

PRIORITIES FOR FEDERAL INNOVATION REFORM

Pathways to Innovation

By

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In the following list, all the products have one thing in common. Can you guess what it is?

Electronic Octane	World Wide Web
Solar Powered Airplane	Strobe Lights
Radar Imaging	Kitty Litter
56K Modem	Gatorade
Microwave Cookware	Implantable Cardiac Pacemaker

Surprise! All these inventions were created by independent inventors².

Independent inventors form the backbone of innovation in the United States, yet they often encounter difficulties gaining access to corporate America where their ideas can be implemented. We recommend that the Committee on Technology of the National Science and Technology Council create a dynamic, multidisciplinary, multi-agency program housed in a foundation to support more fluid and fruitful engagement of the Nation's independent inventors and corporate America.

First, some lessons learned can be gleaned from a current U.S. Department of Energy (DOE) program, now called the Inventions and Innovation Program, that has been in operation for the past 25 years. This is the only Federal program specifically oriented to meet the needs of independent inventors. In the past, DOE's Inventions and Innovation Program has operated under two manifestations, which illustrate the strengths and weaknesses of approaches to promote technologies developed by independent inventors.

The earlier manifestation, the Energy-Related Inventions Program, offered a free technical evaluation to "all comers" through the auspices of the National Institute of Standards and Technology (NIST). These lengthy engineering evaluations added value to the inventor's idea by offering a concise yet comprehensive analysis of the invention's technical feasibility, national energy impact, and

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² The list above is taken from a list of 230 products created by independent and university inventors that was published by *Inventors' Digest* in support of National Inventors' Month™ and furnished to us by Joanne Hays-Rines, editor. One of the technologies is also the most commercially successful product supported by the U.S. Department of Energy's Energy-Related Inventions Program.

commercial/economic promise. Inventors were free to apply at any time, did not need a formal written proposal, and could submit ideas in any technical area related to energy except nuclear energy. NIST deemed approximately 4 percent of these inventions to be “promising” and then recommended that DOE consider providing technical and financial assistance to the inventor. Roughly 80-90 percent of those recommended to DOE received a small grant to move the technology closer to the marketplace; all received technical assistance in the form of training in the commercialization process and mentoring from centralized portfolio managers. Many of these independent and university inventors also received market assessments.

The current manifestation, established in 1998, issues an annual request for proposals and requires that applicants respond to topics, similar to the Small Business Innovation Research Program. All proposals are peer reviewed, and an inventor’s proposal is either accepted or rejected—there is no further value added. Mentoring has been decentralized at the regional level.

The earlier manifestation of the Program achieved a level of success that was measurably by a variety of quantitative indices; the current manifestation is too new to allow for quantitative measurements. Between 1980 when the first commercial sales were recorded and 1996, 24 percent of the inventions supported by DOE had various degrees of commercialization success³. Conservatively, the inventions had generated over \$1 billion in sales from these inventions and their spinoffs. The ratio of sales to grants was 20:1, and the ratio of sales to Program appropriations was 8:1.

Three problems have plagued both versions of this Program and limited its effectiveness: there is no champion who has entrée at the highest levels of Government and industry to promote these worthy inventions, there is no board of directors who can bring the same degree of distinction to the Program, and there are only very limited ways to organize independent inventors into a coalition that can speak for all. By contrast, the Small Business Innovation Research Program (SBIR) has enthusiastic support from the small business community. It has champions in Anne Eskesen, the “godmother” of the program; Roland Tibbetts, who created the SBIR Program at the National Science Foundation and worked with Anne and others to expand it to other agencies; and Jere Glover, Chief Counsel for Advocacy at the Small Business Administration.

Ultimately, an effective National Innovation System will have to address the unique needs of independent inventors. They are creative, but driven, people who prefer to work by themselves (that way no one can steal their ideas). They are gullible and fall prey to scam artists whom the Federal Trade Commission continues to prosecute but only to limited effect. Inventors often drive straight-line thinkers to distraction because they are so focused on what they perceive as the value of their invention. They have limited entrepreneurial skills and need training in the commercialization process, especially in their ability to gain access to capital markets and corporate sponsors. They are just not easy to deal with!

¹ Robert B. Braid, Jr., et. al., 1966, *The Energy-Related Inventions Program: Continuing Benefits to the Inventor Community*: Oak Ridge, Tennessee, Oak Ridge National Laboratory, p. vii.

Similarly, an effective National Innovation System must fulfill the needs of corporate America by adopting more ideas from independent inventors and turning them into commercial successes. Although corporate America stands to reap the profits of implementing innovative ideas, it tends to under-invest in independent inventors for a variety of reasons: (1) high risk of investment in long-term innovation; (2) inability to appropriate exclusively the economic benefits accruing from innovation; and (3) limited information about pertinent inventions that could improve industrial processes or create a new, commercial product.

We offer the following suggestions on how a National Innovation System might serve as a broker to jointly meet the needs of both independent inventors and corporate America:

- **Create a foundation that will collect the best attributes of multiple Federal agencies.** An advocacy center for independent inventors needs to be created in a single, centralized locale, rather than being distributed across a number of agencies. Centralizing this function and broadening its mission beyond just energy strengthens its profile and allows the more efficient exchange among multiple disciplines, rather than limiting consideration only to inventions that fit an agency's mission. Moreover, a centralized organization can serve as a focal point to filter out inventions that are not technically valid (for example, they may violate the laws of physics) -- not dismissing any submittal perfunctorily, but giving each its just due. In addition, a centralized organization provides a less expensive means to deliver customized, tailored resources to both inventors and corporate America. Indeed, the core mission of such a centralized organization is to serve as a matchmaker between independent inventors and corporate America where their ideas would be placed.

