is difficult for many to visualize.

The student competition therefore invites student to develop cutting-edge geothermal communications tools that marry accurate, technical information with an infographic. Infographics provide the opportunity to distill technical data and information and visually transform them to facilitate insight, comprehend relationships and patterns, and understand complex messages with a minimum of words.

*Solution Type*: Creative (design & multimedia)

*Primary Goals*: Inform and educate the public; Engage new people and communities

*Results*: GeoEnergy is Beautiful 2014 successfully engaged groups the Geothermal Technologies Office (GTO) did not normally interact with, and provided professional development for students interested in science, communication, and policy. The five

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[151] http://www.energy.gov/eere/bioenergy/bioenergizeme

[152] Challenge Website: http://orise.orau.gov/science-education/capabilities/science-education-events/ngsc-proposal-requirements.aspx

applicant teams included four teams at universities with which GTO had no previous interaction and most of the students did not know anything about geothermal prior to entering into the competition. Three winners were awarded $2000 each and an additional $500 to support the implementation of their outreach plans. In addition, all three teams' members were also invited to attend the Annual Geothermal Resources Council Meeting in Portland, Oregon in September 2014.

The seven students present at the Geothermal Resources Council Annual Meeting all expressed desires to move into careers in energy after their graduation. Several expressed a desire to go into communications and policy, and others are choosing to pursue graduate degrees in engineering. In addition, two of the three final teams submitted both English and Spanish versions of their infographics; this was a first for GTO graphics and might be one of the first within EERE as well.

### III.      Open Source Wave Analysis and Response Program (OpenWARP)[153]

Summary: Wave energy converter (WEC) devices could extract 1170 terawatt-hours of electricity per year by harnessing ocean wave energy. By tapping into just 10% of the total extractable ocean wave energy, WEC devices could power 10 million American homes.

Through OpenWARP, the Department of Energy has launched a series of crowdsourcing contests at TopCoder, in partnership with the NASA Center of Excellence for Collaborative Innovation. These contests are designed to help the offshore renewable energy community develop open-source simulation tools that can predict the hydrodynamic coefficients that describe the behavior of floating bodies within a wave field. This capability is essential to the blossoming ocean energy community. OpenWARP uniquely links the ocean energy community to the algorithm development expertise of the coding community.

*Solution Type*: Analytics, visualizations, and algorithms

*Primary Goals*: Solve a specific problem

*Results*: 23 winners were chosen from 55 entries, and awarded a total of $50,000. OpenWARP encouraged a French research group at Ecole Centrale de Nantes (ECN) to make their hydrodynamic simulation code open-source. Through TopCoder, the challenge competitions improved the code both in terms of numerical capabilities and usability, resulting in overall stronger abilities to model wave energy converter devices. While it is difficult to quantify how much "better" the code is than current methods, a large part of its uniqueness lies in the fact that it is modifiable by any and everyone in the research community to meet specific modeling needs Further, the code can maintain relevance as it

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[153] Challenge Website: www.topcoder.com/doe

is now live on a platform that enables community-sustained code development and advancement. DOE has been able to accomplish the original scoped effort in less time and budget anticipated, and this has allowed the team to add additional objectives to the OpenWARP project that has resulted in an even more complete user-friendly package.

## E.  Department of Health and Human Services

### I.  CMS Healthcare Fraud Partnership Data Exchange Network[154]

Summary: The primary objective of the project was to build a data exchange network that enables healthcare insurance-paying entities in both the public and private sector to safely and securely share information for purposes of prevention and detection of fraud, waste and abuse across partners. This application was built for the Healthcare Fraud Prevention Partnership (HFPP) through The Centers for Medicare and Medicaid Services (CMS). The competition was conducted through an interagency agreement (IAA) with NASA's Center for Excellence for Collaboration Innovation (CoECI) on the TopCoder platform.

*Solution Type*: Software and apps

*Primary Goals*: Develop technology; Engage new people and communities; Solve a specific problem

*Results*: The challenge received 1,406 entries from 52 countries and awarded 55 winners a total of $100,000. The output of the project is hosted on GitHub[155]. In addition to the healthcare fraud solutions, the challenge provided CMS with "market research"

### II.  CMS Open Payments App Challenge[156]

Summary: The Centers for Medicare and Medicaid Services (CMS) wanted to provide stakeholders (industry representatives and physicians) of the Open Payments program with a tool that they could use to track payments and other transfers of value (e.g. gifts, meals, speaking fees) in real-time. The tool would provide doctors a way to more easily and efficiently report payments and transfers of value, help CMS to identify where better reporting can lead to better treatment and patient care, and the open reporting of the data would allow the public to make better decisions about their health care.

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[154] Challenge Website: http://www.topcoder.com/cms/hfpp/

[155] https://github.com/nasa/CoECI-CMS-Healthcare-Fraud-Prevention

[156] Challenge Website: http://www.topcoder.com/cms/open-payments-challenge/

The objective of the project is to develop both an iPhone app and a reporting web application for CMS: payments recorded using the iPhone app would then be aggregated by the web application. The applications should be easy to install and easy to use in order to foster high and active participation by vendors and providers. They should also be easy to grow and change in response to changes and new opportunities in use. Innovation and diversity in data collection should be encouraged by supporting integration to 3<sup>rd</sup> party validation engines. Solvers should develop lightweight procedures for sustained use, and streamline the execution of and compliance with regulatory requirements to achieve high compliance rates. The competition was conducted through an interagency agreement (IAA) with NASA's Center for Excellence for Collaboration Innovation (CoECI) on the TopCoder platform.

*Solution Type*: Software & apps

*Primary Goals*: Develop technology; Solve a specific problem

*Results*: The challenge received 740 entries and awarded 29 winners a total of $42,000. The output of the project is hosted on GitHub[157]. While CMS released two mobile apps to the public, the results of the challenge were also used for idea generation and to inform other work being done in parallel. Because the challenge was run during the infancy of the Open Payments program, CMS could still use the NASA challenge product to develop future technologies.

### III.   NIH Breast Cancer Startup Challenge (BCSC)[158]

Summary: The co-development or licensing of federal inventions face unique and complex challenges on the path to commercialization. While mechanisms and tools exist within NIH to enable collaborative research or to license technology to existing businesses, many technologies, particularly in the health care field, are early stage and best suited for start-ups to license and further develop into commercial products. The BCSC planning team was comprised of the National Cancer Institute Technology Transfer Center, the Center for Advancing Innovation and the Avon Foundation for Women. Breast cancer-related inventions were selected based on their commercial viability and suitability to be launched into a startup. This new program is designed to create start-up companies based on Federally-conceived and owned inventions who will move them forward toward commercialization.

The primary goals of the Challenge are to accelerate the process of bringing emerging breast cancer technologies to market, and to stimulate the creation of start-up businesses

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[157] https://github.com/nasa/CoECI-CMS-Open-Payment

[158] Challenge Website: http://www.breastcancerstartupchallenge.com/

around these inventions. The Challenge represents an innovative approach to moving NIH discoveries to market and is the first program focused on the creation of start-ups. The desired outcome was the creation of startup companies, who secure funding and negotiate a license to the associate technology from the NIH. NIH believes this new program provides such inventions a new and alternate way to reach the market and thereby benefit public health.

*Solution Type*: Ideas; Business Plans

*Primary Goals*: Find and highlight innovative ideas; Solve a specific problem; Advance scientific research; Engage new people and communities; Build capacity; Stimulate a market

*Results*: More than 200 teams expressed interest in challenge, 46 teams were accepted into the competition and the 12 winning teams were awarded a total of $50,000. In addition, winners were offered support from NIH and the Center for Advancing Innovation to advance their submitted business plans and develop 10 early stage cancer intervention technologies that will impact the fight against breast cancer. The 11 new startups created by the teams will also help create new jobs.

The Challenge turned an existing business plan competition model on its head to create a new channel to license inventions by crowdsourcing brilliant talent from around the world to create new startups. The challenge also represents a new model for efficient venture philanthropy for Avon Foundation – with the equivalent of one grant, Avon Foundation pushed forward 10 inventions. Finally, the Challenge engaged nearly 300 post-doctoral fellows, graduate students, and undergraduate students and provided them with entrepreneurship training and experience in the "business of science."

### IV.    NIH Neuro Startup Challenge (NSC)[159]

Summary: Neurology represents the third most common category of drugs in preclinical development and Phase III trials[160], and 84% of New Molecular Entity (NME)-focused development activities are for first-in-class medicines in neurology. Despite the significant preclinical and clinical development activity, neurological disorders can be attributed with

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[159] Challenge Website: http://www.neurostartupchallenge.org/

[160] http://www.phrma.org/sites/default/files/pdf/2013innovationinthebiopharmaceuticalpipeline-analysisgroupfinal.pdf

growing death rates and disability-adjusted life years (DALYs[3]) and cost the U.S. more than $760 billion a year[161].

Several pharmaceutical firms have abandoned or restructured their central nervous system (CNS) programs due to costly, long development timelines and high failure rates[162]. So, who are taking on these worthy battles in neurology? The small biotechs. Given that Neuroscience makes up the fifth largest category of NIH funding,[163] there is a very rich pool of inventions that can be advanced into commercial products to address unmet neurological disorders. The Neuro Startup Challenge was launched to crowdsource startups to advance the most commercially viable neurology-related NIH inventions.

The NSC is the second challenge of its kind, and is modeled on the framework created by the Breast Cancer Startup Challenge (BCSC). Launched in September 2014, the NSC is centered around 16 unlicensed brain-related inventions from multiple NIH institutes. In this latest challenge, 61 teams comprised of graduate-level medical and business students and postdocs, as well as seasoned entrepreneurs, were accepted into the competition to create strategic business plans and launch startups to develop and commercialize the selected inventions. The Center for Advancing Innovation (CAI) is continuing its partnership role with NIH Technology Transfer in this new challenge, and Heritage Provider Network is engaged as the philanthropic partner.

