INTRODUCTION

In 1598 King Phillip III of Spain, having lost at sea many of his ships returning from the West Indies, offered a monetary prize for the first person to discover a method for measuring longitude.\(^1\) Despite hundreds of submissions, however, the problem remained unsolved. A series of prize offerings from other European nations followed, spurring scientific research by the greatest minds of the time, including Galileo Galilei. Galileo’s work, combined with the calculations of Johannes Kepler and the theories of Sir Isaac Newton, helped to distill the problem to the search for an accurate chronometer.

In light of this progress towards a solution, the English government in the early 18\(^{th}\) century offered a £20,000 prize\(^2\) to the first person constructing a sufficiently accurate chronometer. Amateur John Harrison developed a bulky (72 pounds) contraption thereafter that, despite being too imprecise to win the prize, demonstrated that Harrison was pursuing a fruitful technique. The English Board of Longitude was so impressed by Harrison’s efforts that it granted him a £500 “advance” to help him build an improved model. Several attempts later, Harrison succeeded, constructing a chronometer than remained accurate within two minutes of

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\(^1\) Rene Ritson, *History Notes: All at Sea*, available at [www.infj.ulst.ac.uk/NI-Maths/hypotenuse/ritson.htm](http://www.infj.ulst.ac.uk/NI-Maths/hypotenuse/ritson.htm).

\(^2\) To give an idea of the kind of incentive provided by such a prize, £20,000 in 1715 was worth the same as about £2.4 million, or $4.3 million, was worth in 2005. *See EH.Net, How Much is That Worth Today?*, at [eh.net/hmit/ppowerbp; xe.com, The Universal Currency Converter, at xe.com/ucc.](http://eh.net/hmit/ppowerbp)
time while at sea. It had taken Harrison 48 years to complete the task, and took another 10 years before the Board finally agreed to pay him the prize in 1773.\(^3\)

Why did Harrison, an amateur scientist with no formal training, spend nearly his entire life trying to solve a technological problem that had remained unsolved for hundreds of years? Why did Spain, England and others believe that such a prize would eventually lead to a workable solution to the longitude problem?

The answer to these questions lies in the nature of what might be called an “incentivizing prize.” An incentivizing prize is a monetary award that is publicly declared to be available to the first person or organization to meet certain specified conditions. This paper will argue that the use of incentivizing prizes offer significant benefits over other foundation strategies, and can be employed to generate solutions to the most intractable social problems that plague the world.

I. A TYPOLOGY OF THE PRESENT USES OF PRIZES BY FOUNDATIONS

It is not uncommon for foundations to use strategies that they dub “prizes” or “awards.” Only a few of those strategies, however, can accurately be viewed as incentivizing prizes. Instead, prizes can be used to bestow recognition, to raise awareness, to fund operating costs, or to incentivize behavior. Some prizes are constructed to meet more than one of these goals. Each of these types of prizes, and why it fails to adequately incentivize behavior, is discussed in turn.

A. Recognition Prizes

Some prizes are offered by foundations to bestow recognition upon an individual or organization for past actions or achievements. These prizes are usually awarded in recognition

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of a person’s or organization’s lifetime achievement, as is the case with the Nobel Prizes.\textsuperscript{4} The Nobel Prizes are the most well-known of the recognition prizes, and act almost solely as instruments of recognition. For example, the Nobel Prize in Literature is given to the person in the literary field who “had produced ‘the most outstanding work in an ideal direction.’”\textsuperscript{5} Similarly, the Pritzker Architecture Prize, offered by the Hyatt Foundation, honors “a living architect whose built work demonstrates a combination of those qualities of talent, vision, and commitment, which has produced consistent and significant contributions to humanity and the built environment through the art of architecture.”\textsuperscript{6}

Of course, recognition prizes are often intended to serve purposes in addition to mere recognition of the recipient. Commonly, the purpose of a recognition prize is described by the sponsoring foundation as serving the dual function of bestowing recognition and providing an incentive to resolve a particular problem. For example, the Albany Medical Center Prize in Medicine and Biomedical Research of $500,000, offered by the Silverman Foundation, exists “[t]o encourage and recognize sustained contributions to improving healthcare and promoting innovative biomedical research.”\textsuperscript{7} Recognition prizes can serve also to raise awareness of a particular social problem, or to raise awareness of the donor’s largess, as discussed in Part I.B.

Recognition prizes have been roundly criticized, however, for several reasons. First, recognition prizes are often reserved for recipients who have already completed a successful career and who thus have little time or incentive to make further contributions in their lifetimes.

\textsuperscript{4} Information available at nobelprize.org.
\textsuperscript{6} The Hyatt Foundation, \textit{A Brief History of the Pritzker Architecture Prize}, available at pritzkerprize.net/2006/pdf/mediakit.pdf.
\textsuperscript{7} A more obscure example is the Zayed International Prize for the Environment, established “to recognize and encourage environmental achievements.” Zayed Prize, \textit{at} www.zayedprize.org.ae/en/display.aspx?type=menu&id=441.
The monetary portion of these awards, dubbed “foot-in-the-grave awards” by Pablo Eisenberg,\(^8\) is unlikely to be used by the recipient to conduct further research, produce more art, or solve more problems.

Second, to the extent recognition prizes are intended to incentivize behavior, they are often not tailored to do so effectively. In light of the fact that it requires a lifetime’s work to obtain, say, a Nobel Prize, it seems unlikely that a person would orient her entire lifetime towards the receipt of such recognition. Lesser-known prizes suffer from the tautology that an incentive cannot change behavior if the class of potential recipients has never heard of it. For example, when Danny Hillis learned that he had been nominated for the Dan David prize, offered by the Dan David Foundation for achievement in one of “three Time Dimensions: Past, Present, and Future,”\(^9\) he had never heard of the award and thought it was a hoax.\(^10\) Moreover, the criteria for selection for many recognition awards are so vague as to provide no direction even to an individual who might attempt to orient his behavior towards receiving the prize. For example, to receive the Milton Friedman Prize for Advancing Liberty from the Cato Institute, a recipient must have “made a significant contribution to advance human freedom.”\(^11\)

Third, because the prizes are offered late in a recipient’s life and it is difficult for potential recipients to orient their behavior to increase their chances of winning the prize, the

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\(^{9}\) Dan David Prize, at dandavidprize.com.

