

THE POWER OF INCENTIVE PRIZE COMPETITIONS

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At the Wendy Schmidt Ocean Health XPRIZE awards ceremony, murmurs rippled through the crowd. The \$2 million prize competition to develop better pH sensors for the measurement of ocean acidification (the increasing chemical imbalance in our oceans due to excessive carbon in our atmosphere) resulted in some surprising outcomes. The competition had two tracks—one for better accuracy (best performance) and one for affordability (cost and ease of use). In an unlikely victory, team Sunburst Sensors, a small business and relatively new market entrant based in the landlocked state of Montana, had won both first-place prizes, garnering \$1.5 million. Their approach was novel: using an autonomous spectrophotometric process in ocean conditions. Their technology demonstrated unprecedented accuracy in both coastal and deep-sea environments up to 3,000 meters. Sunburst Sensors is currently looking to expand its small company and bring high-tech jobs to Missoula. In the accuracy competition, Sunburst Sensors had beaten industry leader and incumbent Team DuraFET, who won the second-place prize. Gracious in defeat, Team DuraFET announced that they would donate their second-place purse of \$250,000 to the University of Washington to enable them to add pH sensors on profiling floats around the world, further expanding oceanographic and ocean acidification monitoring. Met with resounding applause, both teams illustrated the power of prizes to inspire teams to compete—not just for the purse—but to achieve innovative breakthroughs for the betterment of humanity.

We are living in extraordinary times, when technology is allowing ordinary individuals to accomplish what was once the province of only the wealthy and powerful. Small teams of innovators are creating breakthroughs that touch the lives of billions, tackling challenges and solving problems once thought to be solely the domain of governments. Incentive prize competitions can challenge these innovators to solve some of our most difficult, grand challenges.

Incentive prize competitions are different from *post facto* awards for accomplishments, such as the Nobel Prize and Pulitzer Prize. Instead of serving as an acknowledgement, the purse (cash or, in some cases, resources or opportunities) works as an incentive to motivate innovators to address a particular problem, usually one where the best solution or approach is unknown. It can also be used to draw public attention to an important issue facing humanity. Although the purse/prize itself is important (prizes can range from opportunities alone to millions of dollars), it is important to note that it is often not about the money for competitors and that a well-defined and executed prize competition can have extraordinary results.

Historically, governments used prizes to solve large, intractable problems. In 1714, the British government used a prize to challenge innovators to measure longitude, a barrier facing the maritime industry. Deviating from the more traditional approach of celestial navigation, clockmaker John Harrison cracked the problem by creating an extremely accurate maritime clock, radically improving the safety and efficiency of global trade.

Most people are familiar with Charles Lindbergh's extraordinary transatlantic flight in 1927, but what few people know is that he did so in pursuit of the Orteig Prize, a \$25,000 purse to the first person to complete a nonstop, solo voyage between New York and Paris (or Paris and New York). Lindbergh's winning flight captured the attention of the press, public, and investors, accelerating the development of the aviation industry as we know it today.

For a time, prizes fell out of favor as research and development primarily became the purview of governments. But in 1996, Peter Diamandis launched the Ansari XPRIZE for private spaceflight, resulting in a prize renaissance where prize competitions are frequently used by both the public and private sectors.

PRIZES ARE POWERFUL

Prize competitions are powerful tools that anyone, including corporations, nonprofits, and governments, can use to address specific challenges. They promote innovation, offer financial benefits, and increase public awareness.

Prizes promote innovation by: 1) encouraging new ideas; 2) proving the hardest test cases; 3) building community; and 4) democratizing

innovation. Prizes define problems rather than solutions, allowing a diverse crowd of innovators to develop a wide variety of possible solutions. In effect, they allow investors to bet on a portfolio of ideas versus investing in only a few organizations with a narrow set of solutions. Prizes can be designed to address the most difficult aspects of a problem, such as the most critical use cases or the hardest-to-reach constituents. Frequently, the resulting solution has a much wider application. Not being near the ocean, Sunburst Sensors might have been overlooked, but by participating in the Wendy Schmidt Ocean Health XPRIZE, they were able to validate a different technological approach and see it pitted side-by-side with the current best-in-class solution. Also, they proved their solution at depth and far from the coast, one of the world's most challenging environments for pH sensors, thus proving that it will function in less difficult conditions.

