SELECTED INNOVATION PRIZES AND REWARD PROGRAMS
KEI Research Note 2008:1

Table of Contents

Introduction*

This is a survey of innovation prizes and reward programs that have been implemented with the primary purpose of stimulating innovation. The purpose of the survey is to provide background and context for those who are considering prizes to stimulate innovation.

In recent years, there has been a growing interest in new ways of rewarding innovation. The themes and rationales for various prize efforts differ considerably from area to area. In some cases, prizes are seen as a way for "crowdsourcing" research and development – reaching out beyond closed communities of employees and contractors or grant recipients. Prizes are also sometimes proposed as an alternative to intellectual property-enforced monopolies, in order to enhance access. But in other cases, prizes simply supplement other, more traditional subsidies and incentives. Governments, philanthropists, businesses and others considering the use of prizes are interested in learning more about the way they have been implemented by others. This research note provides a number of data points to support such investigation.

We have largely, but not exclusively, focused on *ex ante* prizes that specify, in advance, a desired outcome and a reward for obtaining it in order to incentivize innovation, rather than *ex post* prizes that honor or reward achievements after the fact. However, the distinctions are not black and white. For example, in some cases, prizes are announced as rewards for achievements in a particular area, such as to promote sustainable energy, but the criteria for winning are not very specific. Such prizes likely stimulate innovation, but they are not as relevant to this survey as prizes that are more clearly obtainable if one performs in less ambiguous ways. We include many different types of innovation prizes, but the survey is weighted toward examples that are more specific regarding the outcomes that are rewarded.

Prizes are grouped by subject matter, and then listed chronologically from earliest to latest as determined by the year in which the prize was initially offered. In addition to the many prize competitions that were actually implemented, several are included that were proposed by legislators or political candidates or parties that so far have not been implemented. The prizes included in this survey were chosen for a variety of reasons. Some are prominent, and others are not. The list of prizes is not exhaustive and is more complete in some fields than in others. Taken together, the examples are intended to illustrate the possibilities that prizes offer. As is evident from the examples, there is considerable diversity in the purposes, designs, management

* Several people have contributed to this summary of selected innovation prizes. It incorporates most of Benjamin Krohmal's March 1, 2007 paper, "Prominent Innovation Prizes And Reward Programs," KEI Research Note 2007:1, while correcting some errors, expanding or editing some of the entries, and adding a number of prizes not included in the earlier survey. This update contains contributions from Ben Krohmal, David Serafino, James Love, Manon Ress, Judit Rius, and Michelle Childs, and benefited from numerous surveys and papers on prizes, including those cited in the end notes, in *KEI Research Note 2008:2*, and helpful suggestions from others.. This version was published in March 2008. Minor formatting changes were made in November 2008.

structures and performance of various innovation prizes. Some prizes have been very successful, while others have been mired in controversy, or did not induce the desired result. The amount of the prizes varies considerably, from $2.56 (the Knuth Reward Checks) to a proposed prize fund of more than $80 billion per year (S.2210, 110th Congress, the Medical Innovation Prize Fund of 2007).

The literature on innovation prizes is surprisingly incomplete, but one does find extensive references to the use of prizes to stimulate innovation in the 18th and 19th centuries, for a wide range of purposes, only a handful of which are reported here. Enthusiasm for the use of prizes seemed to wane in the late 19th century and in the 20th century, only to see a new and still-expanding interest in the early 21st century.

Cash prizes are only one of many different ways to stimulate innovation. Grants and other up-front research subsidies and the prospect of marketing monopolies enforced by patents and other intellectual property rules are also important mechanisms.

The relationship between prizes, intellectual property rights, and grants varies considerably in the examples reported here. In many cases, prizes have been proposed as an additional incentive that would supplement the rewards from exclusive rights associated with patents. In other cases, the prizes are designed as a substitute for, or an alternative to, a patent-enforced monopoly. In the 20th century, government research institutions in France, Germany, the UK and elsewhere largely replaced prizes with systems of grants, and courts have allowed privately endowed prizes to be converted to grant programs.

The advantages of grants and temporary patent-enforced monopolies as mechanisms for financing research into innovation are many. It is often difficult to measure or pre-specify useful outcomes from research, and a system that only relies upon performance, such as prizes, can fail to provide the type of sustainable support that is needed for systems of science and innovation, and low expected probabilities of success may unduly discourage effort or investment, factors that have certainly contributed to the rise of a grants economy.

The traditional patent system provides opportunities for inventors and entrepreneur to identify useful innovations that have commercial value, outside of the supervision of a tradition-bound and cautious bureaucracy, and the market-driven valuation of patented inventions creates enormous incentives for investment in the development and commercialization of new products and services. In terms of resources, grants and the prospect of temporary monopolies have generated enormous resources for research and development activities, far more than the level of funding now available for prizes.

Prizes, however, offer certain important advantages over grants or temporary monopolies. When designed well, prizes can reach a wider community of problem solvers than will grants and, like the prospect of a commercial monopoly, bring in new actors following unconventional approaches, and stimulate private decision-making and entrepreneurship. Prizes can be used when the desired output is not patentable, or the use of the patent system is too costly and bureaucratic, or when the private market for the outcome is inadequate or does not exist. If prizes are used as an alternative to a monopoly as the incentive for private investment, it is possible to avoid a wide range of costs associated with monopolies, including not only high prices and barriers for access to the inventions, but also obstacles to follow-on innovation. Prizes can also be tailored as incentives in ways that are simply not possible with rewards that are tied to the monopoly prices of the outputs. Some of the areas where prizes are thought to have important advantages are cases where it socially and economically important to have marginal cost pricing and/or free access to the outputs of the R&D efforts, or where it is important to reward the development of translational and transition technologies and products that will not by themselves be commercially viable, but which serve to advance the state of the useful arts and sciences.

All systems to finance innovation have shortcomings. The challenges associated with the use of prizes are several, including difficulty in specifying and measuring the outcomes to be rewarded, and the financing of the rewards.

The majority of the prizes discussed below are *sui generis* in nature, focusing on specific problems to be addressed, and outside of specific prize endowments, without a sustainable system of finance. For example, all of the new prizes in the areas of transportation, power, and climate change follow this traditional approach of *sui generis* specification of rewarded outcomes and intellectual property rules, and episodic funding.

In the minority, but of interest, are the more ambitious efforts to use prizes as a systematic mechanism to reward innovation, with sustainable systems of finance. The often disparaged Soviet Union system of rewarding innovation with "Authorship Certificates" achieved sustainable finance by tying prize rewards to a fraction of savings achieved by innovations. While the now

discontinued Soviet approach did achieve successes in some areas, it operated in an economy where inventors had to rely upon the State to provide the planning, capital, energy and risk necessary to exploit the inventions, which was a severe shortcoming. An older experiment was the system used in Lyon, France in the 18th Century to reward innovations in the textile industry. Lasting many decades, and financed both through a tax on silk imports and contributions from members of the Grand Fabrique textile guild, the Lyon system is considered by many to be a powerful and successful example of the use of prizes to stimulate both innovation and the diffusion and use of the innovations, in a system where invention was considered a public good. The Lyon system also explicitly rewarded technology transfer and sequential innovation. More recently, the proposed U.S. Medical Innovation Prize Fund would reward private drug developers who are successful at registering new medicines that improve healthcare outcomes with enormous levels of sustainable funding tied to annual GNP levels, completely eliminating the need for monopolies on new medicines.

No program to stimulate innovation guarantees success. The prize competitions discussed below sometimes succeeded impressively, but not always. Failures are not unique to prizes. For example, despite billions of dollars in grants from the National Institutes of Health and other donors and the existence of strong exclusive rights for patents, there is a paucity of progress for the treatment of Alzheimer's disease. Similarly, there has been almost no significant innovation in terms of tuberculosis testing for more than a century. The administration of some prizes were fraught with difficulty, but so are some grant programs, and patent systems are subject to a plethora of well-known shortcomings. Each instrument has strengths and weaknesses, and the results will vary.

Today many philanthropists, businesses and governments are looking to prizes as an incentive mechanism that can complement or compete with grants or marketing monopolies. The context is very important, as the goals and problems that motivate the creation of the prizes vary considerably. At a minimum, prizes can extend the community of actors working to solve innovation challenges beyond those who would be supported by grant programs. Prizes can also be used to overcome access problems otherwise caused by monopolies, or to stimulate innovation in areas where patents are irrelevant or ineffective. But prizes may also be used in combination with grants and/or marketing monopolies. Prizes are, however, increasingly becoming part of the policy framework for stimulating innovation, and play an important role in shaping our knowledge ecology.

Agriculture and Food

Académie de Besançon Prize for Substitute Foods (1771)

Following the famine of 1769, the French Provincial Académie de Besançon announced a prize, in 1771, for discovering a vegetable which could be used in the time of famine. Antoine Parmentier won the prize in 1773, when he investigated the nutritional values of starches, and proposed the use of the potato as a source of nourishment. The potato, which had been discovered in South America, was still largely unknown and unused in France, where its cultivation was discouraged because of mistaken medical warnings that the vegetable was the cause of illnesses, such as leprosy. Parmentier would later popularize the use of the potato in France.[1]

Sainte-Lucie Prize for the Best Processed Sugar, the Best Rum, and the Best Cotton Mill (1780s)

According to James McClellan and François Regourd, local colonial officials in the Caribbean Island of Sante-Lucie offered prizes of several thousand livres for the best processed sugar, the best rum, and the best cotton mill.[2]

Napoleon's Food Preservation Prize (1795)

Napoleon was said to have "volubly espoused the eighteenth-century faith in science and technology, and in the spirited role of entrepreneurs [as] engines

[1] "Took Potato to France: Antoine Parmentierś Service to be Recognized by French Farmers," *New York Times*, December 14, 1913; J.H. Gilbert, "The Potato, The Science of Potato Growing," Reprinted from the *Agricultural Student's Gazette*, Cirencester, included in *the Dublin Review*, 1890, page 84; William Stuart, *The Potato: Its Culture, Uses, History and Classification*, J. B. Lippincott Company, 1927; Kenneth J. Carpenter, *Protein and Energy: A Study of Changing Ideas in Nutrition*, Cambridge University Press, 1994.

[2] James E. McClellan, III; François Regourd, "The Colonial Machine: French Science and Colonization in the Ancien Régime," Osiris, 2nd Series, Vol. 15, *Nature and Empire: Science and the Colonial Enterprise*. (2000). McClellan and Regourd cite also the Centre des Archives d´Outre-Mer, Aix-en-Provence, Colonies C10 C3, dossier 6 (1786).

of human progress."[3] In order to stimulate industrial development, he created or revived bodies dedicated to science and offered prizes for new technologies. Among the best known was the 12,000 franc prize by the Society for the Encouragement of Industry to enhance the preservation of food, reported as having first been offered in 1795. For Napoleon, it was important to find a method of food preservation in order to better feed his troops when an invaded country was not able or inclined to sell or provide food. In 1809, Nicolas François Appert won the prize for his solution, which involved heating, boiling and then sealing the food to be preserved in airtight glass jars, for which he used champagne bottles, the strongest glass one could find at the time, asit can resist gas produced by fermentation. Forced to publish his method,[4] Appert's commercial cannery in Massy, France, was only the first of many canneries to use his method. The technology was also used across the the English Channel, using tin cans, and helped feed English troops at Waterloo, and then reached the United States when Thomas Kensett established the first U.S. canning facility for oysters, meats, fruits and vegetables in New York in 1812. The basic principles of canning have not changed much since Nicolas Appert's methods were published. Heat must be sufficient to destroy microorganisms and is applied to foods packed into sealed, or "airtight" containers, but it wasn't until more than 50 years later that Louis Pasteur provided the explanation of the method's effectiveness when he was able to demonstrate that food spoilage was caused by the growth of microorganisms.

Elkington Reward for Drainage Technology (1795)

In 1764, Joseph Elkington, an illiterate but very bright Warwickshire farmer, first discovered, and later refined, a new and effective system of draining farmland to make it better suited to raising corps or supporting livestock. Elkington sold his services to landowners seeking more effective systems of drainage. While news of Elkington's success spread, much remained unknown regarding his techniques. In 1795, the British House of Commons authorized 1,000 pounds to offer as an inducement for Mr. Joseph Elikington to disclose and disseminate more widely his mode of draining. Elikington accepted the reward, and worked closely with Mr. John Johnstone, an Edinburgh land surveyor, who accompanied him in his work. In 1797, under the supervision of the Board of Agriculture and the Highland Society of Scotland, a report compiled by Johnstone was published, titled: *An Account of the Mode of Draining Land According to the System Practised by Mr. Joseph Elkington.*[5]

Dutch Prize for Sugar from Native Plants

In 1747, a Berlin professor of chemistry, Andreas Marggraf found a way to extract sugar from a beet, and published his results in French and German. This led to a growing interest in finding improved methods of extraction that would be economically competitive with traditional sources of sugar. To this end, the Dutch Society for the Encouragement of Agriculture offered a prize for extracting sugar from native plants,[6] further stimulating research in this area. The prize of twenty ducats was awarded to the chemist R.J. Brouwer of Nijkerk, for a system of extracting sugar.[7]

Napoleon Sugar Beet Prize (1810)

In 1810, facing blockade of its ports, Napoleon offered a large prize[8] for the best method of extracting sugar from beets. The prize was part of a large set of national incentives and mandates to stimulate the production of sugar from beets.[9]

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[3] Steven Englund, *Napoleon: A Political Life*, Simon and Schuster, 2004, p. 322.

[4] Nicholas Appert, *In The Art of Preserving All Kinds of Animals and Vegetable Substances for Several Years: A Work Published By Order of The French Minister of the Interior, on the Report of the Board of Arts and Manufacture*, Published in 1811, s. n. p.

[5] See also, Loammi Baldwin, *Report on Introducing Pure Water into the City of Boston*, Hillard, Gray and Co. 1835, p. 72. John Hancock Klippart, *The Principles and Practice of Land Drainage*, 1867. Henry Flagg French, *Farm Drainage: The Principles, Processes, and Effects of Draining Land*, 1859.

[6] J.H. Galloway, "Sugar," included in *The Cambridge World History of Food*, Edited by Kenneth F. Kiple and Kriemhild Coneè Ornelas, Cambridge University Press, 2000.

[7] B. H. Slicher van Bath, *The Agrarian History of Western Europe*, A.D. 500-1850, 1963, page, Page 277.

[8] Reported by various researchers as 100,000; 200,000 or 1,000,000 francs.

[9] Ellen Henrietta Richards, *Food Materials and Their Adulterations*, Whitcomb & Barrows, 1906, page 90. Edwin Emery Slosson, *Creative Chemistry: Descriptive of Recent Achievements in the Chemical Industries*, The Century Co., 1919, 165. Frank George Carpenter, *Foods: Or, How the World is Fed*, American Book Company, 1907, page 329. J.H. Galloway, "Sugar," included in *The Cambridge World History of Food*, Edited by Kenneth F. Kiple and Kriemhild Coneè Ornelas, Cambridge University Press, 2000. Eugene van Cleef, "The Sugar Beet in Germany," *Bulletin of*

Art of Piercing or Boring Artesian Wells (1818)

Similar in purpose to the 1797 book on Elkington's methods of drainage, in 1818, the Society for the Encouragement of National Industry in France offered a reward of 3,000 francs for "the best manual, or practical and elementary instructions upon the art of piercing or boring Artesian wells with the miner's or fountaineer's augur, from 25 metres (82 feet), to 100 metres (328 feet) depth, and deeper if possible." The award was given by the Society in 1821 to Mr. Gamier, for an important and useful discussion of the use of Artesian wells employed for the discharge of foul and infected water. The work was published in 1882 as *De V'Art du Fontenier Sondeur et des Puits Artésiens, ou Mémoire sur les différentes espéces de Terrains dans lesquels on doit rechercher des eaux souterráines, et sur les moyens qu'il faut employer pour ramener une partie de ces eaux a la surface du sol, á 1'aide de la Sonde du Mineur ou du Fontenier.*

Highland and Agricultural Society of Edinburgh Reaper Prize (1826)

In 1826, a Scottish student named Patrick Bell won a prize from the Highland and Agricultural Society of Edinburgh for his design for a horse-driven reaper that used blades that open and closed like scissors, with a canvas apron to deposit the grain on one side. Pictures and full descriptions of his invention were published, and several models were built, including a reported four that were exported to the United States. Shortly thereafter, from 1831 to 1834, three Americans patented reapers in the United States.[10]

Apple and Pear Prize (1826)

As one of several such prizes, in 1826, the Royal Horticultural Society, of Paris, offered a 1,000 franc prize for experiments, following the approach of von Mons, to improve the fruits from apple and pear trees.[11] The prize was to be awarded in 1847.

Substitute for Guano (1852)

In 1852, the The Royal Agricultural Society of England offered a prize of 1,000 pounds for for the discovery of a manure equal in fertilizing properties to Peruvian Guano. The prize specified that the substitute be available in an unlimited supply to English farmers at a rate not exceeding 5 pounds per ton.[12]

Napoleon III Margarine Prize (1869)

The Second French Empire is considered a time of industrial and economic growth, with many French citizens leaving the country for the cities. Soon, the demand for butter could not be met and its price kept rising. In 1869, Napoléon III offered a prize for anyone who could discover a process to manufacture a butter substitute.[13] Hippolyte Mège-Mouriez won the prize the same year and was granted a patent (also registered in England) for 15 years for the processing and production of certain fats of animal origin by the French Ministry of Agriculture and Trade. By 1873, Mège-Mouriez received a United States Patent (146,012) and, shortly after, the first margarine plant was built in the U.S. Continuing his work, Mège-Mouriez also obtained a patent for the canning of beef.

Hippolyte Mège-Mouriez started as a pharmacist at the Hotel Dieu hospital, where he had earlier invented a remedy to the side effect of Copahin, a common drug used to treat syphilis. He allegedly won a prize for this achievement and soon changed his career from pharmacist to chemist. Others of his patented inventions included effervescent tablets, paper-making, sugar-making and the use of egg yolks for the tanning of leather. By the 1850s, he started to focus exclusively on food, and in the 1860s was doing research on dairy products at the Imperial Farm owned by Napoleon III.

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the American Geographical Society, Vol. XLVII No. 4, 1915.

[10] Holland Thompson, *The Age of Invention, A Chronicle of Mechanical Conquest*, Yale University Press, 1921.

[11] "ART. III. Programme of a Prize of one thousand Francs, offered by the Royal Horticultural Society of Paris, with the view of obtaining, by means of a repetition of the Experiments of Van Mons, and also by any other Method pursued with Seeds, the Improvement of the varieties of Apples and Pears," Translated by A. J. D. *The American Gardiner's Magazine of Horticulture, Botany, and All Useful Discoveries and Rural Affairs,* 1826, page 446.

[12] *The Cultivator, a Monthly Journal Devoted to Agriculture, Horticulture, Floriculture and to Domestic Rural Economy*,1852. page 355 .

[13] Khan, Zorina B. *The Democratization of Invention Patents and Copyrights in American Economic Development, 1790-1920*. Cambridge University Press (2005) p. 47. List, G.R. 2006. Giants of the Past: Hippolyte Mege (1817-1880). Inform. 17(4):264. Also: Louisa Dalton, "Margarine," *Science & Technology,* August 16, 2004 Volume 82, Number 33 p. 24.

French Prize Competition in Irrigation Practice (1874)

Under the authority of a decree of June 2, 1874, the French minister of agriculture and commerce offered a series of prizes to agriculturists, proprietors, or renters, who had "utilized in the most intelligent manner the water of the different irrigation canals." The prizes were intended to encourage efforts "that tend to the progress of agriculture, and especially to cultivation by irrigation, looking at the losses occasioned by phylloxera, and the necessity to transform or increase the production of irrigable land." In addition, the prizes were used to acquire and disseminate information about best practices in irrigation.[14]

Italian Prize Competition in Irrigation Practice (1879)

In a June 19, 1879, Italian Royal Decree on "Drainage, of Irrigation, and of Combinations of Drainage and Irrigation," the King of Italy announced a prize competition for works of drainage, of irrigation, and of colmatage. The prizes were available to private individuals, or an association that executed in the interest of agriculture, good results and creditable works of irrigation, drainage, or combinations of both.[15]

The Orloff-Davidoff Prize (1894)

The Orloff-Davidoff Prize of 10,000 rubles was offered by Count Orloff-Davidoff for the discovery of a cure or prevention of cattle plague. The remedy was required to have a level of efficacy equal to similar treatments or protections for small-pox or anthrax. The prize was managed by the Curator of the Imperial Institute of Experimental Medicine of St. Petersburg, and the competition was open researchers in any country, with the exception of active members of the Institute managing the prize.[16]

Burkina Faso Innovation Prizes (1994)

The Burkina Faso "Forum National de la Recherche Scientifique et des Innovations Technologiques", which includes the Education Ministry and the Ministry of Trade and Commerce, manages innovation prizes,[17] many of which are for agricultural innovations. For example, among the 28 prizes in 2006 for research, inventions and innovations, were the Prix du Directeur Général du CIRDES for innovations in water management relating to raising cattle (100,000 F. CFA), a Prix du Ministre des Ressources Animales, for research or inventions regarding cattle in desertic regions, awarded to M. Zongo Boubacar for his invention of a pump, powered by a bike pedal-driven turbine (500.000 F. CFA), and the Prix du Président du FASO for the best product to fight poverty, awarded to Dr. Sie Moussa and his collaborators for 9 new rice varieties (2,000,000 F. CFA). (*See below for more on the Burkina Faso Innovation Prizes*).

Self-Powered Farms (2007)

In 2007, Representative Roscoe Bartlett (R-MD) introduced HR 80 (110th Congress)[18], a bill that includes a section requiring the Secretary of Energy to enter into an arrangement with the National Academies of Sciences to evaluate the feasibility of prizes to promote the development of farms that are net producers of both food and energy.

Automotive

Wisconsin Prize for Mechanical Substitute for Horses and Other Animals (1875)

In 1875, the Wisconsin legislature passed an act authorizing the payment of a $10,000 bounty to "any citizen of Wisconsin, who shall invent, and after five years continued trial and use, shall produce a machine propelled by steam or other motive agent, which shall be a cheap and practical substitute for the use of horses, and other animals on the highway and farm." The law was amended twice in the next two years, with the final 1877 version eliminating the requirement for "five years continued trial and use," while adding specific requirements for winning the prize. Contestants with machines that could operate in both forward and reverse were required to complete a 200-mile

[14] "French Irrigation Legislation," included in *Report of the State Engineer of California: Irrigation Development*, California Office of State Engineer, William Hammond Hall, 1886.

[15] "Italian Irrigation Legislation," included in *Report of the State Engineer of California: Irrigation Development*, California Office of State Engineer, William Hammond Hall, 1886, page 348.

[16] *The Medical Record,* July 14, 1894, page 64.

