

Testimony of

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Competitiveness

“Empowering Breakthroughs in Health Care with  
Prizes”

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## **Introduction**

On behalf of XPRIZE, I'd like to thank the committee, Chairman Cruz and Ranking Member Peters for the opportunity to testify today. XPRIZE welcomes the committee's attention to incentivizing cure development for the world's deadliest diseases. XPRIZE welcomes the conversation regarding how and when prizes can be an appropriate and effective mechanism for the Federal government to incent innovation, economic growth and solutions to some of the biggest problems facing our nation today. I'm Chris Frangione, Vice President of Prize Development. I am responsible for overseeing the design of XPRIZES from conception to launch.

## **Background**

XPRIZE is the global leader in the creation of incentivized prize competitions. As a 501c(3) not-for-profit organization, our mission is to bring about radical breakthroughs for the benefit of humanity, thereby inspiring the formation of new industries and the revitalization of markets. XPRIZE works to accelerate the pace of innovation across sectors through the implementation of prizes that are audacious, yet achievable. XPRIZE looks to find "white spaces" where breakthroughs can bring about exponential shifts.

Founded in 1995, we are the recognized world leader for creating and managing large-scale, global, incentive prize competitions that stimulate investment in research and development worth far more than the prize itself. To date, XPRIZE has successfully awarded five prizes with combined purses of over \$27 million. These prizes spanned multiple sectors, including Progressive Insurance Automotive XPRIZE for highly fuel-efficient vehicles, the Wendy Schmidt Oil Cleanup XCHALLENGE for better surface oil cleanup technologies, the Northrop Grumman Lunar Lander XCHALLENGE, the Nokia Sensing XCHALLENGE, and of course the Ansari XPRIZE for commercial space flight. In most of these competitions, we collaborated with the U.S. government, the private sector, and the research community.

We also have five active prizes with combined purses of \$64 million. These include the \$30 million Google Lunar XPRIZE that challenges teams from around the world to land a rover on the Moon and send back live video; the \$2 million Wendy Schmidt Ocean Health Prize - a competition to create breakthrough pH sensors that can help us begin the process of healing our oceans; the \$15 million Global Learning XPRIZE that challenges teams to develop new learning solutions to empower children and communities around the world; and the \$7 million Barbara Bush Foundation Adult Literacy XPRIZE, which challenges teams to develop mobile applications for adult learners that radically improve their literacy skills in just twelve months.

## **Life Sciences**

Specific to today's discussion, XPRIZE has a Life Sciences Prize Group aimed at stimulating innovative breakthroughs in molecular biology, stem cell research, bionics, organogenesis, synthetic biology, and artificial intelligence in order to improve health care and extend healthy

living. XPRIZE seeks to accelerate the real-world impact of science, technology, and information related to the worldwide optimization of health and the elimination of illness and disease.

We recently awarded \$2.25 million to competition teams for the Nokia Sensing Challenge, a medical sensor challenge aimed at accelerating the availability of hardware sensors and software sensing technology that individuals use to access, understand, and improve individual health and well-being. We believe innovation in sensing is an important component to creating a means for appealing, usable, smarter digital health solutions.

DNA Medicine Institute (DMI) of Cambridge, Massachusetts, took home the grand prize of \$525,000 for developing a portable device capable of running hundreds of clinical lab tests on a very small sample of blood. Results are available in a matter of minutes and are highly accurate. Five other teams – from Switzerland and England, and Illinois, Minnesota and California in the U.S. - also took home \$120,000 each for their sensing innovations.

Our current life sciences prize is the Qualcomm Tricorder XPRIZE, a \$10 million global competition to stimulate innovation and integration of precision diagnostic technologies, helping consumers make their own reliable health diagnoses anywhere, anytime.

Advances in fields such as artificial intelligence, wireless sensing, imaging diagnostics, lab-on-a-chip, and molecular biology will enable better choices as to when, where, and how individuals receive care, thus making healthcare more convenient, affordable, and accessible. We will award the team whose technology most accurately diagnoses a set of diseases independent of a healthcare professional or facility, and which provides the best consumer user experience with their device. In fact, we just recently down-selected to the top 7 teams from 4 countries – the United States, Taiwan, Canada, and India - who are currently in the process of testing.

With that said, understand that prizes don't work well across the entire healthcare spectrum owing to major barriers to entry, cost and time-intensity. So, where do we think they do work well?