Similar to the BCSC, the primary goals of the NSC are to accelerate the process of bringing emerging federal technologies to market, and to stimulate the creation of start-up businesses around the selected inventions. The Challenge represents a new way to move NIH discoveries to market and thereby benefit public health. In addition, it is providing an excellent platform to help postdocs and graduate students learn "the business of science" providing an opportunity to help train and motivate the next generation to meet NIH's mission.

The NSC is different than its predecessor in several major ways given the lessons learned from the BCSC:

- Expanded the number of judges and advisors - 147 judges and advisors from around the world in every major neuroscience area and discipline, e.g., legal, business, venture, etc.

- Increased the number of classes being taught – 40 classes are offered for the NSC versus 12 for the BCSC; the range of classes are broader as well to include basic

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[3] http://www.who.int/mental_health/neurology/chapter_2_neuro_disorders_public_h_challenges.pdf?ua=1

[161] http://www.brainfacts.org/policymakers/global-burden-of-neurological-and-mental-disorders/

[162] https://www.incresearch.com/sites/default/files/news/INC%20Research%20news%20item%20-%20therapeutic%20insights%20February%202014.pdf

[163] The Center for Advancing Innovation analysis of http://report.nih.gov/categorical_spending.aspx

business principles as well as specifics of launching a biotech startup such as valuation, R&D strategy, patent strategy, commercialization/market strategy, etc.

- a public voting and crowdsourcing platform was established to allow teams to receive constructive feedback on their elevator speeches

*Solution Type*: Ideas; Business Plans

*Primary Goals*: Find and highlight innovative ideas; Solve a specific problem; Advance scientific research; Engage new people and communities; Build capacity; Stimulate a market

*Results:* As of March 2015, the challenge is in progress. To date, 61 teams competed in Phase 1, the Elevator Speech phase, producing two-minute elevator speeches (videos) outlining their technology and potential startup. The videos were posted on www.neurostartupchallenge.org for evaluation by the public and by the Challenge judges[164]. On January 23, 2015, 55 Finalists were announced, and have moved on to Phase 2 of the competition, the Business Plan phase. In the Business Plan phase, the Finalists are developing a 10-page business plan, a supporting financial model, and a 10-minute live pitch to the judges. Winners of Phase 2 will be announced in May of 2015.

## F.    Department of Homeland Security

### I.    TSA New Bag Tracking and/or Tagging for Risk Based Security of Checked Baggage Screening[165]

Summary: Risk Based Security (RBS) includes multiple security layers, and one such area is the screening of checked baggage. TSA currently devotes extensive resources towards screening over 1.1 million bags daily within the United States and is always exploring opportunities to introduce efficiencies. TSA currently can designate a passenger as low risk which can be encoded in that passenger's boarding pass and used to determine which type of checkpoint screening that passenger will receive (standard, TSA Pre✓ ®, etc.).

TSA is looking for new and innovative means to associate an individual's screening designation with their checked baggage within a Checked Baggage Inspection System (CBIS) environment. This may include securely encoding some form of media, bag tag, or other data exchange method. The passenger's screening designation has to be reliably

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[164] https://www.youtube.com/playlist?list=PLPTlbubazQb2U2df8gLxgRPKgkV5OJZfn

[165] Challenge Website: https://www.innocentive.com/ar/challenge/9933342

interpreted by automated means as the bag travels through the baggage handling and security process. This challenge is being run on InnoCentive.

The results of this challenge will hopefully provide TSA with new ideas on how to accomplish passenger risk score transfer and RBS implementation within a CBIS environment. TSA is open to ideas focusing on improving the entire process, or individual elements within the process.

*Solution Type*: Ideas

*Primary Goals*: Solve a specific problem

*Results*: The challenge garnered much media attention, and TSA had 361 active registered solvers and received 62 submissions upon challenge completion. The prize was awarded in the amount of $15,000, split between two solvers.

### II.    TSA Next Generation Design and Queue Model[166]

<u>Summary</u>: TSA Pre✓ ® is an expedited screening program that allows low-risk travelers to experience expedited, more efficient security screening. TSA Pre✓ ®provides a quicker transit through the airport security screening as TSA Pre✓ ® passengers do not require the removal of shoes, 3-1-1 compliant liquids, jacket, belt, and may keep their laptop in bag for screening.

As TSA Pre✓ ® continues to expand, current queue layouts at TSA Pre✓ ® airports will need to adapt to support the increasing population of TSA Pre✓ ® - passengers. TSA is looking for the Next Generation Checkpoint Queue Design Model to apply a scientific and simulation modeling approach to meet queue design and configuration needs of the dynamic security screening environment with TSA Pre✓ ® .

The Challenge is to provide a simulation modeling concept that can form the basis to plan, develop requirements, and design a queue appropriately to support an increase in TSA Pre✓ ® passengers. The concept will be used to develop a model to be applied in decision analysis and to take in considerations of site specific requirements, peak and non-peak hours, flight schedules and TSA staffing schedules. Solvers are expected to provide the concept and provide evidence that the modeling concept works as described in the requirements. The Challenge is being run by InnoCentive.

*Solution Type***:** Ideas; Analytics, visualizations, and algorithms

*Primary Goals*: Solve a specific problem

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[166] Challenge Website: https://www.innocentive.com/ar/challenge/9933343

*Results*: The challenge garnered much media attention, and TSA had 5,533 active registered solvers and received approximately 1,378 submissions upon challenge completion, breaking the InnoCentive record for the most submissions and the most project rooms opened. The prize was awarded in the amount of $15,000, split between three solvers. .

## G.  Department of Justice

### I.  NIJ Delivering Mission Critical Voice Communications for Law Enforcement and Public Safety Responders in the COTS LTE Environment[167]

Summary: Increased access to mobile broadband services is vital to law enforcement and other public safety responders since it offers the potential for greater efficiencies and new capabilities in day-to-day operations, response to critical incidents, and management of major events. Recognizing the potential offered by broadband communications to enhance public safety, Congress directed the establishment of a nationwide, interoperable public safety broadband network in the Middle Class Tax Relief and Job Creation Act of 2012. The FCC required that all networks deployed in the 700 MHz public safety broadband spectrum adopt the Long-Term Evolution (LTE) standard.

NIJ seeks innovative solutions for providing mission-critical voice communications services for law enforcement and other public safety responders within Environment using commercial-off-the-shelf (COTS) technology. The solutions must be achievable within five years of the Challenge prize being awarded. For purposes of this Challenge, this capability is defined as instant communications with a defined set of mobile users either in a 'one-to-all,' 'one-to-some' or 'one-to-one' mode based on the supervisory responsibility of the user and/or the urgency of their need (e.g., threats to life, mission criticality) for access.

Entries must be made through the Office of Justice Programs Grants Management System (GMS).

*Solution Type*: Technology demonstration and hardware

*Primary Goals*: Solve a specific problem; Develop technology

*Results*: Although final award decisions have not been made, the experience of operating Challenge has had positive benefits for the agency. This Challenge augments NIJ's grant-making activities, providing an opportunity to cast a wide net to determine with only a

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[167] Challenge website: http://nij.gov/funding/pages/fy13-comms-challenge.aspx

modest investment whether a more substantial investment is warranted. In addition, NIJ learned a great deal about how to structure future Challenge evaluation and judging criteria and will apply these lessons in any future Challenges.

## II.    NIJ Randomized Controlled Trial Challenge in Criminal Justice Agencies[168]

Summary: NIJ was created in 1968 to facilitate research and scientific inquiry that would help state, local and tribal governments address crime problems and challenges in the American criminal justice system. Of the various scientific methods of inquiry available, randomized controlled trials (RCTs) have the greatest likelihood of producing sound evidence because of the ability of random assignment to isolate a specific treatment of interest from all of the other factors that influence any given outcome. However, the criminal justice system has been slow to adopt RCTs and could do more with RCTs to determine whether a strategy or intervention makes a meaningful difference.

This challenge calls for timely and innovative RCTs that address meaningful criminal justice problems. The NIJ Randomized Control Trial Challenge hopes to create incentives for criminal justice agencies to use low-cost RCTs as a standard and straightforward approach to answering their questions and conducting their day-to-day business operations. NIJ strongly encouraged potential contestants to establish partnerships with independent researchers or research agencies/institutions to obtain support to use rigorous research methods. The winner of the Challenge will be the first contestant to complete five RCTs successfully.

*Solution Type*: Ideas

*Primary Goals*: Find and highlight innovative ideas; Engage new people and communities; Improve government service delivery

*Results*: Results cannot yet be reported as this challenge is still ongoing and in the early stages. The challenge is intended to draw interest from a variety of agencies in the criminal justice system including policing, courts, corrections, parole and probation. NIJ is pleased with the number and quality of applications received thus far, and has seen interest from a number of these agency types. The marketing strategy for the RCT Challenge is therefore considered a success.

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[168] Challenge website: http://nij.gov/funding/pages/rct-challenge.aspx

### III. NIJ SORNA Challenge: Developing Strategies to Measure the Implementation Costs and Public Safety Benefits of the Sex Offender Registration and Notification Act[169]

Summary: To improve the effectiveness of sex offender registration and notification programs in the United States, Congress passed the Sex Offender Registration and Notification Act (SORNA) as part of the Adam Walsh Child Protection and Safety Act of 2006 (Public Law 109-248).

NIJ's SORNA Challenge seeks creative and innovative research strategies for future researchers to use when studying (1) the implementation costs associated with complying with SORNA and/or (2) SORNA's public safety benefits (examples include, but are not limited to, the Act's general and specific deterrent effects, its effect on law enforcement's ability to prevent crime, and its effect on the public's ability to protect itself).

Empirical research on sex offenders has grown over the past decade, but no study to date has examined the multifaceted effects of SORNA, specifically the wide range of costs that have been or may be incurred in implementing SORNA, or the public safety benefits achieved with SORNA compliance. This Challenge seeks to advance the sex offender research literature by developing a comprehensive strategy for further research measuring SORNA's costs and public safety benefits. It provides an opportunity for practitioners and researchers to think creatively about how broadly to define, operationalize and ultimately measure those costs and benefits.