\(^{10}\) St. John, *supra* note 8.

\(^{11}\) Cato Institute, *2006 Milton Friedman Prize for Advancing Liberty*, at cato.org/special/friedman/about.html (indicating that the last two prizes, in 2002 and 2004, were awarded to economists).

A review of the statements of recipients of such prizes reveals that they often view the prizes as ex post justifications for past efforts, not as ex ante motivators to perform the work in the first place. For example, one recipient of the Milken National Educator Award noted that the prize “helped justify all the extra hours” she devoted to her school. Jay Mathews, *Michael Milken, Giving Freely; Convicted Financier Hopes to Boost Educators—and Perhaps His Image—with $25,000 Awards*, THE WASHINGTON POST, Jul. 14, 1997, at B1. Similarly, a recipient of the Broad Prize, offered by the Broad Foundation, surprised that her school had won the award, explained that “[t]his really validates what we’re doing.” Joel Rubin, *Garden Grove Schools Win $500,000 Eli Broad Prize in National Contest*, LOS ANGELES TIMES, Sep. 21, 2004, at B5.
prizes are considered by many to be “a lot of waste” of foundation money that could have been spent otherwise.\textsuperscript{12}

\textsuperscript{12} Daniel Borochoff, President of the American Institute of Philanthropy, quoted in St. John, \textit{supra} note 8.
B. Awareness Prizes

Another common type of prize are those prizes designed to raise awareness. Such awareness prizes can be constructed to raise awareness of a particular social problem or matter, or, in some instances, to raise awareness of the donor’s name or benevolence.

Awareness prizes of the first type are often tailored to a particular category of social problem, and serve to raise awareness of specific problems that fall under the prize’s general aegis. For example, the Goldman Environmental Prize is given annually to six “environmental heroes” for their “sustained and significant efforts to protect and enhance the natural environment,” including “protecting endangered ecosystems and species, combating destructive development projects, promoting sustainability, influencing environmental policies and striving for environmental justice.”13 Because the recipients are often from “isolated villages or inner cities,”14 it is unlikely that they are specifically orienting their behavior in order to receive the prize.15 Instead, the prize serves to raise awareness internationally of the particular environmental problem combated by the recipients. In essence, it is a way of garnering international publicity via the excitement of a prize that could not be generated by a mere press release stating that there is an environmental problem in some remote part of the world.

These types of awareness prizes are often compared to recognition prizes. The Goldman Environmental Prize, for example, has been referred to as “the Nobel Prize for Environmentalists.”16 However, the ability of these recognition prizes to target particular current social problems renders them analytically distinct. The Nobel Peace Prize, for example,

13 Goldman Prize, About the Prize, at goldmanprize.org/theprize/about.
14 Id.
15 This is in contrast to the stated goal of the Goldman Environmental Foundation, that “[t]hrough recognizing these individual leaders, the Prize seeks to inspire other ordinary people to take extraordinary actions to protect the natural world.” Id. Even with the favorable press coverage of the Prize, however, it is unlikely that individuals at the “grassroots” level would change their behavior because of the existence of the prize.
recognizes a person for past achievements made under the broad umbrella of peace.\(^{17}\) In contrast, the Goldman Environmental Prize targets a goal narrow enough that the prize can bring media attention to the present efforts of the recipient to improve society in a particular way. That is, the prize honors “grassroots environmentalists” in order to provide “[w]orldwide visibility for the issues they champion.”\(^ {18}\)

The other type of awareness prize is more self-serving, with the purpose of raising awareness of the donor’s name or benevolence. Most innocuously, these prizes might serve to honor a person the donor admires. For example, the Strauss Prize at Carleton College is awarded in memory of the donor’s father, and recognizes humorous writing.\(^ {19}\) More often, however, these prizes are “simply elaborate marketing gimmicks” to raise awareness of the donor’s name.\(^ {20}\) For example, the Milken Family Foundation offers a $25,000 prize, the Milken National Educator Award, to educators “who are furthering excellence in education.”\(^ {21}\) The award has been criticized, however, as an effort to “remake [the] image” of “multimillionaire and convicted felon” Michael Milken.\(^ {22}\) Similarly, the Cato Institute’s Milton Friedman Prize for Advancing Liberty\(^ {23}\) might be criticized as a method of raising awareness of one particular theory of economics.\(^ {24}\)

\(^{17}\) The administrators of the award themselves note that “[t]he ways and means to achieve peace are as diverse as the individuals and organizations rewarded with the Nobel Peace Prize.” Nobelpri...\(^ {18}\) Goldman Prize, About the Prize, at goldmanprize.org/theprize/about.

\(^{19}\) Carleton College, Samuel Strauss Prize, at apps.carleton.edu/campus/doc/honors/strauss.

\(^{20}\) See St. John, supra note 8.


\(^{22}\) Mathews, supra note 11.

\(^{23}\) See Cato Institute, 2006 Milton Friedman Prize for Advancing Liberty, at cato.org/special/friedman/about.html.

\(^{24}\) Another example is the Zayed International Prize for the Environment, awarded to those making “environmental achievements . . . in line with the vision and philosophy” of the current President of the United Arab Emirates. Zayed Prize, at www.zayedprize.org.ae/en/display.aspx?type=menu&id=441.

Prizes that are linked to corporate giving fall into this category of awareness prizes as well. For example, Samsung and Microsoft offer prizes in their “Hope for Education” contest for those “students, teachers, parents or anyone with concern about a particular school” who submit an essay answering the question “How will the growing use of technology in the classroom benefit students in the future?” Samsung and Microsoft Announce Winning
C. Operating Cost Prizes

A third type of prize is that which funds the operating costs of an organization. These “operating cost prizes” are not dissimilar from typical grants given by foundations. Just as a nonprofit organization might apply for a grant from a foundation to fund its mission, competitors for operating cost prizes apply for the prize from a foundation to fund its mission. Likewise, grants and operating cost prizes are both awarded based on the soundness of an organization’s business plan and likelihood that it will achieve its goals.

