

Implementation of Federal Prize Authority: Fiscal Year 2012 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

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DEPARTMENT, AGENCY, OFFICE, AND DIVISION ABBREVIATIONS

AF	Air Force (part of DOD)
AFRL	Air Force Research Laboratory (part of AF/DOD)
CDC	Centers for Disease Control and Prevention (part of HHS)
CMS	Centers for Medicare & Medicaid Services (part of HHS)
DARPA	Defense Advanced Research Projects Agency (part of DOD)
DOC	Department of Commerce
DOD	Department of Defense
DOE	Department of Energy
DOL	Department of Labor
EPA	Environmental Protection Agency
EEER	Office of Energy Efficiency and Renewable Energy (part of DOE)
FDA	Food and Drug Administration
GSA	General Services Administration
HHS	Department of Health and Human Services
NASA	National Aeronautics and Space Administration
NIBIB	National Institute of Biomedical Imaging and Bioengineering (part of NIH/HHS)
NIH	National Institutes of Health (part of HHS)
NIHES	National Institute of Environmental Health Sciences (part of NIH/HHS)
NIST	National Institute of Standards and Technology (part of DOC)
NOAA	National Oceanic and Atmospheric Administration (part of DOC)
ODPHP	Office of Disease Prevention and Health Promotion (part of HHS)
OMB	Office of Management and Budget
ONC	Office of the National Coordinator for Health Information Technology (part of HHS)
OPM	Office of Personnel Management
OSTP	Office of Science and Technology Policy
SBA	Small Business Administration
USAID	U.S. Agency for International Development
USPTO	United States Patent and Trademark Office (part of DOC)

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EXECUTIVE SUMMARY

On January 4, 2011, President Obama signed into the law the America COMPETES Reauthorization Act (COMPETES), granting all agencies broad authority to conduct prize competitions to spur innovation, solve tough problems, and advance their core missions.

Prizes have an established track record of spurring innovation in the private and philanthropic sectors. This report details examples of how well-designed prizes 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 prizes a standard tool in every agency’s 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 framework² to guide agency leaders in using prizes to advance their core missions. In September 2010, the Administration launched Challenge.gov³, a one-stop shop where entrepreneurs and citizen solvers can find public-sector prizes. By September 2012, Challenge.gov had featured more than 200 competitions from over 45 Federal agencies, departments, and bureaus.⁴

The prize authority in COMPETES supports this effort. By giving agencies a clear legal path, the legislation makes it dramatically easier for agencies to use prizes. By significantly expanding the authority of all Federal agencies to conduct prize competitions, the legislation enables agencies to pursue more ambitious prizes with robust incentives.

Since the signing of the Act 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

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/>

⁴ <http://www.whitehouse.gov/blog/2012/09/05/challengegov-two-years-and-200-prizes-later>

OMB jointly developed a Fact Sheet and Frequently Asked Questions memorandum⁵, issued in August 2011, which provided guidance to help streamline implementation of the new, government-wide authority.

Agencies including the Department of Health and Human Services (HHS) and the Environmental Protection Agency (EPA) have established strategies and policies to further accelerate widespread use of the new prize authority granted to them through COMPETES. Some agencies, such as the National Aeronautics and Space Administration (NASA) and the U.S. Agency for International Development (USAID), have personnel dedicated to lead prize design and administration efforts at their agencies and to provide internal support to program managers interested in making use of prizes.

As many agencies expand their use of the authorities provided to them under COMPETES, some agencies have continued to administer prizes 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 prizes and challenges.

In addition, as called for in Section 24(n) of the Act, the General Services Administration (GSA) launched in July 2011 a contract vehicle⁶ to dramatically decrease the amount of time required for agencies to tap the private-sector expertise that is so critical to early success. In Fiscal Year 2012 (FY 2012), agencies initiated their use of this contract vehicle. Adding to the support for the use of prizes, a government-wide Center of Excellence, led by NASA, provided multiple agencies support for the full lifecycle of pilot prize competitions: from design, through implementation, to post-prize evaluation.