Prizes build community. They are as much about collaboration as they are about competition. Prize competitions galvanize resources, encourage conversations, and engage supporters in pursuit of a common goal. Where permissible, teams sometimes combine to improve their chances of winning, but they have also been known to make selfless gestures in support of other teams because they believe in the importance of solving the problem or appreciate another team's efforts. In addition to donating their prize purse to the University of Washington, Team DuraFET supported and collaborated with other teams, including donating to one team's crowdfunding campaign to raise the funds needed to attend competition trials and collaborating post-prize with another team whose goal is to enable surfers to capture ocean health data via their surfboards. These acts occur so frequently during XPRIZE competitions that they are referred to as "cooperation."

Prizes also offer unique financial benefits by: 1) paying only for successful outcomes; 2) potentially resulting in exponential gains; and 3) providing financial leverage. The largest expenditure for a prize occurs only after a solution that meets the criteria is achieved. In this way, it makes highly efficient use of limited resources. Prizes can result in extraordinary and exponential advancements by requiring teams to address well-scoped problems with non-prescriptive solution requirements which, if solved, might enable several additional problems to be solved down the line. Prizes incentivize many teams to work on a solution. This increases the amount

of aggregate investment in research and development to solve a problem and reduces the risk that a successful solution will not be developed. Teams competing for the Ansari XPRIZE for private space flight spent a combined \$100 million in pursuit of a \$10 million purse. The challenge was audacious but achievable, well-scoped, and non-prescriptive: The winning team must build a reliable, reusable, privately financed, manned spaceship capable of carrying three people to 100 kilometers above Earth's surface twice within two weeks. This one challenge dramatically accelerated the private space flight industry.

Prizes also build awareness by influencing, exciting, and educating the public. Prizes issue a clear call to action and tell a simple, yet powerful, story about a challenge that needs to be addressed. In the Wendy Schmidt Ocean Health XPRIZE, the competing teams and XPRIZE spent hundreds of hours engaging with the press and social media, garnering significant media attention as well as direct engagement through education and aquarium outreach programs.

Prize competitions democratize innovation, meaning that they ask innovators from anywhere, with any background or experience, to tackle a challenge and create diverse solutions. Most important, good prizes endeavor to create as objective and fair a playing field as possible, enabling great ideas from unlikely sources to shine. It does not matter how old participants are, where they went to school, or how long they have been working in the field—if they can solve the challenge, they win. This is even more relevant today, as teams have the ability to take advantage of exponential technologies (e.g., artificial intelligence, virtual reality, big data) to develop solutions in pursuit of prizes. Prizes democratize innovation because they encourage the creation of diverse, cross-disciplinary teams, and incentivize and validate new or unlikely thinkers. Good prizes allow anyone to compete, encourage teams to identify and incorporate people with diverse skills sets into their teams, and often provide incentives (e.g., solution testing, deployment, training) to support teams as they attempt to reach the goal set by the competition. These resources help prepare teams for a successful run in competitive markets after the prize is completed.

For example, in 2010, a team of high school students from West Philadelphia High School Academy of Automotive and Mechanical

Engineering competed in the \$10 million Progressive Automotive XPRIZE. Despite coming from an economically disadvantaged and very low-performing school, this student team competed against teams of well-funded, seasoned engineers. The Hybrid X team made a strong showing in their attempt to build a car capable of achieving 100 miles per gallon equivalent. Although Hybrid X did not win the prize, they won the hearts and minds of all who heard their story. As part of their incredible journey, in 2011 they sat with Michelle Obama at the State of the Union, were featured in newspapers, and were lauded by Philadelphia's mayor. Members of the team were later accepted to The New School and Penn State. Their story showcases the power of a prize competition to incentivize innovators from anywhere to tackle our toughest challenges and change their own lives in the process.

PRIZES ARE VERSATILE AND EFFECTIVE BUT ARE NOT SUITABLE FOR ALL PROBLEMS

Prizes are strong yet flexible tools for creating change. Prizes are especially effective for engineering challenges and validating technology. The Ansari XPRIZE required scientists and engineers to tackle the challenge by applying and integrating known technology and approaches to the space race in new ways. It also had a clear and simple method for proving that the challenge criteria had been met. An important value offered by a prize competition can be the testing of solutions, especially prototypes, to identify which one is truly superior at solving the problem.

Prizes work best when targeting a specific problem and can be highly effective when addressing a critical piece of a larger, more systemic problem. By defining specific elements to target, a prize competition can help chip away at larger, less tractable problems. Prizes work well by addressing necessary elements on the path toward addressing the problem in its entirety. For example, the Wendy Schmidt Ocean Health XPRIZE may unlock exponential advances in addressing ocean acidification and climate change by enabling oceans to be healthier and more accurately measured, understood, and managed by the world's scientists.