- Where new forms of cross-disciplinary collaboration are needed;
- Where research is underfunded or there is a small patient pool driving inefficient market activity; and
- Where “engineering” type solutions could bring breakthroughs to bear.

Where prizes don't work well in healthcare (and where other programs should be continued):

- Early stage research/discovery; and
- Large, longitudinal research efforts which are too long for a prize (10+ year studies).

Even where we believe prizes work well, they can always complement traditional forms of funding, and should not be seen as a replacement for traditional forms of funding.

Currently, we are exploring additional prizes in organogenesis, kidney disease and Alzheimer's.

- **Organogenesis:** Nationwide, the supply of viable organs simply does not meet the growing demand. In 2012, 114,690 transplants were performed according to the World Health Organization's Global Observatory on Donation and Transplantation. This number of transplants represents only approximately 10 percent of the roughly one

million organs needed worldwide. It also demonstrates stagnant growth from the numbers reported in 2008, largely due to a lack of growth in the number of available organs donated for transplant. XPRIZE is exploring a prize that challenges innovators to demonstrate the successful function of a bioengineered human tissue and/or human organ (heart, lung, liver or kidney).

- **Kidney Disease:** Kidney disease is caused by approximately 100 different diseases and disorders. Kidney disease treatment has seen little innovation in nearly 40 years. Investment and innovation is low and the market is dominated by large, for-profit dialysis providers that meet Medicare reimbursement standards. Significant research is needed to address those causes, but we do not develop XPRIZES for basic research. This prize is designed to be a bridge between the current state of treatment (which is very expensive and has terrible outcomes for patients) and potential and/or the ability to grow new organs for transplantation. An XPRIZE will bring public awareness to the problem of kidney disease and the lack of innovation in treatment by focusing a community of innovators on key breakthroughs. Thus, XPRIZE is working in partnership with the American Society of Nephrology to develop and capitalize this prize.
- **Alzheimer's:** In partnership with 10 individual donors, we are exploring an Alzheimer's prize. While we are in the very early stages, we are seeking to improve diagnostics and effective treatments to alleviate symptoms of the disease. Senator Wicker has a keen interest in this issue and we have had very productive conversations with his staff about ways to encourage relevant agencies like NIH and OSTP to support a prize around Alzheimer's. We applaud his leadership aimed at accelerating discovery and development of cures for Alzheimer's and related dementia.

## The XPRIZE Prize Model

XPRIZE believes we can make the impossible possible by creating an infrastructure where our world's innovators create breakthroughs that both catalyze industries and have a measureable benefit to humanity. We do this via large-scale, incentive prize competitions.

Prizes are useful tools for solving problems for which the objective is clear, but the way to achieve it is not. By attracting diverse talent and a range of potential solutions, prizes draw out many possible solutions – many of them unexpected – and steer the effort in directions established experts may never take, but where the best solution may nonetheless lie.

Prizes are powerful for many reasons, the most important of which include leveraging your investment, democratizing innovation, and reducing risk.

Throughout the course of a competition, teams spend their own money to compete for the prize. We find that teams spend research and development dollars that, aggregated across all teams, is four to ten times the value of the prize purse. So, you could give a grant or contract worth \$5 million and get \$5 million worth of research and development, or you can put out a prize with a purse of \$5 million and get upwards of \$20 to \$50 million worth. In a time of fiscal constraint, prizes are an extremely efficient tool to help spur innovation.

At XPRIZE we say, "Why find the needle in the haystack when that needle can find you?" Hosting a prize does just that. Prizes inspire teams from around the world to compete to achieve