The authority provided in COMPETES led to significant new efforts applying prizes to national priority areas including energy, health, and employment. In FY 2012, 27 prizes were conducted under this authority, compared to seven conducted from January-September 2011. Seven agencies including EPA, Department of Commerce (DOC), Department of Energy (DOE), Department of Health and Human Services (HHS), Department of Labor (DOL), Department of State, and the Small Business Administration (SBA) each launched prizes in FY 2012 enabled by the COMPETES authority. This look at the expanded use of the COMPETES prize authority in FY 2012, the first full fiscal year of

⁵ https://cio.gov/wp-content/uploads/downloads/2012/09/Prize_Authority_in_the_America_COMPETES_Reauthorization_Act.pdf

⁶ <http://www.gsaelibrary.gsa.gov/ElibMain/sinDetails.do?scheduleNumber=541&specialItemNumber=541+4G&executeQuery=YES>

implementation of that authority, indicates the ways this authority will continue to help agencies across the Federal government reap the benefits of high-impact prizes.

INTRODUCTION

From the 1714 Longitude Prize that stimulated the development of 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 X Challenge⁷ awarded to a company from Illinois that demonstrated more than four times the previous best tested recovery rate for cleaning up oil from the ocean's surface, prizes have a long record of spurring innovation. A 2009 McKinsey report found that philanthropic and private-sector investment in prizes increased significantly in recent years, including \$250 million in new prize money between 2000 and 2007.⁸ Some of these incentive prizes included the GoldCorp Challenge⁹, the Ansari X Prize¹⁰, the Netflix Prize¹¹, and the Heritage Health Prize Competition¹².

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 prizes and challenges to harness America's ingenuity to solve some of the Nation's most pressing challenges.¹³ In March 2010, OMB issued a memorandum that provided a policy framework to guide agency leaders in using prizes to advance core missions.¹⁴ In September 2010, the Administration launched Challenge.gov, a one-stop shop where entrepreneurs and citizen solvers can find and engage with public-sector prizes. By September 2012, the site had hosted over 200 challenges posted by more than 45 departments and agencies. By that point, more than 16,000 citizen "solvers" had participated in these competitions directly on Challenge.gov, with additional entrants joining the competitions through other sources.¹⁵

⁷ <http://www.iprizecleanoceans.org/>

⁸ McKinsey & Company, "And the Winner Is..."; *Capturing the promise of philanthropic prizes*, 2009, [http://www.mckinseysociety.com/downloads/reports/Social-Innovation/And the winner is.pdf](http://www.mckinseysociety.com/downloads/reports/Social-Innovation/And%20the%20winner%20is.pdf)

⁹ Fast Company, <http://www.fastcompany.com/magazine/59/mcewen.html>

¹⁰ <http://space.xprize.org/ansari-x-prize>

¹¹ <http://www.netflixprize.com/>

¹² <http://www.heritagehealthprize.com/c/hhp>

¹³ <http://www.whitehouse.gov/innovation/strategy>

<http://www.whitehouse.gov/sites/default/files/microsites/ostp/innovationstrategy-prizes.pdf>

¹⁴ http://www.whitehouse.gov/sites/default/files/omb/assets/memoranda_2010/m10-11.pdf

¹⁵ <http://www.whitehouse.gov/blog/2012/09/05/challengegov-two-years-and-200-prizes-later>

On January 4, 2011, President Obama signed Public Law 111-358, the America COMPETES Reauthorization Act. Section 105 of this Act added section 24 (Prize Competitions) to the Stevenson-Wydler Technology Innovation Act of 1980 to provide all agencies broad authority to conduct prize competitions in order to spur innovation, solve tough problems, and advance their core missions. By giving agencies a simple and clear legal path, the Act supports the Administration's effort to make prizes a standard tool in every Federal agency's toolbox.

The Act also requires OSTP to annually submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science and Technology of the House of Representatives a report on the activities carried out under the new prize authority during the preceding fiscal year.