[17] http://www.ird.bf/frsit/

[18] H.R. 80. "To provide for Federal research, development, demonstration, and commercial application activities to enable the development of farms that are net producers of both food and energy, and for other purposes." 110th Congress. See SEC. 3.

route at "not less than five miles per hour working time," and to perform certain functions, such as plowing and pulling loaded wagons. Trials were conducted in 1878 and ended in controversy when one of the judges refused to grant the full prize money to a contestant many observers thought had satisfied the contest rules. Subsequently, two crews split part of the prize money. [19]

Chicago Times-Herald Prize for Motors (1895)

In 1895, the *Chicago Times-Herald* offered a $5,000 Prize for Motors to be awarded for the development of "practicable, self-propelling road carriages," as determined by a 54-mile race. The winner was J. Frank Duryea. Even more than the prize money, the publicity generated did much to promote investment in automotive innovation.[20]

Automotive X-Prize (2007)

The X-Prize foundation is currently circulating draft guidelines and plans to announce in 2007 a multi-million dollar prize for developing a commercially viable car with seating for four that meets US federal safety guidelines and gets at least 100 miles per gallon of gasoline.[21] The prize is intended to bring forth "viable, super-efficient vehicles that help break our addiction to oil and stem the effects of climate change."

New Options Petroleum Energy Conservation Act (2007)

HR.1451 (110th Congress), the "New Options Petroleum Energy Conservation Act of 2007", is a bill to reduce dependence on foreign oil which includes, among other things, a $1 billion prize for the first U.S. car manufacturer to sell 60,000 gasoline-powered, mid-sized sedans that can travel 100 miles per gallon.[22]

Animal Control

Destruction of the Bothrops Lanceolatus (1859)

The Bothrops Lanceolatus is a venomous pit viper species endemic to the island of Martinique. In 1859, la Société D' Acclimation proposed a prize of 1,000 francs to anyone who could invent a means to destroy the serpent, which at that time was killing about 50 residents a year in the French colony Martinique.[23] One proposed solution was the introduction of the African Stork to Martinique.

The Phylloxera Prizes (1869)

In the late 1850s, France was facing an agricultural and cultural crisis. About 40 percent of French grape vines had been destroyed by the phylloxera, a North American aphid that had been introduced into France. France was reduced to importing good wines, and the destruction from the phylloxera was so large that wages and businesses in the wine growing regions collapsed, leading to a migration of population to North Africa and the United States. In 1869, the French Minister of Agriculture offered a prize of 20,000 francs for a remedy. In July 1874, the government offered a larger prize of 300,000 francs. By 1877, some 696 remedies were submitted for the prize, none of which were considered effective or economically feasible. Eventually, the solution widely embraced was to graft phylloxera-resistant, American-grown grape rootstock to the French grape vines, a practice objected to by many in France on the grounds that it would change the taste of the French wine. A French wine grower named Laliman who advocated this approach unsuccessfully sought the prize andwas rejected, officially on the grounds that the grafting of roots had not actually cured the infected vines. Laliman was also accused by many in France for having been a source of the imported phylloxera aphids. The prize was never claimed.[24]

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[19] Richard Backus, "The Great Race of 1878: Early Steam Traction Engines Vied for Supremacy in America's First Road Race." http://www.steamtraction.com/article/2004-05-01 .

[20] Gill, K. (2004). "The Chicago Times-Herald Race of 1895." *Encyclopedia of Chicago*. See: http://www.encyclopedia.chicagohistory.org/pages/2380.html (accessed Feb. 2, 2007).

[21] "Inventors to race for millions in auto-efficiency prize." CNN. May 29, 2007. See: http://www.cnn.com/2007/US/05/29/psyk.diamandis/ (accessed July 5, 2007).

[22] HR.1451. New Options Petroleum Energy Conservation Act. 110th Congress. See SEC. 5.

[23] *The Medical Times and Gazette, a Journal of Medical Science, Literature, Criticism and News*, December 24, 1859, page 646.

[24] P. T. H. Unwin, *Wine and the Vine: An Historical Geography of Viticulture and the Wine Trade*, Routledge, 1991, page 289. Christy Campbell, *Phylloxera: How Wine was Saved for the World*, HarperCollins:

Texas Boll Weevil Eradication Prize (1903)

In 1903, the Texas Legislature passed legislation to create a prize for a discovery or invention that would be a practical remedy or device for eradicating the boll weevil. The legislation created a commission to evaluate the submissions. In 1904, the Commission completed its review of the submissions, but failed to find a successful remedy, and did not grant the award. [25]

Cane Toad Trap Competition (2004)

In Australia, the Northern Territory Government and the Pest Animal Control Cooperative Research Centre in Canberra put up a total of $16,000 to stimulate the design of a trap to catch the highly poisonous Cane Toads which had been imported from Hawaii in the 1930s and eventually reached a population of 100 million, and which have begun moving into the cities of the Northern Territories.[26] The prize money included $5,000 to aid in the commercialization of the winning design and $1,000 for each of six finalists.[27] The competition drew 114 entries, and the winning design caught 112 toads to the runner-up's 73.[28]

Aviation and Outer Space

Deutsch Prize (1900)

In 1900, Henry Deutsch de la Meurthe offered the Deutsch Prize of 100,000 francs for the development of an airship that could be flown on an 11km course around the Eiffel Tower in under 30 minutes. The Brazilian born son of a French engineer, Alberto Santos-Dumont became an international sensation after being awarded the prize in 1901, despite exceeding the time limit by 40 seconds. After Santos-Dumont's success, the Brazilian government matched the prize money he received.[29]

Deutsch-Archdeacon Prize (1903)

In 1903, French Aero Club members Ernest Archdeacon and Henry Deutsch de la Meurthe offered a prize of 50,000 francs to the first pilot to fly a heavier-than-air vehicle in a 1 kilometer circular course. Henry Farman won the prize in 1907, and went on to become a commercial airplane manufacturer.[30]

Scientific American Prize (1908)

In 1908, the magazine *Scientific American* offered a prize of $2,500 to the first person to publicly fly an airplane in America for 1 kilometer. Glenn Curtiss won the prize the same year.[31]

English Channel Crossing Prize (1909)

In 1909 the British Newspaper *The Daily Mail* offered the English Channel Crossing Prize of 1,000 British pounds to the first pilot to fly an airplane 21 miles across the English Channel.[32] Louis Bleriot won the prize the same year, and the French government supplemented his winnings with an additional 50,000 francs.

Rheims Airshow Prizes (1909)

Also in 1909, several prizes for speed, distance, and altitude were offered at the Rheims Airshow. Glenn Curtiss won two prizes for speed, including the

2004. Harry W. Paul, Science, *Vine and Wine in Modern France*, Cambridge University Press, 2002.

25 "Did Not Kill Boll Weevil: Texas Appropriation for Successful Cotton Pest Conqueror Unawarded," *New York Times*, April 14, 1904. "He claims $50,000 prize," *New York Times*, October 15, 1903. Ian R. Manners, "The Persistent Problem of the Boll Weevil: Pest Control in Principle and in Practice," *Geographical Review*, Vol. 69, No. 1 (Jan. 1979), pages 25-42, doi:10.2307/214235.

26 http://www.medical-hypotheses.com/article/PIIS0306987706008309/abstract

27 http://newsroom.nt.gov.au/2004/20041209_cb_ToadTrap.shtml

28 newsroom.nt.gov.au/2005/20050429_BurnsToadCompetition.pdf

29 Davis, L. and Davis, J. (2004). "How Effective Are Prizes as Incentives to Innovation? Evidence from Three 20th Century Contests." Paper for the Druid Summer Conference on Industrial Dynamics, Innovation and Development. Elsinore, Denmark.

30 "Those Fabulous and Foolhardy Flyers II." The Unmuseum. See: http://www.unmuseum.org/flyers2.htm (accessed Feb. 2, 2007).

31 "Aeroplane Wins Contest for Prize; The "June Bug" Flies a Mile at Hammondsport in a Little Over a Minute. Alights Without Mishap. G.H. Curtiss in Full Control of the Machine -- Cup Offered by The Scientific American." *The New York Times,* July 5, 1908.

32 Boyle, A. June 16, 2004. "How Prizes Pushed Progress: Rewards provided incentive to inventors, adventurers." MSNBC. See: http://www.msnbc.msn.com/id/5191763/ (accessed Feb. 2, 2007).

Gordon Bennett Prize, and launched an airplane manufacturing business with his winnings.[33]

Milan Committee Prize (1910)

In 1910, the Milan Committee offered a prize of 160,000 lire for the first pilot to fly a plane over the Alps between Switzerland and Italy. The prize was won the same year by Gorges Chavez, but his winning flight ended in a crash and the pilot died four days later.[34]

Hearst Prize (1910)

Also in 1910, William Randolph Hearst Offered $50,000 to the first pilot to fly across the U.S. in under 30 days. Though there were some attempts, the prize expired in 1911 without a winner.[35]

Daily Mail Trans-Atlantic Prize (1913)

In 1913 *The Daily Mail* offered the Trans-Atlantic Prize of 10,000 British pounds to the first pilot to fly across the Atlantic within 72 hours. John Alcock and Arthur Whitten Brown won the prize after World War I in 1919.[36]

Orteig Prize (1919)

In 1919, Raymond Orteig offered the $25,000 Orteig Prize for the first non-stop flight between New York and Paris. The prize offer expired in 1924 with no attempts before Orteig extended the deadline. By the time Charles Lindbergh won the prize in 1927 in his famous plane, the "Spirit of St. Louis," nine competitors had prepared to make the flight and three had already tried and failed. Lindbergh's success sparked a boom in American interest in aviation, and inspired many subsequent prizes, including the Ansari X-Prize 70 years later.

England-to-Australia Air Race Prize (1919)

In 1919, the Australian Government announced a prize of 10,000 pounds for the first successful flight from England to Australia. The contest was limited to Australian airmen, and included the requirements that the flight be completed within 720 consecutive hours (30 days), using a single aircraft that was constructed and assembled entirely with parts and labor available within the British Empire. The challenge was open until the 31st of December, 1920. The contest was won by Captain Ross Smith and his brother Lieutenant Keith Smith, who made the journey in 27 days and 20 hours.

NASA Space Act Awards (1958)

In 1958, NASA established the Inventions and Contributions Board with the authority to offer Space Act awards of up to $100,000 for technological developments in aeronautics that contribute to NASA's goals. The program is still in place, and dozens of prizes have been awarded.

Kremer Prizes for a Human-Powered Flying Machine (1959)

In 1959, the industrialist Henry Kremer agreed to offer the first of several prizes for pioneers of human-powered flight. The initial Kremer Prize was conceived over a lunch at the Cambridge Hotel in Camberley, England, between Kremer and Robert Graham, a proponent of human-powered flight, and H. G. Bennison, Fred East, and Air Commodore Bryan Hatfield. In November of 1959, a 5,000 British pound prize was announced for the "first successful flight of a British-designed, built, and flown Man-Powered Aircraft, such flight to take place within the British Commonwealth, under conditions laid down by the Royal Aeronautical Society." Kremer would later donate an additional 270,000 British pounds to increase the purse for the first Kremer prize, and to add several new ones.

The first Kremer prize, then increased to 50,000 British pounds, was won on August 23, 1977 for the first human-powered aircraft to fly a figure eight around two markers one-half of a mile apart, starting and ending the course at least 10 feet above the ground. The prize was won by Dr. Paul MacCready, whose Gossamer Condor was piloted by Bryan Allen. A second Kremer prize of 100,000 British pounds was won on June 12, 1979 for a flight from England to France, again by the team of MacCready and Allen, with the Gossamer Albatross. Another Kremer prize of 20,000 British pounds was won by a design team from the Massachusetts Institute of Technology. Other Kremer

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[33] "Those Fabulous and Foolhardy Flyers II." The Unmuseum. See: http://www.unmuseum.org/flyers2.htm (accessed Feb. 2, 2007).

[34] Davidian, K. "Prize Competitions and NASA's Centennial Challenges Program." NASA. See: centennialchallenges.nasa.gov/documents/cc_ilc_paper_2005-09-08.pdf

[35] See: http://en.wikipedia.org/wiki/Hearst_prize

[36] "$50,000 FOR FLIGHT ACROSS ATLANTIC; Daily Mail Offer for First Crossing by Waterplane in 72 Hours." *The New York Times* April 1, 1913.

Prizes that have not yet been awarded include a 50,000 pound prize for completing a 26-mile course in less than an hour, and a challenge stressing maneuverability for 100,000 pounds.

Sikorsky Prize (1980)

In 1980 the American Helicopter Society (AHS) founded the Sikorsky Prize, named in honor of one of the pioneers of helicopter development. This $20,000 prize, which has still not been claimed, will go to the first to design and fly a human-powered helicopter for at least sixty seconds at a height of three meters. Only two projects, the DaVinci III and the Yuri I, have left the ground in front of an official witness. The contest is international, and open to both individuals and teams. Competition rules are available at the AHS website.[37]

Ansari X-Prize (1995)

In 1995, the Ansari family sponsored the first X-Prize. The X-Prize was modeled after the Orteig Prize won by Lindbergh, and offered $10 million to the first private team to build and launch a spacecraft capable of carrying three people to an altitude of 100 kilometers twice within two weeks. Mojave Aerospace Ventures won the prize in 2004 with a spacecraft designed by Burt Rutan. The prize garnered significant media attention, and significantly raised the public profile of commercial spaceflight.[38]

Budweiser Cup (1997)

In 1997, Anheuser-Busch announced a $1 million prize, half of which would be donated to charity, for the first non-stop balloon flight around the globe. Bertrand Piccard and Brian Jones won the prize in 1999 for meeting what was called the "last great aviation challenge of the century."[39]

Cheap Access to Space Prize (1997)

In 1997, the Space Frontier Foundation and the Foundation for International Non-governmental Development of Space (FINDS) announced the $250,000 Cheap Access to Space (CATS) Prize for the first private team to launch a 2-kilogram payload to an altitude of 200 kilometers. Two launches were made, but the prize expired in 2000 with no winner.[40]

America's Space Prize (2004)

Funded by hotel entrepreneur Robert Bigelow, also the founder of Bigelow Aerospace[41], this $50 million prize will go to the first U.S.-based, privately funded team to design, build, and fly a reusable, manned capsule capable of flying five astronauts and docking with a Bigelow Aerospace inflatable space module. To win the prize, the capsule must reach a minimum altitude of 400 kilometers at a velocity sufficient to complete two full Earth orbits. In addition, no more than twenty percent of the hardware can be expendable, and the craft must either dock, or prove capable of docking, with the inflatable space module for a period of 6 months. The craft must complete two launches within 60 days, with a full crew of 5 astronauts aboard, before the deadline of January 10, 2010.[42] In an interview with *Space News*, Robert Bigelow said that a key ambition behind the prize offer is to break the Russian monopoly on space transport vehicles.[43] In addition to the $50 million in prize money, Bigelow has stated that his company is willing to offer $200 million in conditional purchase agreements for six flights of a selected vehicle, regardless of whether or not it is the winning entry, and an additional $800 million in options contracts, raising the size of the venture to over $1 billion.

NASA Centennial Challenges (2004)

In 2004, NASA announced the first in a series of Centennial Challenges,[44] offering prizes of up to $2 million for private sector development of specific

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37 http://www.vtol.org/awards/hphregs.html

38 See: http://www.xprize.org/x-prizes/ansari-x-prize

39 Crouch, T. (1998). "Breitling Orbiter 3." Aircraft of the Smithsonian. See: http://www.nasm.si.edu/research/aero/aircraft/breitling.htm (accessed Feb. 2, 2007). Browne, M. "Balloon History-and in Only 20 Days." *New York Times*. O'Brien, M. March 23, 1999. "Prize Money Propels Record-quests." CNN Downlinks with Miles O'Brien. See: http://www.cnn.com/TECH/space/9903/23/downlinks/ (accessed Feb. 2, 2007).

40 Space Frontier Foundation. "The Cheap Access to Space (CATS) Prize." See: http://www.space-frontier.org/Projects/CatsPrize/ (accessed Feb. 2, 2007).

41 http://www.bigelowaerospace.com/

42 Leonard David. "Exclusive: Rules Set for $50 Million 'America's Space Prize,'" *Space News*, November 8, 2004.

43 http://www.space.com/spacenews/businessmonday_bigelow_041108.html

44 NASA Centennial Challenges. NASA. See: www.centennialchallenges.nasa.gov

technologies to advance space exploration. The following is a list of challenges, many of which are held annually. Pursuant to Section 104 of the National Aeronautics and Space Administration Authorization Act of 2005 (P.L. 109-155)[45], competitions may, but are not required to be, administered by a NASA-selected "allied organization". As of January 2008, the eight challenges which have been announced are all administered by a third-party organization which pays for the administration of the prize, while NASA funds the prize itself. The NASA Authorization Act of 2005 also bars federal employees from participating as judges or contestants, sets the ceiling for a prize at $1,000,000 except when authorized by senior officials, and permits fundraising from both federal appropriation bills and third-party donations.

Regolith Excavation Challenge (2007-2008)

This is a $250,000 annual prize for a machine able to excavate lunar regolith, the loose material laid over bedrock. Teams compete by building autonomous systems to excavate and deliver regolith to a collector in a thirty minute, head-to-head competition format. The allied organizations are the California Space Education & Workforce Institute (CSEWI)[46] and the California Space Authority[47]. The entire $250,000 grand prize will go to the team able to excavate the most regolith over 150 kilograms, with prize money staked by the Centennial Challenges program. There was no winner in the 2007 competition.

Personal Air Vehicle Challenge (2007-2008)

In this competition, $250,000 in prizes for personal aircraft are split between winners in the categories for Shortest Runway ($25,000), Lowest Noise ($50,000), Highest Top Speed ($15,000), Second Highest Top Speed ($10,000), Best Handling Qualities ($25,000), and Most Efficient ($25,000), with a grand Vantage Prize of $100,000 going to the best combination of performance overall. Entrants are permitted into the contest only after a series of qualifying test flights. Prize winners in 2007 were all individuals. The allied organization is the Comparative Aircraft Flight Efficiency Foundation (CAFE)[48]. According to NASA, the contest will run annually until June 1, 2009, but will be restructured and renamed.

General Aviation Technology Challenge (2008)

In December 2007, NASA and CAFE announced the General Aviation Technology (GAT) Challenge. This competition was designed as a successor to the Personal Air Vehicle Challenge, with a $300,000 purse, funded by NASA, to be divided among the winners of the following categories: the Community Noise Prize ($150,000), the Green Prize ($50,000) for miles per gallon, the Aviation Safety Prize ($50,000) for handling and an eCFI (electronic Certified Flight Instructor)[49], the CAFE 400 Prize ($25,000) for speed, and the Quietest LSA Prize ($10,000) for speed and decibel level.

Moon Regolith Oxygen Extraction (MoonROx) Challenge (expires 2009)

This is a $1 million prize for technology or processes to extract breathable oxygen from lunar regolith on the scale of a pilot plant. The contest is a "first-to-demonstrate" competition, with a single prize going to the team that can "quickly extract breathable oxygen from a supply of lunar regolith simulant using a steady-state process."[50] The contest will be administered on a "first qualified, first judged" basis. Other specifications include a maximum weight of 50 kilograms for the ISRU hardware, a maximum power consumption of 10kW, and a minimum extraction of 2.5 kilograms of breathable oxygen within 4 hours.[51] The allied organization for this competition is the California Space Education & Workforce Institute (CSEWI), and the competition is co-hosted by the California Space Authority.

Elevator: 2010 (2005-2010)

Funded by the Centennial Challenges program, this competition is administered by the Spaceward Foundation[52], and includes two separate challenges: the Strong Tether Challenge and the Power Beaming Challenge. The Spaceward Foundation characterizes the Elevator: 2010 competition as a 5-year, $4,000,000 technology prize designed to stimulate innovative technology needed to build a space elevator.[53] The Power Beaming Challenge requires teams to design and build a machine that can go up and down a tether ribbon (a climber), while carrying a payload and using power beamed from a transmitter on the ground to a receiver on the climber. Each climber must

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45 P.L. 109-155. Previously S. 1281. National Aeronautic and Space Administration Authorization Act of 2005. 109th Congress.
46 http://www.californiaspaceauthority.org/regolith-2007/
47 http://regolith.csewi.org/
48 http://cafefoundation.org/v2/main_home.php
49 http://www.cafefoundation.org/v2/pav_enablingtech_eCFI.php
50 http://centennialchallenges.nasa.gov/cc_challenges.htm#moonrox
51 http://moonrox.csewi.org/about
52 http://www.spaceward.org/elevator2010-pb.html
53 http://www.spaceward.org/projects.html

reach a height of 50 meters at a minimum speed of 2 meters per second, according to the rules of the 2008 competition, with a high-speed bonus prize for a team able to reach a speed of 5 meters per second.[54] The team with the highest score, based on average velocity and payload mass, wins the competition. The Tether Challenge is a cumulative competition requiring a 50 percent improvement in the tether's breaking force from year to year, starting with the strongest commercial tether available in 2005. Tethers must also meet specifications for weight, length, and width.[55] There have been no winners of the competition since its inception in 2005.

Astronaut Glove Challenge (2007-2008)

This is a $250,000 head-to-head, two-part competition between manufacturers of highly dexterous astronaut gloves. In the first part, the Astronaut Glove Challenge ($200,000), competitors must perform various tasks with their gloves, and will be judged on the results. The second part, the Mechanical Counter Pressure Glove Demonstration ($50,000) is for gloves which do not use bladders or bladder restraints. Contestants may not compete for both prizes. Competition goals included advancements in the weight, durability, flexibility of the glove, a reduction in hand fatigue, and improved dexterity. Entrant teams must be headed by a U.S. citizen, and be based in the U.S. or have offices in the U.S.[56] The 2007 Astronaut Glove Challenge for $200,000 was won by an engineer from Maine named Peter Homer, who stitched together the winning entry on a sewing machine at his home. The allied organizations are Volanz Aerospace Inc. and Spaceflight America.

Northrop Grumman Lunar Lander Challenge (2006-2008)

This $2 million prize fund is split between two competition levels. Level One ($500,000) requires a vertical take-off, 90 seconds of hover time at a minimum of 50 meters, followed by a vertical landing 100 yards distant from the point of take-off, then repetition of the process in reverse. Level Two ($1,500,000) requires 180 seconds of hover time with take-offs and landings from a boulder- and crater-covered lunar surface simulation. The difference between the competitions is in the time of hovering and the surface on which the vehicles land. The allied organization is the X-PRIZE Foundation, which calls the contest the Northrop Grumman Lunar Lander Challenge.[57] The competition takes place at the WireFly X-Prize Cup, a two-day event where competing teams are given four launch windows. As of January 2008 there have been no winners, though in 2007 Armadillo Aerospace, the only team to qualify for the event, nearly completed Level One.[58]

Space and Aeronautics Prize Act (2004, 2005, 2007)

The Space and Aeronautics Prize Act (H.R. 5336, 108th Congress) would have established a National Endowment for Space and Aeronautics to award cash prizes for outstanding achievements in basic, advanced and applied research, technology development, and prototype demonstration in conjunction with or independent of the National Aeronautics and Space Administration (NASA). The Orbital Demonstration Prize Authority section of the bill created a prize for the demonstration of a space flight vehicle to carry at least one person to a minimum altitude of 400 kilometers from within the United States or its territories, completing at least three Earth orbits, and returning safely, if possible, with a high degree of reusability for future flights beyond the demonstration flight. In order to be eligible for the prize, the space flight vehicle must have the capacity to carry a minimum of 3 persons, and shall not have been substantially developed under a contract or grant from any foreign or domestic government. The total amount of cash prize for the program described in this section may not exceed $100,000,000.