your goal – and often those that are inspired are not the current industry incumbents. Some solvers are from tangential fields and have a solution that could be tweaked to solve the challenge at hand, while others possess little to no experience at all. A prize does not care if someone has 20 years of experience or 20 days of experience – as long as they meet the goal of the competition. Using a traditional grant or contract, you would be very unlikely to find such innovators. Your focus would fall on the known players who comprise your target audience. Let me give you some examples. In the 1714 Longitude Prize - established by the British government to reward the precise determination of a ship's longitude - everyone assumed it would be a ship's captain or astronomer who would win. But it was a clockmaker. In the 1919 Orteig prize for the first person to fly between New York and Paris non-stop, everyone assumed the winner would be one of the aviation leaders. They all failed because they were too conservative in the design of their planes and how they flew. Instead, it was won by a relatively unknown, 25 year-old mail pilot, Charles Lindbergh. In our Progressive Insurance Automotive XPRIZE, we had a group of high school students surpass much of the competition. In our Wendy Schmidt Oil Cleanup XCHALLENGE, a tattoo artist made it into the finals. And although his team did not win, it still did better than the industry standard at that time. In fact, in that prize, four of the ten finalist teams were new to the industry. Most likely you would have never awarded a grant or contract to these innovators because (1) you would have seen it as too risky, (2) you never would have known they existed, and (3) they never knew they had an interest in solving the challenge prior to the prize. To get disruptive innovations, we need to democratize innovation – encouraging anyone, from anywhere, with any background, to help solve our grandest challenges.

Third, prizes reduce risk. What separates prizes from traditional R&D and other funding mechanisms is that the burden of risk is wholly on the teams, since the prize is designed only to reward success. That is, you only pay when a team meets your goal. In a traditional grant or contract, you would award it to the known players because that is less risky for you. But the known players want to be successful, so they are not going to take those risks that are necessary to result in a truly transformational breakthrough. Failure is a necessity of invention, because innovation must build upon unsuccessful attempts. Those competing for the prize are willing to embrace this risk because they have little to lose. As we say at XPRIZE, “The day before anything is a breakthrough, it's a crazy idea!”

As you can see, prizes are extremely powerful and should be one of the primary tools in any innovation toolkit.

But, for prizes to work well, you need to ensure they are designed well. I just spoke about passing the risk to the teams and paying only for success. That leads to the question of why teams compete for prizes. Many point to the prize purse – and that is true – but the prize purse is only one of the incentives for teams to compete. We have found the best prizes offer valuable operational incentives for teams to compete. A prize purse is often not enough for teams to compete because teams know that only one or two or three of them will win the prize purse.

The teams are really competing for the end market – for the ability to go out into the marketplace and become a profitable company. As such, we have found that the best operational incentives align with helping teams prepare to win that market – these include incentives such as marketing, testing, milestone prizes, partnerships, and education.

A well-designed prize markets the prize, the teams, and the solutions. This allows the teams to show their progress and results to the world – including potential funders and customers.

Testing is key to incentivizing teams to compete. Often teams come out of our competitions with independent, third party verified data – data they can take to the marketplace to help raise funding or data that they can show to potential customers. Sometimes this testing costs us millions of dollars, but it is necessary to prove a winning solution works and has the added benefit of being extremely valuable to teams. For example, in our Adult Literacy XPRIZE, the top five finalists will have their solutions tested on 1,000 adult learners each over a 12-month period. Imagine a small startup doing this testing on its own, or even a large company. It would be very difficult, but the value of the data collected is enormous.

Milestone prizes are mid-way prizes that we offer during many of our competitions. They reward teams for certain successes along the way or reward those teams that make it through a down select. These are extremely valuable to teams insofar as they provide them with a small amount of funding to push forward and get press around their early wins. That press, again, helps them to raise funds and/or bring in potential customers.

Partnerships in terms of access to potential funders or investment funds, additional testing, advanced market commitments, and the like provide teams with other ways to market, test, and raise funds. We try to develop partnerships with organizations relevant to the prize area. I will focus on these partnerships more a bit later in this testimony.

We all know that sometimes the best innovators are not the best business people. Because the way to truly disrupt an industry or change the world through the prize is to get as many of the teams out in the market place with successful technologies – not just the winners – we believe that significant effort should be placed on educating the teams on how to formulate business plans, perform road shows to raise money, understand the regulatory impacts of their business, and other valuable business functions. Without this education, the prize may end up with good solutions, but the teams may not be able to commercialize the solutions.

In order to get the best results, we believe that you must provide additional incentives and value to the competing teams beyond the prize purse.

### **Prizes are One Way to Spark the Innovation Cycle**

We strongly believe that the private and public sectors must work together to utilize every tool available to facilitate meaningful innovation that drives economic growth. Prizes are not a replacement for traditional financing mechanisms, but are augments to them. They are one of many innovation tools that agencies and the Federal government should consider utilizing in tandem with other financial mechanisms such as grants, contracts, investments and incentives.