*Solution Type*: Ideas; Scientific

*Primary Goals*: Advance scientific research

*Results*: Soliciting research strategies to assess SORNA through a challenge competition was an exploratory undertaking – at low cost – to test whether the challenge method was another option for cultivating sound research proposals. There were fifteen submissions to the SORNA Challenge. Based on the number of submissions to the challenge, NIJ feels the marketing strategy was successful. Though some promising proposals were submitted to the challenge, the best ones were clearly cost-prohibitive and not feasible, and no awards were made.

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[169] Challenge Website: http://nij.gov/funding/Pages/fy13-sorna-challenge.aspx

### IV.     NIJ Ultra-High Speed Apps: Using Current Technology to Improve Criminal Justice Operations[170]

Summary: The expansion of ultra-high speed (UHS) networks offers increased opportunity for the development of "disruptive" criminal justice apps – apps that actually change the way services and information are delivered to criminal justice and other public safety practitioners. New UHS apps now have the potential to provide ubiquitous, real-time, individually tailored information and decision-support for criminal justice and public safety practitioners in rapidly evolving emergency situations. The increased capacity of UHS systems now makes it possible to merge and manipulate data, allowing for the development and use of powerful analytical and management tools.

Through this Challenge, NIJ seeks to encourage the development, use, and evaluation of UHS apps capable of improving criminal justice and public safety efficiency and/or effectiveness; and develop models for measuring and quantifying the specific impact of these apps. It is anticipated that this Challenge will help to accelerate the development and deployment of UHS applications in other fields.

Entries were made through the Office of Justice Programs Grants Management System (GMS).

*Solution Type*: Software and apps

*Primary Goals*: Improve government service delivery

*Results*: A winner has not yet been announced for this challenge. NIJ received 15 proposals from which five contestants (three companies and two cities) were selected to compete in Phase II to develop a working prototype of their proposed app. These contestants demonstrated the potential for measurably improving services and operations in areas such as school safety, crime mapping, video technology, and data streaming.

## H.     Environmental Protection Agency

### I.     Algal Bloom Photo Contest[171]

Summary: The Algal Bloom Photo Contest asked for photos of algal blooms where people lived, vacationed, or recreated. Algal blooms can occur in water bodies as small as a neighborhood pond and as big as the Gulf of Mexico. When algae grow out of control in US waters, the result can be unappealing, harmful to American health and harmful to the

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[170] Challenge Website: http://nij.gov/funding/pages/fy13-ultra-high-speed-apps-challenge.aspx

[171] Challenge Website: http://neefusa.org/algalbloomcontest

environment. The submissions are intended to build a photo library that can be used for education to illustrate the prevalence and impacts of algal blooms.

*Solution Type*: Creative (design & multimedia)

*Primary Goals*: Inform and educate the public; Engage new people and communities

*Results*: The photo contest was successful in that it attracted 140 photo submissions from people from all walks of life, demonstrating the occurrence of algal blooms in different aquatic and community settings. These photos came from 27 states, Washington D.C., Guam, and China, leading to a diverse portfolio of algal blooms and the environments they impact. The submitted photos created a photo library of algal blooms to be used in future education and outreach material to help illustrate the prevalence and impacts of algal blooms around the country. Although only 3 winners had to be chosen, all of the photos showed extraordinary examples of how algal blooms not only effect water quality, but also recreational use and wildlife.

Wining photos were taken in Overbrook, Kansas; New York, NY's Central Park; Lake Hodges in Southern California. These are locations where blue-green algal bloom events have made recreation areas less picturesque, caused fish kills that leave locals with nothing to fish, or affected bodies of water that supply drinking water. The first prize winner received a Digital SLR Camera and had their photo featured on the NALMS Lakeline Magazine Cover. The second prize winner received a camera at a retail value of $350, and the third place prize winner received a gift card at retail with value of $100.

Some of the photos will be used in a photo-based social media campaign EPA is preparing for summer 2015 to continue to raise public awareness about algal blooms and nutrient pollution.

### II.     Campus RainWorks Challenge[172]

Summary: EPA invites student teams to design innovative green infrastructure projects for their campus to show how managing stormwater at its source can benefit the campus community and the environment. While single-purpose "gray" stormwater infrastructure (e.g. catch basins, pipes, and ponds) is largely designed to move urban stormwater away from the built environment, green infrastructure uses vegetation and soil to manage rainwater where it falls. By weaving natural processes into the built environment, green infrastructure can provide not only stormwater management, but also heat island mitigation, air quality management, community amenities, and much more. The Campus

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[172] Challenge Website: http://water.epa.gov/infrastructure/greeninfrastructure/crw_challenge.cfm

RainWorks Challenge is designed to encourage college and university students to become part of these solutions.

*Solution Type*: Creative (design & multimedia); Ideas

*Primary Goals*: Find and highlight innovative ideas; Inform and educate the public; Engage new people and communities

*Results*: There were 64 entries. The competition highlights ideas from students that EPA might not otherwise engage, and encourages implementation of green infrastructure while emphasizing the importance of water quality. In addition, the competition speaks directly to Administrator McCarthy's theme of "making a visible difference in communities."

### III.    Challenging Nutrients Ideation Competition[173]

Summary: Nutrient pollution is one of America's most widespread, costly, and challenging environmental problems. Finding a solution to this problem is critical to preserving aquatic ecosystems and ensuring drinking water quality. EPA and fellow collaborators sought to identify bold and innovative, ideas leading to a fundamental change in the way we manage or recover nutrients. Innovators from across the world were asked to provide ideas for innovative solutions to nitrogen and phosphorus recovery and management.

A key consideration for this Challenge was to address barriers to implementation of the proposed solutions. This prize was part of a broader effort by the Challenging Nutrients Coalition, a group of Federal agencies, universities, and non-profit organizations dedicated to spurring innovation for the development of a suite of sensors to measure nutrients on land and in water. The prize was operated on InnoCentive.

*Solution Type*: Ideas

*Primary Goals*: Find and highlight innovative ideas; Engage new people and communities

*Results*: There were 67 entries, from which 3 winners were chosen and awarded a total of $15,000. Winners of this coalition-led prize came from state governments and the private sector. They created a data-based decision-support tool, a proposal for a real-time nutrient management system, and a proposal for an incentive for farmers to manage nutrients.

The prize directly supports the EPA Administrator's themes of "Protecting Water: A Precious, Limited Resource" and "Addressing Climate Change and Improving Air Quality."

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[173] Challenge Website: https://www.innocentive.com/ar/challenge/9933112

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## IV.  "Climate Change in Focus" student video contest[174]

Summary: Students will use scientific data to help create a 30-120 second video that answers these two questions: Why do you care about climate change? How are you reducing carbon pollution or preparing for the impacts of climate change?

*Solution Type*: Creative (design & multimedia)

*Primary Goals*: Inform and educate the public; Engage new people and communities

*Results*: There were 143 entries, with 3 winners announced and awarded toys that either produce energy through kinetic use or use solar energy to charge devices. In addition, the first 100 students who entered received a subscription to National Geographic Kids magazine.

The competition allowed EPA to partner with a major education foundation (the National Environmental Education Foundation) to provide prizes that can engage middle school students in learning about climate change.

## V.  Cyano Predictive Modeling & Mobile App Challenge[175]

Summary: One of the EPA's great concerns is the proliferation of cyanobacterial harmful algal blooms (HABs) in the nation's lakes. The TopCoder project on HABs aims to develop an algorithm that will be deployed in an Android app with mapping and data visualization capabilities. The app will inform local and Federal policy makers about locations where bloom events are likely to occur, up to 30 days in advance of previously available satellite observation, allowing them to concentrate their efforts in those areas. The app is also required to display water quality/color data and the predictive modeling outputs for cyanobacteria predictions in a visually appealing manner.

This challenge was conducted in partnership with the NASA Center of Excellence for Collaborative Innovation.

*Solution Type*: Software and apps; Analytics, visualizations, and algorithms

*Primary Goals*: Improve government service delivery; Solve a specific problem; Develop technology (mobile app)

*Results*: The TopCoder platform allowed EPA to break a complex problem into many component parts, and then come out at the end with a functional product – in this case, a mobile app that displays water quality information. EPA could not have accomplished this on its own at a high level in the same time frame / resource allocation.

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[174] Challenge Website: http://www.epa.gov/climatestudents/contest.html

[175] Challenge Website: http://www.topcoder.com/epa/challenge-details

More than 700 people registered for the challenge, at least 200 participated, and more than 27 winners will be announced. The final results (an algorithm integrated with the mobile app) will be released in spring 2015. The challenge fits with two of EPA Administrator McCarthy's major themes for her administration – protecting water and addressing climate change.

### VI.    GameDay Recycling Challenge[176]

Summary: The GameDay Recycling Challenge is a friendly competition for colleges and universities to promote waste reduction at their football games. During the challenge, colleges and universities implement waste reduction programs during home football games. To participate in the GameDay Recycling Challenge, schools need to track the quantity of recyclables, organic food waste and trash generated at one or more regular season home football games. Following that game, schools will report quantities of each material type.

*Solution Type*: Other (Waste Reduction)

*Primary Goals*: Inform and educate the public; Engage new people and communities; Solve a specific problem

*Results*: This challenge was operated in collaboration with three non-profit organizations (College and University Recycling Council, RecycleMania, and Keep America Beautiful). EPA recognizes the winners and provides technical assistance, while the non-profit partners maintain the challenge website, review the data and identify winners. As the Agency leveraged existing initiatives (WasteWise and Food Recovery Challenge) to promote participation, few Agency resources were required. There is no monetary prize.

91 schools, representing over 30 athletic conferences, engaged their fans to accept the Challenge. These participants recycled or reused 1,098 tons of bottles, cans, paper, cardboard, food scraps, and other recyclables, resulting in a reduction of 3,358 metric tons of greenhouses gases emitted. This is equivalent to the annual greenhouse gas emissions from 707 passenger vehicles, or the emissions produced by the annual electricity use of 306 households. Two national winners were named, and 4 winners were named in each of the 11 conferences/divisions. More information about results[177] and winners[178] can be found on the challenge website.