One example of such an operating cost prize is the Goldman Sachs Foundation’s prize awarded to the winners of the “National Business Plan Competition for Nonprofit Organizations.” The prizes are awarded to nonprofit organizations “in the planning stage,” and winners receive “hundreds of hours of technical business planning consultations to assist their organizations in implementing the new ventures.” Similarly, the $1 million Opus Prize is “given to people or organizations that are committed to changing deeply rooted problems such as poverty, hunger, illiteracy or disease.” The most recent recipient, an Indian priest, will use interest on the prize money to fund his organization’s creation of more literacy centers in India.

More commonly, operating cost prizes are awarded to individuals to fund their proposed course of study or community work. Though these are more often called “fellowships,” they are not different in type from prizes given to organizations based on their business plans. The most well-known example of such an operating cost prize is the MacArthur Fellows Program, offered

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26 Id.
27 Marquette University Office of Marketing and Communication, Opus Prize Awarded to Organization Furthering Literacy in India, available at marquette.edu/opa/newsroom/news/opus110705.shtml.
28 Tom Heinen, Million-dollar Prize Goes to Priest, MILWAUKEE JOURNAL SENTINEL, Nov. 4, 2005.
by the John D. and Catherine T. MacArthur Foundation. These prizes, known commonly as “genius grants,” are “unrestricted fellowships to talented individuals who have shown extraordinary originality and dedication in their creative pursuits and a marked capacity for self-direction.” The fellowships are not granted based necessarily on a detailed proposal by the recipient as to future community work, but one significant purpose of the prize is “to facilitate subsequent creative work.” Similarly, the Clinical Scholars Program, offered by the Robert Wood Johnson Clinical Scholars Program, pays for the costs of educational fellowships in order “to create a corps of physicians ‘with a strong grasp of the societal forces that impact health care, the quantitative and qualitative skills to assess both those forces and the health care system, and therefore the ability to effect change within the system.’”

Winners of operating cost prizes are selected based on the resources they wield to contribute to society. The MacArthur Fellows Program takes perhaps the broadest view, investing in people based on demonstrated potential but imposing neither any reporting requirement on the recipient nor restrictions on the use of the money. A prize that requires a business plan, similarly, invests in an idea, not a proven solution. As a result, neither type of operating cost prize can be precisely tailored to resolve a particular social problem; a MacArthur fellow could choose to do nothing with the prize, and even a well-crafted business plan may fail.

30 Id.
31 Id.
33 In fact, one recipient, the physicist Jon Schwarz, used his grant to purchase “a nice house.” Elizabeth Venant, *MacArthur’s Award for Genius Fellowship: The Big Honor Bestowed on Scientists, Humanists, and Artists is Prestigious and Comes with No Strings Attached*, LOS ANGELES TIMES, Dec. 25, 1989.
D. Incentivizing Prizes

An incentivizing prize is distinct from the other types of prizes. Though an incentivizing prize may bestow recognition on the recipient, the prize generates the laudable activity, not the other way around. Though an incentivizing prize may raise awareness of a social problem, it also is awarded only once that problem is solved. Though an incentivizing prize may be used to reimburse operating costs already expended, it is awarded only after those costs have been incurred.

Quite recently, one foundation has been created with the incentivizing prize as its key strategy. The X Prize Foundation credits itself with reinvigorating the strategy of the incentivizing prize in developing the $10 million X Prize for the first private spaceflight.34 Inspired by Charles Lindbergh’s winning of the 1927 Orteig Prize for the first transatlantic solo flight, X Prize Foundation founder and chairman Peter Diamandis decided to drive the private race to space with an incentivizing prize.35

Diamandis realized that prize money can be used to leverage spending from other sources.36 Competitors for the Orteig Prize, for example, spent a total of $400,000 to win the $25,000 prize. Similarly, the winner of the X Prize, Microsoft co-founder Paul Allen, spent an estimated $20 million to win the $10 million X Prize.37 Diamandis reports that his foundation is researching possible expansion into offering prizes to solve problems in “energy, genomics, education, nanotechnology, and . . . the social arena.”38

Diamandis’ success with incentivizing prizes has been emulated by the federal government. For example, NASA is now offering “Centennial Challenges,” designed “to

34 Michael A. Prospero, Fuel for Thought, FAST COMPANY, Jan/Feb 2006, at 102.
35 Id.
36 Id.
37 John J. Miller, Extraordinary Feats of an X-Man, PHILANTHROPY,
38 X Prize Foundation, Welcome, at xprizefoundation.com/index.asp.
stimulate innovation and competition in solar system exploration and ongoing NASA mission areas.”

39 NASA parrots the distinguishing features of an incentivizing prize in describing this initiative, noting that the awards are “based on actual achievements, instead of proposals” and seek solutions “from non-traditional sources of innovation.”

40 Similarly, the Defense Advanced Research Projects Agency (DARPA), an administrative arm of the federal government, sponsored the “Grand Challenge” to award $2 million to the team winning a grueling desert race with an “autonomous vehicle.”

41 DARPA plans to incorporate the innovations into military applications. The Grand Challenge also reflects the unique attributes of an incentivizing prize; its slogan is “Harnessing American Ingenuity.”

42 Despite these successes, few foundations offer true incentivizing prizes. Instead, the recent boom in prizes offered by foundations has generated prizes falling into one or more of the other three types of prizes.

43 In fact, research did not reveal a single incentivizing prize offered by a foundation outside of those offered for technological innovation.

II. ADVANTAGES OF INCENTIVIZING PRIZES

The use of an incentivizing prize as a strategy to solve social problems has two primary advantages to the use of other foundation strategies. First, the incentivizing prize allows for the possibility of leveraging the prize money to generate even more spending towards resolving the targeted problem or other problems. Second, the incentivizing prize rewards solutions developed by anyone, not proposals submitted by a select group of applicants.