The bill did not pass in the 108th Congress. It was re-introduced in modified form as HR 1021 in the 109th Congress, and in December 2007 as HR 4916 (110th Congress) as the "Aeronautics and Space Prize Act."

Google Lunar X-Prize (2007)

On September 13, 2007 the X-PRIZE Foundation and Google announced a $30 million prize for the first private company able to land a privately funded lunar rover on the moon. In order to win the prize, the rover must be capable of roaming for at least 500 meters and sending images, video and data back to Earth. The $30 million is divided into a $20 million grand prize, a $5 million second prize, and $5 million in bonus prizes. The Grand Prize goes to the team which soft lands a rover on the moon and transmits a specific set of video images and data. Second prize goes to the team which lands, roves, and transmits data. The Grand Prize drops to $15 million at the end of 2012 and expires at the end of 2014, unless extended by the sponsors. The second prize will be available until the end of 2014. Bonus prizes can be won by roving longer distances, transmitting images of man-made artifacts, discovering water

[54] http://www.spaceward.org/elevator2010-pb.html
[55] http://www.spaceward.org/elevator2010-ts.html
[56] http://astronaut-glove.tripod.com/
[57] http://space.xprize.org/lunar-lander-challenge/
[58] http://space.xprize.org/lunar-lander-challenge/archive.php

ice, and surviving through a lunar night (14.5 Earth days).[59]

Climate, Environment, Energy and Power

Bernoulli's Steam-Power Prize (1753)

In 1753, the French Academy of Sciences awarded a prize to Daniel Bernoulli for the best essay on the manner of impelling vessels without wind. Bernoulli argued that steam power could not be successfully applied to navigation without a continuous rotary motion, and he proposed an early version of the screw propeller.[60]

Rumsey Premiums for Steam Engine Invention (1784)

Beginning in 1784, James Rumsey proposed to several state legislatures that they agree, by contract, to a reward for developing a craft that could travel upstream in a rapid river at twenty-five to forty miles per day, carrying 10 tons of cargo, "wrought at no greater Expense than that of three hands." The reward proposed was a 10-year monopoly on the service, *or* a cash "premium" in the event that monopoly was abolished. In the case of the New York proposal, the monopoly could be eliminated by the State of New York in return for a payment to Rumsey of 10,000 pounds.[61] In 1785, in response to another petition, the Continental Congress offered a prize of 30,000 acres of land to James Rumsey if he could put into practice within a year a steam engine invention for inland navigation.[62] Rumsey reportedly did not meet the deadline set by the Continental Congress.[63] Rumsey would become engaged in often bitter competition with John Fitch for a series of state monopolies for inland steamship navigation, with many leading political figures playing a role, and the disputes over their competing patent claims shaped the early federal patent law, including by the decision in 1793 to award patents to the first to invent.[64]

The Volta Prize for Electricity (1801)

In 1801, the Volta Prize was established by Napoléon Bonaparte to honor Alessandro Volta, an Italian physicist noted for developing the battery. There was a 60,000 livres Grand Prize for the best application of electric power, as well as smaller annual prizes of 3,000 francs for good work on the subject.[65] Among the winners of the Grand Prize were, in 1807, the British Scientist Sir Humphry Davy, for work with electrolysis, who won the Volta Prize despite the fact that England and France were at war. Louis Napoléon Bonaparte would later renew the Volta prize, which was offered several times, with a Grand Prize of 50,000 francs, initially open for a five-year period to the individual who could discover a method of rendering the voltaic pile applicable economically to industry as a source of heat or light, or to chemical or mechanical science, or to medicine, as judged by an eminent panel of men of science.[66] In 1864, Emperor Napoléon III awarded "Le Prix Volta," to Heimich D. Ruhmkorff, a German-born instrument maker, for "l'invention de la bobine d'induction." In 1880, Alexander Bell received a Volta Prize of 50,000 francs for the invention of the telephone. Among the luminaries who

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59 "Google Sponsors Lunar X-Prize to Create a Space Race for a New Generation." Press release, available at: http://www.googlelunarxprize.org/.

60 The date of the prize was 1752 in some accounts. Robert Henry Thurston, *A History of the Growth of the Steam-engine*, 1878, page 228. Nathan Read, *His Invention of the Multi-Tubular Boiler and Portable High-Pressure Engine, and Discovery of the True Mode of Applying Steam Power to Navigation Railways. A Contribution to the Early History of the Steamboat and Locomotive Engine, by his Friend and Nephew, David Read,* Hurd and Houghton, 1870, page 29.

61 E.B. O'Callaghan, M.D. *The Documentary History of the State of New York, Arranged Under the Direction of the Hon. Christopher Morgan, Secretary of State,* Vol. II. Albany: Weed, Parsons & Co., Public Printers, 1849, page 1088.

62 28 *Journals of the Continental Congress*, 349–50 & n.1, 1785.

63 Frank D. Prager, *The Steamboat Pioneers Before the Founding Fathers*, 37 J. PAT. OFF. SOC'Y 486, 499, 1955.

64 James Rumsey, *Short Treatise on the application of Steam, Whereby is Cleaerly Shewn From Actual Experiments, that Steam May be Applied to Propel Boats or Vessels of any Burden Against Rapid Current with Great Velocity*, 1788. John Fitch, *The Original Steam-Boat Supported: Or, A Reply to Mr. James Rumsey's Pamplet, Shewing the True Priority of John Fitch, and the False Datings of James Rumsey*. 1788. J. Fairfax McLaughlin, Jr., "Father of Steam Navigation; Apparently James Rumsey Antedated Both Fitch and Fulton," *New York Times*, April 18, 1905.

65 Maurice P. Crosland, *Science Under Control: The French Academy of Sciences, 1795-1914*, Cambridge University Press, 1992.

66 *The Medical Times and Gazette, a Journal of Medical Science, Literature, Criticism and News*, October 8, 1859; John Timbs, F.A.S., *The Year End Book of Facts*, 1857, page 43.

judged were Victor Hugo and Alexandre Dumas. In 1888, Zénobe Theophile Gramme, a semi-literate Belgian industrialist with no advanced knowledge of mathematics nevertheless became an important inventor and electrical engineer, and won a 50,000 franc Volta Prize for his work on motors and generators.

Prize Question for Propelling Vessels without a Paddle Wheel (1825)

In 1825, a British company seeking to commercialize a gas vacuum engine offered a prize of 100 guineas for the best suggestion on propelling vessels without paddle wheels. The prize was won by Samuel Brown, who proposed the use of a screw propeller at the front of a boat. In a test on the Thames River, the engine failed, but many assigned blame to the screw propeller, a factor which is thought to have delayed itsuse.[67]

Turbine Prize (1826)

In 1826 the French Society for the Encouragement of Industry offered a prize of 6,000 francs for the development of a large-scale commercial hydraulic turbine. The prize was won in 1833 by Benoît Fourneyron, who had applied for a patent in 1832. In 1843, 10 years after his memoir was published, there were 129 plants created or improved in France, Germany, Austria and Poland thanks to his design, which also helped to power the burgeoning New England textile industry, and was installed as a generator on the U.S. side of Niagara Falls.

Liverpool & Manchester Railway Locomotive Prize (1829)

In 1829, the Liverpool & Manchester Railway company offered a prize of 550 pounds sterling to the company or individual who could build a locomotive that would weigh less than six tons and could pull a load of 20 tons at a rate of ten miles per hour, and satisfy a number of other technical requirements. Five engines entered a competition for the prize in October of 1829. The winning entry, "the Rocket", built by George Stephenson, his son Robert and Henry Rooth, was the only entrant to complete the course and exceed all the requirements without incident, at the then stunning speed of 35 miles per hour. The Liverpool & Manchester Railway (the L & M) subsequently bought the Rocket from Stephenson and ordered four more to begin a passenger service between Liverpool and Manchester, reportedly the first rail passenger service in the world,[68] and the beginning of the modern railroad industry. Stephenson's winning entry was not considered particularly novel in terms of inventive ideas, but rather as an impressive implementation of known technologies, and superior workmanship and engineering compared to his rivals.[69]

The Screw Propeller Reward (1855)

In 1855, the British government gave a 20,000 pound reward for the invention of the screw propeller used in the Royal Navy. The administration of the award was controversial, as there were reportedly 44 competing claims by different inventors. Confronted with multiple claims of credit for the invention and its adoption, the government gave the reward money to a private group made up of five competing claimants, on the condition that the group indemnify the government against all other competing claims, and that the reward also satisfy any future claims against the Royal Navy for use of the inventions.[70]

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[67] Rear Admiral Charles W. Dyson, U.S.N., *Screw Propellers and Estimation of Power for Propulsion of Ships. Also Air-Ships Propellers,* Second Edition, New York: John Wiley & Sons, London: Chapman & Hall, 1918. A.E. Seaton, *The Screw Propeller: and Other Competing Instruments for Marine Propulsion, 1909*. Page 15. John Bourne, *A Treatise on the Screw Propeller, with Various Suggestions of Improvement*, 1852, page 18.

[68] Samuel Smiles, *George Stephenson, Railway Engineer*, H.O. Houghton and Company, 1858. "Rocket - Stephenson's Steam Locomotive (1829)," http://scalemodel.net/Gallery/Rocket1829.aspx.

[69] Holland Thompson, *The Age of Invention, A Chronicle of Mechanical Conquest,* Yale University Press, 1921.

[70] John Timbs, *Wonderful Inventions: from the Mariner's Compass to the Electric Telegraph Cable,* 1868. page 269. *Hansard's Parliamentary Debates*, Third Series, Commencing with the Accession of William IV., 17° VICTORIA, 1854, Vol. CXXX. pages 1387-8. See: Captain E. J. Carpenter, R.N., "The Screw Propeller. A Letter to Captain G. T. Scobell, R.N., M.P. With Documents relating to the Invention of the 'Screw Propeller' used in the Royal Navy, and to the misapplication of the Grant of Twenty Thousand Pounds 'Remuneration Compensation' voted by the House of Commons," published in *The Mechanics' Magazine, January 1st - June 30th*, 1855, Edited by R.A. Brooman, VOL. LXII. London: Robertson, Brooman and Company, 1855, page 422. See the letters in *Mechanic's Magazine, and Journal of Engineering, Agricultural*

Premium for the Prevention of Smoke (1855)

As an early example of an environmental prize, in 1855, the Steam-Coal Collieries' Association at Newcastle offered a reward of five hundred pounds for the invention of "an effectual method for preventing the emission of smoke from the chimneys of multitubular boilers." The conditions for eligibility included the following requirements:[71]

> (a.) It shall effectually prevent the production of smoke during the combustion of any of the Hartley steam coals of the north of England.
>
> (b.) Such prevention shall be accomplished by the combustion of the smoke or gases in the furnace or air-chamber previous to passing through the flues or tubes.
>
> (c.) It shall be applicable to all the usual forms of boilers, containing a number of small tubes between the furnace and the chimney, and especially to the usual forms of marine boilers.
>
> (d.) It shall not diminish the evaporating power of the boiler to which it may be applied.
>
> (e.) It shall not impair the durability of the boiler.
>
> (f.) It shall, as far as possible, be independent of the personal attention of stoker or engineer ; but it is not essential that it should be absolutely so.
>
> (g.) It shall not be, or be made the subject of a patent, or if so, the inventor or patentee shall undertake that .the patent right shall not exceed in amount such rate per horse power, or per foot of fire grate, as the judges shall determine.

The contest, which drew 103 submissions, was won by Mr. Charles Wye Williams for his "Essay on the Prevention of the Smoke Nuisance."

Machinery, Manufacturers and Shipbuilding, Edited by R.A. Brooman. Vol. II. July to December 1859, pages 44, 297-9. *The Foreman Engineer and Draughtsman*, 1876, pages 69-75.

[71] *The Mechanics' Magazine, January 1st - June 30th*, 1855, Edited by R.A. Brooman, Vol. LXII. London: Robertson, Brooman and Company, 1855, page 464.

French Society for the Encouragement of Industry Prizes (1896)

The following is an illustration of the types of prizes awarded regularly by the French Society for the Encouragement of Industry. These prizes were given in 1896 (see the last section of this paper for more details).

Best motor to run on commercial oil

3,000 francs for the best motor to run on commercial oil.

Efficient steam engine

3,000 francs for an engine of 25 to 100 horsepower that used a maximum of seven and a half kilograms of steam per hour per unit of horsepower.

Motor suitable for housework

2,000 francs for a motor suitable for housework, and another 2,000 francs for the cheapest method of transmitting mechanical energy from a central station to domestic use.

Incandescent electric lamp of 1/10th candle power

2,000 francs for an incandescent electric lamp of one-tenth candle power when a current of .05 ampere is passing through it at a potential of 100 volts.

Galileo Ferraris Prize (1897)

In 1897, the 15,000 lire Galileo Ferraris Prize was offered for a machine, apparatus, or combinations of machines or apparatuses, that advanced the industrial applications of electricity. The contest was open to foreign entrants. The rules required the inventions to be shown at an 1898 exhibition in Turin, and be made available for experimental tests.[72]

Automobile Clubs Prize for a Cheap Alternative to Gasoline (1913)

In 1913, the International Association of Recognized Automobile Clubs announced, in Paris, that they were offering a prize of $100,000 ($2.1 million at 2007 prices) for the best fuel, other than gasoline, capable of being used in internal combustion engines.[73] The prize was an effort to address the rapidly

[72] "Science and Industry," *New York Times*, April 3, 1898. "Chemical Notices from Foreign Sources," the Chemical News, May 21, 1897 page 251.

[73] "Prize of $100,000 for New Auto Fuel; International Association of Auto Clubs Offers It for a Substitute for Gasoline," *New York Times*, January

increasing price of gasoline by interesting chemists in the development of "a fuel which cannot be rigged or cornered by any nation or combination of national interests."

U.S. Patent Compensation Board (1946)

In 1946, the Atomic Energy Act barred all future patent rights and revoked all existing patents for inventions using atomic power for military purposes, including the production of fissionable material.[74] Private patents were still awarded for inventions using atomic energy for civilian purposes, but with restricted rights for the patent holder.[75] In addition, the U.S. Patent Compensation Board was established to provide an incentive for private innovations in atomic energy that were no longer eligible to be patented for security reasons. The Board considered the cost and usefulness of inventions in determining how much to reward inventors. Reward amounts have been criticized for being too low. A group including Enrico Fermi received less than $400,000 for a patented process for the production of radioactive isotopes, and that grudgingly. The Board's lawyers argued that Fermi, as a member of the General Advisory Committee for the Atomic Energy Board, was ineligible for remuneration, as were his co-inventors.[76] The Board also has the power to issue a compulsory license on inventions considered important to the field, and to make them available to competitors at reasonable royalties.[77] The Atomic Energy Act of 1954 restored the atomic energy field to the patent system, with the exception of technologies for the construction of atomic weapons, which remained governed by the 1946 Act.[78] The Compensation Board remains in place today.[79]

Super-Efficient Refrigerator Program (1992)

In 1992, 24 American utility companies created the Super-Efficient Refrigerator Program (SERP) that offered a prize of up to $30 million for the development of a commercially viable, CFC-free refrigerator that surpassed federal efficiency standards by at least 25 percent. The actual prize payment was based on the number of units sold. While Whirlpool won the competition in 1994, exceeding the program's efficiency requirements, falling energy costs and delayed implementation of federal efficiency standards led to lower-than-expected sales and a lower prize payment.[80]

China Energy-Efficient Refrigerators Project (2000)

In 2000, the China Energy-Efficient Refrigerators Project announced an energy-efficiency innovation competition for Chinese manufacturers. The prize was set at one million yuan ($150,000), and attracted considerable media attention. One particular issue confronting the prize administrators was whether or not to allow foreign subsidiaries and joint ventures with substantial foreign ownership to participate. Though the prize was meant to stimulate innovation among Chinese manufacturers, partial foreign ownership was becoming increasingly common among the leading enterprises.[81]

Grainger Challenges (2005)

In 2005, the National Academy of Engineering announced the first in a planned series of Grainger Challenges, offering a $1 million first prize and $200 and $100 thousand second and third prizes for the development of economical filtration devices for the removal or arsenic from well water in developing countries. Over 70 entries were submitted, and Abul Hussan was announced the winner in 2007 for his SONO filter, which has already been implemented to provide safe drinking water to 400,000 people.[82]

26, 1913.

74 42 U.S.C. § 1811 (a) (1946).

75 Galane, Morton R. "Standards for a Reasonable Royalty Under the Atomic Energy Compulsory Licensing Program." *Virginia Law Review*, Vol. 38, No. 1. (Jan., 1952), pages 53-68.

76 Segré, Emilio *Enrico Fermi: Physicist,* University of Chicago Press, 1970, pages 84-5.

77 42 U.S.C. § 1811 (c) (1946).

78 Boskey, Bennett. "Some Patent Aspects of Atomic Power Development." *Law and Contemporary Problems*, Vol. 21, No. 1, Atomic Power Development (Winter, 1956), pages 113-131.

79 See: Atomic Energy Act of 1946, Sec. 11. Available at: www.osti.gov/atomicenergyact.pdf

80 John Holusha, "Whirlpool Takes Top Prize In Redesigning Refrigerator," *New York Times*, June 30, 1993. Boyle, A. June 16, 2004. "How Prizes Pushed Progress: Rewards provided incentive to inventors, adventurers." MSNBC. See: http://www.msnbc.msn.com/id/5191763/ (accessed Feb. 2, 2007).

81 Birner, S. and Martinot, E. "Market transformation for energy-efficient products: Lessons from programs in developing countries," *Energy Policy* vol. 33, 2005. pages 1765–1779.

82 Weiss, R. Feb. 2, 2007. "GMU Teacher's Ingenuity Nets $1 Million Prize." *Washington Post*. B1. See: http://www.washingtonpost.com/wp-

MIT Clean Energy Entrepreneurship Prize (2007)

The MIT Clean Energy Entrepreneurship Prize[83] is the combination of two existing MIT competitions: the $100,000 Entrepreneurship Competition and the Ignite Clean Energy Competition. The Clean Energy Entrepreneurship Prize offers a top cash prize of $200,000 and is sponsored by MIT, NSTAR Electric & Gas Corporation and the US Department of Energy. NSTAR and the DoE will provide the funding. Applicants are judged on the basis of their business plans for clean energy products or technologies, and will be rigorously coached as part of the selection process. The competition is open to students and non-students. Semi-finalists and finalists must present and defend their proposal in front of a panel of clean energy experts and venture capitalists. The grand prize and three runner-up prizes of $20,000 each will be awarded in May 2008.

Prizes for Advanced Technology Achievements (2007)

S.701 (110th Congress) was introduced by Senator Clinton "to amend the Internal Revenue Code of 1986 to impose a temporary oil profit fee and to use the proceeds of the fee collected to provide a Strategic Energy Fund[84] and expand certain energy tax incentives, and for other purposes." One "other purpose" is to establish a prize fund to recognize and reward "outstanding achievements in basic, advanced, and applied research, technology development, and prototype development" of clean energy technology. The bill sets a total maximum payout of $50 million with an individual maximum of $10 million, unless overridden by the Secretary of Energy.

Bright Tomorrow Lighting Prizes (2007)

The Energy Independence and Security Act of 2007 (PL 110-140) establishes, within one year of its adoption, the Bright Tomorrow Lighting Prizes fund. This fund, without a fiscal year limitation, will finance prizes for energy-efficient lamps in three categories: the 60-watt Incandescent Replacement Lamp Prize ($10 million), the Par Type 38 Halogen Replacement Lamp Prize ($5 million), and the Twenty-First Century Lamp Prize ($5 million). Applicants for each prize must satisfy a variety of specifications for efficiency, interoperability, quality and quantity of color, heat and light, lifetime and, in addition, must be capable of mass production for competitive commercial markets. The bill permits the Secretary of Energy, under whose authority the prize fund is to be established, to accept funding from private sources in addition to funding through appropriations. The awarding of prizes will be based on the availability of funds. The Secretary is also required to establish a technical review committee composed of non-federal officers to review submissions, and is permitted to competitively select a third-party administrator for the fund. The bill also contains procurement provisions to replace the lights in government buildings with prize-winning models.[85] The prize is only open to companies incorporated and based in the United States or, in the case of an individual submission, to legal residents of the U.S.

H-Prize (2007)

In December 2007, the Energy Independence and Security Act of 2007 (PL 110-140) was signed into law. Section 654 of this Act amends Section 1008 of the Energy Policy Act of 2005 (42 U.S.C. 16396)[86], the U.S. Code, and instructs the Secretary of the Department of Energy to set up prize funds to recognize breakthroughs in energy technology. The H-Prize designates $50 million in federal funds to be awarded as prizes between 2008 and 2017 for developments in hydrogen-powered vehicle technology.[87] The law now provides for a prize of $1 million every other year for technological advances, $4 million every other year for the development of a working prototype, and $10 million after 10 years for a "transformational advance in hydrogen energy technology." The Department of Energy is to administer the program with support from a third-party non-profit organization, which will set criteria for winning and assist in fundraising, in addition to funds raised from yearly appropriations. In addition, the law instructs the Secretary to publicize the project through the Federal Register and among businesses and universities, especially universities which have been "historically black" and businesses

dyn/content/article/2007/02/01/AR2007020101874.html (accessed Feb. 3, 2007).

[83] MIT Clean Energy Entrepreneurship Prize. See: http://web.mit.edu/newsoffice/2007/clean-energy-1128.html

[84] S. 701. Strategic Energy Fund Act of 2007. 110th Congress. See: SEC. 151.

[85] PL 110-140. Energy Independence and Security Act of 2007. 110th Congress. See: SEC. 655 (Bright Tomorrow Lighting Prizes).

[86] Section 1008 of the Energy Policy Act of 2005 (42 U.S.C. 16396).

[87] Wolfe, K. "House Passes 'H-Prize' Bill for Energy Research." CQ.com, June 6, 2007. See: http://public.cq.com/docs/cqt/news110-000002525938.html (accessed July 5, 2007).

"owned or controlled by socially and economically disadvantaged persons."[88]

Saltire Prize (2007)

The Scottish government in 2007 announced the Saltire Prize[89], an annual prize fund of 2 million British (Scottish) pounds to reward various business and technological innovations, with the prize in 2008 being dedicated to generating innovation in renewable energy. The Saltire fund also includes an additional 10 million pound Horizon Prize to attract international interest in implementing green technology in Scotland, particularly in the areas of tidal and wave-generated power. The Saltire Prize was initially set at 5 million pounds per year with no guarantee of a yearly award. It has since been reformulated in the annual 2 million prize format, with the 10 million pound Horizon Prize, which was modeled on the X-Prize series in the United States, set aside to reward a "tangible breakthrough, targeted at aspects of marine renewables."[90] Outlays for the prizes total 16 pounds million over three years.

Virgin Earth Challenge (2007)

In 2007, Sir Richard Branson and former U.S. Vice President Al Gore announced the $25 million Virgin Earth Challenge[91] for "a commercially viable design which results in the removal of anthropogenic, atmospheric greenhouse gases so as to contribute materially to the stability of Earth's climate." In announcing the prize, Branson cited inspiration from previous innovation prizes, including the Longitude Prize, French prizes for alkali and canning, and 20th century prizes for automobiles and aviation.