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[176] Challenge Website: http://gamedaychallenge.org/

[177] http://gamedaychallenge.org/wp-content/uploads/2012/09/FINAL-GDRC-Results-Press-Release-1-20-15.pdf

[178] http://gamedaychallenge.org/participating-schools/2014-results/

These results fit with EPA Administrator Gina McCarthy's theme of "Working Toward a Sustainable Future."

## VII.    National Aquatic Resource Surveys Campus Research Challenge[179]

Summary: The National Aquatic Resource Survey (NARS) Campus Research Challenge gives undergraduate and graduate students the opportunity to use NARS data to conduct scientific research and analysis. The challenge applicant will identify one or more key and innovative questions or hypotheses and will use the NARS data, along with other relevant information such as landscape information, human disturbance information, economic or other social information to address the selected question or hypotheses.

This challenge is intended to encourage external, innovative research and information development that supports enhanced water management at multiple scales.

*Solution Type*: Scientific

*Primary Goals*: find and highlight innovative ideas; advance scientific research; Engage new people and communities

*Results*: 24 entries have been received so far, and final results will be announced summer 2015. The total prize purse is $50,000, and winners will be given the opportunity to speak on NARS webcasts and at NARS events. This competition fits with the EPA Administrator's themes of "Launching a New Era of State, Tribal and Local Partnerships," "Making a Visible Difference in Communities," and "Protecting Water: A Precious, Limited Resource."

## VIII.    National Radon Poster Contest[180]

Summary: Students from across the country are encouraged to learn about radon and its effects, and submit a poster describing what they learned for a national contest. The contest is intended to engage new people and communities to test homes for radon, mitigate if high radon levels are found, and save lives from radon-induced lung cancer.

*Solution Type*: Creative (design & multimedia)

*Primary Goals*: Engage new people and communities

*Results*: There were 3500 submissions, and 88 winners across the state and national competitions. The 10 national winners received $3000 total. This was the final year for the

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[179] Challenge Website: http://water.epa.gov/type/watersheds/monitoring/nars-challenge.cfm

[180] Challenge Website: http://sosradon.org/poster-contest

National Radon Poster Contest, and during the past 9 years, it has educated thousands of students about the dangers of radon in their homes. The contest relates to EPA Administrator McCarthy's theme of Making a Visible Difference in Communities.

## IX.    Presidential Green Chemistry Challenge – 2014[181]

Summary: The Presidential Green Chemistry Challenge Awards promote the environmental and economic benefits of developing and using novel green chemistry. These prestigious annual awards recognize chemical technologies that incorporate the principles of green chemistry into chemical design, manufacture, and use. Program award winners have significantly reduced the hazards associated with designing, manufacturing, and using chemicals.

*Solution Type*: Nominations

*Primary Goals*: Other (Recognize successful innovations)

*Results*: The 98 winning technologies from the 19 years of the awards program have eliminated billions of pounds of hazardous waste, and saved billions of gallons of water. From 62 nominations, 5 further winners were announced in 2014 and recognized at an annual awards event.

## X.    Real-Time Sensor to Monitor Sewer Overflows[182]

Summary: In periods of rainfall or snowmelt, wastewater volume in a combined sewer system can exceed the capacity of the sewer system or treatment plant. Combined sewer systems are designed to overflow occasionally and discharge excess wastewater directly to nearby streams, rivers, lakes, or estuaries. Every year, combined sewer overflows (CSOs) release about 850 billion gallons of untreated sewage and stormwater into lakes, streams, and rivers across the United States. A key to reducing sewer overflows in urban areas is the ability to effectively collect real-time information from these locations. The lack of cost-effective technologies to monitor such overflows often makes data collection efforts in these areas inefficient and ineffective.

The U.S. Environmental Protection Agency (in partnership with Cincinnati Innovates, and with the technical help of Cincinnati Metropolitan Sewer District and Sanitation District No.1 of Northern Kentucky), asked solvers for a design of an efficient, low-cost and low-

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[181] Challenge Website: http://www2.epa.gov/green-chemistry/information-about-presidential-green-chemistry-challenge
[182] Challenge Website: https://www.innocentive.com/ar/challenge/9933103

maintenance real-time sensor to monitor sewer overflows and provide characterization of wet-weather impacts on urban sewers.

*Solution Type*: Technology demonstration and hardware

*Primary Goals*: Find and highlight innovative ideas; Develop technology; Engage new people and communities; Solve a problem

*Results*: The competition attracted 588 solvers from around the world. Solutions were submitted from 56 people. The winning solutions came from India (winner) and the USA and Canada (runners up). The two partnering local utility districts have expressed interest in testing the prize-winning ideas identified by the competition.

## XI.     ToxCast Challenge[183]

Summary: People are exposed to many artificial chemicals throughout their lives, some of which can be toxic. The term "systemic toxicity" is often used because the effects of toxic chemicals can occur in different organ systems such as the liver, kidney, lungs, or reproductive system. The systemic Lowest Effect Level or LEL is the lowest dose that shows effects in animal toxicity tests. Ideally, every chemical to which we are exposed would have a well-defined LEL. However, the full battery of animal studies required to estimate the LEL costs millions of dollars and takes many months to complete. As a result, thousands of chemicals lack the required data needed to estimate an LEL. To help fill this gap, EPA has screened nearly 2,000 chemicals across a battery of more than 700 biochemical and cell-based in vitro assays to identify what proteins, pathways, and cellular processes these chemicals interact with and at what concentration they interact.

EPA seeks solutions that will help predict a chemical's LEL, using a combination of key in vitro assays, chemical properties, and/or structural descriptors that quantitatively predict a chemical's systemic LEL derived from in vivo toxicity tests.

EPA partnered with the NASA Center of Excellence for Collaborative Innovation to operate this challenge.

*Solution Type*: Ideas; Analytics, visualizations, and algorithms

*Primary Goals*: Find and highlight innovative ideas; Advance scientific research

*Results*: The challenge used both Innocentive, for ideation, and TopCoder, to build the desired product. For the InnoCentive competition, the prize was an effective way to generate solutions that EPA might not have otherwise encountered. There were 153 entries

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[183] Challenge Website: https://www.innocentive.com/ar/challenge/9933111 and
http://www.topcoder.com/epa/toxcast/

and 2 winners, who were awarded a total of $10,000. For TopCoder, the challenge gave EPA access to some of the best computer programmers who could bring their expertise to the field of chemistry. For this phase, there were 436 entries and 5 winners were awarded a total of $20,000.

The TopCoder challenge developed an algorithm based on data provided by the EPA to help predict a chemical's "systemic lowest effect level" from a traditional animal toxicity study. EPA is working to integrate the solutions into agency work and the results were presented at two data summits organized by EPA to showcase the LEL data[184]. Both challenges speak to the EPA Administrator's theme of "Taking Action on Toxics and Chemical Safety."

## XII.    TRI University Challenge[185]

Summary: Every year, thousands of U.S. manufacturing facilities submit reports on their waste management practices of certain toxic chemicals, including the release of those chemicals into the environment. The TRI Program makes these data available to everyone through a variety of online reports, search tools and applications.

In February 2014, TRI challenged the academic community to find innovative and creative uses of TRI data and related information to promote more informed decision-making and action on the part of communities, manufacturers, and government. The 2014 TRI University Challenge aims to increase awareness of the TRI Program and data within academic communities; expose students to TRI data, tools, and analysis; and generate innovative programs, activities, recommendations, or research that improve the accessibility, awareness, and use of TRI data.

*Solution Type*: Scientific

*Primary Goals*: Find and highlight innovative ideas; Advance scientific research; Engage new people and communities

*Results*: Six proposals were selected from 11 entries. The winning academic partners received direct support from EPA subject matter experts on their projects, opportunities to participate in webinars or in-person events with the other partners, and practical experience working with a Federal agency – which is particularly useful for students building a resume. Previous projects have yielded deliverables that the schools have made available to the public for use in other research projects, such as GIS tutorials posted on YouTube,

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[184] https://sites.google.com/site/toxcastworkshoprtp/;
https://sites.google.com/site/toxcastdatasummit/agenda

[185] Challenge Website: http://www2.epa.gov/toxics-release-inventory-tri-program/2014-tri-university-challenge

high school and college curricula that incorporate TRI, and a merged database that combines TRI data with health data.

## I.     Intelligence Advanced Research Projects Activity

### I.     Investigating Novel Statistical Techniques for Identifying Neural Correlates of Trustworthiness (INSTINCT)[186]

Summary: How do you know if you can trust someone?

In 2010, IARPA launched its TRUST (Tools for Recognizing Useful Signals of Trustworthiness) program to advance understanding and assessment of trust and trustworthiness under realistic conditions. Research conducted by IARPA-funded teams during the first phase of the TRUST program resulted in large amounts of neural, physiological, and behavioral data from interactions between informed volunteers. Preliminary analyses suggested that signals collected from one person might have untapped potential to predict trustworthiness in others. However, many possible analytic routes and techniques were available, and it was not a priori obvious which would be appropriate to pursue.

The INSTINCT challenge asked members of the American public to develop algorithms that improved predictions of trustworthiness using neural, physiological, and behavioral data recorded during experiments in which volunteers made high-stakes promises and chose whether or not to keep them. Determining trustworthiness is essential for society in general—but particularly so in the Intelligence Community (IC), where knowing whom to trust is often vital.

This challenge was operated on the InnoCentive platform.