39 National Aeronautics and Space Administration, NASA’s Centennial Challenges, at exploration.nasa.gov/centennialchallenge/cc_index.html.
40 Id.
42 Id.
43 For a presentation of many such recent prizes, see St. John, supra note 8.
A. Leveraging of Prize Money

The dangling of prize money before an open field of competitors can serve to leverage that prize money into total spending among all competitors that far exceeds the value of the prize itself. This dynamic is well illustrated by Martin Shubik’s “Dollar Auction” game.\textsuperscript{44} In the Dollar Auction, an “auctioneer auctions a dollar bill to the highest bidder, with the understanding that both the highest bidder and the second highest bidder will pay.”\textsuperscript{45} Aside from collusive strategies and a trivial equilibrium point,\textsuperscript{46} the game tends to lead to large bids, topping several dollars in certain crowds.\textsuperscript{47}

To understand this seeming paradox, consider that the bidding starts small, but eventually escalates to a bid of 60 cents by A. B might counter by bidding 65 cents. Notably, at this point the dollar bill has already been leveraged to create spending of at least $1.25. But the bidding rarely ends there, because A faces this decision: if he bids no more, he will lose 60 cents if no one else bids. Alternatively, he can outbid B by bidding, say, 70 cents, and thus secure for himself a temporary advantage of $1.00 minus $0.70 = $0.30. But then B faces a similar dilemma, and will probably choose to escalate her bid also. Eventually, one party usually bids $1.00 for the dollar bill. Suppose B had bid 95 cents, but A outbids B by bidding one dollar. In that case, B faces a loss of 95 cents unless she outbids A, so she might consider bidding $1.05 for the dollar bill to protect her investment. In this way, the game often ends with parties having bid several dollars for the single dollar bill.

\textsuperscript{44} First described in Martin Shubik, The Dollar Auction Game: A Paradox in Noncooperative Behavior and Escalation, 15:1 THE JOURNAL OF CONFLICT RESOLUTION 109–11 (Mar. 1971).
\textsuperscript{45} Id. at 109.
\textsuperscript{46} Competitors could collude, agreeing that one would bid a penny while the other competitors would refrain from bidding. In this case, the competitors could share the net benefit of 99 cents. Alternatively, the first competitor could bid $1.00, yielding a trivial equilibrium point whereby other competitors have no reason to outbid the first, and all parties, including the auctioneer, end the auction with a zero net gain. Id. at 110.
\textsuperscript{47} Id.
The game elegantly demonstrates how an incentivizing prize can spur competitors to spend in total more than the value of the prize. This result would be likely to occur in any situation where a sufficiently large number of competitors $n$ spending an average of $\text{cost}_{\text{avg}}$ in their attempt to win the prize $p$ follows the relation $n \times \text{cost}_{\text{avg}} > p$. In certain incentivizing prize situations, the collateral spending of the non-winning competitors nevertheless confers positive social value by reducing the magnitude of the principal social problem or by solving related social problems.\(^{48}\) In such situations, especially where $n \times \text{cost}_{\text{avg}} \gg p$, the prize money $p$ has been leveraged to accomplish more via an incentivizing prize than the same amount could accomplished by a direct grant.\(^{49}\)

By assuming that competitors consider marginal strategies, the Dollar Game also demonstrates how an individual competitor can rationally spend more in winning the prize than he might receive if he wins the prize. In a real incentivizing prize situation, all competitors, not just the top two spenders, lose the money they spend towards winning the prize. Thus, a competitor who has already spent, say $0.9p$, and believes that she has a reasonable chance of winning the prize by spending an additional $0.2p$, might rationally end up spending a total of $1.1p$ in her attempt to win the prize worth only $p$.

The tactic of leveraging expenditures is used to differing degrees of success in the private sector and in the nonprofit sector. In the private sector, the incentive of profit encourages problem-solving as individuals and corporations compete for the profit. Outside of the patent system, corporations spend money ex ante in the hopes of developing a marketable solution to the problem or need at issue. Alternatively, venture capitalists adjudge an entrepreneur’s business plan to develop a marketable solution as a sufficiently low risk or potentially

\(^{48}\) See infra notes 56–57 and accompanying text.

\(^{49}\) Of course, this assumes a separate source of funding for the competitors. See infra note 57 and accompanying text.
blockbuster investment. In either case, the ability of the corporation to allocate funds towards the project depends entirely on the estimated return on that investment when the product or solution is developed. Such gains might be secured because the corporation can keep the solution a secret, and thus protect profits, or because the corporation benefits from first-mover advantages.

The patent system’s grant of a limited monopoly to inventors in exchange for disclosure makes more secure the incentive for a corporation to problem-solve, because it is guaranteed the profits extricable from the limited monopoly. These profits, however, only flow into the corporation’s coffers if there is a sufficiently robust market for the solution such that the ex ante spending to secure the patent is reimbursed. Thus, the patent system itself incorporates the whims and predilections of the market and consumers’ willingness to pay.

A side effect of the winner-take-all nature of the patent system is to create a race for the rival prize—the patent. In some cases, this undoubtedly produces waste; competitors who do not win the race might have spent considerable resources on research or infrastructure, only to have their efforts not only unrewarded but unrewardable because of the monopolistic nature of the patent. In other cases, however, innovators may discover that their methods themselves are rewardable by a patent, or that they had serendipitously solved a different problem than that

52 35 U.S.C. § 271(a) ("[W]hoever without authority makes, uses, offers to sell, or sells any patented invention . . . infringes the patent.").
54 35 U.S.C. § 101 ("Whoever invents or discovers any new and useful process . . . may obtain a patent therefore.").
which they set out to solve.\textsuperscript{55} Thus, the winner-take-all nature of the patent system can, in some situations, create collateral benefits to society, even if fortuitously.

Incentives to solve problems operate quite differently, on the other hand, in the standard market for grants and donations in the nonprofit sector. In such a market, nonprofit organizations compete for scarce grant money from foundations, and scarce donations from individual donors, by proposing the most promising solutions to social problems. In contrast to the private sector market, which directs the path of innovation, foundations themselves are able to select which social problems they deem most in need of resolution and can fund efforts focusing on those problems. This might be called the benefit of “foundation choice.” At the same time, numerous nonprofit organizations tend to seek, obtain, and implement grant money to attack the same problem concurrently. Because of the historical unavailability of reliable metrics for evaluating the successes of such solutions, however, it is often unclear which of these multiple solutions, if any, are achieving the desired end most effectively. Thus, spending across all foundations and donors to solve a particular social problem tends to be quite diffuse—myriad organizations pursuing disparate strategies while all receive funding towards the same end.