This report documents the benefits the Federal government has already reaped from using incentive prizes, the steps the Administration has taken to establish a lasting foundation for use of the COMPETES prize authority, and detailed examples from FY 2012 of how the COMPETES prize authority is increasing the number of agencies that use prizes to achieve their missions more efficiently and effectively.

This scope of this report includes an overview of every prize conducted under the COMPETES prize authority in FY 2012 (as reported by Federal agencies to OSTP) and only selectively covers prizes conducted under other authorities available to agencies beyond the authority provided to agencies within COMPETES.

1. BENEFITS OF PRIZES IN THE PUBLIC SECTOR

The unique benefits of prizes have been well documented in the private and philanthropic sectors.¹⁶ Early adopters in the public sector have begun to reap the rewards of well-designed prizes over the last several years. For example, NASA's Chief Technologist Mason Peck reports that "NASA recognizes the extraordinary opportunity that prize competitions represent: that they can 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."¹⁷ Specifically, prizes have enabled the Federal government to:

¹⁶ See e.g., McKinsey & Company, "And the Winner Is..."; *Capturing the promise of philanthropic prizes*, 2009, http://www.mckinseysociety.com/downloads/reports/Social-Innovation/And_the_winner_is.pdf

¹⁷ NASA Report to Office of Science and Technology Policy on Prize Competitions for Fiscal Year 2012, submitted by Mason Peck, NASA Chief Technology Officer, to the Office of Science and Technology Policy, December 31, 2012

APPENDIX 2: AGENCY PROGRAMS CONDUCTED UNDER AUTHORITIES OTHER THAN THE AMERICA COMPETES REAUTHORIZATION ACT OF 2010

This Appendix provides a summary of some prizes and challenges conducted in FY 2012 under agency prize authorities other than COMPETES and does not include any of the multiple prize competitions conducted under other authorities in FY 2012 or prior.

LIST OF CHALLENGES

8. National Aeronautics and Space Administration

- 8.1. [Technology Demonstration: Sample Return Robot Challenge](#)
- 8.2. [Theoretical Challenge: Strain Measurement of Vectran and Kevlar Webbing](#)
- 8.3. [Ideation Challenge: Big Data Challenge](#)
- 8.4. [Ideation Challenge: Rice Business Plan Competition \(RBPC\)](#)
- 8.5. [App Development: Android Electrocardiography \(ECG\)](#)
- 8.6. [App Development: Planetary Data System Challenge](#)
- 8.7. [Apps Contest/Mass Collaboration: International Space Apps Challenge](#)
- 8.8. [Video Challenge: Venus Transit Video Time Capsule Challenge](#)
- 8.9. [Video Challenge/ Education Challenge: Zero Robotics Challenges](#)
- 8.10. [Education Challenge: NASA Great Moonbuggy Race](#)
- 8.11. [Education Challenge: NASA Student Launch Projects \(SLP\)](#)
- 8.12. [Education Challenge: Lunabotics Mining Competition](#)
- 8.13. [NASA Tournament Lab](#)
- 8.14. [NASA Innovation Pavilion](#)

9. National Institute of Standards and Technology

- 9.1. [NIST SHA-3 Hash Competition](#)

10. Department of Defense

- 10.1. Army Challenge: [Federal Virtual Worlds Challenge](#)
- 10.2. Air Force Challenges: [Fuel Scrubber](#); [Grey Data](#); [Durable Dielectrics on Polycarbonate](#); [Energetic Core-Nanocluster Production](#)
- 10.3. DARPA Challenges: [Cash for Locating and Identifying Quick Response](#); [Shredder](#)

8.1 Technology Demonstration: Sample Return Robot Challenge

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. Offering a prize permitted NASA to explore multiple solutions and to pay only for achievement of the goals.

private data. The results of this challenge were added to a legal studies report produced by the USAF Academy on how to determine boundaries of social media research.

10.2.3 Durable Dielectrics on Polycarbonate: AF researchers were looking for a dielectric coating and a process to apply it to a curved polycarbonate substrate whose surface area ranges from 150 to 750 square cm. The coating had to act as a "hot mirror" (transmit visible, reflect near infra-red), be up to 10 microns in thickness, and maintain its integrity and performance under environmental conditions (-40 C to +70 C, and 0% to 98% RH, Mil Std Salt fog testing). Although 237 people participated in this challenge, there was no viable solution found and no award was made.