*Solution Type*: Analytics, visualizations, and algorithms

*Primary Goals*: Solve a specific problem; Advance scientific research; Find and highlight innovative ideas; Engage new people and communities

*Results*: One winner was named from 39 entries, and awarded $50,000. The winning team connected focused expertise with broader interdisciplinary interests in neuroscience, data, and engineering. The application of the winning techniques to behavioral prediction was novel, improved on IARPA's baseline analysis of the data, and will help IARPA to more

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[186] Challenge Website: http://www.iarpa.gov/index.php/working-with-iarpa/prize-challenges/218-instinct-iarpa-s-trustworthiness-challenge

appropriately follow up on TRUST program results. IARPA and the Air Force Research Lab are working with the winning team on publication of their results

 The challenge attracted significant attention, and IARPA has continued to receive interest in working with the data set following challenge close. This has led to exploration of new ways to make such data open to public analysis, and of venues and techniques for sharing large multimodal data sets that include neurophysiological components. It has also helped to jump start IARPA's use of challenge techniques, with the ASPIRE speech recognition challenge currently under way and other challenges in the planning or consideration stage. INSTINCT also sought to increase wider awareness of the kind of high-risk, high-payoff research questions and approaches that fall under IARPA's mission.

## J.    National Aeronautics and Space Administration

### I.    Asteroid Data Hunter Challenge[187]

Summary: The Asteroid Data Hunter Challenge is the first open innovation project to be conducted in support of NASA's Asteroid Grand Challenge: to find all asteroid threats to human populations and determine what to do about them. The results of the Asteroid Data Hunter Challenge were intended to provide new algorithms to increase the ability to detect asteroids from imagery captured by ground-based telescopes, such as the Catalina Sky Survey (CSS).

NASA partnered with Planetary Resources, Inc to conduct a series of challenges on TopCoder to develop a more computationally efficient, general purpose algorithm to detect moving objects using CSS data – specifically, to increase the detection sensitivity, minimize the number of false positives, ignore imperfections in the data, and ensure that the algorithm can run effectively on all computers. The challenge evolved to include the development of a software application that is so easy that citizen scientists, hobbyist astronomers and even professional organizations/institutions will want to download it. Thus the challenge both sought to provide both scientific value to the asteroid detection community as well as a tool for citizen scientists to use to practically help with asteroid detection.

*Solution Type*: Analytics, visualizations, and algorithms; Scientific

*Primary Goals*: Solve a specific problem; Advance scientific research; Develop technology

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[187] Challenge Website: https://www.topcoder.com/asteroids/asteroiddatahunter;
https://www.challenge.gov/list/?ag=National Aeronautics and Space Administration

*Results*: The challenge had 1268 participants who submitted 700 solutions. Results are still being verified, and the software application is in final development. $55,000 will be provided in prize money.

The algorithm developed as a result of the challenge has resulted in a definite improvement in the number of asteroids identified in the main belt and represent a real opportunity to identify more asteroids in the CSS data. The software release will occur in the first quarter of calendar year 2015 and will provide amateur astronomers with access to new tools in the asteroid hunting arsenal.

The results of this challenge continue to support the use of crowd-sourced algorithms to advance NASA's image processing capabilities as well as the continued use of open innovation in support of the Asteroid Grand Challenge.

## II. Asteroid Tracker Challenge[188]

Summary: The Asteroid Data Hunter Challenge is the second open innovation project to be conducted in support of NASA's Asteroid Grand Challenge. Near Earth Object (NEO) detection and characterization is a critical need for NASA and the United States. NASA has been directed by Congress to develop capabilities to observe, track and characterized NEOs and other deep space objects that could pose a threat to the Earth. As a result, NASA is developing concepts for a highly capable deep space radar array consisting of sets of commercially available monolithic antennas.

One of the challenges faced by NASA is determining the optimum selection of individual antennas within the array for a given track observation. This is a complex analysis and goes directly to development of the concept of operations and cost of operations (in terms of maintenance and total capacity required).

The Asteroid Tracker Challenge, operated on TopCoder, tasks competitors to develop optimization algorithms for tracking NEOs using monolithic radar arrays. Optimizing the use of an array of radar dishes when tracking NEOs from the time they become visible over the horizon till the point at which they cease to be visible will allow scientists to gather information from each object such as composition and spin rate, among other properties.

*Solution Type*: Analytics, visualizations, and algorithms

*Primary Goals*: solve a specific problem; engage and educate the public

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[188] Challenge Website: http://www.topcoder.com/asteroids/tracker/;
https://www.challenge.gov/list/?ag=National Aeronautics and Space Administration

*Results*: There were 390 entries, and 9 winners were awarded $36,886 in total. The challenge resulted in an algorithm[189] that performs very well under a robust variety of conditions. While there are no formal estimates of what NASA would have spent to develop this capability in-house, it is safe to assume that it would have taken 1-2 FTE which would have been many times the cost of this challenge. Furthermore, since Appirio-Topcoder has access to some of the top algorithm developers in the world, the in-house result would likely have been a less effective algorithm. A follow on challenge to optimize placement of dishes in an array is under consideration.

### III.    CubeSat Launch Initiative Poster and Flyer Design Challenge [190]

Summary: This challenge was to design a poster and a flyer that introduces NASA's CubeSat Launch Initiative (CSLI) to high schools, universities and community colleges, and excites them about the potential of building their own mini satellites to launch into space.

The NASA CubeSat Launch Initiative, operated on TopCoder, enables the launch of small research satellites, or CubeSats, that are designed, built and operated by students, teachers and faculty. CSLI provides participants with hands-on flight hardware development experience by giving them access to space to conduct research in the areas of science, exploration, technology development, education or operations.

Since its inception, the initiative has selected over 100 CubeSats from across the United States. The miniature satellites are chosen from among proposers that respond to yearly public announcements. NASA hopes to expand CSLI to include launching 50 small satellites from 50 states within five years

*Solution Type*: Creative (Design & Multimedia)

*Primary Goals*: Inform and educate the public; Engage new people and communities

*Results*: 13 unique designs were obtained, as opposed to one solution created through traditional acquisition channels. 2 winners were named, and awarded a total of $1,250. The winning design is being used by NASA to promote the NASA CubeSat Launch Initiative as part of the 50 CubeSats from 50 states in 5 years campaign.

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[189] https://github.com/nasa/NTL-Asteroid-Tracker

[190] Challenge Website: http://studio.topcoder.com/?module=ViewContestDetails&ct=30040977; https://www.challenge.gov/list/?ag=National Aeronautics and Space Administration

### IV. Disruption Tolerant Networking Challenge Series[191]

Summary: The Disruption Tolerant Networking Challenge Series is a multi-year series of challenges to develop data networking protocols that can extend the Internet into the Solar System. Building on the prototype implementations of the Disruption Tolerant Networking (DTN) protocol suite, these challenges helped improve the security, performance, and application of network protocols that can withstand the time delays caused by the immense distances between planets and the disruptions and non-contiguous paths of the space communications links. The series of challenges included two completed challenges in 2013 and included two additional challenges in 2014 that were conducted through Appirio-TopCoder.

The first challenge to close in 2014 was the Security Key Challenge, which began in 2013. This challenge devised a method by which cryptographic keys can be exchanged among peers in a DTN network suffering from network connectivity disruptions and random topology changes. The second challenge was the Astronaut Email Challenge. This challenge was to develop an email system for astronauts that will use DTN to operate over disrupted or delayed communications links. This challenge was started in 2014 and is currently in progress and planned for completion in the first quarter of 2015. There are also plans to add additional challenges to the DTN suite of challenges during early 2015.

*Solution Type*: Software and apps

*Primary Goals*: Solve a specific problem; Develop technology

*Results*: These challenges are providing cost effective products that NASA can utilize. The Security Key architecture that was completed in 2014 has produced a security architecture that was previously not available – no security organizations had figured out how to do it and it was unclear at the outset if it could be done. NASA considers this to be a considerable achievement and will provide the basis for secure communications in future space communications architectures implemented using DTN. Together, the security key and astronaut email challenges received 93 entries, of which 20 were named winners and awarded a total of $85, 632.

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[191] Challenge Website: http://www.topcoder.com/dtn/; https://www.challenge.gov/list/?ag=National Aeronautics and Space Administration

## V. Earth Science Data OpenNEX Challenge[192]

Summary: NASA launched two challenges to give the public an opportunity to create innovative ways to use data from the agency's Earth Science satellites. Both challenges used the Open NASA Earth Exchange, or OpenNEX, a data, cloud computing, and knowledge platform where users can share modelling and analysis codes, scientific results, information and expertise to solve big data challenges in the Earth sciences. OpenNEX, which is hosted on Amazon Web Services through a NASA Space Act Agreement, provides users with a large collection of climate and Earth Science satellite data sets including global land surface images, vegetation conditions, climate observations and climate projections.

The first challenge focused on gathering new and creative ideas for how to use, visualize, analyze or otherwise utilize the datasets and sought input from climate experts, hobbyists, citizen scientists and all others with ideas for how to use the data to address climate issues. The second OpenNEX Challenge focused on building an application that uses the Climate and Earth Science data in new and creative ways. Challenge participants were encouraged to use the winning ideas from the first challenge, but were not limited to those ideas.

*Solution Type*: Ideas; Software and apps

*Primary Goals*: Engage new people and communities

*Results*: NASA met the goal of engaging new individuals and groups in the use of this high quality imagery: The 59 participants in the ideation challenge represented 13 countries, and the 5 winners were selected from 4 different countries (2 Canada, 1 US, 1 Philippines, 1 Slovenia). For the Build an App challenge, the participants represented 61 countries and 5 winners were selected from 4 different countries (2 Canada, 1 US, 1 Philippines, 1 Slovenia).

The ideas selected for the first challenge were used to support the Build an App challenge. Although the final five applications selected as winners for this challenge were excellent visualization tools, the OpenNEX team determined that the applications were not as strong on scientific merit as they had originally wanted to achieve. Overall the team agreed they learned much as the result of conducting these challenges, and valued the experienced as well as the visibility it brought to the OpenNEX data and capabilities.