Incentivizing prizes are able to combine the leveraging benefits of the winner-take-all reward system sometimes used in the private sector with the “foundation choice” benefit of the nonprofit sector. Incentivizing prizes squarely respond to the directive that “[f]or foundations to have a significant impact . . . , they need to act strategically and leverage their assets.”\textsuperscript{56} As is the case with the Dollar Auction, the X Prize, and the British longitude prize, an incentivizing

\textsuperscript{55} The annals of scientific research teem with examples of such good fortune. For example, physicist Wilhelm Conrad Röntgen was trying to study cathode rays, like those used in televisions, only to accidentally generate a different kind of electromagnetic emission, the x-ray. Natasha Stillwell, \textit{Top Ten Accidental Discoveries}, Discovery Channel, \textit{at} exn.ca/Stories/2004/04/19/51.asp?t=dp. More peculiarly, Art Fry accidentally invented “post-its” while he was “trying to create bookmarks that would stay put in the church choir’s hymnals.” Paul D. Kretkowski, \textit{The 15 Percent Solution}, Wired News, \textit{at} wired-vig.wired.com/news/business/0,1367,9858,00.html.

\textsuperscript{56} Mayer, \textit{supra} note 53, at *15.
prize can be used to leverage an even greater amount of spending towards solving the social problem than if it were instead a direct expenditure on services.

In some instances, an incentivizing prize would merely leverage additional spending from other foundations. That is, competitors with promising ideas on how to win the prize tomorrow might seek project funding from other foundations today. This kind of leverage might not dramatically increase the amount of spending across foundations, however. The ability of an incentivizing prize to leverage other spending is most promising when investments from outside of the foundation community cover the project costs of the competitors. Such additional spending might come from charitable donations because of the increased interest in the social problem among the public created by the excitement of the prize. Alternatively, it might come from private investors who place their money at risk in hopes of receiving a portion of the prize money. 57

**B. Path Independence; Rewarding Solutions by Anyone, Not Proposals by the Few**

As was true for Harrison in winning the British longitude prize, innovation can come from anyone, regardless of his formal training. This is one of the key motivations behind NASA’s Centennial Challenges. Brant Sponberg, the program manager for the project, explains that NASA “needed a mechanism to reach out to sources of innovation wherever they might lie.” 58 In essence, there are plenty of amateur space enthusiasts attracted by the esoteric and inspirational nature of space travel who might not otherwise be able to contribute their knowledge, time and energies to NASA’s research.

In contrast, foundations make grants to nonprofit organizations that have the wherewithal to conduct formalized fundraising efforts and that possess a business plan demonstrating how

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57 There are potentially significant tax implications to a foundation giving money to individuals or for-profit enterprises, but analysis of these implications is beyond the scope of this paper.

58 Prospero, supra note 34.
they plan to achieve their results. Because some fundraising expertise and planning is thus required to secure grants, the market for grant recipients has a significant barrier to entry. Of course, it is not difficult to form a 501(c)(3), and perhaps the best ideas need not be accompanied by a glossy brochure. However, these barriers may be enough to dissuade some persons who might, if instead seeking a large sum of prize money, be able to overcome these barriers to secure secondary funding in hopes of winning the prize.

Furthermore, an incentivizing prize rewards only demonstrably successful solutions, not mere proposals, no matter how promising. An oft-cited example of a program with a promising strategy but disappointing results is Drug Abuse Resistance Education (D.A.R.E.). Despite its implementation in 80 percent of school districts in the United States, D.A.R.E. was found in 2003 to make “no significant difference[] in illicit drug use” among program graduates, according to a General Accounting Office report.\textsuperscript{59} One scholar estimates the total economic costs of D.A.R.E. to be approximately $1 billion per year.\textsuperscript{60} An incentivizing prize might instead offer a large sum to the first school district to lower the incidence of illicit drug use among its students by a certain percentage.

This feature of incentivizing prizes might be called “path independence.”\textsuperscript{61} As used here, a strategy to solve a particular social problem employs path independence if the strategy specifies only the conditions of the problem and requirements of an acceptable solution, without reference to the tactics that might be used to achieve such a solution. More plainly, the use of incentivizing prizes enjoys path independence because the foundation offering the prize need not

\textsuperscript{59} General Accounting Office, Youth Illicit Drug Use Prevention: DARE Long-Term Evaluations and Federal Efforts to Identify Effective Programs, available at www.gao.gov/new.items/d03172r.pdf.


\textsuperscript{61} The mathematically inclined reader will note the borrowing of this term from the field of vector calculus.
consider at all how the problem might be solved. In the words of NASA’s Sponberg, “[W]e at NASA don’t have to be smart enough to pick the right performer.”

This is in stark contrast to the role played by foundations in awarding grants. In that market, each foundation must have a wealth of accumulated expertise in order to differentiate those proposals among the myriad submitted that have merit from those that are less likely to succeed. Even when such in-house resources are effective in separating the wheat from the chaff, some promising proposals will nevertheless fail to solve the problems they target.

In sum, the use of incentivizing prizes can allow the sponsoring foundation to leverage its money to generate even more spending towards resolving a problem, opens up the field of potential innovators from organized nonprofits to everyone, and alleviates the burden on foundations to determine which proposals are best, instead allowing the thrill of competition and even greed drive innovators to solve the problems on their own.

III. TYPES OF SOCIAL PROBLEMS RESOLVABLE BY INCENTIVIZING PRIZES

The social problems that might be solved by incentivizing prizes share three characteristics in common: (A) private-sector failure to resolve the problem, resulting from the perceived or actual inadequacy of financial rewards; (B) state failure to resolve the problem, resulting from inadequate political rewards; and (C) the presence of “activation barriers,” beyond which the solution becomes self-perpetuating.