Climate Technology Challenge Program (2007)

S. 280 (110th Congress), the Climate Stewardship and Innovation Act of 2007[92], is designed to "accelerate the reduction of greenhouse gas emissions in the United States by establishing a market-driven system of greenhouse gas tradable allowances, to support the deployment of new climate change-related technologies, and to ensure benefits to consumers from the trading in such allowances, and for other purposes." The bill includes a prize fund (established in Sec. 323) to stimulate innovation to reduce greenhouse gas emissions. The program is to be carried out between 2008 and 2011, with the Secretary of Energy posting requests for technologies and suggested levels of funding, then awarding funding to the lowest bidders in each category. Categories include: advanced coal with carbon capture and storage, renewable electricity, energy efficiency, advanced technology vehicles, transportation fuels, carbon sequestration and storage, zero and low emissions technologies, and adaptation technologies. The program's funds will be administered by a Climate Technology Financing Board to be established by the Secretary of Energy. The Board will be comprised of the Secretary of Energy as the chair; 6 appointees, including the CFO of the DoE; 1 representative from the newly established Climate Change Credit Corporation; and members with experience in corporate and project finance in the energy sector. Bids will be evaluated by a panel of experts chosen by the Secretary of Energy, and proposals will be on their ability to reduce, avoid, or sequester greenhouse gas emissions at a given price, as well as being held to safety standards. After 2011 the Secretary of Energy and the National Academies of Science will review the program for possible extension or amplification. The maximum award is set at $100 million.

Earth Fund (2007)

The Earth Fund was launched on December 10, 2007 in Bali[93] to "facilitate market-based environmental innovation in developing countries." The Global Environmental Facility (GEF) and International Finance Corporation (IFC), the private sector arm of the World Bank Group, launched the fund during a U.N. climate change conference in Bali. The fund, which is expected to reach $200 million through various donations, is open to the public, private foundations, and others, and will use instruments including grants, soft loans, equity participastion, and prizes to reward environmental innovation in areas such as second generation biofuels, water treatment or clean energies.

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88 PL 110-140. Energy Independence and Security Act of 2007. 110th Congress. See SEC 654 (H-Prize).

89 http://www.scotland.gov.uk/News/Releases/2007/08/15121842

90 Robbie Dinwoodie, "Scotland to offer £10m 'green' prize," *the Herald*, November 16, 2007. http://www.theherald.co.uk/politics/news/display.var.1837626.0.0.php

91 "Sir Richard Branson and Al Gore Announce The Virgin Earth Challenge: A $25 million Global Science and Technology Prize." Earth Challenge. See: http://www.virginearth.com/ (accessed Feb. 12, 2007).

92 S. 280. Climate Stewardship and Innovation Act of 2007. 110th Congress. See: SEC. 323 (The Climate Technology Challenge Program).

93 "Earth Fund launched to support environmental innovation in developing countries." See: http://news.xinhuanet.com/english/2007-12/10/content_7226776.htm

NESTA Big Green Challenge (2007)

From October 2007 to October 2009, the National Endowment for Science, Technology and the Arts (NESTA) in the U.K. is sponsoring a 1 million British pound prize, the Big Green Challenge[94], to reward community-based development and implementation of projects resulting in a 60 percent reduction of CO_2 emissions. The contest is open only to groups or organizations with non-profit status, though groups may apply to the challenge and incorporate at a later time. NESTA supported the prize with informational sessions around the U.K. in November and December 2007. One hundred semi-finalists will be asked to submit detailed proposals on implementation. Ten finalists will be given one year to implement their approach, with advice and 20 thousand pounds in financial support. Judges will look for qualities such as scalability, sustainability, and transferability, as well as at the reduction in carbon dioxide emissions from October 2008 to October 2009, before selecting a winner. Winners will receive the bulk of the one million pounds, with runners-up receiving award money at the judges' discretion.

Design and Architecture Prizes

Competitions in the area of design and architecture are quite common. Here is one notable old design prize, and a handful of the thousands of such prizes currently offered:

King Edward VII Tuberculosis Sanatorium Design Prize (1903)

When King Edward VII was given $1,000,000 to be used for a charitable, utilitarian purpose, the King decided to devote a large portion of the prize money to erecting a new tuberculosis sanatorium. To collect the latest opinions on the sanatorium's design, the King offered three prizes of $2,500; $1,000; and $500 for the best essays on the subject of sanatorium design. An advisory board of prominent English physicians was assembled to judge entries, though the competition was open to entries from all countries, resulting in over 180 submissions. The names and designs of the winning entries were published in *The Lancet* one year after the donation announcement, and the winning design, with suggestions from other essayists incorporated, was to be erected shortly thereafter.[95]

Aga Kahn Awards (1977)

The Aga Khan Award for Architecture, first established in 1977, manages a $500,000 prize fund, which recognizes programs that "demonstrate excellence in architectural design as it pertains to Muslim communities through contemporary design, social housing, community improvement and development, restoration, re-use, conservation, landscaping, and the environment." When the award concerns the product of efforts by diverse individuals, groups and organizations, the money is apportioned among the contributors (architects, other design and construction professionals, craftsmen, clients and institutions) whom the Aga Kahn Foundation considers the most responsible for the success of each project.

Schindler "Access for All" Award for Architecture (2003)

The Swiss elevator manufacturer Schindler sponsors a competition for architecture that focuses on designs that enhance "accessibility to buildings for everyone, irrespective of their physical capabilities," in order to create in participants' minds a special awareness of the different forms of disability and of different possibilities of circumventing these disabilities. And by doing so to influence future architects in their everyday work." In the annual competition, held this year in Vienna, students propose designs, and compete for € 72,000 in prizes. Schindler obtains ownership of the submissions, but the students retain "artistic property rights" in the designs.

Robert Bruce Thompson Student Light Fixture Design Competition (2006)

Bruce Thompson, a twenty-five year veteran of the lighting industry with a background in theatre and light fixture design, established a student light fixture design competition to encourage creativity and education in light fixture design and manufacturing. The Robert Bruce Thompson Trust administers the annual competition, which focuses on a design problem. The design problem for 2008 is as follows[96]:

The 2008 Design Problem

A luxury hotel chain is building a large, multi-story hotel in a

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[94] http://www.biggreenchallenge.org.uk/about/

[95] "KING EDWARD'S SANATORIUM; Plans Submitted by Writer of Prize Essay on the Treatment of Tuberculosis Likely to be Adopted With Slight Modification OpenAir Method Favored." *The New York Times,* January 18, 1903.

[96] http://www.rbtcompetition.org/rules2b.html

resort destination. They want an elegant, ADA compliant sconce to light the guest room corridors. The corridors are 6' wide, 8'6" high with room entries on each side. The sconce should light the room entry, as well as light the corridor when there is no entry door. Management is concerned about energy and maintenance costs. Consider the aesthetics of architectural finishes and materials as you design the sconce. Your sconce should use energy-efficient lamps, such as compact fluorescent, or other light sources with good color rendering and long life. The ballast should be integral to the fixture. Self-ballasted lamps and other retrofit lamps that fit into incandescent screw base sockets are not acceptable. Identify all major components and materials.

GreenStop Design Competition (2006)

The California Department of Transportation offers the $10,000 GreenStop International Design Competition to develop a model roadside rest area that is "both sustainable and "off the grid." The submissions are required to show how such a rest stop can be adapted to a regional context, and showcase local history, cultures, and products.

Concrete Thinking for a Sustainable World Student Design Competition (2007)

In the 3rd Annual Portland Cement Association (PCA) competition for "Concrete Thinking for a Sustainable World Competition," prizes are awarded for innovative uses of Portland cement-based material to achieve sustainable design objectives. The contest involves two separate categories, one for an environmentally responsible recycling center "focused on reusing today's materials to preserve tomorrow's resources," and a second for the design of a "single element of a building that provides a sustainable solution to real-world environmental challenges."[97]

International Bamboo Building Design Competition (2006)

The Maui-based Bamboo Technologies has sponsored an International Bamboo Building Design Competition. Architects, builders, designers, and students everywhere are invited to submit designs for a bamboo structure, in order to raise awareness of the uses of bamboo in structurally sound and building code-approved buildings. The prize is $5,000.

Governance and Social Innovation

French National Institute Class of Moral and Political Sciences Prize Contests (1798-1802)

From 1798 to 1802, as France was recovering from and responding to recent political upheavals, the French National Institute Class of Moral and Political Sciences conducted several contests to address subjects of governance and social order in France. Among the best known were the following five prize questions:[98]

1. "What are the most suitable institutions to establish the morality of a people?"

2. "Is emulation a good means of education?"

3. "By what means may the institution of the jury be improved in France?"

4. "For what objectives and under what conditions is it suitable for a republican state to offer public loans?"

5. "In an agricultural country, do landowners effectively pay the entire tax burden, and do indirect taxes fall on them with a surcharge?"

The Ford Foundation Innovations Award Programs (1986)

First established in 1986 at Harvard University's John F. Kennedy School of Government as an incentive for creativity in the public sector, the Ford Foundation sponsors 10 Innovation Award Programs for governments in Brazil, Chile, China, Mexico, the Philippines, Peru, South Africa, the East African Region, local governments in the United States and among the Native American tribes of the United States. Each award brings with it a monetary prize, ranging from $25,000 (Mexico's Local Government and Management Award) to the $1 million U.S. IAG program that is currently split among 10 recipients. A full list of the programs, as of January 2008, is as follows:

[97] https://www.acsa-arch.org/files/competitions/PCAProgram.pdf

[98] Martin S. Staum, "The Enlightenment Transformed: The Institute Prize Contests," *Eighteenth-Century Studies*, Vol. 19, No. 2. (Winter, 1985-1986), pages 153-179.

Brazil - The Public Management and Citizenship Program
Chile - The Citizenship and Local Management Program
China - Innovations and Excellence in Local Chinese Governance
East African Region - The Mashariki Innovations in Local Governance Awards Programme
Mexico - The Local Government and Management Award
Peru - The Participation and Local Management Program
South Africa - The Impumelelo Innovations Award Trust
The Philippines - The Galing Pook Awards
United States - Innovations in American Government Program
United States, American Indian Nations - Honoring Contributions in the Governance of American Indian Nations

Bank of Innovation Projects Convocatorias (Argentina, 2004)

The Bank of Successful Projects (BPE) in Buenos Aires is a system of reception, evaluation, registration, documentation, and diffusion of public management projects, with the aim of spreading successful projects to other state organizations to promote quality in public management. In 2004, the BPE was transformed into the Bank of Innovation Projects (BPI) under the authority of the Sub-secretary of Public Management. The BPI runs a yearly "convocatoria", to which it invites NGOs and individuals to discuss and present transformative ideas to improve public administration. Each convocatoria is based around a theme. In 2004, the theme was "the Simplification and Increased Responsiveness of Paperwork", and in 2005 it was "Political Decentralization—Administrated by the State." At these convocatoria, the BPI offers two Provincial Prizes for Innovation in Public Management, one for "Ideas and Projects", the other for "Practices." On the "Ideas and Projects side", first prize consists of two grants of 700 Argentine pesos, monthly, for a period of two months, in addition to a subsidy of 3,500 pesos for project implementation and publication by the BPI. There is also a second prize of two grants of 600 pesos per month for two months, in addition to technical assistance for implementation, upon a review of viability, and publication by the BPI. First place in the "Practices" category wins 8,000 pesos in cash to the integral members of the presenting team, the chance to present the idea at a seminar held by the Provincial Institute of Public Administration, and publication by the BPI. The 2004 convocatoria drew 37 entries on the "Ideas and Projects" side, and 32 entries for "practices."[99]

[99] Doyle, Alicia y Lozano, Carmen. "Banco de Proyectos de Innovación en la Gestión Pública de la Provincia de Buenos Aires." Junio 2005. www.gestionpublica.sg.gba.gov.ar/html/ponencias_tucuman/banco_proyectos_innovacion_tucuman.doc.

Texas Social Innovation Competition (2006)

Launched on December 4, 2006, the Social Innovation Competition is open to students within the University of Texas System, the Texas A&M University System, and Rice University.[100] The program is run by a graduate student-organized philanthropy program at the University of Texas, Austin, and offers $80,000 in prize money, including a $50,000 grand prize for socially responsible business plans. Prize money is considered seed money to launch the projects. The 2007 grand prize winner was a plan for a searchable database of maps geared towards disabled people, including information on hill gradients, curb cuts, ramps, and wheelchair-friendly entrances and bathrooms. Other proposals included an educational opportunity database and learning centers for refugees, and a solar power system for the poor. The competition is run in three stages, with an online submission process leading directly to a semifinalist nomination and a finalist presentation session, where three groups are chosen to present their proposals to a selection committee of representatives from the private enterprise, nonprofit, and government sectors. February 1 is the deadline for the 2008 competition.

Ibrahim African Leadership Prize (2006)

In 2006, businessman Mo Ibrahim announced a $5 million annual award for a former African head of state who has ceded power after significantly contributing to the welfare of his or her constituents. The prize is intended to reduce corruption as well as promote effective development strategies. The first winner of the prize was former Mozambique president Joaquim Chissano. Only former African leaders are eligible for the prize. Chissano ruled Mozambique for 18 years.[101]

Mathematics

French Royal Academy Prize Questions (1721)

In 1721, the French Royal Academy of Sciences began offering regular scientific and mathematical "prize questions" and offering a Grand Prix medal

[100] http://www.utexas.edu/lbj/rgk/competition/index.php

[101] Craig Timberg, "Mozambique's Ex-President Wins $5 Million African Leadership Prize ," *Washington Post*, October 23, 2007; Page A10.

for the best solution. While initially no cash prizes were awarded, the medals were potentially career-making honors and stimulated considerable research on the selected questions. Prize-winners included Maclaurin for his work in kinetics and Coulomb for work on magnetic compasses.[102]

Wolfskehl Prize for Fermat's Last Theorem (1908)

At his death in 1906, Paul Wolfskehl left 100,000 German marks, a considerable fortune at the time, as a prize for the first valid proof of Fermat's Last Theorem.

Much has been written about Wolfskehl's motivation in leaving a large part of his fortune to endow the prize, including one theory that the theorem so intrigued him one night, he forgot to commit a suicide planed in response to a failed romance. Another theory is that Wolfskehl simply hated his shrewish wife so deeply he wished to deprive her of his fortune, and endowed the prize for the academic discipline that he had come to love.

The theorem is named after Pierre de Fermat, who, in 1637, wrote in the pages one of his mathematics texts, *Cuius rei demonstrationem mirabilem sane detexi. Hanc marginis exiguitas non caperet*, which is translated from Latin as, "I have a truly marvelous proof of this proposition which this margin is too narrow to contain." The theorem states that "it is impossible to separate any power higher than the second into two like powers," which can be expressed also as follows: If an integer n is greater than 2, then the equation $a^n + b^n = c^n$ has no solutions in non-zero integers a, b, and c.

The Wolfskehl Prize followed earlier prizes offered to solve what had become a famous problem for mathematicians. This included two 3,000 franc prizes offered by the the Académie des Sciences de Paris in 1816 and in 1850, and a prize offered by the Academy of Brussels in 1883.

When Wolfskehl bequeathed the 100,000 mark prize in his will, it was considered a staggering sum, and in 1908, solvers were given 100 years to claim the prize. It took nearly eighty years for the prize to be collected by Andrew Wiles, a British mathematician teaching at Princeton University, who won the prize in 1997 for his proofs of the theorem as published in 1993-1995.[103]

After the prize was first offered, Germany lost two world wars and suffered through hyperinflation. In 1958, the prize administrators announced that, due to inflation and financial changes, the Wolfskehl Prize had been reduced to 7,600 marks.[104] In 1997, Wiles reported having collected prize money equal to 30 thousand British pounds.

The Beal Conjecture and Prize (1997)

In December 1997, Andrew Beal, a Dallas, Texas banker and mathematics enthusiast established a prize for the solution of a conjecture in number theory that he formulated.[105] The Beal Conjecture asserts that if A^x +B^y = C^z, where A, B, C, x, y, and z are positive integers and x, y, and z are all greater than 2, then A, B, and C must have a common prime factor. The prize goes to anyone who can prove or disprove the conjecture. The prize was initially funded at $5,000, increasing by $5,000 per year until solved, with a cap of $50,000. The prize has since been raised to $100,000, and is administered by American Mathematical Society. The requirements for the award are that "the solution has been recognized by the mathematics community . . . that either a proof has been given and the result has appeared in a reputable refereed journal or a counterexample has been given and verified."

Millennium Grand Challenge in Mathematics (2000)

In 2000, the Clay Mathematics Institute of Cambridge announced the Millennium Grand Challenge in Mathematics[106], offering prizes of $1 million each for a proof or counterexample to any of seven classical conjectures in mathematics:

P versus NP

The Hodge conjecture

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[102] Boyle, A. "How Prizes Pushed Progress: Rewards provided incentive to inventors, adventurers," MSNBC, June 16, 2004. See: http://www.msnbc.msn.com/id/5191763/ (accessed Feb. 2, 2007).

[103] Barner, K. "Paul Wolfskehl and the Wolfskehl Prize." Notice of the AMS. 44:10, 1997, pages 1294-1303.

[104] Paulo Ribenboim, *13 Lectures on Fermat's Last Theorem*, Springer, 1979.

[105] R. Daniel Mauldin, "A Generalization of Fermat's Last Theorem: The Beal Conjecture and Prize Problem," *Notices of the AMS*, Vol 44, No 11, pages 1436-7.

[106] Jaffe, A. "The Millennium Grand Challenge in Mathematics," *Notices of the American Mathematical Society,* 53:6 652-660, 2006.

The Poincaré conjecture

The Riemann hypothesis

Yang-Mills existence and mass gap

Navier-Stokes existence and smoothness

The Birch and Swinnerton-Dyer conjecture

The prize announcement received considerable public attention. Grigori Perelman was confirmed to have solved one, the Poincaré conjecture, in 2006, but he declined the award.

Medical

Smallpox Vaccination Reward (1802)

After being told by a peasant woman "I can't catch smallpox, for I have had cowpox" in 1796, Dr. Edward Jenner performed a vaccination on an eight year-old boy, James Phipps, and followed with other experiments, leading to the first effective prevention of smallpox, and the discovery of vaccination. Jenner published his findings in 1798 under the title, *An Inquiry into the Causes and Effects of the Variolæ Vaccinæ, Or Cow-Pox*. Jenner did not patent the vaccine method. In 1802, House of Commons vote to give Jenner a reward of of 10,000 pounds and, later, an additional 20,000 pounds, for one of history's most important medical discoveries.

French Academy of Sciences Montyon Prizes (1820)

In 1820, the French Royal Academy of Sciences[107] began offering large monetary awards after a private donor established the Montyon Fund for prizes in medicine. The Montyon prizes were designated for solutions to pre-specified medical challenges, with reward amounts intended to be "proportional to the service" of the innovator. The Academy struggled with applicants' failure to disclose negative results, while some suggested that the Academy itself was corrupt as there was little transparency in awarding the prizes and un-awarded funds reverted to the Academy's coffers. Nonetheless, an unprecedented 283,000 francs in prizes were awarded between 1825 and 1842. In 1860, a young Louis Pasteur was awarded a Montyon prize for his work in physiology, and the winnings subsidized much of his subsequent groundbreaking research. In the mid-1800's, private contributions to the French Royal Academy lead to the establishment of dozens of additional monetary prizes. The French Royal Academy gradually transitioned from offering prizes to grants in the late 19th and early 20th centuries.[108] According to Marie Jaisson, more than 8,600 grants and prizes were issued from 1916 to 1996.[109]

Duke of Oldenburg Prize for the Best Treatise on Yellow Fever (1822)

This is typical of the thousands of such prizes offered by a plethora of donors and medical societies in the nineteenth century for research on medical issues. In 1822, the Duke of Oldenburg offered a prize of 200 Dutch ducats for the best treatise upon several questions respecting the nature and contagiousness of the yellow fever. The contest attracted eighteen submissions, six in German, four in French, seven in English, and one in Latin. The prize was won by Dr. Charles Christian Matthaei, the court physician to the King of Hanover.[110]

Prize for Best Memoir Regarding the Preservative Virtue of Vaccine (1842)

An example of the medical science prizes awarded by the French Academy of Sciences was this prize of ten thousand francs, to be awarded in 1842, for the best research findings that addressed specific questions regarding the durability of vaccination. Specifically, the Academy asked:

> "Is the preservative virtue of vaccine absolute or temporary? In the latter case, to determine, by precise observation and authentic facts, the period during which the vaccine preserves against variola.— Has the cow-pox a preservative virtue more certain and persistent than the vaccine employed in a greater or less number of successive vaccinations?—Supposing the

[107] Crosland, M. and Galvez, A. (1989). "The Emergence of Research Grants within the Prize System of the French Academy of Sciences, 1795-1914." 19 *Social Studies of Science* 71, 1989. Gauja, Pierre. "*L'Académie royale des sciences* (1666–1793)." *RHS* 2 (1949): 293–310. Ernest Maindron, *Les Fondations des prix à l'Académie des sciences*, Paris, 1881.

[108] Robin Hanson, "Patterns of Patronage: Why Grants Won Over Prizes in Science," July 28, 1998. http://hanson.gmu.edu/whygrant.pdf.

[109] Marie Jaisson, *Prix et Subventions de l'Académie des sciences, 1916-1996,* Turnhout, Editions Brepols, 2003, Vol. 2, page 1364.

[110] *The Edinburgh Medical and Surgical Journal*, Vol. 26, 1826, page 444.

> preservative quality of vaccine to be enfeebled by time, by what means may it be renovated?—Has the greater or less intensity of the local phenomena any relation with the preservative quality? —Is it necessary to vaccinate several times in the same person; and if so, in what years should the new vaccinations be performed?"

Premium for a Substitute for Quinine (1849)

This type of challenge was typical of those offered by the Society of Pharmacy, of Paris, concerning practical issues of manufacturing medicines. In 1849, the Society of Pharmacy offered a reward of 4,000 francs "to the chemist who will discover the means of preparing artificially the sulphate of quinine; that is: without employing in the preparation, either cinchona or any other organic matter contained in quinine already formed." The Society of Pharmacy sought practical ways of increasing the supply, or at least reducing the cost, of quinine. In the event that the solution was not found by the January 1851 deadline, the reward was given to "the author of the best work making known to as a new organic product, natural or artificial, having medicinal properties equal to those of quinine, and which can be placed commercially in competition with it." Contestants who "wish to reserve their processes, in order to preserve their ownership, should place apart, and under a sealed envelope, the descriptions they do not wish made public."[111]

The Jecker Prize (1851)

In 1851, the French Academy of Sciences established the Jecker Prize "to accelerate the progress of organic chemistry." Charles Friedel was among the winners of the Jecker Prize for his now famous Friedel-Crafts reaction.

The Breant Prize for Asiatic Cholera (1854)

In 1854, the French Academy of Sciences of received a 100,000 franc endowment for a prize to be awarded to a person who could cure Asiatic Cholera.[112] While the cure was being sought, the interest on the prize endowment was available for annual prizes to the researcher who did the most to combat the disease. The main Breant Prize was never awarded, but it did stimulate important and useful research on cholera and other infectious diseases.

The Armand Hammer Cancer Prize (1981)

In December 1981, Armand Hammer, the industrialist, announced a $1 million prize for the scientist who found a cure for some form of cancer in the following decade.[113] Hammer also offered a number of smaller prizes of $100,000 or less for pioneering research on cancer.[114] Hammer died of bone marrow cancer nine years later, in December 1990, at the age of 92.