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[192] https://www.innocentive.com/ar/challenge/9933584;
https://www.innocentive.com/ar/challenge/9933585; https://www.challenge.gov/list/?ag=National Aeronautics and Space Administration

## VI.     Enterprise Search Portal[193]

Summary: Searching for information is now a critical requirement to accomplish the day-to-day work of NASA employees. As a result, NASA needs the ability to not only search against the regular internet, but also within the NASA intranet (content that is only accessible to NASA users). This challenge was designed to develop the user interface for NASA's Enterprise internet/intranet search portal. This challenge was operated on TopCoder.

*Solution Type*: Software and apps

*Primary Goals*: Solve a specific problem

*Results*: There were 7 entries for this challenge, and 3 winners were awarded $6,395. The competition was successful in meeting the specific Agency need of a low-cost, lightweight development approach for an Enterprise Search Portal User Interface, which is being transitioned for Agency-wide operational use. By using crowdsourcing, NASA's Web Services Team was able to harvest a multitude of interface designs and capture the insight of a diverse group of web developers, thus ensuring a more intuitive interface to accommodate an equally diverse number of end users. Additionally, using crowdsourcing allowed for technically skilled, just-in-time, augmentation that supported the resource-limited NASA development team.

## VII.     Future Engineers 3D Printing Challenge[194]

Summary: The Future Engineers 3D Printing Challenges provide the opportunity for students in Grades K-12 to become the creators and innovators of tomorrow by submitting designs using 3D modeling software. The ability to 3D print in space is a game-changer for space exploration, giving future astronauts on Mars the ability to make whatever they need on demand. That's exactly why NASA is challenging the next generation of explorers to start designing parts for space now. NASA wants students to create and submit a digital 3D model of a tool that they think astronauts need in space. The winner will have their design printed in space on the 3D printer aboard the International Space Station (ISS). The challenge was announced as part of the White House Maker Faire, and is the first in a series of challenges surrounding designing 3D objects for space exploration.

*Solution Type*: Ideas

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[193] Challenge Website: https://www.topcoder.com/challenge-details/30045232/?type=develop&noncache=tru; https://www.challenge.gov/list/?ag=National Aeronautics and Space Administration

[194] Challenge Website: www.futureengineers.org

*Primary Goals*: Inform and educate the public; Engage new people and communities

*Results*: The competition is not yet complete. The submitted ideas are housed on an on-line repository.[195]


### VIII.     Human Exploration Rover Challenge[196]

<u>Summary</u>: The first NASA Human Exploration Rover Challenge, managed by the Marshall Space Flight Center (MSFC), Academic Affairs Office in the Office of Human Capital, was held April 11-12, 2014, at the U.S. Space & Rocket Center in Huntsville, Alabama. More than 600 students participated, comprising 77 teams from 17 states and Puerto Rico, along with 10 international teams from Germany, India, Russia, Canada, and Mexico.

The 2014 Rover Challenge was an engineering design challenge that gives students in high school and college the opportunity to design, construct, and test technologies for mobility devices to perform in extraterrestrial environments, and it provides valuable experiences that engage students in the technologies and concepts that will be needed in future exploration missions. It served as a platform to engage the next generation of researchers in NASA's exploration mission by focusing on NASA's current plans to explore planets, moons, asteroids, and comets. The emphasis of the challenge was on designing, constructing, and testing technologies that may enable mobility devices to perform in these different environments.

*Solution Type*: Ideas; Technology demonstration and hardware

*Primary Goals*: Engage new people and communities

*Results*: There were 77 entries, and 21 winners were awarded $10,000 total. Throughout the course of the race, participating students displayed an amazing grasp of technology and came to the challenge to put their masterpieces to the test, and perhaps launch their careers as next-generation engineers, scientists, and space explorers. The Challenge also achieved significant outreach, with 15 high-profile print/TV news stories in racers' home states, plus news reports in German and Indian newspapers and online. There were nearly 45,000 unique viewers of the live coverage on UStream and NASA TV, and the NASA Rover Challenge web presence received 27,000 page views over the course of the weekend. On Flickr, race photo galleries have earned another 90,000+ views and counting

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[195] http://www.futureengineers.org/Gallery/

[196] Challenge Website: www.nasa.gov/roverchallenge

### IX. Humans in Space Art Video Challenge[197]

Summary: Science, Technology, Engineering, Art and Math (STEAM)-based activities effectively raise global awareness for space exploration, research and technology and educate and engage the public. In addition, research suggests that the integration of science with art results in better student learning, making education fun, personal, and accessible to a wide demographic. It also fosters experimental, cognitive, and communication skills and helps to train imagination, the precursor to innovation. Educating youth alone, however, is not sufficient for the success of the future of space exploration, research, and technology-development: reaching out effectively to the adult public is also essential to gain their interest, support, and understanding of the value of space to humanity.

The Humans in Space Art Program invites participants to communicate about the future of space, science and technology using visual, literary, musical or video artwork. Then it weaves the artwork into multi-media displays and performances worldwide to inspire and engage others. Program activities provide people from multiple age groups, skill backgrounds, and countries an opportunity to learn about, and participate in, the future of space exploration, research, and development.

The Humans in Space Art Program's portfolio of projects includes the video challenge, whose target participant group is college students and early-career professionals. In partnership with NASA's International Space Station Program (ISS), the 2014 Video Challenge specifically asked participants to submit 3 minute videos sharing their visions of "How will space, science, and technology benefit humanity?"

*Solution Type*: Creative (design & multimedia)

*Primary Goals*: Inform and educate the public; Engage new people and communities

*Results*: There have been 70 entries, and the videos will be evaluated and displayed during 2015. Preliminary assessment suggests that the challenge successfully engaged the university and early-career demographic to learn about the ISS and NASA's space programs and to submit video artwork relaying their visions of the future of space. Many participants came from university arts programs and the entertainment industry, engaging individuals likely not previously educated about or contributing to the advancement of space exploration and research. Other participants were space science and engineering students and early practitioners who could train their innovative thinking and communication skills through participation. The video styles used to communicate ideas are varied and include many novel approaches from space footage display to poetry to dance.

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[197] Challenge Website: http://www.lpi.usra.edu/humansinspaceart/challenge/

In order to realize the Challenge objectives to provide the winning videos for viewing by the general public, multiple 2015 display opportunities are currently being planned, including a display at the 11th Annual HollyShorts Film Festival at the TCL (formerly Grauman) Chinese Theater in August 2015. In addition, the videos will provide display content for future use by NASA, the Humans in Space Art Program, and other partners to educate and engage the larger public about the benefits of space exploration and potentially bring new ideas into future plans.

### X.     International Space Apps Challenge[198]

Summary: The International Space Apps Challenge has become the biggest global hackathon, with over 500 organizations internationally contributing with data, challenges, in-kind and financial resources. For the 2014 event, more than 8,000 global citizens in 46 countries and 96 cities engaged directly with NASA to design innovative solutions to global challenges in software development, citizen science, hardware and data visualization.

Each Space Apps challenge provides innovators with all of the information they need to learn about a topic, understand the challenge statement, and craft a solution in less than two days. The aim is for teams of technologists, scientists, designers and entrepreneurs to develop answers to some of the most pressing challenges on earth and space using publicly available data. An overarching goal of the event is to increase awareness and interest in space exploration and aeronautics by opening up the Agency's extraordinary data.

In 2014, forty new challenges were offered in five categories (Technology in Space, Human Spaceflight, Asteroids, Earth Watch, Robotics), as well as opportunities to add to the development of 26 ongoing projects. The Space Apps team collaborated with the White House Climate Data Initiative, as well as NOAA and the EPA, to highlight NASA's Earth science data, and create and promote challenges relating to coastal inundation hazards.

*Solution Type*: Software and apps; Analytics, visualizations, and algorithms; Technology demonstration and hardware; Scientific

*Primary Goals*: Engage new people and communities; Solve a specific problem

*Results*: Space Apps began in 2012 and has grown in size each year, building a successful model for innovation that can be replicated by other government agencies. The 2014 Challenge had more than 8000 participants in 95 cities and 46 countries. 671 projects were created during the April 12th-13th weekend, 69 of them by teams that were completely virtual. Many Space Apps projects have gone on to deployment, like the Sol Mars weather

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[198] Challenge Website: www.spaceappschallenge.org

app, or have formed the basis for the creation of new ventures, like Gotham Labs in New York. In addition, Space Apps increases the awareness and interest in space exploration and aeronautics of families and youth – the youngest team-members in 2014 were four and seven year-old siblings.

## XI.   Lunar Mapping and Modelling Portal (LMMP) Image Processing Challenge[199]

Summary: The purpose of the Lunar Mapping and Modelling Portal Image Processing Challenge was to develop an application that performs image processing to transform the raw images taken by Lunar Reconnaissance Orbiter (LRO) into geo-referenced and 'mosaicked' images that can be displayed on the Lunar Mapping and Modelling Portal.[200] These rich visualizations are highly valuable for future mission planning and development.

The challenge was operated on TopCoder.

*Solution Type*: Software and apps

*Primary Goals*: Solve a specific problem

*Results*: There were 21 contests with 153 unique registrants from 9 different countries for a total of 35 submissions. 15 winners were awarded a total of $12,625. The LMMP Challenge delivered an on-line tool that reduced the time to process LRO images into a hi-resolution geo-referenced mosaic. The previous on-line service tool required 19 hours to process 29 images. The new solution reduced the time to process the images to 3 hours and allows for an additional reduction in time by adding additional nodes.

## XII.   Mars Ascent Vehicle Challenge[201]

Summary: The Centennial Challenges Mars Ascent Vehicle (MAV) Prize is helping to advance the technology to return samples from Mars. Current mission scenarios for returning samples from Mars envision sending a robot to collect a variety of samples and cache them at a location for pick up by a follow-up mission. The MAV will need to navigate to the sample cache site, collect the samples and place them in orbit for return to Earth. Teams must build a robot that can locate, identify, and collect a cache of samples and launch them to 3,000 feet into a simulated orbit around Mars.