It is important to note, however, that a prize competition may not be the right tool for tackling a problem in the following circumstances: 1) when a large systemic problem needs to be solved in its entirety; 2) when policy

or regulatory barriers exist; 3) when a thriving market or many players exist with significant funding; or 4) when basic research is needed. A prize may not be able to address all aspects of a systemic problem that may have many barriers to solutions. For example, a prize attempting to cure a disease or "end" homelessness may be too complex or inoperable or may require such large incentives as to be unrealistic.

TIPS FOR DESIGNING EFFECTIVE PRIZES

Prizes should be considered one of many innovation tools that can help us solve difficult problems. Even though prizes are powerful, they are not a panacea. Prizes must be well-designed, well-targeted, and well-operated to be successful. Good prize designers: 1) understand what a prize can and cannot do; 2) ensure that a prize has sufficient resources; 3) design to the market; 4) incentivize the right thing; and 5) consider the timing. Prizes succeed when they target areas where they are most effective, are scoped to balance expectations, and are part of a supported ecosystem that includes staff to operate the competition, judges to validate the competition, and resources that directly support teams, such as by providing access to experts and funding.

Good prize design identifies barriers to innovation in a market and overcomes or bypasses those barriers. When designed properly, prizes can catalyze stagnant markets and stimulate innovation. "You get what you incentivize" is the prize designer's mantra. Be careful not to include too many criteria or inadvertently incentivize an unintended outcome. The best prize designs are simple, elegant, and clear. Good prizes have a sufficiently long timeline to allow for innovation, yet are short enough so as to not lose the attention of the audience or allow market forces to move faster than the competition itself. Tougher problems usually take longer to solve, so consider the time horizon carefully. Look out for accelerating and advancing markets, as advancement is sometimes unpredictable.

By following these principles, XPRIZE has become increasingly effective at designing prizes. It has expanded to new topic areas and implements prizes in new ways. For example, XPRIZE has expanded from prize competitions for the development of novel technology and hardware solutions (e.g., Ansari XPRIZE and Wendy Schmidt Ocean Health XPRIZE) to population- and application-based competitions, where teams compete

to show that they can help a group of people acquire new skills or apply exponential technologies to grand challenges in novel ways (e.g., Global Learning XPRIZE; Barbara Bush Foundation Adult Literacy XPRIZE presented by Dollar General Literacy Foundation; and IBM Watson A.I. XPRIZE, a Cognitive Computing Challenge).

PRIZES FOR SOCIAL OUTCOMES

Although prizes may not be the best solution to address social problems in totality, they can be very effective at accelerating progress and advancement. A well-designed prize targeted at the right part of a systemic problem can tip over a pivotal domino in a problem chain and result in exponential benefits. Through the Barbara Bush Foundation Adult Literacy XPRIZE presented by Dollar General Literacy Foundation, XPRIZE challenged teams of educators, mobile developers, and innovators to develop mobile learning solutions that would improve the basic English literacy skills of adults in the United States. The competition catalyzed a network of partners, including Comcast, the Philadelphia Mayor's Office of Adult Education, the Los Angeles Unified School District, and the Dallas County Community College District, and resulted in a 20-fold increase in the number of mobile learning apps available to adults at these lowest literacy levels, both by accelerating the pace at which incumbents transitioned to mobile platforms and by bringing new entrants into the field. By improving the literacy skills of adult learners and providing low-cost, easily accessible learning solutions, the prize will increase the percentage of adult learners able to access educational services, improve participants' access to information, improve their navigation of health and financial challenges, and increase their children's chances of succeeding in school.

Prizes create an incredible platform to compare and test solutions, especially where the best approaches may not be known. Imagine a competition to help change outcomes for a population of people experiencing homelessness, where teams compete to see which program provides the best improvement in people's access to care and housing. Imagine teams of technologists and educators competing to reduce achievement gaps in schools or improve entry-level employees' access to the skills they need to succeed in the workplace.

THE PROMISE OF PRIZES

Prizes hold significant promise for widespread use. They can enable us to solve global challenges by identifying the right problems to tackle, by motivating solvers to come to us, and by bridging the gap in incentives to bring solutions to market. Prize competitions are proven tools that enable us to crowdsource solutions to some of the world's grand challenges. They tell powerful stories and change how people view global problems and their solutions.

XPRIZE believes that the prize model is one tool to harness technological advances and the crowd to help achieve a world of abundance—food, water, education, health, and wellbeing—for all of our planet's inhabitants. XPRIZE believes that there are no problems that cannot be solved. There are plenty of untapped minds out there just waiting to solve them.

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