It is important to note that the resulting technology solutions are not replacements for behavioral change. Understanding how and where prizes work best will help ensure that they are used most efficiently and effectively. One of the hallmarks of an XPRIZE is its ability to create and/or catalyze industries. In this regard, the XPRIZE's impact does not begin at its launch, but with its award. Prizes, therefore, are the beginning, not the end, of the innovation cycle, maximizing the impact on emerging industries, scaling new ideas, and ultimately contributing to the economy.

Prizes provide a mechanism to discover breakthroughs that generate, operate and become part of the industrial base. They can catalyze an industry in order to have a real set of benefits for humanity. When an industry undergoes a catalyzing event as the result of a breakthrough, everyone benefits – humanity, industry, and the public perception of what's possible.

## **Importance of Policy to Send a Signal**

The federal government has rightly recognized the power of prize competitions to draw out the latent innovative vision that simply hasn't found the means or the outlet to reach its potential. Following passage of the 2010 America COMPETES Act, which granted agencies the authority to operate prizes, and President Obama's "Strategy for American Innovation," which called on agencies to use Grand Challenges as an innovation tool, there has been an up-tick in the utilization of prizes by the federal government. In 2015 alone, 30 agencies self-reported a total of 97 prize competitions and challenges. The prize opportunities ranged in value from as low as \$2,500 to greater than \$1 million, across industry sectors. These prizes have enabled government agencies to establish ambitious goals, pay only for success, and utilize novel approaches from outside partners to achieve their goals.

Now, Congress has an opportunity to once again use policy as a driver for innovation by passing the Science Prize Competitions Act – which passed the House of Representatives earlier this year. We look to the leadership of this subcommittee and the full Senate Commerce Committee to complement the bipartisan efforts of the House by introducing and passing policy supportive of prizes, much as it did in 2010 with the America COMPETES Act. We believe legislation that provides guidance to utilize high-impact prizes as an economically efficient way to incent innovation sends a strong signal to federal agencies, and also to the private sector and innovation community, that the federal government believes in the power of prizes as a source of innovation.

## **The Value of Public-Private Partnerships**

At the crossroads of policy-driven innovation and “garage ideas”, I have witnessed remarkable breakthroughs brought about by critical partnerships between the public and private sector. For example, XPRIZE partnered with the Department of Energy to support a \$10 million global competition to inspire a new generation of viable, safe, affordable, and super fuel-efficient vehicles. We brought together government and the private sector, including our lead sponsor Progressive Automotive Insurance. Our top prize-winner, Oliver Kuttner, a commercial real estate developer who loved to tinker with cars since taking auto shop in high school, maxed out his wife's credit cards to invest in chasing his dream – which culminated in his construction of a four-seat, 830-pound vehicle that ran on a one-cylinder, ethanol-fueled internal combustion engine that achieved 102.5 miles per gallon fuel efficiency. Today, Kuttner's company, Edison2, is continuing to develop extremely light, super fuel-efficient vehicles including an electric version. That is the kind of citizen innovation we take pride in fostering at XPRIZE.

Another ongoing example of government playing a supportive role even without supplying any financial support is the Qualcomm Tricorder XPRIZE. The U.S. Food and Drug Administration (FDA) is an integral partner in the effort, which XPRIZE is supporting with funding from our lead sponsor, the Qualcomm Foundation. In addition to assisting teams in preparing for future regulatory clearance post-competition, this prize competition is helping the FDA maximize its own readiness for new regulatory submissions in the direct-to-consumer diagnostics space.

Partnerships such as these have a history of maintaining a commitment to scientific excellence by guiding the conception, safety, and deployment for various technologies that have paved the way for the breakthroughs of today.

## **Conclusion**

We strongly believe that the private and public sectors must work together to utilize every available tool to facilitate meaningful innovation that drives economic growth. As Congress explores ways to innovate in healthcare, prizes are one such essential tool that agencies, and the private sector, can, and should, consider.

Policymakers can encourage greater and more strategic use of prizes by agencies by supporting prize policy such as the House-passed “Science Prize Competitions Act”. Passage would send a signal to agencies, the private sector and the innovation community that the Federal government views the prize mechanism as an important solutions driver.

We look forward to continuing the dialogue with Congress about the power of prizes to unlock innovation towards finding cures for diseases, in addition to some the world’s greatest challenges.