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[199] Challenge Website: http://www.topcoder.com/solarsystem/lmmp/;
https://www.challenge.gov/list/?ag=National Aeronautics and Space Administration

[200] www.lmmp.nasa.gov

[201] Challenge Website: http://www.nasa.gov/mavprize

*Solution Type*: Technology demonstration and hardware

*Primary Goals*: Develop technology

*Results*: The challenge was opened for registration with Preliminary Design Reviews being conducted in 2014. The competition will occur on April 7-12 2015. 23 domestic University sponsored teams registered to compete in the competition.

### XIII.    Mars Balance Mass Challenge[202]

Summary: NASA was looking for creative yet practical ideas from all disciplines to find a dual purpose for Balance mass ("dead weight") that is jettisoned from Mars landers to balance the spacecraft during entry and landing. Payloads replacing Balance mass should perform some type of scientific or technological function adding to NASA's knowledge base while closely matching the volume and weight characteristics of the original Balance mass.

This challenge was operated on InnoCentive.

*Solution Type*: Ideas

*Primary Goals*: find and highlight innovative ideas; solve a specific program

*Results*: As of the writing of this report the submissions are still under evaluation. The level of participation in this challenge, however, was a significant outcome in and of itself providing an indicator of the excitement the international community has regarding the exploration of Mars. The challenge had over 2,000 project rooms opened on the InnoCentive platform representing over 90 countries. A project room can consist of individuals and/or a team of individuals. That is by far the largest number of participants for any NASA Innovation Pavilion challenge to date. From those 2,000 project rooms, NASA received over 200 submissions.

### XIV.    Rice Business Plan Competition Challenge[203]

Summary: NASA through its various Human Health and Performance activities is consistently seeking new ideas for health-related technologies that will improve medical care capabilities on Earth and have potential application to human spaceflight. Traditional means for identifying such ideas include contracts, grants, SBIRs, etc. Because these methods require knowledge of the Federal government's business practices to submit an

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[202] Challenge Website: https://www.innocentive.com/ar/challenge/9933607;
https://www.challenge.gov/list/?ag=National Aeronautics and Space Administration

[203] Challenge Website: http://alliance.rice.edu/rbpc.aspx/

idea, other mechanisms that allow for broader engagement are also valuable. A business plan competition provides another means to find new innovative technology ideas that complement current methods in addressing the health-related technology needs of NASA.

The Human Health and Performance Directorate (HH&P) at Johnson Space Center has supported a $20,000 award annually since 2008 at the Rice Business Plan Competition, an internationally recognized student business plan competition held at Rice University in Houston, Texas. Forty-two student teams enter the competition each year. The HH&P award focuses on new and emerging health and performance based technologies and recognizes the development of a new business, small business innovation, and entrepreneurial spirit. Each company is commercializing a health-related technology that will improve medical care capabilities on Earth and have potential application to human spaceflight.

*Solution Type*: Business plans

*Primary Goals*: Find and highlight innovative ideas; Engage new people and communities

*Results*: From the 1200 applicants to the Rice Business Plan Competition, one winner was chosen to receive $20,000. The 2014 NASA HH&P prize went to Tympanogen from Tulane University. Tympanogen developed a gel/coagulation approach that would permit the non-surgical closure of a ruptured ear drum and could convert painful pediatric surgeries to an office procedure. For NASA, it could add to an autonomous medical kit for exploration of Low Earth Orbit (LEO). In addition to developing this capability, by partnering with the Rice Business Plan Competition NASA increases awareness of the role NASA plays in driving technology innovations that have benefits on Earth -- thus educating students, faculty, and the general public about how research and innovations provide greater societal benefits.

## XV. Sample Return Robot Challenge – 2014[204]

Summary: The NASA Sample Return Robot Challenge called upon robotics innovators to build a robot that could autonomously locate, identify, and collect a variety of samples and then return the samples to a designated point without reliance on GPS or other terrestrial navigation aids. This challenge simulates a potential Mars Sample Return mission scenario. 2014 was the third year of the Challenge.

*Solution Type*: Technology demonstration and hardware

*Primary Goals*: Develop technology

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[204] Challenge Website: http://www.nasa.gov/robot; http://wp.wpi.edu/challenge/

*Results*: There were 21 entries in the 2014 Challenge. Offering a prize permitted NASA to explore multiple solutions from non-traditional sources and to pay only for achievement of the goals. Limited program funds could not have been leveraged to investigate as broad a spectrum of possible solutions.

In comparison to the first competition, all of the competitors demonstrated significant progress toward achieving the challenge goals. The University of West Virginia Mountaineers, a student team, was awarded $5,000 for completing Level I of the challenge. This team demonstrated the functionality needed to compete at the next level where they will have no knowledge of the sample locations and will have to locate and pick up samples of various sizes and shapes – just as rovers may on future NASA missions.

One team, Team Survey, was eligible to compete in Level II of the challenge for the larger prize purse up to $1.5M. However, they were unsuccessful at collecting enough samples/points for prize money.

The competition was also the cornerstone of a large-scale public outreach effort that attracted over 15,000 guests to the competition and provided NASA with the opportunity to educate the public on NASA robotics and Mars exploration efforts. The competition documentary vodcast by NASA 360 continues to be rebroadcast on NASA TV, Public TV stations nationwide and other commercial broadcast stations. The show is also accessible on many online sources such as iTunes. The competition is being repeated in 2015.

### XVI.    Solution Mechanism Guide Challenge[205]

Summary: If you are a scientist or project manager at NASA, sometimes it's hard to figure out what is the best route/path to take to solve your problem. The Solution Mechanism Guide is a tool to educate NASA scientists and managers about what mechanisms, such as contracts, grants, partnerships, and prizes, are available for them to utilize in order to solve the challenges of spaceflight.

This challenge sought to create an online tool that allows users to navigate a series of questions that lead to solution mechanisms that are a best fit for their specific needs. It is crucial that this tool be flexible to changing and new mechanisms, while not requiring significant administrative overhead, so that it can be used by any organization and meet its changing needs. Implementation of the tool provides the basis for improvements in the organization's ability to educate its project managers on available mechanisms and, as a result, obtain more effective results from projects.

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[205] Challenge Website: http://www.topcoder.com/smg/; https://www.challenge.gov/list/?ag=National Aeronautics and Space Administration

The challenge was operated on TopCoder.

*Solution Type*: Software and apps

*Primary Goals*: Solve a specific problem

*Results*: This challenge resulted in a very capable on-line tool that exceeded initial expectations. The software was developed very cost effectively (for approximately $58,000) and is currently deployed internally on NASA's network. The code was delivered as OpenSource software under an Apache 2.0 license and the source code is available online.[206]

### XVII.    Student Launch Challenge[207]

Summary: The NASA Student Launch (SL) Challenge transitioned from an educational activity to a research-based, competitive, and experiential exploration activity that supports the Space Launch System (SLS) Program. Participating teams design, fabricate, test, and fly payloads on a high-powered rocket to a predetermined altitude not to exceed 20,000 feet above ground level.

Payloads developed by teams addressed research needs of different SLS subsystems, and were required to include a Hazard Detection System, a parachute system designed and manufactured by the team, and two other payloads chosen from topics conceived by the SLS Program Office in collaboration with SLS industry partners. These payloads and components flew on student-designed and -built high-power rockets. Student Launch requires teams to submit a series of reports and reviews, develop a Website, provide educational engagement in their local community, and provide a timeline, a budget, and other requirements. The reports and reviews are similar to NASA's technical review process. Throughout the year, teams interact on a regular basis with engineers, scientists, and educators, mentored by experienced rocketry enthusiasts, share their knowledge of STEM with younger students, and learn teamwork and leadership skills. During launch week, teams visited ATK Aerospace Systems research and development facilities and demonstrate their project to NASA during the Rocket Fair and technical poster presentation.

In addition to the development of a rocket and research requirements, SL teams are challenged to educate others in the areas of science, technology, engineering, and mathematics (STEM).

*Solution Type*: technology demonstration and hardware

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[206] https://github.com/nasa/NTL-Solution-Mechanism-Guide

[207] Challenge Website: http://education.msfc.nasa.gov/slp

*Primary Goals*: Develop technology; Find and highlight innovative ideas; Solve a specific problem; Engage new people and communities

*Results*: There were 31 team entries in the 2014 Student Launch Challenge, with 7 winners. The overall winner was awarded $5000. Participants strongly indicated that the Student Launch challenge helped them build STEM skills, conceptual and analytical abilities, understanding of the link between classroom concepts and real-world applications, and helped to clarify their career plans. In addition, SL teams far surpassed requirements for outreach activities, and reached over 22,000 students and educators in fiscal year 2014.

## K.    National Science Foundation

### I.    Comet ISON Photo Contest[208]

<u>Summary</u>: On Thanksgiving Day 2013, Comet ISON skimmed the sun's outer atmosphere. Bright comets excite astronomy enthusiasts like few other sky events, and so there was enormous interest in viewing the comet among amateur astronomers and the public at large.

The National Science Foundation, Division of Astronomical Sciences along with *Astronomy* magazine and *Discover* magazine, held a unique contest centered on capturing images of the expected bright Comet ISON (C/2012S1). Photographers, amateur and professional, were challenged to explore the Comet through cameras & tripods, piggyback cameras or through the scope.

*Solution Type*: Creative (design and multimedia)

*Primary Goals*: Inform and educate the public; Engage new people and communities; Advance scientific research

*Results*: Despite the comet being less visible than initially estimated, there were still     60 entrants in the contest, and the 7 winners were announced in the June 2014 issue of *Astronomy* magazine. The competition achieved NSF's strategic goal for the Open Government Initiative.

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[208] Challenge Website: http://www.nsf.gov/news/special_reports/cometchallenge/about.html

## II.  Community College Innovation Challenge (CCIC)[209]

Summary: The National Science Foundation (NSF) invites teams of 3-5 community college students alongside a faculty mentor and community/industry partner to identify key problems and propose innovative solutions in the areas of big data, broadening participation in STEM, sustainability, improving STEM education and infrastructure security.