A. Private-Sector Failure

Much has been written about the concept of “market failure,” or the failure of the free market to arrive at a pareto optimal allocation of resources. There are some social problems

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62 Prospero, supra note 34.
that arise from traditional market failure and require state or civic intervention to correct the market. One such type of market failure is the underproduction of goods or services because of monopolistic or collusive behavior by private firms. These problems are resolved by governmental intervention in the form of antitrust regulation.\(^64\) Another type of market failure occurs when private actors overestimate the risk involved in a particular venture because of reigning customs and stereotypes. The nonprofit sector can often rectify such misinformation. For example, the private lending market tends to under-supply credit to the poor.\(^65\) Through strategic grant-making by the Ford Foundation, however, micro-credit banks were established to cater to this underserved population.\(^66\) Today, private lending institutions do not hesitate to invest in such micro-credit banks, because the risk level of such investments has been demonstrated to be low.\(^67\)

Even when the market functions perfectly from an economic standpoint, however, private actors will not develop solutions to social problems if such solutions do not generate a sufficient return on investment. This kind of “failure” is not a malfunction, then, but rather an inherent limitation of the sector itself. A classic example of this type of failure is the failure of the pharmaceutical industry to develop vaccines or treatments for diseases that plague only the poor.\(^68\) Even a perfect market would not reward the investment required to develop such

\(^{63}\) See, e.g., Edward McCaffery & Jonathan Baron, The Political Psychology of Redistribution, 52 UCLA L. REV. 1745, 1747 (2005). A more accessible definition is provided in I. Trotter Hardy, Not So Different: Tangible, Intangible, Digital and Analog Works and Their Comparison for Copyright Purposes, 26 U. Dayton L. Rev. 211, 218 (2001) ("A ‘market failure’ means that unless something is done to fix things, people will produce either too much or too little of some good or service, where ‘too much or too little’ are [sic] defined in relation to what would be the optimal use of society's resources.").

\(^{64}\) See, e.g., the Sherman Anti-Trust Act, 15 U.S.C. §§ 1–7 (2000) (making illegal “[e]very contract . . . in restraint of trade” and criminalizing the actions of “[e]very person who shall monopolize . . . any part of the trade or commerce among the several States”).

\(^{65}\) Mayer, supra note 53, at *24.

\(^{66}\) Id.

\(^{67}\) Id.

\(^{68}\) For example, despite the fact that a malaria vaccine might be within reach, the disease continues to kill approximately 3,000 African children per day. See World Health Organization, Malaria Is Alive and Well and
vaccines or treatments. In recognition of this failure, in fact, scholarly commentary in the patent field has focused on the notion of the government using incentivizing prizes as an alternative or in place of the traditional patent system to motivate the private sector to develop such products.69

Finally, the private sector will often fail to produce sufficient public goods. Public goods are those goods that are both nonrival and nonexcludable.70 Private actors have no incentive to invest in the production of public goods because they are unable to capture the benefits of the goods by charging for their use.

B. State Failure

The classic formulation of state failure explains that governments are beholden to majoritarian interests by the instrument of democracy, and will not sufficiently resolve minority concerns. More specifically, governments will fail to attack social problems that affect segments of the population without sufficient political clout, whether by nature of their minority or lack of alignment with moneyed interests.

A government can also underproduce certain public goods when doing so would confer positive “horizontal political externalities” on other government units.71 As explained by Professor Depoorter, “[h]orizontal electoral externalities arise whenever political decisions impact the electoral demand for other political actors, including competitors.”72

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69 See, e.g., Michael Abramowicz, Perfecting Patent Prizes, 56 Vand. L. Rev. 115 (2003) (discussing the particulars of how governmental agencies might function in administering patent prizes); Michael Polanyi, Patent Reform, 11 Rev. Econ. Stud. 61, 65 (1944) (arguing in his seminal article that inventors should be rewarded not with a commercial monopoly, but with a sum from “the public purse”).


71 This theory, including the coining of the term “horizontal political externalities,” is described in Professor Ben Depoorter, Political Externalities & The Supply and Demand of Disaster Management, forthcoming in Volume 56:1 of the Duke L.J. (October 2006).

72 Id. at *16.
Depoorter posits that his theory of horizontal political externalities explains the ex ante failure of the local, state, and federal governments to avert the devastation following Hurricane Katrina. That is, the federal government did not prepare the optimal level of disaster planning ex ante because to do so would have conferred positive political benefits on the state and local governments involved. Because of the inability of governments to internalize these positive externalities, there is a “political deadweight loss.”

A related category of state failure arises when a social problem, despite imposing substantial harm or loss, has a low probability of imposing such harm during any one political cycle. These “low probability, high loss” problems can be conceived as being the dynamic version of the positive horizontal political externality problems described by Professor Depoorter. Thus, we can describe a class of social problems as having “dynamic horizontal political externalities,” in which present political actors fail to engage in optimal actions because to do so would impose positive externalities on their successors in office. These types of social problems are likely to correlate with “low probability, high loss” social problems because a rational political actor would be unlikely to spend financial and political capital on a problem that will probably not prove disastrous during her term in office.

C. Activation Barriers and a Self-Perpetuating Solution

Incentivizing prizes work best to resolve problems plagued by “activation barriers,” the solutions to which become self-perpetuating once set in place. As used here, “activation barriers” are present when a problem cannot be solved without a significant outlay of capital, whether financial, political, intellectual, or temporal. Once those activation barriers are

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73 Id. at *20.
74 The same logic can be used to demonstrate why the local and state governments did not adequately prepare.
75 Id. at *19.
surmounted by the implementation of a solution, however, ongoing resolution of the problem or prevention of its recurrence requires relatively little capital.

The classic example of a social problem that meets these two criteria is the failure to develop a vaccine for a disease that primarily affects the poor such as malaria. In order for the private sector or the state to develop such a vaccine, an enormous amount of money, time, research, and, in the case of the state, political capital would have to be expended. Once a vaccine were discovered, however, it would be relatively inexpensive to produce, and could be distributed worldwide with comparatively trivial effort. Eventually, even the incidence of vaccination could decrease, as the disease would become less prevalent. In this case, the private sector can take over the distribution of the vaccine. If the manner in which to produce the vaccine is in the public domain, firms will build capacity to provide the vaccine, and the normal market forces will drive the price of the vaccine to the marginal cost of producing it. For other types of social problems, the solution might be more akin to an idea or plan, and may self-perpetuate simply by having been demonstrated to be an effective method of resolving the problem. One example of this type of solution might lie in the arena of disaster management planning, as highlighted in Part IV.B.

By way of contrast, lack of support for the arts and culture is a classic example of a social problem that meets neither of these criteria. The arts require continual investment to showcase cultural artifacts or treasures or to present performance pieces. Taken as a whole, the investment shortfall for the arts for this year is not substantially different from the shortfall for the next.
Thus, there is no significant activation barrier, nor would the achievement of funding for the arts today mean that the arts would not continue to be underfunded in the future.\textsuperscript{76}

IV. CRAFTING INCENTIVIZING PRIZES FOR SELECTED PROBLEMS

For an incentivizing prize to function properly, the sponsoring foundation should craft it carefully to ensure that it achieves its optimal incentivizing effect. The first step in crafting an appropriate prize is to specify clearly the social problem to be attacked. Next, the foundation must specify the parameters of a solution sufficient to trigger the award of the prize. The foundation should be sure that such a solution overcomes the activation barriers inherent in the social problem, and can be adequately subsumed by private sector or duplicated without significant cost.