Rockefeller Prize (1994)

In 1994, the Rockefeller Foundation offered a prize of $1 million[115] for developing a low-cost, highly accurate diagnostic test for gonorrhea or chlamydia that could be easily administered in the developing world. The prize expired in 1999 without a winner, and has been critiqued for being too small, too inflexible, and offered for too short a period of time.

InnoCentive (2001)

The now independent company InnoCentive[116] was founded by Eli Lilly in 2001 as a registry for scientific innovation prizes. Companies post specific scientific needs, a prize amount, and a deadline. The innovator providing the best solution is awarded the prize. In 2006, the Rockefeller Foundation began a collaboration with InnoCentive that expanded its work in the areas of development, climate change and public health. In September 2007,

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[111] All quotes from "Article. IV. -- Program of a Premium offered by the Society of Pharmacy, of Paris, Translated for this Journal from the Journal of Pharmacy, 1849," *The Western Journal of Medicine and Surgery*, Edited by Yandell and Bell, Third Series, Vol. V. Louisville, 1850, page 248.

[112] "The Prize for Curing the Cholera," *the New York Times*, April 14, 1854. Joseph Wallace, *Cholera: It's Cause and the Cure*, *Bellfast: James MaGill, Donegall Place,* 1866. Wei, M. (2007). "Should Prizes Replace Patents? A Critique of the Medical Innovation Prize Act of 2005." *Boston University Journal of Science and Technology Law* (working paper).

[113] John Nobel Wilford, Hammer Officers $1 Million Prize for Cancer Cure, New York Times, December 4, 1981.

[114] "Two Doctors Win $50,000 Each for Work on a Cancer Drug", AP Published in *the New York Times*, December 4, 1982 . "Three Scientists Share Research Prize," AP, Published in t*he New York Times*, October 27, 1987. "Four Scientists Awarded Cancer Research Prize," AP, Published in *the New York Times*, January 21, 1984.

[115] "The Prize." Feb. 20, 1994. *New York Times*, Health Section.

[116] InnoCentive. See: http://www.innocentive.com/ (accessed Feb. 2, 2007).

InnoCentive announced an expansion beyond their traditional domains of Life Sciences and Chemistry to include Business & Entrepreneurship; Engineering & Design; Physical Sciences and Mathematics & Computer Science. Also in 2007, InnoCentive announced a new collaboration supported by the Rockefeller Foundation to work with GlobalGiving, described as an "online marketplace for global philanthropy that enables individuals, corporations, and other organizations to find and direct their funds to high impact, grassroots projects around the world." The InnoCentive competitions generally range from $5,000 to $1,000,000, but many are below $50,000. The following are two examples of open competitions:

INNOCENTIVE 5636748

Safe and Economical Synthetic Route for PA-824, a candidate drug for tuberculosis

$20,000 USD, POSTED: Nov 29, 2007, DEADLINE: Feb 29, 2008

1. Detailed proposal of your proposed synthesis, supported by references where appropriate, including a synthetic scheme with anticipated reagents and reaction conditions and explanations of the synthetic methodology used.

2. Explanations as to why you believe that your proposed synthesis meets the Technical Requirements listed in the Detailed Description of the Challenge.

This Challenge solicits paper proposals that will be evaluated by the Seeker Scientists on a theoretical basis considering current state of the art knowledge.

INNOCENTIVE 5676808

Dry-based biolatrines

$20,000 USD, POSTED: Dec 06, 2007, DEADLINE: Feb 05, 2008

1. The detailed description of biolatrines that would be able to separate urine from solid waste and use no added water to operate. The description should provide outline of the biolatrines design and mode of operation and also to address specific Solution Requirements presented in the challenge description.

2. Rationale as to why the proposed design will possess the properties described in the detailed description of the challenge. The rationale should be supported by relevant literature and/or patent precedents.

The Seeker is not looking for just a review on the subject. The proposed design should offer the Seeker "freedom to practice", i.e. there should be no patents or patent applications preventing the use of the solution. The award is contingent upon the theoretical evaluation of the submitted proposals by the Seeker.

Methuselah Mouse Prize (2003)

The Mprize[117] is a $4.5 million prize designed to stimulate research into anti-aging and rejuvenation. Administered by the Methuselah Foundation, the prize was founded by Aubrey De Grey and David Gobel. The prize is divided into two categories: the Longevity Prize, for the single longest living mouse; and the rejuvenation prize, for best late-onset intervention. In the longevity category, prize money is allocated in proportion to the size of the fund and the number of days by which the previous record is broken. An award in the late-onset intervention category is contingent upon publication of a peer-reviewed study in which the treated and control groups consisted of at least 20 mice each, the intervention commenced in the second half of the mice's lives, and the study has to show a reversal in at least five markers use to gauge aging. The next winner of the prize will have to beat the mean death age of the longest-lived 10 percent of the previous group. The only requirement for eligibility is delivery of the "winning" mouse within a week of death. Prospective contestants are encouraged to register with the Foundation ahead of time, however, in order to generate credibility, and to advertise their work. The prize is administered by an advisory board of six scientific advisors, two sponsors, and four non-scientific advisors, including Peter Diamandis, CEO of the X-Prize Foundation.

Project Bioshield (2004)

In 2004, the U.S. enacted Project Bioshield (Public Law 108-276)[118], which includes a provision for automatic government payment to procure newly

[117] MPrize Homepage: http://www.methuselahmouse.org/

[118] Project BioShield Homepage: http://www.whitehouse.gov/infocus/bioshield/

developed "qualified countermeasures" against bioterrorism.

Medical Innovation Prize Act (2005)

In 2005, former Congressman Bernie Sanders introduced a bill, the Medical Innovation Prize Act of 2005 (HR 417, 109th Congress) that called for .5 percent of U.S. GDP annually to be paid to the developers of new pharmaceuticals in lieu of market exclusivity now granted by a patent. Technically, patents were not eliminated, and would have an important role in determining the ownership of the prizes. But new drugs would be open to generic competition as soon as they received FDA approval, with prize payments over a ten-year period serving as an alternative financial incentive for private innovation. The Act called for prize payments to be linked to the incremental medical benefit provided by a new product, meaning that the fund would be divided between the developers of new drugs on the basis of the relative medical utility of their products. The intent of the bill was "to provide incentives for the investment in research and development for new medicines" and to "enhance access to new medicines."[119] The bill did not pass in the 109th Congress, and was reintroduced in a modified form as S.2210 in the 110th Congress.

Archon X-Prize for Genomics (2006)

In 2006, the X-Prize foundation announced the Archon X-Prize for Genomics, offering $10 million for reaching targets for high speed and low cost in full genome sequencing.[120]

Prize4Life (2006)

In 2006, Harvard Business School graduate and ALS (Lou Gehrig's disease) sufferer Avichai Kremer established the non-profit Prize4Life[121] to offer prizes for developments related to the treatment of ALS. The organization is now offering a $1 million prize through November 2008 for finding a verifiable biomarker that could allow early diagnosis of ALS. Prize4Life's prizes are brokered through the prize network InnoCentive.

Hideyo Noguchi Africa Prize (2006)

The Hideyo Noguchi Africa Prize is a 100 million yen prize, awarded every five years. The prize has two categories, one for individuals active in the field of medical research, and one for an individual or organization involved in medical services. The research prize is for original research or milestones for concepts for better understanding of the pathology or the human and environmental ecology of infectious or other diseases prevalent in Africa, or the improved clinical management, ecological management, or patient therapy relevant to such diseases, in order to better control or treat such diseases. The medical services prize is for field-level medical and public health activity that has a broad and direct impact on the African public, particularly the poor.

Pneumococcal Vaccine Advance Market Commitment (2007)

In 2007, Canada, Italy, Norway, Russia, the United Kingdom, and the Bill & Melinda Gates Foundation announced a $1.5 billion "Advanced Market Commitment," or AMC, for pneumococcal vaccines. The AMC specifies requirements for new pneumococcal vaccines and pledges $1.5 billion to heavily subsidize the purchase of eligible vaccines for use in developing countries, in effect offering a prize for the development and delivery of effective vaccines. Backers suggest the AMC will speed delivery of vaccine to developing countries by 10 years and save the lives of 5.4 million children by 2030.[122]

Australian Democrats Prize Proposal (2007)

In 2007 the Australian Democrats Party issued an action plan for pharmaceuticals calling for an international "public-good patent scheme funded by rich and poor countries in proportion to their means." The scheme

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[119] For a discussion of the background to the bill, and its rationale, see James Love and Time Hubbard, "The Big Idea: Prizes to Stimulate R&D for New Medicines," *Chicago-Kent Law Review*, Volume 82, Number 3 (2007). For another view, see Wei, M., "Should Prizes Replace Patents? A Critique of the Medical Innovation Prize Act of 2005." *Boston University Journal of Science and Technology Law* (working paper). (2007)

[120] Archon X-Prize for Genomics Homepage: http://genomics.xprize.org/

[121] Prize4Life Homepage. See: http://prize4life.org/ (accessed June 27, 2007). Wessel, D. "Using M.B.A. Drive to Speed an ALS Cure." *Wall Street Journal Online*. June 22, 2006.

[122] "Five nations and the Bill & Melinda Gates Foundation launch Advance Market Commitment for Vaccines to Combat Deadly Disease in Poor Nations." Advance Marked Commitments for Vaccines. See: http://www.vaccineamc.org/launch_event_01.html (accessed Feb. 12, 2007).

"would give pharmaceutical innovators the option of taking out a public-good patent which would give them no veto powers over others' use of the invention, but would instead reward them, out of public funds contributed by cooperating governments, in proportion to the health impact of their invention."[123]

Gotham Prize for Cancer Research & Ira Sohn Conference Foundation Prize in Pediatric Oncology (2007)

In May 2007, a group of scientists and hedge fund managers announced the Gotham Prize and the Ira Sohn Prize to provide annual awards of $1 million and $250,000 respectively for innovative ideas leading to progression in the prevention, diagnosis, etiology and treatment of cancer, and pediatric oncology research.[124] The Gotham Prize webpage will serve as an anonymous public forum for registered oncology researchers to present and discuss research proposals. The prizes will go each year to the scientist who posts the best ideas in general and pediatric oncology, as determined by an advisory board of prominent scientists. The prize and web page are modeled on the Value Investors Club, an online club for investors to share ideas that was founded by the partners of Gotham Capital.

John Edwards Medical Prize Proposal (2007)

In June 2007, former Senator and presidential candidate John Edwards called for "an expert panel to identify whether there are discoveries where prizes -- not patent monopolies -- would offer new incentives to researchers, guaranteed gains to companies, and lower costs to patients."[125] Edwards' campaign explained that "Drug companies would know that if they generated a life-saving breakthrough, they would be guaranteed a significant payment in exchange for allowing competition in manufacturing and distribution. With prizes, the government will pay more up front, but it will save taxpayers in the end because companies will generate breakthrough drugs more quickly and provide it to patients at a lower cost."

Medical Innovation Prize Act (2007)

This legislative proposal (S.2210, 110th Congress) would eliminate patent-enforced market exclusivity for new drugs, instead giving developers large cash rewards from a "Medical Innovation Prize Fund,"[126] when products improved health outcomes. The bill sets the *annual* funding at .6 percent of GDP -- about $80 billion at the 2007 GDP levels. Under the proposal, the patent system would still be used, but the patent owners would no longer be given monopoly rights to control the manufacturing and sale of products. Instead, patents would be used to establish who "owns" the right to the cash rewards given for new inventions. Drugs developed without patents would also be eligible for the prizes. The administrators of the fund would use common pharmacoeconomic metrics to estimate the benefits of various products and allocate prize money accordingly. The legislation also contains provisions to ensure that firms are rewarded for "follow-on" innovation, while those products that are "first" continue to share in prize payments, even when displaced in the market by new versions that are slightly better. The 2007 bill also sets aside 18 percent of the prize fund rewards for three special health areas: 4 percent (initially $3.2 billion) for global neglected diseases; 10 percent (initially $8 billion) for orphan drugs; and 4 percent (initially $3.2 billion) for global infectious diseases and other global public health priorities, including research on AIDS, AIDS vaccines, and medicines for responding to bioterrorism.

Piramal Prize for Innovations that Democratize Healthcare (2007)

In 2007, the 10 lakh rupee ($25,000) Piramal Prize was established by the

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[123] Australian Democrats Action Plan on Pharmaceuticals Health and Aging. 2007.

[124] Gotham Prize for Cancer Research. Gotham Prize Foundation. See: http://www.gothamprize.org

[125] "Reforming Health Care to Make it Affordable, Accountable, and Universal." John Edwards '08 Presidential Campaign Factsheet. See: http://johnedwards.com/news/headlines/20070614-health-care-costs-quality.pdf (accessed July 5, 2007).

[126] S. 2210. Medical Innovation Prize Act of 2007. 110th Congress. For a discussion of the background to the bill, and it's rationale, see, James Love and Time Hubbard, "The Big Idea: Prizes to Stimulate R&D for New Medicines," *Chicago-Kent Law Review*, Volume 82, Number 3 (2007), and James Love, "Would cash prizes promote cheap drugs?" *The New Scientist*. November 12, 2007. For another view, see Wei, M., "Should Prizes Replace Patents? A Critique of the Medical Innovation Prize Act of 2005." *Boston University Journal of Science and Technology Law* (working paper), 2007.

Ajay G. Piramal Foundation "to encourage and support bold entrepreneurial ideas which have a profound impact on access to higher standards of health for India's rural and marginalized urban communities." According to the Foundation, the "award recognizes high-impact, scalable business models that propose innovative solutions which directly or indirectly address India's health care crisis [including but not limited to] innovations in service delivery, technology applications, health-related products, or mechanisms to address public health necessities such as potable water."

Contestants for the prize must first submit a proposal that outlines the Indian health problem being addressed, the nature of the innovation(s), and the design of an "enterprise" solution that does not depend upon donations or grants to solve the problem. After the proposals are vetted, semi-finalists submit detailed business plans and financial projections, and five finalists are invited to a Piramal Prize weekend at IIM-Ahmedabad in June 2008.

Selected Prizes for Tuberculosis Research, Treatment, Prevention and Care

The following are examples of prizes that have been offered to stimulate or recognize research, treatment, prevention and care of tuberculosis.

French Academy of Medicine Prizes for 1887

In 1887, the Portal Prize of 600 francs was for an essay "On Primary Renal Tuberculosis."

Congress for the Study of Tuberculosis prize (1892)

In 1892, the Congress for the Study of Tuberculosis announced a prize of 3,000 francs for the best essay on "The Means of Diagnosticating Latent Tuberculosis before its Appearance or after its Cure."[127] 1898 Medals were awarded by the Congress of Tuberculosis to Drs. Koch, of Berlin; Brouardel, of Paris; Bang, of Copenhagen; Biggs, of New York; Liroadbent, of London; and von Sehroetter, of Vienna.

The Colorado State Medical Society Prize Essay on Tuberculosis (1894)

Illustrative of the widespread interest in prizes and concern about tuberculosis, the Colorado State Medical Society offered a prize of $100 for the best essay upon "The Diagnosis of Tuberculosis by Microscopic Examination of the Blood."[128]

The Weber-Parkes Trust Prize (1895)

In what would become an enduring legacy, Dr. Hermann Weber, the personal physician to Queen Victoria, endowed a 3,000 British pound fund for a triennial prize to the author of the best essay on tuberculosis.[129] Dr. Weber used the prize to also honor the memory of Dr. Alexander Parkes. The first Weber-Parkes Prize was awarded in 1897, with the Royal College of Physicians acting as prize adjudicators by proposing a subject and setting out regulations, including the adoption of a motto and a detailed exposition of methodology.[130] The Weber-Parkes prize is still administrated by the Royal College of Physicians, though it is now awarded for "best work already done…in the U.K. or abroad" and is considered a top prize in the field. The most recent prize was awarded in 2005 to a British physician conducting part of his research in Peru.

Francois Joseph Audiffred Prize for a Tuberculosis Remedy (1896)

The Académie de Médecine of Paris offered the Francois Joseph Audiffred prize of 24,000 francs for a curative or preventive remedy against tuberculosis. The offer was open for twenty-five years starting from April 2nd, 1896.[131]

Alvarenga Prize of the College of Physicians of Philadelphia (1898)

The College of Physicians of Philadelphia awarded the Alvarenga Prize for 1898 to Dr. S. A. Knopf, of New York City, for his essay entitled: "Modern Prophylaxis of Pulmonary Tuberculosis and its Treatment in Special Institutions and at Home."[132]

International Tuberculosis Congress prize (1899)

Two Berlin merchants, as lay members of the "International Congress for the Study of the Best Way to Combat Tuberculosis as a Disease of the Masses", donated a total of 4,000 German marks to be used as a prize for the best essay

[127] "Prize for Essay on Tuberculosis." *The Annals of Hygiene. Pennsylvania State Board of Health*, University of Pennsylvania Press, Vol. 7 (1892).

[128] *The Medical Record*, Vol. 46, 1894.

[129] http://www.ic.ac.uk/P6976.htm

[130] Ransome, Arthur. "Researches on Tuberculosis: The WeberParkes Prize Essay." Smith, Elder (1898).

[131] *The Lancet*, Vol 1, for 1898, page 81

[132] *New England Medical Monthly*, Volume XVHI, No. 1. January, 1899. Whole No. 205, page 32.

on the subject "Tuberculosis as a Disease of the Masses and How to Combat It." The prize was announced at the International Tuberculosis Congress, held in Berlin in May of 1899. The regulations set forth by the Congress included restrictions on length, a requirement that authors submit a motto with their entry, and allowed for a division of prize money between two papers in equal measure or with one to receive 3,000 marks and the other to receive 1,000. Twelve judges announced their decision through the public press. The winning essay or essays became property of the German Central Committee for the Erection of Sanatoria, which was to take upon itself the printing and distribution, and eventually published the essay in English, French, Dutch, Italian, German and Russian and offered the books in bulk at reduced prices.[133] Of the eighty-one papers submitted, twenty-six were selected for a second stage of reading, three moved on to a third stage, and a subcommittee of judges was selected to make the final decision. The winning paper, "To combat consumption successfully requires the combined action of a wise government, well-trained physicians, and an intelligent people", was written by Dr. S. A. Knopf, of New York.

King Edward VII Tuberculosis Sanatorium Design Prize (1903)

When King Edward VII was given $1,000,000 to be used for a charitable, utilitarian purpose, the King decided to devote a large portion of the prize money to erecting a new tuberculosis sanatorium. To collect the latest opinions on the sanatorium's design, the King offered three prizes of $2,500, $1,000, and $500 for the best essays on the subject of sanatorium design. An advisory board of prominent English physicians was assembled to judge entries, though the competition was open to entries from all countries, resulting in over 180 submissions. The names and designs of the winning entries were published in t*he Lancet* one year after the donation announcement, and the winning design, with suggestions from other essayists incorporated, was to be erected shortly thereafter.[134]

[133] Frankel, B. Foreword to the German edition of *Tuberculosis as a Disease of the Masses and How to Combat It,* by Sigard Adolphus Knopf. The German edition was published by the German Central Committee for the Combat of Tuberculosis, Berlin (1900).

[134] "KING EDWARD'S SANATORIUM; Plans Submitted by Writer of Prize Essay on the Treatment of Tuberculosis Likely to be Adopted With Slight Modification OpenAir Method Favored." *The New York Times,* January 18, 1903.

Nobel Prize in Physiology or Medicine (1905)

In 1905, Dr. Robert Koch, a German physician and scientist, was presented with the Nobel Prize in Physiology or Medicine in 1905 "for his investigations and discoveries in relation to tuberculosis." The prize honored a lifetime of work.

Hodgkins Fund Prize (1908)

This prize fund, offered by the Smithsonian Institution, was established in connection with the Sixth International Congress on Tuberculosis, to fulfill the wishes of a donor, Thomas George Hodgkins, who requested that part of his donation be used to fund "the increase and diffusion of more exact knowledge in regard to the nature and properties of atmospheric air in connection with the welfare of man." Prior to the Congress, which was held in Washington, DC, Secretary of the Smithsonian Charles D. Walcott announced a $1,500 prize for the best treatise "On the Relation of Atmospheric Air to Tuberculosis", which was broadened to include any memoir on the spread, prevention, or cure of tuberculosis. Papers were accepted in English, French, German, Spanish, or Italian, and were judged by a committee appointed by the Secretary, in conjunction with the officers of the Congress on Tuberculosis. The Smithsonian Institution reserved the right to publish the winning paper, and to withhold the award if no contribution was considered to be of sufficient merit.[135]

The Sixth International Congress on Tuberculosis (1908)

The Central Committee of the International Congress on Tuberculosis, held in Washington, DC in 1908, announced eleven prizes related to tuberculosis.[136]

1. "A prize of $1,000 for the best evidence of effective work in the prevention or relief of tuberculosis by any voluntary association since the last International Congress in 1905." This prize applied to organizations working in Tuberculosis education, lobbying, fundraising, etc. "Evidence" included printed matter, reports indicating an increase in membership, lectures and meetings given, "influence in stimulating local Boards of Health, schools, dispensaries, hospitals", influence with schools, churches, and labor

[135] *Transactions of the Sixth International Congress on Tuberculosis,* Fell, Vol. 7 (1908).

[136] "International Congress on Tuberculosis Washington D.C." The Australian Medical Gazette, May 20, 1908, pp. 25455. "Spread Knowledge of White Plague," New York Times, March 15, 1998.

unions, newspaper clippings, etc.

2. $1,000 for the best exhibit of an existing sanatorium for the treatment of curable cases of tuberculosis among the working classes. Entrants were judged on a brief report and details of the site's construction, equipment, management, and results.

3. The best example of a furnished house, "designed in the interest of the crusade against tuberculosis", for a working-class family or group of families was eligible for $1,000. The prize was "designed to stimulate efforts towards securing a maximum of sun-light, ventilation, proper heating, and general sanitary arrangement for an inexpensive home." Competitors were judged on the basis of drawings, specifications, and estimates.

4. A $1,000 prize was announced for the best example of a dispensary for the treatment of tuberculosis in the poor. In addition to a brief report, entrants were required to submit details of construction, management, equipment, and results.

5. $1,000 was set aside to reward the best example of a hospital for the treatment of advanced pulmonary tuberculosis, again judged by details of construction, management, equipment, and results.

6. The Hodgkins Fund Prize: (see above).

7. Seven prizes of $100 each were reserved for the best examples of educational leaflets in seven different categories: for adults generally, for teachers, for mothers, for indoor workers, dairy farmers, grammar school children, and pictoral booklets for primary and nursery school children.

8. One gold medal and two silver medals were put on offer to any state government in the U.S. exhibiting "effective organization for the restriction of tuberculosis".

9. Another set of medals, one gold and two silvers, were to be awarded to any non-U.S. state or country exhibiting the same.

10. Eight sets of medals, again one gold and two silvers, were minted to reward: the best contribution to the pathological exhibit; the best example of laws and ordinances for the prevention of tuberculosis by and U.S. state; the best example of laws and ordinances for the prevention of tuberculosis by a state or country outside of the U.S.; the best example of laws and ordinances for the same enacted by any municipality in the world; the society engaged in the crusade against tuberculosis with the largest membership in relation to population; the best fundraising plan; the best example of a passenger railway car to aid the crusade against tuberculosis; and "the best plans for employment for arrested cases of tuberculosis."