We recommend that this centralized organization be operated as a foundation for two reasons. First, a centralized foundation can attract the "best and brightest" of staff that would be contributed by participating agencies. Second, a foundation allows the contribution of private sector money to supplement the seed money provided by the Federal Government.

- **Establish a robust and timely value-added evaluation system.** A value-added evaluation system would weigh each invention on its own merits, by comparing each new idea to current practice within its respective discipline and judging its chances for commercial success. This approach contrasts sharply with other methods that toss all inventions submitted into a single "bucket," then rank order them, and fund only the top few. This does not mean that the value-added evaluation system that we propose will not be selective -- after all, budgets and staff resources are limited -- just that each invention submitted will be evaluated fairly relative to its respective discipline.

Furthermore, the turnaround time to evaluate a submitted invention must be reduced to a timeframe more acceptable to inventors. The earlier manifestation of the DOE's Inventions and Innovation Program would often take more than 2 years to complete an evaluation; the goal was to reduce that time to 18 months. If the U.S. Patent and Trademark Office can reduce its pendency time to 1 year, then an evaluation system should be able to complete an evaluation in less than that time. The SBIR

Program at DOE uses peer reviews to complete evaluations in less than 6 months. The peer review process in the Inventions and Innovation Program does it in 3 months. According to Gerald Udell⁴, head of the Wal-Mart Innovation Network, his evaluations of products designed to be sold at Wal-Mart take 3 weeks. There must be some middle ground to allow for a customized evaluation in a reasonably short period of time.

- **Offer training and commercialization assistance to guide the inventor in the pathways to the marketplace.** Inventors are creators first, and businesspersons second. Training can help an inventor design elements into his/her invention that can increase its chances of success as the idea travels downstream from research and development to full commercialization. Often, an inventor does not understand the need to cede control to corporate interests that can develop the inventor's idea. He or she needs to understand the need to sell or license the invention and move on in certain cases. However, some inventors can turn into entrepreneurs -- witness the SBIR Program. Staff at the foundation need to know when to suggest that an inventor license his/her idea to a corporate developer and when to go into business.
- **Establish value that will attract corporate sponsors to independent inventions.** First, the foundation should act as a clearinghouse to ensure the greatest possible transfer of information from independent inventors to corporate America. Convenient interfaces should be created to make it as easy as possible for corporate America to access ideas relevant to their individual enterprises. Foundation staff also should be knowledgeable enough to make appropriate referrals to specific companies. In this gatekeeper role, staff of the foundation would forward only the most technically valid inventions, and the necessary intellectual property protection would be in place for the inventor.

Moreover, to mitigate the risk of investing in undeveloped ideas, it is anticipated that smaller, intermediate companies will be the primary audience for the clearinghouse and referrals. These intermediaries serve to collect good ideas and develop them either for their own use or for further referral to larger companies that can utilize them.

- **Create mechanisms to raise the stature of independent inventors.** An inventor oftentimes is held in low esteem because he/she doesn't wear a lab coat or has not had his/her idea peer reviewed. Technical and professional societies offer awards to their inventors (otherwise known as product developers, university researchers, or company scientists and engineers). If the Lemelson Foundation can offer a \$500,000 prize to an invention and Nobel Prizes are offered to scientists, we recommend that this foundation offer a similar annual award and prize to the most deserving independent inventor. We propose naming the prize after the recently deceased Jacob Rabinow⁵, former consultant to the Energy-Related Inventions Program, entrepreneur and holder of over 230 patents, and independent inventor.

⁴ Telecom with Gerald Udell, September 13, 1999.

⁵ Anon., September 14, 1999, Obituary of Jacob Rabinow: Washington, D.C., *Washington Post*, p. B5.

Moreover, the director of the foundation should be a “champion” who can work toward ensuring its successful operation and broader notoriety. Someone with “clout” who has access to the highest levels of Government and the private sector would be ideal. Potential candidates include Jack Welch after his retirement from General Electric, Q. Todd Dickinson, the newly designated Patent Commissioner, or James Ferguson (the inventor of liquid crystals).

To encourage the innovation process, we recommend that the foundation be run by board of directors that has access to the highest levels of Government and industry. To reach the grassroots level and to ensure further support for the program, some of the directors could be drawn from the National Association of State Venture Funds, the State Science and Technology Institute, and the Association of Small Business Development Centers. Others would be from companies of all sizes. Furthermore, this new program for independent inventors must be announced from the White House and housed in a highly visible location. These are the only ways to guarantee the credibility that the new program needs.

- **Design the program so that it leverages funding from the private sector.** Funds contributed from the private sector will reduce the likelihood of the program’s being viewed as “technology welfare.” Since the program champion and board of directors will have access at the highest levels of Government and industry, finding money to leverage should not be difficult.

In fact, we recommend that the foundation explore means for reimbursement, should forwarded ideas yield sufficient profits when developed in corporate America. Reimbursement would be limited only to the investment that the foundation made in evaluating the idea and promoting it to corporate America and would not be used to subsidize unsuccessful inventions. Some recoupment of investment would allow the foundation to operate as somewhat of a revolving fund.

Our research and networking have shown that there is a need for such a program housed in a highly visible foundation. We hope that the arguments we have made will convince the Committee on Technology of the National Science and Technology Council to create a program for independent inventors.