Having specified the problem and the parameters of a solution, the foundation should assign a monetary value to the prize such that the optimal incentive is provided. The prize must be large enough so that an innovative competitor could feasibly design a solution and make a significant profit.\textsuperscript{77} Of course, the prize should not be so large as to be several orders of magnitude larger than the investment of each competitor. Perhaps a foundation could use an escalating prize structure, whereby the prize amount is increased over time if no workable solution has yet been found.

Finally, the prize should be widely publicized. In order to maximize the incentivizing effect, the foundation should be careful not to limit the scope of possible competitors. The prizes

\textsuperscript{76} Of course, on a more local scale, particular artistic events could be conceived as satisfying these two criteria. For example, a foundation could offer a prize to performance piece that draws a certain crowd for a certain period of time, which piece might be expensive to develop but relatively inexpensive to repeat.

\textsuperscript{77} See note 57 and accompanying text.
should “reach out to sources of innovation wherever they might lie.” The prize should also be crafted to ensure that the potential winners are those in whom the discretion to succeed lies. That is, there can be an agency problem that arises when a prize could be won by an entity distinct from the entities that would have to innovate or work hard in order to make the innovation succeed. For example, if an incentivizing prize for education were offered to a county, but the individual teachers were the key determinants in whether education actually improved in the county, the foundation would have to structure the prize to reward the teachers directly as well to avoid an agency problem.

To highlight how development of an incentivizing prize might work in practice, a few examples are discussed below.

A. Pharmaceuticals

There has been much scholarly debate about employing incentivizing prizes within or in lieu of the patent system. This research has focused on how government can supply prizes to motivate research into goods like pharmaceuticals for which there is an insufficient private market to justify the outlay of capital required to produce the first unit of the good. Combined with this private-sector failure is the failure of the state to address such problems, likely because there is only a limited and weak political constituency that pushes for the creation of such pharmaceuticals. This social problem also suffers from an activation barrier—the capital required to create the first such goods. Because the social problem of underproduction of pharmaceuticals for the poor possesses these three characteristics, as described in Part III, and because this is an area thoroughly studied in the context of patents, incentivizing prizes for the

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78 Brant Sponberg of NASA, as quoted in Prospero, supra note 34.
79 See note 69 and accompanying text.
development of pharmaceuticals might be an appropriate first step for a foundation seeking to employ a strategy of offering incentivizing prizes.

For example, a foundation might offer a prize for the development of a reasonably safe malaria vaccine, provided that the marginal cost of producing one unit thereof is below a certain threshold. The foundation would have to consult with medical experts to assign a value to the term “reasonably safe,” and might consider the ability of the African poor to pay for the vaccine when setting the “certain threshold.” The prize would probably have to measure in the hundreds of millions of dollars, because it costs about $800 million to develop a new drug via traditional methods, according to the pharmaceutical industry.\textsuperscript{80} Though a prize of, say, $100 million may seem astronomically high, it would constitute just 3% of the annual dollars granted by foundations for health-related projects.\textsuperscript{81} Moreover, the prize could be accounted for over the several years it might take for a vaccine to be developed.

\textbf{B. Disaster Management Planning}

Local, state, and federal governments in the wake of Hurricane Katrina demonstrated their ineptitude in disaster management planning. Professor Arti Rai has suggested that a prize mechanism might be an appropriate solution to motivating a higher level of ex ante planning to avoid or mitigate natural or man-made disasters.\textsuperscript{82} However, because the inadequate planning may have resulted from the political deadweight losses inherent in a state system of dual sovereignty, an incentivizing prize for disaster management planning should come from outside

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\item See Bill & Melinda Gates Foundation, \textit{Grantee Profiles: Medicines for Malaria Venture Seeks Effective and Affordable Malaria Drugs, at gatesfoundation.org/GlobalHealth/GranteeProfiles/SGGH_MMV-040519.htm.}
\item According to the Foundation Center, foundations spent $3.4 billion in 2004 on health-related causes. Foundation Center, \textit{Highlights of Foundation Giving Trends, available at fdncenter.org/gainknowledge/research/pdf/fgt06highlights.pdf} (2006).
\item Arti K. Rai, Address at the Duke Law Journal 36th Annual Administrative Law Conference, \textit{Administrative Law and Emergency Management: Katrina and Beyond} (March 24, 2006) (proposing a government-managed prize structure similar to those proposed in the patent field).
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the state sector. Foundations are in a unique position as society’s “free agents”\textsuperscript{83} to leverage their capital to attack this ongoing state failure to address such “low probability, high loss” events.

The lack of adequate disaster management planning possesses the other two characteristics of a social problem for which incentivizing prizes are useful. Because such planning is a classic public good, it is an inappropriate product for the private market to produce. Furthermore, once developed, adequate planning might require only periodic modification and training of personnel—the obstacle thus far is an activation barrier, not the chilling effect of the prospect of long-term spending.

The problem of inadequate disaster management planning is not merely one of retrospection on what could have been done in New Orleans. Such governmental paralysis continues in other regions of the country at risk for disaster. Indeed, developers continue to build new homes below sea level in the California delta.\textsuperscript{84} Governor Schwarzenegger proposes to build “bigger, stronger levees” with funds from taxpayer-financed bond issues.\textsuperscript{85}

There would be many alternatives to structuring a prize to solve California’s problem of inadequate preparation and misguided development. A foundation might offer a prize to the first developer to buy up a certain percentage of the land and implement a land use that carries a risk of flooding or property damage below a certain threshold. Such a prize would have to be contingent on the sale of a negative easement by the developer to the local or state government, to ensure that the land would never again be developed into single-family homes or a similar risky land use. Alternatively, a foundation could start a competition between the local and state

\textsuperscript{83} See Mayer, supra note 53, at *13.
\textsuperscript{84} Matt Kondolf, \textit{Who is Prepared? What’s California Delta’s Future—Central Park or the Ninth Ward?}, SAN FRANCISCO CHRONICLE, April 5, 2006.
\textsuperscript{85} \textit{Id.}
governments to see which might implement a zoning scheme or other regulation that preserves
the designated land for less risky land uses. Finally, a foundation could start a competition
within the private sector, to develop and implement a comprehensive flood-protection system for
the region. Such a system would have to be able to withstand, say, not only the 100-year floods,
but even the 500-year floods, and would meet certain specifications for redundancy and
earthquake resistance. The prize might even reward the local government itself, provided that
the winning solution is adopted.