11. Two gold medals and three silver medals were designated as rewards for the best example of a workshop or factory designed to support the crusade against tuberculosis.

The Kochon Prize (2006)

The Stop TB Partnership Kochon Prize is awarded to a person or persons, institution or institutions, or organization or organizations, who have made a great achievement in combating tuberculosis, contributing to the formulation and implementation of a system or policy for anti-tuberculosis programs or who have made a contribution to education and training for the prevention of tuberculosis. The prize was created to honor Chong-Kun Lee, who established the Chong Kun Dang Pharmaceutical Corp. in Korea, a manufacturer of tuberculosis drugs, and who created the non-profit Kochon Foundation in 1973. The Kochon Foundation supports the budget related to this prize.

Prize for Journalism to Combat Tuberculosis (2007)

In 2007, at the World Conference of the International Union Against Tuberculosis and Lung Disease, the Stop TB and Lilly MDR partnerships announced a $3,000 prize for journalism to combat Tuberculosis. The award will recognize reporting and commentary, both in traditional news media and the new Internet platforms, that increases public knowledge of tuberculosis and resistant strains of the disease in developing countries. Entrants must be resident in the country where the article is published and write in English or Hindi with an English translation.

InnoCentive Tuberculosis Prize for PA-824 (2007)

InnoCentive is hosting a prize contest (INNOCENTIVE 5636748) for a "Safe and Economical Synthetic Route for PA-824, a candidate drug for tuberculosis." The challenge was posted on November 29, 2007, with a deadline of February 29, 2008. Funded by the Rockefeller Foundation, the amount of the prize is $20,000. The prize calls for "theoretical proposals for a safe and economical synthetic route [that is] more economical than the publicly disclosed routes." The development of PA-824 is being directed by

the Global Alliance for TB Drug Development, which is seeking to accelerate the discovery and development of new TB drugs that will shorten treatment, be effective against susceptible and resistant strains, be compatible with antiretroviral therapies used for HIV/AIDS, and improve treatment of latent infection.

The Intellectual Property provisions in this challenge include the following terms:

> Upon Acceptance of your Proposal by a Seeker and payment of an Award to you (see Section 5, "Payments"), you hereby assign and convey to InnoCentive all rights, title, and interests in and to the Proposal and any Work Product that are related to the InnoCentive Challenge, and you retain no rights to the Proposal or the Work Product insofar as they are related to the InnoCentive Challenge. In the event that the Work Product cannot be assigned and conveyed under statutory law, you herewith grant to InnoCentive a worldwide, unlimited, perpetual, irrevocable, and exclusive license to use, make, have made, market, copy, modify, lease, sell, distribute, and create derivative works of the Work Product, including the right to assign the foregoing license to Seekers. If you utilize any processes in development of the Work Product which are the subject of patent rights owned by you, you agree to grant to InnoCentive a worldwide, non-exclusive, perpetual, royalty-free right and license to practice any patented processes used in the Work Product, including the right to assign the foregoing license to Seekers. Furthermore, you agree that you will, during the term of this Agreement and at any time thereafter, execute all papers and do all things deemed necessary by InnoCentive or a Seeker to ensure that InnoCentive and the Seeker acquires all rights, title, and interests in and to the Solution and any Work Product that are related to the InnoCentive Challenge, including the rights to all Intellectual Property embodied therein, and that ensures that all such rights are transferred to Seeker.

Mining

Goldcorp Challenge (2000)

In 2000, the gold mining company Goldcorp introduced the Goldcorp Challenge: the company released all of its geological data on an underperforming Canadian mine, and offered $575,000 in prizes, including a grand prize of $105,000 for the most accurate predictions no where to dig to find the most gold. Over 1,400 people participated from 50 countries, with 80 percent of 110 identified digging sites yielding significant quantities of gold. A partnership of two Australian companies using computer fractal technology won the grand prize in 2001.[137]

Unlock the Value (2007)

Barrick Gold Corporation, a Canadian mining concern, announced a $10 million prize[138] for anyone able to increase the silver yield for their Veladero mine in Argentina. Under the terms of the program, Barrick will review proposals for an economically viable way to recover silver from silica-encapsulated ore and, for proposals judged to have merit, Barrick will fund the research, pay a consulting fee, provide resources and expertise, and help develop and test the proposal. The $10 million prize is for any idea which is successfully implemented, and is treated as a performance bonus. The application process consists of four phases: a preliminary round of submission and proposal selection; a full proposal and test-definition phase; a collaborative development and proof-of-concept testing phase; and a commercial evaluation. Upon reaching phase three, Barrick will make a $25,000 payment to each team, at which point teams will be required to sign a Development Services Agreement to define the scope of testing and development activities to be funded by Barrick, the technical advisory/consulting role of the participating team, and the management of intellectual property rights. This phase may span several years and evaluate the technology at several different scales. Projects successfully implemented at Veladero will receive the $10 million payment.

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[137] Tapscott, D. and Williams, A. "Innovation in the Age of Mass Collaboration," Feb. 1, 2007. *BusinessWeek.com*. See: http://www.businessweek.com/innovate/content/feb2007/id20070201_774736.htm (accessed Feb. 2, 2007).

[138] Unlock the Value. See: www.unlockthevalue.com

Nanotechnology and Robotics

Feynman Prizes (1959)

In 1959, physicist Richard Feynman offered prizes of $1,000 for the development of the first motor less than 1/64th of an inch on every side, and for the first written text at 1/25,000th scale. William McLellan and Thomas Newman won the prizes in 1960 and 1985, respectively.[139]

Foresight Institute Feynman Prizes (1996)

In 1996, the Foresight Institute announced the $250,000 Feynman Grand Prize to be awarded for two specified breakthroughs in nanotechnology.[140] The Grand Prize has not yet been won, but in the meantime the Feynman Institute awards $20,000 annually for the most significant advancements in nanotechnology.

DARPA Grand Challenges (2003)

In 2003, the Defense Advanced Research Projects Agency announced the first DARPA Grand Challenge[141]: $1 million for the first robotic vehicle to complete a course from California to Nevada in under 10 hours. Multiple teams competed for the prize in 2004, but none completed the course. A second Grand Challenge was held in 2005, with the Stanford Racing Team winning the $2 million prize. Eighty-nine teams have applied to participate in the third Grand Challenge, scheduled for November 2007 on a 60 mile simulated urban course, with a total of $3.5 million in prizes to be awarded.

[139] McCarthy, V. "Nanotechnology Starts with a Dare: Feynman's Big 'Little Challenges'". Available at: http://www.nanoscienceworks.org/publications/just-in-print/nanotechnology-starts-with-a-dare-feynman2019s-big-little-challenges

[140] Davis, L. and Davis, J. (2004). "How Effective Are Prizes as Incentives to Innovation? Evidence from Three 20th Century Contests." Paper for the Druid Summer Conference on Industrial Dynamics, Innovation and Development. Elsinore, Denmark.

[141] "DARPA Grand Challenge." DARPA. See: http://www.darpa.mil/grandchallenge/index.asp (accessed Feb. 2, 2007).

Sea and Inland Navigation

Spanish Longitude Prize (1567)

In 1567, Philip II of Spain offered a prize for the discovery of a method of find longitude at sea. In 1598, King Philip III of Spain increased the prize. Reports vary on the amounts offered by the prizes. By one account, the prize was 6000 gold ducats plus a pension of 2000 ducats a year for life.[142]

The Dutch Longitude Prize (1627)

In 1627, a prize was promised by the States General of the United Provinces of the Netherlands to anyone who could find a correct method of determining longitude. Reports vary on the amounts offered by the prize.

British Longitude Prize (1714)

In 1714, the British government offered the Longitude Prize[143] for a method of accurately determining a ship's longitude. Prizes of 10, 15, and 20 thousand British pounds were offered for solutions of varying degrees of accuracy. John Harrison was awarded the top prize in 1773, and his system revolutionized navigation and maritime trade. Commentators have noted that the methods for verifying a winner of the Longitude Prize were poorly specified, resulting in arguably unreasonable demands of proof that postponed Harrison's eventual payment by years. On the other hand, by leaving open eligible methods for solving the problem, the prize succeeded in promoting a surprising solution. Harrison's method utilized a chronometer, when most expected the winning method to involve improved star charts.

Meslay Prize (1714)

In 1714, the French parliamentarian Rouillé de Meslay bequeathed a fund of 125,000 livres for two prizes to be administered by the French Academie des Sciences. One of the prizes was to determine longitude at sea and discoveries useful to navigation and long-distance voyages. According to one account, "the Académie made the first navigation award-a substantial 2,000 livres-in 1720, and it continued to pose research questions and award the Meslay prize

[142] James Roy Newman, *The World of Mathematics*, Courier DoverPublications, 2000. Other versions range from 1,000 to 300,000 crowns.

[143] Sobel, D. (1995). *Longitude: the True Story of a Lone Genius who Solved the Greatest Scientific Problem of his Time.* New York: Walker.

into the 1780s."[144] 2,000 livres was roughly equivalent to four years of wages for a skilled worker.

The Magellanic Premium (1786)

In 1786, with a grant of 200 guineas, John Hyacinth de Magellan of London, the grandson of Ferdinand Magellan, endowed the Magellanic Premium (also known as the Magellanic prize) for major contributions in the field of navigation (whether by sea, air, or in space), astronomy, or natural philosophy. Benjamin Franklin accepted the grant on behalf of the American Philosophical Society, which created the terms of reference and administers the prize. The Magellanic Premium is the oldest U.S. medal for scientific achievement. The prize has been awarded 32 times, including 12 times for navigation.[145]

Army Corps of Engineers Navigable River Prize (1829)

Following an 1826 Act of Congress calling for the Mississippi and Ohio Rivers to be made more navigable, the U.S. Army Corps of Engineers offered $1,000 and a lucrative contract to open up the Ohio River to the developer of a machine capable of removing obstacles to navigation.[146] The winner, John Bruce, could not come to agreement with the Corps over the terms of a contract, which was instead awarded to Henry Shreve for his development of a steam-powered snag boat. The Shreve boats earned the nickname "Uncle Sam's tooth-pullers" and greatly expanded steamboat traffic on the Ohio and Mississippi rivers.

Software, Computers and Information Technology

Knuth Reward Checks

Donald E. Knuth, Professor Emeritus of the Art of Computer Programming at Stanford University, is the author of many well-known texts on computer programing. In the preface of many books, and on his own web page, he offers rewards of $2.56 to the first person to report errors (technical, typographical or historical) in his published books. Knuth maintains a lists of those reported errors and amendments, which readers may download from his web page. The 256 cents represent "one hexadecimal dollar." He also offers 32 cents for valuable suggestions. Knuth offers a different reward for finding coding errors in his software programs. Inspired by the famous Wheat and Chessboard reward (a reward calculated by doubling the grains of wheat on each square of a chessboard), the rewards start at $2.56, but are doubled annually until reaching a value of $327.68. Knuth is not necessarily prompt in making payments, and sometimes the delay takes several years, but late payments also include an additional 5 percent compound interest. Knuth reported having written more than 2,000 checks, with an average value of more than $8 per check.[147] Most of the checks are not cashed, but are kept by the recipients, and sometimes framed.

Fredkin Prize (1980)

In 1980, computer scientist Edward Fredkin offered a $100,000 prize for the first computer chess program to beat a reigning world chess champion. IBM's Deep Blue Chess team won the prize in 1996 when their machine defeated Gary Kasparov.[148]

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[144] James E. McClellan, III; François Regourd, "The Colonial Machine: French Science and Colonization in the Ancien Régime," *Osiris*, 2nd Series, Vol. 15, Nature and Empire: Science and the Colonial Enterprise. (2000), pages. 37-38. Ernest Maindron. *Les Fondations de prix à l´Académie des Sciences, Les Lauréats de l´Académie, 1714-1880* (Paris:Gauthier-Villars, 1881).

[145] "The Magellan Premium," *New York Times*, May 9, 1888. http://www.amphilsoc.org/prizes/

[146] "U.S. Army Corps of Engineers: Brief History." See: http://www.hq.usace.army.mil/history/brief.htm (accessed June 18, 2007).

[147] "Altogether I've written more than 2,000 checks over the years, and the average amount exceeds $8.00 per check. Even if everybody cashed their checks, it would still be more than worth it to me to know that my books are getting better." Donald Knuth, "All Questions Answered," *Notices of the AMS*, Vol 49, No 3, page 324. March 2002. http://www.ams.org/notices/200203/fea-knuth.pdf

[148] Wade, N. "The Editorial Notebook; The Science of Prize-Giving." *New York Times.* February 27, 1984.

The Loebner Prize for Artificial Intelligence (1990)

The Loebner Prize for artificial intelligence is for a computer program that offers human-like responses to conversations.[149] The prize was funded by Hugh Gene Loebner, an eclectic, if not eccentric, supporter of many different causes, including the legalization of prostitution.[150] According to the sponsors, the Loebner Prize "is the first formal instantiation of a Turing Test." Alan Turing, a British mathematician considered the question, "Can a Machine Think?" and suggested that if responses from a computer were indistinguishable from that of a human, it could be said to be thinking. The competition involves human judges who interact with computer screens, some controlled by humans, and others by non-human "chatterbots." In a series of annual competitions, the judges seek to determine which chatterbot is the most human-like, and award the annual prize that recently has ranged from $2,000 to $3,000, to the best entry in a given year, regardless of how strong the field is. There is a once-only $25,000 prize for the first chatterbot that the judges cannot distinguish from a human, based upon analysis of the text responses. Finally, there is a Grand Prize of $100,000 for the first chatterbot that judges cannot distinguish from a real human, in a conservation that considers text, visual, and auditory inputs. The Grand Prize is only awarded once. The Loebner Prize dissolves once the $100,000 prize is won.

FCC Pioneer Preferences (1991)

In 1991, the U.S. Federal Communications Commission (FCC) established the Pioneer Preference Program, offering a reward of preferential licensing (worth many millions of dollars) for the development of new spectrum-using communications services and technologies. Five companies received the reward before the program ended in 1997, and a sixth, Qualcomm, was granted the award for its development of digital wireless technology after a legal appeal.[151]

RSA Factoring Challenge (1991)

On March 18, 1991, RSA Laboratories announced the RSA Factoring Challenge. Now owned by EMC, RSA Laboratories was founded by the inventors of the RSA public-key cryptosystem, and sells a number of services and products in the field of cryptography. In 1991, the company published a list of "semi prime" numbers (numbers with exactly two prime factors), known as the RSA numbers, and offered a cash prize to the first person to factorize each number. The prizes ranged from $100 to $200,000, depending upon the difficulty of the problem. The challenge was used as an incentive for researchers to both attack the encryption solutions they used in the RSA products, and to demonstrate the strength of the encryption. As noted by Scotchmer, "This is a case where the sponsor is better off if it does not get what it is looking for."[152] According to the original announcement of the prize:

> Finding all the prime factors of a given number is known as "factoring" the number. As the length of the number increases, the problem of factoring it rapidly becomes more and more difficult. Although factoring 100-digit numbers is within the current state of the art, factoring arbitrary 200-digit numbers is not. Over time, advances in computer hardware and computational number theory are expected to advance the state of the art. One purpose of this contest is to "track" the state of the art. The RSA List contain numbers of the kind we believe to be the hardest to factor; the numbers on this list should be particularly challenging. These are the kind of numbers used in devising secure RSA cryptosystems.

In 2007, RSA canceled the contest, announcing that "now that the industry has a considerably more advanced understanding of the cryptanalytic strength of common symmetric-key and public-key algorithms, these challenges are no longer active."

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[149] Loebner Prize Homepage: http://www.loebner.net/Prizef/loebner-prize.html

[150] See, for example, John Sundman, "Artificial stupidity: The saga of Hugh Loebner and his search for an intelligent bot has almost everything: Sex, lawsuits and feuding computer scientists. There's only one thing missing: Smart machines," *Salon*, 26 February 2003, http://archive.salon.com/tech/feature/2003/02/26/loebner_part_one/index.html. See also Loebner's March 7, 2003 response to the *Salon* article: http://archive.salon.com/tech/letters/2003/03/07/loebner/.

[151] Fusco, P. "FCC Grants QUALCOMM Pioneer Preference," Internetnews.com, June 12, 2000. See: http://www.internetnews.com/xSP/article.php/392251 (accessed Feb. 2, 2007).

[152] Suzanne Scotchmer, *Innovation and Incentives*, MIT Press, 2004, page 45.

The RSA Laboratories Secret-Key Challenge (1997)

The RSA Secret-Key Challenge was a series of cryptographic contests started by RSA Laboratories on January 28, 1997 in order to demonstrate the relative security of different encryption algorithms, and to discredit a government backed data encryption standard (DES). For each contest, RSA posted on its website a block of ciphertext and the random initialization vector used for encryption. To win, a contestant would have had to break the code by finding the original plain text and the cryptographic key that generated the posted ciphertext from the plain text. RSA offered one contest using the government-endorsed standard for DES, and twelve contests using the block cipher RC5, an algorithm designed by Ronald Rivest in 1994, and patented by RSA.[153] According to RSA:

> The goal of RSA Laboratories' secret-key challenges was to quantify the security offered by the government-endorsed data encryption standard (DES) and other secret-key ciphers with keys of various sizes. The information obtained from these contests was of value to researchers and developers alike as they estimated the strength of algorithm or applications against exhaustive key-search. It is widely agreed that 56-bit keys, such as those offered by the government's DES standard, offer marginal protection against a committed adversary. In 1999, the Electronic Frontier Foundation's "Deep Crack" machine, in combination with distributed.net, successfully solved RSA's DES Challenge III in 22 hours and 15 minutes.

Cooperative Computing Awards (1999)

In 1999, the Electronic Frontier Foundation announced its Cooperative Computing Awards[154], offering a total of $550,000 in prizes for the discovery of very large prime numbers. The intent of the Awards is to encourage computer networking for the solution of complex computational problems. Nayan Hajratwala won $50,000 in 2000 for discovering a prime number with over 1 million digits with the help of tens of thousands of networked computer users. Prizes for 10 million digits, 100 million digits, and 1 billion digits have not yet been awarded.

[153] United States Patent 5,724,428, Block encryption algorithm with data-dependent rotations.

[154] Electronic Frontier Foundation, "Cooperative Computing Awards." See: http://www.eff.org/awards/coop.php (accessed Feb. 2, 2007).

Windows-on-a-Mac Prize (2006)

In 2006, Colin Nederkoorn, a 23 year-old shipping broker, offered a prize to the first person able to offer a "reliable and duplicatable way" to boot Windows XP on a Mac with an Intel processor. The prize was announced on a website of his own creation, with $100 of his own money offered as seed money. Promising that all those who donated to the prize fund would receive the winning solution, to be returned if no solution was presented by the deadline, Nederkoorn was able to raise $13,840, which was claimed in March 2006. Three weeks later, because of the enthusiasm generated by the contest, Apple released a beta version of BootCamp, to allow the installation of Windows XP onto Macs.[155]

Netflix Prize (2006)

In 2006, Netflix offered a prize of $1 million for a system to more accurately predict consumer preferences, specifically seeking a 10 percent improvement over Netflix's current accuracy in predicting whether a customer will like a movie given previous selections.[156]

Neuros OSD Bounties (2006)

Neuros OSD[157] is a Linux-based media player and archiving system used to view and record video media. Neuros is offering a series of bounties, or prizes, for new applications for use on the OSD—essentially a rewards system for successful hacks. There are currently seven bounties on offer, with cash prizes ranging from $500 to $1,000: for a YouTube or Google Video browser; for a remote control-based browser for Flickr; for a digital music receiver which uses a WiFi PDA or PSP as a remote; for a TiVo-like system for satellite radio; a VoIP (voice over internet protocol) to allow users to make phone calls over the internet using a USB phone plugged into the OSD unit; for cleaning up the build environment before Neuros' internal team; and to develop a package manager to allow the OSD to download applications without having to reflash its memory.

[155] Maya Roney. "Mac, Meet Windows," *Forbes.com,* March 17, 2006. See also: Juri Saar. "Prizes: The Neglected Innovation Incentive." The European Inter-University Association on Society, Science and Technology, 2006.

[156] Leonhardt, D. "You Want Innovation? Offer a Prize," *New York Times,* Jan. 31, 2007.

[157] http://www.neurostechnology.com/

Neuros' stipulations for receiving prize money vary between competitions, but are generally as open-ended as "must work" or "has to be useable."[158] In the case of the digital music receiver, entries must not require a stylus, though if there are no submissions meeting that criteria, they will consider solutions using a stylus. In the case of the build environment clean-up, Neuros asks entrants to contact the judges. The Neuros website also lists a set of rules which state that "the deliverables and rules are sketchy and the interpretation is completely subject to the whim of the selection committee," note that the decisions of the bounty committee, which is composed of three volunteers, are final, and that the committee reserves the right to issue whatever judgment they feel is appropriate. The rules page also encourages hackers to contact Neuros regarding contract opportunities on a project basis. In addition, all code must be licensed under GPL, LGPL, or GPL-compatible and, if borrowed from another GPL project, must comply with the original author's wishes.

Wolfram's Turing Machine Research Prize (2007)

In May 2007, Stephen Wolfram, the creator of the software program Mathematica, offered a prize of $25 thousand to anyone who could prove or disprove his conjecture that a particular 2-state, 3-color "Turing machine" could function as a universal purpose computer. Alex Smith won the prize in October 2007.

Open Architecture Prize (2007)

Advanced Micro Devices and Architecture for Humanity have announced a $250,000 prize for designing a computer lab "adapted to local needs" that can be "built in communities around the world," particularly in developing countries. The prize is intended to advance the goal of having 50 percent of the world's population connected to the Internet by 2015.[159]

Open Source Community Innovation Awards Program (2007)

Announced in December 2007 and sponsored by Sun Microsystems, the Open Source Community Innovation Awards Program is intended to generate innovation in open source programming.[160] Sun has selected six communities to participate in the program's first year: GlassFish, NetBeans, OpenJDK, OpenOffice.org, OpenSolaris and OpenSPARC. Prizes are expected to total at least $1 million (USD) a year. In mid-January 2008, Sun and the six open source communities will announce details on how developers can participate in the individual programs. Each community will have its own contest rules and judging criteria. Prize-winners will be announced in August 2008. Sun's open-source officer, Simon Phipps, announced the prize in Bangalore, India, with the intention of stimulating what Sun believes will be a key source of future open-source innovation.

Google Android Developer Challenge (2007)

Google is sponsoring $10 million in prizes to reward developers of mobile applications that use the Android Software Development Kit, an open and free mobile platform designed by the Open Handset Alliance.[161] The prize money will be split between two separate challenges, one from January to March, 2008, and the second to launch in the second half of 2008, when the first handsets built on the Android platform are released. For the first challenge, the 50 most promising entries will receive $25,000 to fund further development, and will then be eligible for ten $275,000 rewards and ten $100,000 rewards. Panels of OHA members and/or mobile experts will judge submissions, and developers will retain all rights to their applications, though they must grant Google a license to evaluate and test the applications, as well as a license to display the application for promotional purposes. Because of U.S. law, citizens of Cuba, Iran, Syria, North Korea, Sudan, and Myanmar (Burma) cannot participate. Local laws make Italians and Québécois likewise ineligible.[162]

Cisco I-Prize (2007)

In October 2007 in Bangalore, India, Cisco announced the I-Prize[163] to stimulate emerging business ideas. The prize is open to anyone 18 or older,

[158] http://open.neurostechnology.com/node/562

[159] Olsen, Stefanie "AMD Sponsors 'Open Architecture Prize,'" *USA Today,* March 11, 2007. See: http://www.usatoday.com/tech/products/cnet/2007-03-11-architecture-prize_N.htm (accessed June 18, 2007).