10.2.4 Energetic Core-Shell Nanocluster Production: AF researchers were looking for material processing technologies for the production of core-shell nanoclusters of energetic materials with particle diameters between 5 and 25 nm. Emphasis was on a controllable process that produced air-stable, consistent particles at increased rates that could scale up to at least 1g/hour. This challenge had 202 participants but the challenge was also sent to over 100 different nano-research centers across the United States with information about this challenge and AFRL's interest in following up with a Small Business Research effort to test out a potential solution. This challenge is still under evaluation from those responses submitted to the Challenge. AFRL was also contacted by one credible source that did not want to submit to the prize but indicated that they would be submitting to the SBIR solicitation in order to retain control of their Intellectual Property and noted that they would not have responded to the SBIR announcement without first being alerted to it by the challenge.

10.3 DARPA Challenges: Cash for Locating and Identifying Quick Response

In FY 2012, DARPA executed two challenge award programs: (1) the Cash for Locating and Identifying Quick Response (CLIQR) Codes Quest Challenge, and (2) the Shredder Challenge.

10.3.1 CLIQR Codes Quest: The CLIQR Challenge sought to advance the understanding of social media and the Internet to explore the role each plays in timely communication, wide-area team building, and urgent mobilization required to solve broad-scope, time-critical problems. The DARPA CLIQR Quest Challenge provided an increased understanding of how social networks organize around a common theme. The hypothesis was that information brokers would emerge in the development of a network and could be identified through nodal analysis of activity. The Challenge demonstrated that social networks formed as hypothesized, enabling DARPA to map and analyze the process through a semi-controlled scenario. Subsequent to the event, DARPA discussed the results, methods employed, and potential ramifications with several organizations including PeopleBrowsr, HHS ASPR, and the Department of Homeland Security Office of Resilience Policy. In addition, all four Services received

information regarding and had exposure to this Challenge. The DARPA CLIQR Quest Challenge achieved its goals and has helped DARPA advance the understanding of social media and the Internet and explored the role the Internet and social networking play in the timely communication, wide area team-building, and urgent mobilization required to solve broad scope, time-critical problems.

10.3.2 Shredder Challenge: The DARPA Shredder Challenge called upon participants to piece together a series of shredded documents using any means available, including manual methods, computerized methods, and crowd sourcing. Five one-sided handwritten documents were shredded into more than 10,000 pieces, and the images of the shredded pieces were posted online. Document subject matter and the degree of shredding were varied to present problems of increasing difficulty. To complete each problem, participants provided answers to questions embedded in the content of reconstructed documents, with the intent of mirroring the problem facing an intelligence analyst with a similar task. Competitors were awarded points according to an established rubric for successfully reconstructing documents and to a sufficient degree that they could answer embedded questions. The goal of the DARPA Shredder Challenge was to accelerate technological solutions and problem-solving techniques enabling the reconstruction of shredded documents at the tactical edge. Specifically, the program goals were to: (1) identify and assess potential capabilities that could be used by warfighters to more quickly obtain valuable information from confiscated, shredded documents, and (2) gain a quantitative understanding of potential vulnerabilities inherent to the shredding of sensitive U.S. National Security documents.

The DARPA Shredder Challenge was a successful demonstration of the potential of an integrated human-machine approach to solve large, complex problems that would be near impossible by any other means. DARPA discussed the results with several organizations within the law enforcement, military, and intelligence communities including the Federal Bureau of Investigation Questioned Documents Unit, Army G2 Document and Media Exploitation, and Sandia National Laboratories. The DARPA Shredder Challenge achieved its goals and stimulated interest in the programs and projects of interest to the DOD science and technology community. The event attracted a large pool of nontraditional participants. The varied methods used have potential implications for problems generally considered unsolvable by conventional means. This result promises to inspire a new class of problem solving approaches in areas important to National Security.