Community colleges have long recognized the importance of mentoring students and have a history of success in educating underrepresented students for successful careers in STEM. Thus, community colleges play an important role in workforce development in their states and local communities. Industry frequently looks to community colleges to provide an educated and technologically up-to-date workforce. The NSF's thrust of incorporating research into the traditional teaching mission of the community college is a relatively new expansion of its mission. This challenge furthers NSF's mission by enabling students to discover and demonstrate their capacity to use science to make a difference in the world, and to transfer knowledge into action.

*Solution Type*: Ideas; Creative (design & multimedia)

*Primary Goals*: Find and highlight innovative ideas; Engage new people and communities; Build capacity.

*Results*: The NSF CCIC is currently underway, and final results will be reported in FY15. The social media campaign has resulted in excellent numbers (with nearly 1000 engagements with posts on Twitter and Facebook), and over 100 teams have registered.

## III.  Visualization Challenge (The Vizzies)[210]

Summary: The Vizzies is an international contest developed to recognize outstanding achievement by academic scientists and engineers in the use of visual media to promote understanding of research results. As the need to increase science literacy grows more urgent, illustrations can provide immediate and influential connections between scientists and other citizens, and may be the best hope for nurturing popular interest, as well as helping scientists explain complex problems, while also demonstrating to the public the beauty of science and engineering.

In this challenge, participants were asked to submit creative science, visual media that promotes understanding of research results. The competition was created to show how deeply visualization could express what the scientist or engineer is unable to express verbally. It expresses a human dimension and helps create a universal language that will

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[209] Challenge Website: http://www.nsf.gov/news/special_reports/communitycollege/

[210] Challenge Website: http://nsf.gov/news/vizzies

enable people around the world to exchange knowledge and to more fully understand the work.

*Solution Type*: Creative (design & multimedia); Scientific; Software and apps

*Primary Goals*: Inform and educate the public; Engage new people and communities; Advance scientific research

*Results*: The competition is still underway, but to date, $15,000 has been saved in administering the challenge as compared to the cost in previous years. In addition, the participation rate increased by 33% above 2013 participation. Facebook and Twitter posts have had over 240,000 reaches. There have been 303 entries. The competition achieves NSF's strategic goal for the Open Government Initiative.

## L. United States Agency for International Development

### I. Big Ideas@Berkeley "Mobiles for Reading" Prize Competition[211]

<u>Summary</u>: The Big Ideas competition at University of California, Berkeley invites raw ideas from university students. Those with the most promising ideas are designated finalists and paired with mentors from the university, private companies, or nonprofits who assist them for six weeks in turning their ideas into full proposals.

All Children Reading: A Grand Challenge for Development (ACR GCD) is sourcing technology-based solutions to improve the literacy outcomes for children in developing countries. Mobile technology can be an effective tool to disseminate local language instruction materials for teacher professional development and reading materials in a story, game or audio format for children.

As part of the ACR GCD, the challenge for the USAID category of the Big Ideas@Berkeley competition is to develop novel mobile technology-based innovations to enhance reading scores for early grade children in developing countries. Alternatively, proposals may use existing mobile-based technologies to improve early grade reading scores by adapting or applying those technologies in new and innovative ways.

*Solution Type*: Software and apps

*Primary Goals*: Find and highlight innovative ideas; Solve a specific problem; Develop technology; Engage new people and communities

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[211] Challenge Website: http://bigideas.berkeley.edu/contest/reading/

*Results*: The competition is still underway. Of the 6 entries, the judges have recommended 5 teams to move on to the final round where they will be paired with mentors and provided additional resources to help them develop their projects. These teams all received very high scores during the review. In addition to mentorship, the winner will receive $22,000.

## II. The Desal Prize[212]

Summary: The Desal Prize is the "second call" of the Securing Water for Food Grand Challenge, a $32 million commitment between USAID and the governments of Sweden and the Netherlands. Small-scale desalination systems are expensive, inefficient, and environmentally unsustainable. The Desal Prize will award a total prize purse of $400,000 to the top 3 brackish water desalination systems based on their ability to produce a high percentage of usable product water for humans and crop irrigation while greatly reducing the amount of brine concentrate waste. It must be powered solely by renewable energy, and provide a daily volume of potable and irrigation water suitable to support a small holder farm in Jordan.

*Solution Type*: Technology Demonstration and Hardware; Scientific advancement

*Primary Goals*: Solve a specific problem; Technology development; Education and public outreach; Engage new people and communities

*Results*: The Desal Prize is still in progress and will not be completed until Oct. 2015. 68 teams from 29 different countries answered the call and proposed a variety of different desalination approaches to achieve the performance criteria laid out in the prize rules. Nineteen of the teams were from developing countries and 88% of the applicants had not previously applied for USAID funding. 8 Semi-Finalist Teams, from academia and private industry in the US and abroad, were selected based on the innovations proposed in their applications. These teams received seed funding to prototype their desalination technology. The 8 teams will meet for the first head-to-head demonstration competition in April 2015 and the top 3 performing teams will move on to the final head-to-head demonstration in September 2015 in Jordan. These 8 teams have received $26,500 in seed funding and travel funds.

## III. Enabling Writers Prize Competition[213]

Summary: The Enabling Writers Prize Competition, part of the All Children Reading: A Grand Challenge for Development, is a $100,000 prize for software that allows authors to easily create and export texts in mother tongue languages for early-grade students. One of

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[212] Challenge Website: www.thedesalprize.org

[213] Challenge Website: https://www.omnicompete.com/enabling_writers.html

the main barriers to improving children's reading skills is the lack of appropriate and engaging reading materials in mother tongue languages, meaning children are unable to get the reading practice they need in the language they speak and understand. The Enabling Writers prize competition seeks to drive the creation of new software technologies—and the improvement of existing programs—that make it easier, more cost-effective and efficient to write high-quality early grade reading materials that follow tested reading instruction methodologies.

Software designers from around the world were challenged to develop an easy-to-use, open source software that would facilitate the production and virtual storage of large sets of leveled and decodable texts for early grade reading instruction. The storage would allow users around the world to download titles for local printing and use on mobile devices.

*Solution Type*: Software and apps

*Primary Goals*: Solve a specific problem; Develop technology; Engage new people and communities; Find and highlight innovative ideas

*Results*: The Enabling Writers competition is still underway. Based on the more than 130,000 views of the challenge page in over 100 countries, the competition definitely raised the profile of All Children Reading. There were 39 registrations, and 10 entries from 7 countries as of October 1, 2014. Two of the software submissions are from organizations that have never received US government support.

### IV.    GEO Appathon 2014[214]

Summary: The Group on Earth Observations (GEO) Appathon was a global App development competition open to any non-commercial individual, team or entity (students, scientists and developers) with a passion for unleashing the power of Earth Observations (EO) to allow us all to make smarter decisions about the planet. GEO is a voluntary partnership of 95 member governments (plus the European Commission) and 89 Participating Organizations. GEO is charged with developing GEOSS, which is intended to be a global, coordinated, comprehensive and sustained system of observing systems with the intention to support policymakers, resource managers, science researchers and other experts in making informed decisions for society. Yet, there have been few efforts to broadly develop easily accessible and user-friendly decision-making tools.

Using the Global Earth Observation System of Systems (GEOSS) data portal and GEOs Application Program Interfaces (APIs), Appathon participants were encouraged to discover, research and apply any and all types of Earth observation data to inform decisions

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[214] Challenge Website: http://geoappathon.org/

makers at all levels – from ordinary citizens to national level disaster preparedness planners. The Appathon focused on demonstrating the usefulness of not only the GEOSS portal and GEOs APIs, but also the data catalogues of SERVIR, a joint USAID and NASA project, and other capacity building resources and environmental data available through or associated with GEOSS.

*Solution Type*: Software and apps

*Primary Goals*: Other (Demonstrate the potential usefulness of Earth observations to decision making); Inform and educate the public; Find and highlight innovative ideas; Solve a specific problem; Engage new people and communities; Build capacity

*Results*: The Appathon demonstrated great success in reaching a vast audience and creating excitement for the potential usefulness of Earth observations. 246 people from 49 countries registered for the Appathon. In addition, an article about the Appathon appeared in EarthZine Magazine. 15 teams submitted final apps for judging at the conclusion of the competition, and the 5 winners used a variety of data sets to provide a range of capabilities from social networking to natural disaster warnings to citizen science. These apps are available on mobile devices and online[215]. The winners were awarded a total of $19,000.


## V.    Intel ISEF – USAID Special Award[216]

<u>Summary</u>: The Intel International Science and Engineering Fair (ISEF) is the world's largest international pre-college science competition and annually attracts 1,500 of the brightest high school students from over 70 countries to showcase their independent research and compete for more than $4 million in awards. Alumni of the program have made extraordinary contributions to technical fields and hold more than 100 of the world's most distinguished science and math honors, including seven Nobel Prizes and five National Medals of Science.

For the second year in a row, USAID participated as a Special Award Organization in the 2014 Intel International Science and Engineering Fair. The fair was held May 10-15 in Pittsburgh, PA and USAID offered 4 prizes of $10,000 each for outstanding high school students from around the world who have submitted projects corresponding to each of the 4 key presidential initiatives. These are the first international development prizes that a Special Award Organization has offered at the Intel Fair and USAID is proud to be highlighted as an inaugural member and participant.

*Solution Type*: Scientific

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[215] http://geoappathon.org/?page_id=307

[216] Challenge Website: https://apps2.societyforscience.org/intelisef2014/saodetail.cfm?AC=USAID

*Primary Goals*: Engage new people and communities

*Results*: From the full ISEF pool of 1500 entries from 70 countries, 36 students from 11 countries were interviewed for the USAID Special Award. Four awardees, and four honorable mentions were announced. 5 students from 3 countries were named winners. They were awarded $40,000 in total.

The winners developed a refrigeration system that does not require external electricity, a machine for efficient rice farming, the application of a material used in paper-making to the cultivation of mung beans, and a more efficient microbial fuel cell.