It is perhaps the last version of the prize that would be the easiest to define and
administer. The prize amount could probably be on par with the X Prize, or about $10 million,
because it would probably inspire inventors and engineers, professionals and students, to work to
develop a solution, tapping into sources of innovation that might not otherwise seriously consider
the question of land use planning in a flood-prone region.

C. Education

The provision of an education for every child has long been the province of the state
governments. Because funding for local schools is derived in large part from local property
taxes, wealthy areas have better schools while poor areas have high student-teacher ratios and
other institutional problems. Typically, the education gap is the fodder of rhetoric by legislators
but is rarely grappled with seriously in legislation. The private sector has stepped in to bridge
the gap in some instances, opening private schools in areas where the public schools are
inadequate. However, such private schools could not operate at a profit if they admitted every
poor student in the area, and thus many students have no meaningful choice but to attend the

86 A few states have made progress towards closing the educational funding gap through judicial fiat. For example,
the North Carolina Supreme Court recently upheld Judge Howard E. Manning, Jr.’s finding that the method of
school funding in North Carolina violated the state’s constitutional guarantee of a sound basic education. Hoke
County Bd. of Educ. v. State, 358 N.C. 605, 599 S.E.2d 365 (2004) (often referred to by the name of the principal
plaintiff, Leandro).
local public institution. Finally, if an adequate funding scheme or curriculum were set in place, providing an improved education to students within the state, the solution would self-perpetuate at least in part because of ongoing political pressure to maintain a state’s high performance in education.

More specifically, a foundation might offer a prize to the first state (or, on a smaller scale, the first county) to meet certain educational criteria and sustain such successes for a specified number of years. Such criteria might include a certain high school graduation rate, certain scores for the median and tenth percentile on specified standardized tests, a finally, a certain percentage of improvement in these measures over time. It would be important to structure the prize to ensure that poorer students benefited from the improvement; this is the purpose of measuring the performance at, say, the tenth percentile of test-takers. The prize would also have to be structured to reward individual educators in order to avoid a potential agency problem.

For a prize offered at the state level, the magnitude would have to be in the hundreds of millions of dollars. Perhaps a more realistic approach would be for foundations to target specific areas of the country, offering the prize to the first county or metropolitan area, presently meeting certain criteria for educational failure, to improve its educational system as specified by the foundation. An incentivizing prize used in this way could have a strong leveraging effect on dollars from the state government and from local nonprofit organizations. The prize would also generate increased spending on education in the regions that do not ultimately win the prize, which would serve to combat the social problem nationwide. The solution developed by the winning region would also become public knowledge, and might be parroted as an effective structure by other school systems.
D. Energy Policy and Technology

There are a number of problems that are tied to the nation’s current energy policy. Most of these problems stem from the failure of the state to adequately restrict consumption and pollution in the private sector. Consumers and industry tend to overconsume certain resources and overpollute because the resulting negative externalities and not adequately internalized by those actors. For example, the automobile market continues to be dominated by options with poor fuel economy in part because drivers do not directly pay for the pollution and foreign policy implications that result from such overconsumption.

A number of incentivizing prizes might be developed in the field of energy policy and technology. For example, a prize could be offered to the designer of the first combustion-engine automobile able to attain a certain level of fuel economy while seating a certain number of persons, achieving certain speeds and acceleration, and maintaining certain safety ratings. Alternatively, a prize could be offered to the first state to reduce by a certain level its emissions of pollutants as a percentage of total industry size. Finally, a prize could be offered to the first state to achieve an average fuel economy of, say, 40 miles per gallon, of all cars on the roads.

All of these prizes would serve to encourage innovation to win the prize. For example, it may be that the best way to win the last prize described is via technological advances, or it may be that a state would win by tightening its inspection regime or levying pressure on manufacturers and dealers within the state. As with all incentivizing prizes, the path independence of such a prize is one of its greatest virtues; the foundation need not specify how the problem will be solved, just that it be resolved to certain specifications.

87 “Fuel economy” is the proper term to describe the distance per unit fuel that an automobile can travel. “Fuel efficiency,” on the other hand, measures how effectively the engine uses the energy stored in the fuel in comparison to the amount of energy wastefully dissipated by heat, noise, and friction.
CONCLUSION

In sum, this paper proposes the use of incentivizing prizes by foundations as a strategy to solve the social problems that they choose to combat. Though foundations currently use prizes to bestow recognition, to raise awareness, or to fund operating costs, very few effectively use prizes to incentivize public and private actors to develop and implement their own solutions to the social problems. Nevertheless, incentivizing prizes harbor many advantages over other foundation strategies. Incentivizing prizes can be used to leverage other spending towards resolution of the targeted social problem, the sources of which can extend beyond other foundations and include charitable donations and even private-sector investment. Furthermore, incentivizing prizes enjoy path independence; a foundation using an incentivizing prize need not know the best way to resolve the social problem, but need only specify the conditions under which it will consider the problem solved.

Incentivizing prizes are most useful for social problems created by the failure of the private sector to resolve the problem because of the perceived or actual inadequacy of financial rewards for doing so, coupled with the failure of the state to resolve the problem because of the inadequacy of political rewards for doing so. Social problems that present activation barriers to being resolved, but for which solutions are self-perpetuating, are ripe for resolution using incentivizing prizes as well.

A foundation embarking on using the strategy of an incentivizing prize might consider the fields of pharmaceuticals, disaster management planning, education, and energy policy and technology as appropriate targets. Such a foundation must carefully define the social problem itself and delineate the parameters of an acceptable solution. It must also design the prize
amount and distribution method in such a way as to maximize its incentivizing effect while avoiding any agency problems that might hamper innovation.

Foundations need not abandon traditional grant-making. However, because of the many advantages offered by incentivizing prizes, foundations should consider reallocating some of their spending towards this untapped strategy.