[160] "Sun Announces Open Source Community Innovation Program." See: http://www.sun.com/aboutsun/pr/2007-12/sunflash.20071205.1.xml

[161] Open Handset Alliance. See: http://www.openhandsetalliance.com/

[162] Android Developer Challenge. See: http://code.google.com/android/adc.html

[163] Cisco I-Prize website: http://www.cisco.com/web/solutions/iprize/index.html

with winning teams hired by Cisco and sharing in a $250,000 signing bonus with funding of up to $10 million over three years to staff, develop, and bring new businesses to market. Contestants register on the I-Prize website, post their ideas, and respond to other contestants' proposals. Cisco will select up to 100 semifinalist teams to work with Cisco employees to build a business plan and presentation. 10 finalists will present their idea to a panel of judges who will consider the technology and the business opportunity, looking specifically for ideas with the potential to earn up to $1 billion over a five- to seven-year period.

OpenSpaces Developer Challenge (2007)

In December 2007, GigaSpaces Technologies announced the OpenSpaces Developer Challenge[164], a prize fund of $25,000 to reward the development of unique and innovative applications or plug-ins for the OpenSpaces Framework. The challenge is intended to inspire innovation and support the developer community. Prizes will range from $1,000 to $10,000 and will be awarded to the most promising applications built on OpenSpaces, or plug-ins, and to other components that extend OpenSpaces in pioneering ways. Submissions will be accepted between December 10, 2007 and April 2, 2008, with ten $1,000 prizes for concepts submitted by January 29 to encourage "early bird" submissions. Applications will be reviewed and judged by a panel of industry experts.

Nokia Open C Challenge Developer Contest (2007)

In 2007, Nokia announced the first "Open C Challenge,"[165] a mobile application development contest to encourage open source and freeware developers to port software applications built on Nokia's Open C environment to a specific mobile platform. Winners were announced in December 2007, with a developer from Bangkok taking the top prize of $10,000, with runner-up prizes of $5,000; $3,000; and $2,000. Selections by a panel of experts were based on the developer's innovation, creativity and degree of difficulty in the porting process, as well as the quality and usability of the applications themselves.

[164] Open Spaces Developer Challenge Homepage: http://www.openspaces.org/display/ODC/OpenSpaces+Developer+Challenge

[165] http://www.forum.nokia.com/main/resources/technologies/open_c/contest.html

Textile Machines

Lyon Prize Fund (1711)

In 1711, a prize fund to reward innovations in the silk industry was created in Lyon, France. The sustainable source of revenue for the prize fund was from a share of a tax on silk imported into the Lyon, the *Caisse du droit des éttoffes étrangères*. Additional funding to reward inventors was provided by a guild, the Grande Fabrique at Lyons. The prizes were administered jointly by several parties, including the town, the guild, representatives of the national government, and the Académie des Sciences et Belles-Lettres de Lyon. The Lyon prize system has attracted considerable interest from scholars,[166] both because of its importance in stimulating and diffusing innovation in the Lyon silk industry, a success story that contributed to the durable rise of the French fashion industry, and also as a model for open source innovation. Inventions were considered a public good, at least for the Lyon local industry. Inventors were rewarded not only for the invention, but also for providing technical know-how in using the inventions, often through payments for each artisan that was trained in a new method. Follow-on inventions were encouraged and rewarded. The system of rewards, which was in place for many decades, was highly sophisticated, and involved independent assessments of the practical value of the inventions, involving both expert advice and empirical evidence of the value of the innovation in commerce, and as well as methods of resolving

[166] Dominique Foray and Liliane Hilaire Pérz, "The economics of open technology and collective organisation and individual claims in the 'fabrique lyonnaise' during the old regime," included in *New Frontiers in the Economics of Innovation And New Technology: Essays in Honour of Paul A. David*, Edited by Cristiano Antonelli, Dominique Foray, Bronwyn Hall, and W. Edward Steinmueller. Liliane Pérez, "Inventing in a World Of Guilds: Silk Fabrics in Eighteenth-century Lyon," included in *Guilds, Innovation and the European Economy, 1400-1800*, Editors S. R. Epstein and Maarten Prak, Cambridge University Press; 1st edition, March 31, 2008, page 232. Liliane Hilaire-Pérez, and Catherine Verna, "Dissemination of Technical Knowledge in the Middle Ages and the Early Modern Era: New Approaches and Methodological Issues," *Technology and Culture,* Volume 47, Number 3, July 2006, pages 536-565. S.R. Epstein, "Transferring technical knowledge and innovating in Europe, c.1200-c.1800," in: *Endogenous Institutional Change*, 4-5 March 2005, Stanford Institute for Economic Policy Research, Stanford, USA.

disputes over the amount of awards.

U.K. Silk Machines Reward (1732)

The manufacture of silk goods was economically important, and the subject of considerable secrecy. After silk worms were reportedly smuggled out of China in hollow canes by monks in the sixth century, breaking the Chinese silk monopoly, the techniques for cultivating and manufacturing silk goods were protected by the authorities anxious to protect their local industries. In response to efforts by foreign governments or industrial societies to attract skilled workers or obtain technologies, many governments imposed stiff penalties, including even death sentences, against the unauthorized export of know-how, or the migration of skilled artisans. For example, from 1314 to 1523, the Italian city of Lucca offered a bounty of 50 to 200 ducats for the murder of a fugitive artisan. In 1419, Florence called for the beheading of emigrant artisans, and imposed fines of 1,000 florins for persons who helped them.[167] But by the 17th century, the silk industry slowly spread, including to England. The Italian industry was thought to have access to certain technologies that were not known or used in England. In 1717, John Lombe, the half-brother of Thomas Lombe, returned from a stay in Italy, accompanied by several skilled craftsmen, and assisted Thomas Lombe in obtaining patents on three Italian silk machines not in use in England. The Piedmont (Italy) silk industry reportedly retaliated by sending a woman to England who first befriended John Lombe, and then poisoned him, leaving him to die a slow death. In 1732, the Lombe patents were to expire, but Thomas Lombe petitioned the British parliament, seeking an extension of the patent term. This was the first time since the *1623 Statute of Monopolies* that the Parliament had considered a patent extension. The petition was opposed by other textile makers, who wanted to make use of the Lombe/Piedmont technologies, and the extension was rejected by the Parliament. However, an act was passed giving Lombe a reward of 14,000 pounds, on the condition that Lombe place models of his technology in public institutions.[168]

Awards for Spinning and Carpet Manufacture (1757)

The British Society for the Encouragement of Arts, Commerce and Manufactures was created 1753. In 1757, the Society conferred awards for spinning in workhouses and for carpet manufacture.

Spinning Machine Prize (1761)

In 1761, the Society for the Encouragement of Arts, Commerce and Manufactures offered a reward for a successful spinning machine. The Society would continue to offer rewards for innovation until 1850.

Arkwright Invention Bounties

In 1769, Richard Arkwright, apparently after liberally borrowing ideas from Thomas Highs, patented a new approach to spinning wool and cotton, and later introduced several improvements, including a system for water power that revolutionized the British cotton textile trade.[169] The British government was enforcing strict controls over the export of the technology. State governments in the United States subsequently created bounties[170] to reward skilled workers who could introduce the Arkwright methods to the United States.

Massachusetts Bounty for Textile Machines (1786)

In 1786, the legislature of Massachusetts gave a bounty for the construction of machines for carding, roping, and spinning wool and cotton.[171]

Pennsylvania Legislature Prize for the Introduction of a Cotton Carding Machine (1788)

The Pennsylvania legislature provided a prize of 100 pounds to Joseph Hague for the introduction of a cotton-carding machine[172] that had been smuggled out of England, in contravention of the British laws against the dissemination of the technology and know-how.

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[167] Luca Mola, *The Silk Industry of Renaissance Venice*, JHU Press, 2000. "The Dissemination of Techniques," page 43.

[168] *Dictionary of National Biography*, Sidney Lee, Editor, VOL. XII., the MacMillan Company, London, 1909, pages 95-96.

[169] Richard L. Hills, "Sir Richard Arkwright and His Patent Granted in 1769," *Notes and Records of the Royal Society of London*, Vol. 24, No. 2 (Apr., 1970), pages 254-260.

[170] As well as patent protection to the persons who "introduced" the technology to the United States. Doron Ben-Atar, "Alexander Hamilton's Alternative: Technology Piracy and the Report on Manufactures," *The William and Mary Quarterly*, 3rd Ser., Vol. 52, No. 3 (Jul., 1995), pages 389-41.

[171] William Clarence Webster, *A General History of Commerce*, 1918, page 357. *The Merchants' Magazine and Commercial Review*, 1856. page 763.

[172] *Bean's 1884 History of Montgomery Country, Pennsylvania,* Chapter XXXVII. Part - I, Manufacturing Industries.

Napoleon Prize for a Flax Spinning Machine (1810)

On May 10, 1810, a decree was published in *the Moniteur*, signed by the French Emperor Napoleon Bonaparte, offering a one million livres prize for the best machine for spinning flax.[173] The decree was translated into several languages, and disseminated widely. Shortly thereafter, a French inventor, Philippe de Girard, motivated by the prospect of winning the prize, conceived a flax spinning machine, filed for a patent in France, and spent two years perfecting the design. In 1813, de Girard established a flax mill in Paris, and having fulfilled the requirements of the decree, sought the prize. Unfortunately for de Girard, France was soon invaded, Napoleon's government fell, and the Restoration was not inclined to honor the debts of the Empire. De Girard, facing financial ruin, was jailed for his debts, and the plans for his machines were stolen and later used in fraudulent patent filings in England. In 1815, the Austrian government financed efforts by de Girard to bring flax spinning technology to Austria.[174] In 1825 de Girard was invited to introduce flax spinning technology to Poland. In 1844 he returned to France, and in 1853, the French government established a commission to confer pensions on the heirs of Philippe de Girard, as recompense for his earlier innovation.[175]

Indian Government Prizes for Decorticating China Grass (1869, 1881)

In 1869, the Indian Government offered a prize of five thousand pounds for a machine that could separate the fiber from the stems and bark of freshly cut China Grass (also known as rhea), an invention considered key to the development of commercially successful textile products. The offer attracted several competitors, but none who met the conditions attached to the reward (One meritorious attempt was awarded a "donation" of 1,500 pounds). Although eventually withdrawn, the 1869 prize attracted considerable interest and inventive activity, and in 1879, M.A. Favier patented a process of extracting the fibers from textile plants. The Favier process solved some, but not all, of the problems in developing a "commercially reliable" solution. In 1881, the India Government offered a new five thousand pound reward.[176]

Lightweight Thread (1896)

In 1896, the French Society for the Encouragement of Industry offered a 2,000 franc prize for mechanically producing 100,000 meters of linen thread which weighed one kilogram, or if hemp was used, 15,000 meters to the kilogram.

Unlawful Acts

Corporate Crime Bounty (1976)

In April 1976, the People's Bicentennial Commission sent letters to 10,000 highly placed secretaries, offering each of them a $25,000 cash reward for information that would implicate the CEO in criminal activity relating to corporate activities.[177]

Microsoft Virus Bounty (2003)

In November 2003, Microsoft offered $250,000 in rewards for information leading to the successful prosecution of the creators of three prolific computer worms: "Blaster", "Sobig" and "Mydoom."[178] Microsoft later extended the offer to other computer viruses, and credited the bounty for the arrest of a German computer programmer who is suspected of unleashing the Sasser computer worm.[179]

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[173] Charles Dickens, "Madem de Corniellan," *All the Year Round*, July 11, 1863, pages 466-7. Gabriel Joet-Desclosières, *Vie et inventions de Philippe de Girard, inventeur de la filature mécanique du lin*, A. Pigoreau, Paris, 1881.

[174] Dwight C. Long and Philippe de Girard, "the Introduction of Mechanical Flax Spinning in Austria," *The Journal of Economic History*, Vol. 14, No. 1 (Winter, 1954), pages 21-34.

[175] Dickens, *Supra*.

[176] *Scientific American Supplement*, No. 417, December 29, 1883, "China Grass." United States Patent Office, Paul A.A.M.A. Favier, of Paris, Process of Extracting the Fibers from Textile Plants," Letters Patent No. 226,506, dated April 13, 1880, Application filed November 4,1879, Patented in France May 16, 1879.

[177] Marylin Bender, "Staff Informers Offered Reward: Radical Group Sets Bounty for Tips on Executives' Criminal Activity," *New York Times*, April 12, 1976.

[178] Press Release: "Microsoft Announces Anti-Virus Reward Program, Microsoft Teams With Worldwide Law Enforcement to Root Out Malicious Code Distributors," Microsoft.Com. Nov. 5, 2003. John Schwartz, "Microsoft Sets $5 Million Virus Bounty," *New York Times*, November 6, 2003. Paul R. La Monica, "Microsoft: Bounty hunter: The world's No. 1 software company announces a $5M reward program to help catch virus authors," CNN, November 5, 2003.

[179] Martyn Williams, "Microsoft Bounty Helps Nail Sasser Suspect: Reward-

FTC SPAM Bounty (2004)

In September 2004, the U.S. Federal Trade Commission proposed a system of bounties for information that would lead to the conviction of illegal Internet SPAM activity.[180]

Miscellaneous

The Douglas Premiums (1627)

In February and March of 1627, a Scottish nobleman named William Douglas petitioned the government for patents, support and performance-based "premiums" for certain inventions involving weapons. The premiums were bonuses or prizes that would be paid only if the inventions, which had not yet been built, met certain criteria. The criteria for the premiums was as follows:

1. For a new kind of gun, with which one soldier, infantry or cavalry, can fire as many shots as six soldiers with ordinary guns, there was allowed a premium of five thousand guilders;
2. The invention of a pike, with which a soldier can do the work not only of a pikeman, but also of a musketeer, a like premium of five thousand guilders.
3. For the third invention—of a foot-carriage by means of which one soldier can take the place or do the work of a hundred musketeers—a premium of twenty thousand guilders.
4. A horse-carriage, by means of which, with the assistance of one person and two horses, the work of two hundred cuirassiers can be performed—a life premium of twenty thousand guilders.

The Council of State decided that "the inventor must manufacture his contrivances at his own cost" and "should they answer to his representations of them, he is to be complimented in the manner he requests." Douglas was given three months to build and test the inventions, and he was not to communicate his inventions to any one other than the King of Great Britain, a requirement later modified to exclude only enemies of the state. Later Douglas asked for another prize for an "invention that would permit three shots to be made from a canon in the same time as one, for a premium of five thousand guilders." In an April 1627 test of the canon, the Douglas could fire five times against two for shots from the other guns. Trials of the several Douglas inventions were mixed, showing significant improvements over current weapons, but for some inventions, not as much as the initial criteria for the premium. Douglas did receive thousands of guilders for the inventions, as well as for other services in warfare. Douglas died in 1629, in battle, and was fondly remembered. The Scottish author Thomas Urquhart compared his inventive and scientific abilities to Archimedes, John Napier of Merchiston and the Admirable Crichton.[181]

Premium for an Invention to Stop the Progress of Fires (1734)

In 1734, the States of Sweden offered a premium of twenty thousand crowns

seekers' tip leads to arrest of German teen who confesses to writing viruses," IDG News Service, May 10, 2004. Robert Lemos, "Microsoft: Sasser bounty hinges on conviction: Person who fingered alleged author of virus must cool heels while waiting for cool quarter-million-dollar reward," *CNET News.com* September 10, 2004.

[180] "FTC Assesses Reward System for Catching Spammers," FTC Press release, September 16, 2004, http://www.ftc.gov/opa/2004/09/bounty.shtm. Jonathan Krim, "Cash Bounties For Spammers Win Limited FTC Backing," *the Washington Post*, September 17, 2004; Page E01.

[181] "Resolutions Relating to Captain William Douglas, 1626-1629," included in *Papers Illustrating the History of the Scots Brigade in the Service of the United Netherlands, 1572-1782*. Edited by James Ferguson, Vol. 1, 1572-1697 (1899)pages 358-368. Ferguson notes that Sir Thomas Urquhart, in his Eskubalauron, said: "A great many other worthy colonels, amongst which I will only commemorate one, named Colonel Douglas, who to the States of Holland was often times serviceable in discharging the office and duty of general engineer; whereof they are now so sensible, that to have him alive again, and of that vigour and freshness in body and spirit, wherewith he was endowed on the day he was killed on, they would give thrice his weight in gold, and well they might, for some few weeks before the fight in which he was slain, he presented to them twelve articles and heads of such wonderful feats for the use of the wars both by sea and land to be performed by him, flowing from the remotest springs of mathematical search and those of natural philosophy that none of this age saw.' In the opinion of the Knight of Cromarty, Douglas was only surpassed by Archimedes, and only equaled 'in this age of the Scottish nation' by Napier of Merchiston and the 'Admirable Crichton.'"

for the best invention of stopping the progress of fires. Accounts of the attempt by Mr. Fuches to collect the prize discuss the early attempts to design a water bomb to extinguish fires, as well as the unfortunate reaction of onlookers when an experiment failed, perhaps due to sabotage. A follow-up experiment was tried in Holland in 1761, and in the same year, the British Society for the Encouragement of Arts, Manufacturers and Commerce gave a premium to Dr. Dr. Godfrey for the successful trial of a similar device.[182]

The Society for the Encouragement of Arts, Manufactures and Commerce Premium Award Scheme (1756)

In 1756, the Society for the Encouragement of Arts, Manufactures and Commerce was founded in London. Two years later, the Society began a series of widely advertised competitions for awards for improvements in the liberal arts, sciences and manufacturers. The first round of competitions concerned three categories: the growth of Madder, a root vegetable used as a source for red dye in the textile industry, the discovery of Cobalt, and for artistic merit shown by children. By 1758, the contests were expanded and divided into classes, including Agriculture, Chemistry, Colonies & Trade, Manufactures, Mechanics and Polite Arts (painting and the plastic arts). Some of the premiums for inventions offered by the Society were designed to improve the health and life of workers, or to address other social concerns. For example, in 1805, George Smart received a prize for "an invention which cleaned the greatest number of chimneys without the use of children." In 1810, a prize was given for a telescopic ladder on wheels, a still-used "device for preserving life in case of fire." In 1825, the Society gave a prize for an innovative respirator, to address the problems faced by workers in water-gilding and mining that struggled with acrid fumes. The Premium Award Scheme was phased out in 1850.

Alkali Prize (1775)

In 1775, King Louis XVI of France asked the Academy of Sciences to administer a prize of 2,400 livres to anyone who found a commercially viable artificial process for the production of alkali, which was then mostly imported from Spain at a high cost. Naturally occurring alkali was used in paper, soap, and glass production, but discovery of an artificial process in 1791 by Nicolas Leblanc enabled local production and launched the French chemical industry. Unfortunately for Leblanc, in 1793 the French Revolutionary government forced him to publish his process so all could copy his methods and confiscated the alkali factory he was running for his patron, the Duke of Orléans. In 1802, Napoléon Bonaparte returned the factory to Leblanc, but he then lacked the resources to run it. Leblanc committed suicide in 1806, and his heirs received the prize payment from the French government in 1855.[183]

South Shields Lifeboat Premium (1789)

In September 1789, after a terrible wreck of the the ship "Adventure," where the whole crew perished in an accident witnessed by thousands in South Shields, a town on south bank of the mouth of the River Tyne, a "premium" (a prize) was created for the best lifeboat design. According to one report:

> The subject then dropped until 1789, when a ship, by name the Adventurer, of Newcastle, stranded on the Herd Sands at the entrance of the Tyne. A fierce gale was raging, the sea was running mountains high, thousands of spectators were present, and, though but three hundred yards from the ill-fated ship, were unable to afford the slightest succour. The crew dropped off one by one from the rigging ; mothers saw their sons, wives their husbands, drowned before their eyes and within the very sight of home. This tragic event caused such an impression that a committee was formed in South Shields, and a premium was offered for the best design of a Life-boat.[184]

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[182] Thomas Ewbank, *A Descriptive and Historical Account of Hydraulic and Other Machines for Raising Water,* 1846, page 349. George P. Little, *The Fireman's Own Book: Containing Accounts of Fires Throughout the United States as Well as Other Countries*, 1860, page 189. "Dr. Godfrey's machines for the immediate extinction of fire," *Annual Register, or a view of the History, Politics and Literature of the year 1761*, edited by Edmund Burke, page 148.

[183] Masters, W. "Prizes for Innovation in African Agriculture: A Framework Document". 2006 See: http://www.earth.columbia.edu/cgsd/documents/Prizes-FrameworkDocument-RevAug13.pdf (accessed Feb. 2, 2007).

[184] *The Lifeboat; or Journal of The National Life-boat Institution,* VOL.XI. From February, 1880, to November, 1882. The National Life-boat Institution, Vol. XI. 1883, page 194.

The winning design was submitted by Henry Greathead, who also built the protype.[185] The newly designed lifeboat was widely used until a December 1849 disaster, also in the mouth of the Tyne, stimulated another prize and further innovation in lifeboat design (see below).[186] In addition to the privately financed premium, the British Parliament gave Henry Greathead 1,200 pounds as a reward for the invention.

Duke of Northumberland Lifeboat Prize (1850)

Responding to a December 1849 accident in the mouth of the Tyne, where a lifeboat built on the Greathead design was upset and drifted ashore bottom-up, with twenty of twenty-five crew drowned under the board, in 1850 the Duke of Northumberland offered a prize of 100 guineas for the best design of a "self-righting" lifeboat. The desired features of such a design were: (1) Extra buoyancy, (2) Self-relief of water, (3) Ballasting, (4) Self-righting, (5) Stability, (6) Speed, (7) Stowage-room, and (8) Strength of build. The competition attracted 280 entrants, and was won by James Beeching, for a self-righting lifeboat design. After further modifications by James Peake, the design was eventually adopted nationally by the Royal National Lifeboat Institution.[187]

Manley Marble-Sawing Prize (1856)

As example of several period prizes used to stimulate inventions in areas of self-interest, Mr. M. M. Manley, a marble quarry businessman, offered a prize of $10,000 for the best new marble-sawing machine. In March 1856, Manley reported that the prize stimulated considerable innovation, resulting in 16 patented inventions, several of which were in use.[188] Reporting on the marble-sawing prize contest, *Scientific American* enthusiastically noted:[189]

> Whenever a want is felt, it is a good plan to let it be as publicly known as possible, and to offer a reward (if this can be done) for its supply. A short time since a prize was offered for improvements on machinery for sawing marble, and in a very short period afterwards the improvements sought were produced.

The British Horological Institute Watch Prizes (1859)

Faced with tough competition from Swiss watchmakers, in 1859 the British Horological Institute sought to improve the quality of British-made watches. The Institute decided to offer a prize for "the best English-made going-barrel movement that can be made in fair trade at a moderate price, no patent, no exclusive right, but that it shall be the property of the Institute, for the benefit of all." It was further proposed to offer another prize "to the benefactor who shall produce the best practical scale for minute measurement,—a standard gauge, by which all workshops and workmen may correspond and agree with each other, to the hundredth and thousandth part of an inch, all over the country." The Institute was seeking to "bring production to a cheaper rate without lessening the price of labour." The money for the prizes was to be collected from the Institute members.[190]

The Confederate Prize for Inventions that Sink or Destroy Union Ships (1861)

Lacking an effective navy and engaged in a civil war against the Union, in 1861 the Confederate Congress passed a law concerning "letters of marque, prizes and prize goods," which, in addition to the bounty for destroying vessels of war belonging to the enemy, created a prize for inventions used to sink or destroy ships. The prize was for any "new kind of armed vessel, or floating battery, or defense invention" and required the inventor to "deposit a plan of the same, accompanied by suitable explanations or specifications, in the Navy Department," along with assurances the person was in fact the inventor, and that the Confederate government would have, "in all cases, the right of using such invention." In 1862, the act was amended again as follows:

> The Congress of the Confederate States of America do enact . . . that, in case any person or persons shall invent or construct any new machine or engine, or contrive any new method for destroying the armed vessels of the enemy, he or they shall receive fifty per centum of the value of each and every such

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[185] According to some, incorporating also ideas from the submission of Willie Woodhave, a parish clerk.

[186] "Lifeboat," included in *Chamber's Encycolopaedia: A Dictionary of Universal Knowledge*, 1890, page 617.

[187] Ibid. Also, C.J. Staniland, "Lifeboats and Lifeboat Men," *The English Illustrated Magazine*, Macmillan and Co. England, 1886, page 335. "New Life Boat," *Journal of the Society of Arts*, March 13, 1857, page 261.

[188] Cole, Samuel W. *The New England Farmer,* Vol. 8 (1865).

[189] "Improvements -- No Standing Still," *Scientific American*, Vol. 11 (os) No. 47, page 373, 2 August 1856.

[190] *The Horological Journal: The Special Organ of the British Horological Institute*, Feb 1, 1860, page 78.

vessel that may be sunk or destroyed, by means of such invention or contrivance.

The bounty stimulated investment into submarines, torpedoes and fuses, including the *H.L.* Hunley, reportedly the the first submarine to sink a warship in combat.

The Billiard Ball Prize, and the Development of the Modern Plastics Industry (1863)

In the 19th Century, billiards was becoming more popular, but the rising cost of ivory billiard balls, made out of increasingly scarce elephant tusks more than 2-7/16 inches in diameter, was threatening to slow the growth of the entire billiards industry. In 1863, the Albany-based firm Phelan & Collander, the leading U.S. billiard supply company, offered a $10,000 prize for the inventor of a suitable substitute for the ivory used in billiard balls. The prize motivated John W. Hyatt to search for such an invention. His first of several patents was obtained in 1865,[191] but he worked several more years to improve the design, and eventually developed the celluloid billiard ball, which he later manufactured in the Albany Billiard Ball Company.[192] The invention of celluloid, which would later have a plethora of other applications, such as dental plates and shirt collars, led to the development of the modern plastics industry.[193]

H.R. 5925 - Bill to "Establish another System of Rewards for Inventors" (1886)

In 1886, Charles Brown Lore, a Democratic United States Representative from Delaware, submitted for consideration H.R. 5925 (49th Congress, 1st Session), "a bill to Repeal the Patent Laws now in Force, and to Establish another system of reward for inventors." The bill was referred to the Committee on Patents. The bill did not pass, but encouraged considerable debate over possible alternatives to the patent system.[194]

[191] US Patent 50,359, "Billiard-Balls."

[192] Reports are mixed on whether or not he received the $10,000 prize.

[193] Edwin E. Slosson, *Creative Chemistry: Descriptive of Recent Achievements in the Chemical Industries,* The Century Co., 1919. Edward Chauncey Worden, *Technology of Cellulose Esters*, Eschenbach Printing Company, 1921, page 2663.

[194] "The Patent Bills Before Congress," *Scientific American*, v 54 (ns), no 14, p 208, 3 April 1886, http://www.ipmall.fplc.edu/hosted_resources/PatentHistory/posa54n.htm.

French Society for the Encouragement of Industry Prizes for 1896

In the 19th Century, the French Société d'Encouragement pour l'Industrie offered a large number of innovation prizes. One snapshot at the prizes is found in a June 30, 1895 article in the *New York Times,* "Chances for American Inventors."[195] Prizes were open to inventors of any nationality, though papers were required to be written in French. The prizes offered differ in the degree of specification provided, with some detailed and some open-ended challenges. They included:

The Parmentier Prize

A prize of 1,000 francs was reserved for research "tending to improve the material or processes of agriculture and alimentary industries."

Best motor to run on commercial oil

3,000 francs for the best motor to run on commercial oil.

Efficient Steam Engine

3,000 francs for an engine of 25 to 100 horsepower that used a maximum of seven and a half kilograms of steam per hour per unit of horsepower.

Motor suitable for housework

2,000 francs for a motor suitable for housework, and another 2,000 francs for the cheapest method of transmitting mechanical energy from a central station to domestic use.

Incandescent electric lamp of 1/10th candle power

2,000 francs for an incandescent electric lamp of one tenth candle power when a current of .05 ampere is passing through it at a potential of 100 volts.

Lightweight thread

2,000 francs for mechanically producing 100,000 meters of linen thread weighing one kilogram or, if hemp was used, 15,000 meters to the kilogram.

Method of preventing water escapes in boiler tubing

2,000 francs for the best method of preventing water escapes in boiler tubing.

Utilization of waste products

1,000 francs for innovations in the utilization of waste products

[195] "Chances for American Inventors," *The New York Times* June 30, 1895.

Plastic building material

1,000 francs for the discovery of a plastic material similar in appearance to stone, marble, or brick, and hard enough for use outside or inside of houses.

Process to prevent wood from warping

1,000 francs for a process to prevent woods used by carpenters or cabinetmakers from warping when under atmospheric conditions.

Process to detect adulterations in cement

1,000 for a chemical process which will detect adulterations in Portland cement.

The Society also announced 2,000 franc prizes for several other inventions, studies, or research papers, including: the production of fuming sulphuric acid; the discovery of a new and useful alloy; the combustion of gases in furnaces; the expansion, elasticity, and tenacity of clays in ceramics; the substitution of sulphuric acid in dyeing, especially in silk; the physical and mechanical properties of glass; the discovery of processes capable of yielding chemical changes and useful organic products, such as quinine, cane sugar; the production of cast steel or iron, with useful properties by the incorporation of a foreign substance; and the best memoir on the chemical or metallurgical industries.

Soviet Committee for Invention Authorship Certificates (1931)

In 1931, the Soviet Union Committee for Invention and Discoveries implemented a system under which Soviet citizens or foreigners could, as an alternative to a patent, apply for an "Authorship Certificate" that entitled the holder to an award based upon the "highest economy" obtained by using an innovation, during any of the first three years of its exploitation, in any plant in the Soviet Union. The amount of the award was by a sliding scale, that (based upon the "fourth ruble") started at 100 rubles, up to a maximum of 1,000,000 Rubles.

Savings in Rubles	*Percent granted as reward*
100	100
500	30
1,000	25
5,000	17
10,000	15
50,000	11
100,000	8
250,000	6
500,000	5
1,000,000	4
More than 1,000,000	20,950 rubles, plus 2 percent of savings, up to a maximum prize of 1,000,000

Non-monetary social privileges were also offered as rewards. While the patent system was left in place, application fees were high and patents were made less valuable by market controls. The number of Authorship Certificates and "old-style" patents for the years 1933 to 1940 were as follows:[196]

Year	Authorship Certificates	Old-style patents
1933	4,713	285
1934	6,462	538
1935	3,702	355
1936	2,271	140
1937	2,098	113
1938	1,862	32
1939	2,031	30
1940	2,269	29

[196] Francis Hughes, "Soviet Invention Awards," *The Economic Journal*, Vol. 55, No. 218/219, pages 291-297.

The declines in Authorship Certificates (and patents) in the years 1936 to 1940 was attributed to stricter examination for novelty, and fear of impending war, which lead to a decrease in publication of technical matters, as well as the end of an earlier offer to exchange old-style patents for the new Authorship Certificates. Writing in 1945 in the *Economic Journal*, London based Francis Hughes said, "After careful study of the Soviet information available, including the invention specifications, one is inclined to the opinion that, despite circumstances and despite the headlong and at times impracticable rationalization of the legislators who framed the Act, in practice the new system has succeeded much better than the average industrial executive in this country would have expected."[197]

Later the rewards were increased by extending the period of remuneration, but subsequent judgments about the efficacy of the system after the second World War were generally more critical. In particular, the system of Authorship Certificates was limited by its reliance upon the State to provide the planning, capital, energy and risk necessary to exploit the inventions, and also by the growing inefficiencies of the Soviet central planning bureaucracies.[198] The Authorship Certificate system was abolished in July 2001, a few months before the collapse of the Soviet Union in December 1991.

Australian Film Bounty (1933)

In order to stimulate the Australian film industry, in 1933 the Australian government offered annual prizes of $12,500; $6,250; and $3,750 for the three best Australian films, and $1,250 for the best Australian scenario.[199]

Soviet Rewards for Aircraft Design (1946,7)

In addition to the Soviet Authorship Certificates, the Soviet Union offered special rewards for success in specific areas. Among the more impressive were the large rewards announced in April and June of 1946, and May of 1947, as the Soviet government, in an effort to achieve greater innovation in a critical field of defense-related aircraft technology, issued decrees setting out special competitions and design targets for aircraft. According to Mark Harrison:

> First prize in the aircraft competition included 700 thousand rubles for the chief designer together with an Order of Lenin, a Stalin Prize, and a luxury ZIS-110 private car, and many more hundreds of thousands of rubles, apartments, cars, and medals to be shared among his deputies and design staff.[200] Something similar was also on offer to the aeroengine designers in the spring of 1948. Liul'ka was given a Stalin Prize (third class) and was personally awarded 600,000 rubles, or 100 times his monthly pay in 1946, with a further 800,000 rubles for his design team; he got another Stalin Prize the next year, upgraded to first class.[201]

While the use of special rewards and performance incentives was widely used in military-related research and development, Harrison notes that non-monetary incentives were quite important. "The designers themselves regarded a reputation for priority in their field as extremely valuable. . . When money took the place of reputation, enormous sums were required."

Burkina Faso Innovation Prizes (1994)

The Burkina Faso "Forum national de la Recherche Scientifique et des Innovations Technologiques", which includes the Education Ministry and the Ministry of Trade and Commerce, manages innovation prizes.[202] Each Prize has a theme. Corporations as well as government bodies may design a prize that corresponds to specific needs. For example, the Grand Prize is for a "work" (a technical work, a process, or results, etc.) that contributes the most to a development objective regarding health, demography, energy, or food. The Ministry of Education Prize is for the invention of a product that contributes to the solution of a scientific problem—national, regional or

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197 *Ibid*. For an earlier journalistic report, see Waldemar Kaempffert, "The Week in Science: Invention in Soviet Russia," *New York Times*, April 7, 1935.

198 Williams va Caenegem, "Inventions in Russia: From Public Good to Private Property," *Australian Intellectual Property Journal*, 1993(4). http://epublications.bond.edu.au/law_pubs/2/

199 Australia Offers Film Bounty," *New York Times*, November 19, 1933.

200 Mark Harrison, "A Soviet Quasi-Market for Inventions: Jet Propulsion,1 932–1946," *Research in Economic History*, Volume 23, 1–59, fn. 54. Russian State Economics Archive (RGAE), 8044/1/1795, 94 (March 26, 1948).

201 Harrison, Ibid. fn 55. Stalin Prizes for 1947: RGAE, 8044/1/1962, 94 (March 31, 1948). Prize money, RGAE, 8044/1/1795, 79 (no date but April 1948). Stalin Prizes for 1948: RGAE, 8044/1/1965, 7 (no date but March 1949).

202 http://www.ird.bf/frsit/.

global. Some prizes are specific, such as the "special Prize of CILSS", which rewards innovative works regarding the fight against desertification. Since 1994, there have been 7 "editions" of the prize. Here is a rough translation of the themes[203]:

La 4ème édition (2000). The theme was the role of scientific research facing the 3rd millennium challenges of "health, food security and environment."

La 5ème édition (2002). The theme was scientific and technological research and strategies to fight poverty.

La 6ème édition (2004). The theme was "Scientific and technological research: the problem of water for a sustainable development." Problems linked to water (drought, floods, safety etc) are crucial for the country.

La 7eme édition (2006) Ouagadougou, Burkina Faso. Vularization and valorization of research results, inventions and innovations for the population.

In 2006, there were 28 prizes, 11 for research and 17 for inventions and innovations. For examples:

The Prix du Directeur Général du CIRDES regarding water management to solve a problem of raising cattle. 100,000 F. CFA

The Prix du Directeur Général de l'Institut International d'Ingénierie de l'Eau et de l'Environnement (2IE) was awarded for work on water or environment. 250,000 F. CFA

The Prix du Ministre des Ressources Animales was awarded for research or inventions regarding cattle in desertic regions, to M. Zongo Boubacar for his invention of a pump powered by a bike pedal-driven turbine. 500,000 F. CFA.

The Prix du Président du FASO for the best product to fight poverty was awarded to Dr. Sie Moussa and his collaborators for 9 new rice varieties. 2.000,000 F. CFA

BountyQuest.com (2000)

In 2000, BountyQuest.com was created to offer cash prizes for prior art that could be used to invalidate patent claims. The commercial web site was launched with considerable publicity in the Fall of 2000.[204] By the end of 2002, BountyQuest.com had ceased operation. During its relatively brief period of operation, BountyQuest offered cash prizes of $10,000 to $50,000, involving more than 72 bounties. BQ charged money to list the challenges, including a fixed fee and a commission on the prize. BQ did induce a large number of submissions of prior art, and some prizes were awarded, including, for example, a $10,000 bounty for prior art on a genetic sequence database patent held by Incyte Genomics. In many cases, however, the persons who submitted the prior art were not sophisticated enough in patent law to properly evaluate the patent claims, leading to many submissions that did not, in fact, establish prior art. The costs associated with the evaluation of the challenges were also apparently greater than expected.[205]

GALILEO Satellite Prize (2004)

In 2004, the Bavarian regional government established the GALILEO European Satellite Navigation Competition[206], offering an annual 10,000 euro prize for the best ideas in satellite navigation technology as judged by a committee of 80 experts. Starting in 2007, private sponsors offered additional "special topic" prizes, seeking solutions for specific satellite-related problems and offering the winners corporate partnerships to develop their ideas. For instance, the delivery company DHL is seeking a traffic navigation system.

Reward Innovation in America Act (2007)

S. 1371 (110th Congress)[207] is a proposal to establish an innovation prize fund

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[203] See more themes at http://www.ird.bf/frsit/rubrique.php3?id_rubrique=5

[204] Sabra Chartrand, "Patents; A Web site invites bounty hunters to disprove ownership of ideas, even those of its founders," *New York Times,* October 23, 2000.

[205] Sabra Chartrand, "Patents; Even with a bounty, no claims appear to nullify Amazon.com's 'one-click' shopping device," *New York Times*, March 19, 2001. "Industry Insider Q&A: Junk-Patent Perps, Beware of BountyQuest: Charles Cella runs a site that channels rewards to folks who debunk claims," *BusinessWeek.Com*, April 30, 2001. BountyQuest Awards $10,000 for Prior Art on Human Genome Patent, IPFrontline.Com, Monday, May 07, 2001. Damien Cave, "Losing the war on patents: Attempts to fix the intellectual property system from below are faltering. Is it time to bring in the feds?" *Salon.com*, February 15, 2002.

[206] "In search of the GALILEO Master 2007." European Satellite Navigation Competition. See: http://www.galileo-masters.com/index.php?id=52492 (accessed July 5, 2007).

[207] S. 1371. Reward Innovation in America Act (S. 1371). 110th Congress.

in the Department of Commerce. The Secretary of Commerce is given the responsibility of setting all of the terms and conditions of competitions, selecting research topics, selecting and chairing a board, and making plans to partner with or outsource to nonprofit organizations or federal agencies. The only condition stated by the bill is that there are to be two categories of prizes. First is the 21st Century Innovation Prize, to be awarded in multiple competitions in different research areas, with prizes not to exceed $2,000,000. Second are the Innovate America Grand Challenge Prizes, which are to be "awarded in large, highly complex, and expensive competitions" every 2 to 4 years and "address research objectives well beyond the current state of the art and that are intended to become integral to major changes in complex socio-technological systems." The board will set the levels of prizes between $5 million and $30 million, and may elect to award either one grand prize or first, second, and third place prizes.

Wearable Power Prize (2007)

The US Department of Defense (DoD) is concerned that soldiers in future combat settings will need to carry approximately 9 kilograms (almost 20 lbs.) of batteries to complete a 96-hour mission. According to William Rees, the deputy undersecretary of laboratories and basic sciences, DoD seeks to reduce the weight of the power system used for radios, night-vision devices, global positioning systems and other combat gear, including a recharging system, to about 2 pounds per day: "The mantra is four days, 4 kilograms."[208]

To achieve this end, the DoD is offering three prizes - $1,000,000 for 1st place, $500,000 for 2nd place, and $250,000 for 3rd place for wearable power systems that meet or exceed DoD performance criteria. The contest objectives are formally described as follows:

> "To demonstrate a wearable electric power system providing 96 hours of equipment operation at less than half the current weight. The power system should attach to a garment (vest) and provide 20W average electric power for 96 hours with peak power requirements of up to 200W for short periods. All components, including the generation, storage, electronics, and connections must weigh 4kg or less, including the attachment system. The total minimum energy required is 1920 W-hr (20W * 96hr)."

The prize is the first to be offered under a provision in the *John Warner National Defense Authorization Act of 2007,* which amended 10 U.S.C. Section 2347a to create a new authority in the Department of Defense for "Prizes for advanced technology achievements" under the Director of Defense Research and Engineering (DDR&E). Prizes are to be used to:

- Inspire the use of ground-breaking and inventive approaches to solve technical problems of interest;
- Reach non-traditional DoD performers by lowering the barriers for entry and participation;
- Inspire students, private inventors, and commercial sects alike to leverage resources and compete using innovative ideas and approaches;
- Catalyze interest in pursuing Science and Engineering careers in National Security positions.

According to the contest rules, DoD will not claim any rights to the intellectual property of competitor's systems, and proprietary information disclosed to the government will be protected in accordance with government regulations. The future development of the wearable power systems will be done under separate contracts and will be subject to the U.S. government rights clauses agreed to under those contracts.

Clear Prize for Faster Airport Security Technology (2007)

On January 8, 2008, Clear, an airport security firm, announced a $500,000 prize for the first team to deploy faster security land technology in an airport. Among other things, the winning technology "reduces inconvenience by, for example, allowing for no divesting of shoes, outer garments, or any other item approved for carry-on aboard a U.S. commercial flight, and thereby achieves an increase in throughput of 15 percent or more.

In addition to the prize, Clear will buy the winning technology, in bulk, once it is approved by the U.S. Transportation Security Administration. The teams competing for the prize will install, at Clear's expense, "a real world security checkpoint" in an airport security lane operated by Clear, that meets the following criteria:

[208] Donna Miles, "Defense Department Offers $1 Million Prize for Wearable Power Innovations," American Forces Press Service, July 5, 2007. http://www.defenselink.mil/news/newsarticle.aspx?id=46643

1. Achieves acceptance by the Transportation Security Administration (TSA) for deployment at Clear lanes as providing the same or better security than the current Registered Traveler checkpoint process.
2. Reduces inconvenience by, for example, allowing for no divesting of shoes, outer garments, or any other item approved for carry-on aboard a US commercial flight, and thereby achieves an increase in throughput of 15 percent or more.
3. Is compact enough to be deployed at security checkpoints in at least three Clear airports.
4. Is deployed and can be operated at a cost (including capital costs amortized over five years) of less than 25 cents per passenger screened when working at full capacity.

Innobank Chile (2007)

Innobank Chile describes itself as a "bank of ideas" to create products, improve services, packaging, and processes relating to fields such as government, television, and environmental pollution, among others.[209] The Innobank website currently lists three contests: one for new ideas relating to the Pyme card, one called Capotop, run in conjunction with Diego Portales University, and one called an "open innovation competition." The Pyme card competition, which calls for "new ideas" related to a banking card service for small- and medium-sized businesses, offered a total of $4,600,000 in prize money, and was open from June 5 to 30, 2007. The "open innovation competition", with no deadline, calls for "new ideas and/or new solutions" which would interest companies and organizations. The 2007 Capotop competition, now in its eleventh year, was judged by InnoBank's representative, Pedro Ossa, as well as professors of the university, and was won by a team who developed a program called "the cigarette-butt tree", a system for collecting cigarette butts and harvesting seeds from the cotton inside. Regarding the Innovation Prize Contests (Desafíos de Innovación con Recompensa – DIR), visitors to the InnoBank site are encouraged to register as members and select from a list of competitions, each of which is governed by its own set of legal conditions.

Fellowforce.com (2007)

This website, based in the Netherlands with offices in the United States and Poland, allows companies to post innovation challenges, for which members, called "fellows," can compete.[210] The site also hosts a "suggestion box" enabling consumers to pitch ideas directly to participating companies.[211] Prizes range from nothing, to an invitation to Oktoberfest, to 1 million pounds sterling (the NESTA Big Green Challenge).[212] Organizations are responsible for selecting the winning pitches and paying the winning entrants. Prize categories range from consumer products to IT to engineering and design. The forum rules state that all rights, including intellectual property rights, are transferred to the receiving organization, and that in the case of a patent innovation proposal, entrants and receiving organizations are responsible for negotiating licensing rights. The rules also note that publishing an unpatented innovation proposal could prevent entrants from patenting it later. Fellowforce itself does not accept patented challenge pitches.

BootB.com (2007)

Companies such as Lego, Peugot, and DisneyLand were among those registered with BootB at its inception, paying $100,000 apiece to place specifications for their marketing campaigns on the BootB website.[213] The site is open to individuals and ad agencies looking to compete for the development budget, or prize money, offered by each company. Companies specify their goals, target audiences, deliverables, company details, proposed media placement, and other such information. For example, the France-based supermarket chain Auchon is currently offering $12,600 for the best pitch in support of its spring anniversary celebrations, particularly asking for TV storyboards for 10 and 30 second commercials, text for radio advertisements, poster designs, and booklet layout samples.[214] BootB is published in twelve languages, and its registration process constitutes a legally binding contract between creators and purchasers which is meant to guarantee payment upon the selection of a winning entrant.[215]

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[209] http://www.innobank.cl/desafios.php (accessed Jan 16, 2008).

[210] http://www.fellowforce.com/

[211] http://www.fellowforce.com/downloads/Innovate_Us_Press_Release.pdf

[212] http://www.fellowforce.com/blog/

[213] http://www.forbes.com/businesswire/feeds/businesswire/2007/11/30/businesswire20071130005011r1.html

[214] http://www.bootb.com/en/briefs/desc/in_store_promotion/37390-auchan_spring_anniversary/info/

[215] http://www.bootb.com/en/docs/.