

# The Technology Bureaucrats

## Suppression of Innovation by the United States Government

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As I write this article, the United States is in the grip of what has become known as the Great Recession, a downturn more severe than any since the Great Depression in the 1930s. Even in good times, funding for risky new breakthrough innovation is scant. In this economic climate it is practically nonexistent. To say that private sources of funding are scarce these days is to grossly understate the problem.

Practically the ONLY source funding technology innovations at the moment are agencies of the federal government. But when it comes to such innovation, most federal agencies just don't "get it". With the specter of peak oil and the problems of global climate change, new and innovative "breakthrough" technology is a critical element in any mix of solutions. At the very moment when radical innovation is most needed, the only sources of funding are agencies run by government bureaucrats whose lack of vision is legendary.

What is happening now with funding under the American Recovery and Reinvestment act of 2009 is a case in point. While it is true that SOMEONE is getting funding, since government grants are being made, most of that funding is going to the usual suspects. Anything truly unusual from nontraditional sources doesn't stand a chance in a bureaucratically run government program.

Being an inventor myself, I just happen to have developed a transformational new technology in the years before the current crisis. The area the innovation addresses is the solar energy "problem". That is, the diffuse and intermittent nature of renewable energy derived ultimately from the sun.

This is a broad area requiring many different kinds of technology to exploit properly. Consequently, it is not a single invention or device and doesn't lend itself well to bureaucratic government programs that typically focus on one machine or technical approach.

Over a period of years I built and tested many of the components needed to achieve success with this new concept. Because there are a number of devices and applications, the failure risk is actually quite low because it is spread over a broad solution base. While this new approach requires a complex technology mix to achieve commercial success, the concept itself is simple enough.

All conventional solar-derived renewable energy technology relies on intercepting direct solar radiation or harnessing natural atmospheric convection currents in the form of wind. They have serious disadvantages in that output is intermittent and power delivery rates are limited by natural processes. This makes traditional renewable facilities inherently bulky and expensive.

The method I developed is compact, cost effective and can deliver large amounts of dispatchable power from either fixed installations or portable and mobile power systems that move by land, sea or air 24 hours a day, 7 days a week, 365 days a year.

Even if this new technology is only partially realized, it has the potential to revolutionize the energy industry and create millions of new jobs. There are also broad spillover effects. One of the more obvious of these is a potentially drastic reduction in the output of greenhouse gases that drive climate change.

The question here is not whether funding initial development of this technology is a risk worth taking. Such an investment costs very little in comparison to the massive potential return. The amount of capital at risk is very small while the rewards for success are nearly incalculable. The question is therefore much more fundamental. Is the loss of innovation with such enormous potential a risk worth taking?

The Obama Administration is presently looking for bold new “transformational” energy solutions. The objective is to find and develop breakthrough technologies that can enable America to “leapfrog” decades of incremental development in important economic sectors.

Two agencies with the best chance of pulling this off are the storied DOD agency, DARPA, and a newcomer, the civilian DOE ARPA-E agency. DARPA's original mission was to prevent technological surprise to our forces and to create technological surprise for our enemies. DARPA has had some spectacular successes, the original Internet program among them.

Patterned after DARPA, the newer DOE ARPA-E agency is intended to fund high-risk, high-reward energy research that might not otherwise be pursued because there is a relatively high risk of failure. A crucial element in achieving this objective is finding and funding such innovative technology.

Anyone familiar with the problems and perils of the “innovation industry” knows perfectly well what I am getting at here. Some of our most important technological breakthroughs have come from outside the mainstream science and R&D community because the success of radically new innovation cannot be predicted. It is therefore not part of the mainstream research community who will not take up anything where success cannot be inferred in advance.

Logically, if one wanted to acquire transformational technology, the emphasis would be on looking outside the ranks of mainstream R&D companies and scientific institutions that deal in “safe”, incremental innovation. How such radical innovation is submitted, where it comes from, when it is submitted and who developed it are clearly of secondary importance. Once it is identified, the government should set about figuring out how to guide and fund such innovation on a case-by-case basis tailored to individual circumstances.

The problem with most federal agencies is that they are geared almost entirely to service the funding needs of the established mainstream research and development community. This leads to some extraordinarily strange behavior on the part of federal agencies charged with reaching out to those who are not among their familiar clientele.

The response of both DARPA and ARPA-E to recent administration mandates for identifying transformational innovation has been to concoct very traditional government programs driven by bureaucratic solicitations. These byzantine procedures are an absolute nightmare and all but ensure that radical transformational technology from outsiders is never funded.

The two federal agencies have come up with complicated program solicitations that would gravel a Philadelphia lawyer, promulgating a one-size-fits all funding approach geared to the mainstream research industry, not grass-roots innovators. The greatest emphasis in these programs has been placed on the methodology of submission rather than on finding innovation with transformational potential.

The technology bureaucrats in the government have managed in one stroke to subvert the primary goal of finding and funding transformational technology! The result is suppression of all innovation that falls outside the bureaucratic solicitation rules because such innovation will never get funded.

Traditional technology solicitation programs all suffer from very serious flaws when used to find transformational innovation. The biggest problem with these programs is that they wrongly assume such innovation can be crammed into a solicitation cycle. Innovation that doesn't arrive at the agency during the solicitation open period is summarily rejected - no matter how good it is. Likewise, if unsolicited innovation is presented for review it is also rejected out of hand without even so much as a cursory "flip through".

Innovators who try to find an open solicitation quickly discover that information about these opportunities is not widely available. Because details are not typically present in the public media during the open period, these solicitations are "stealthy". Information is often not widely disseminated until well after the solicitation has closed.

Solicitation programs are very effectively "buried" on sprawling government websites and the open period deadlines are often severely truncated. It is very hard for new applicants to learn about the opportunities in time to apply.

Those in the mainstream research community who typically submit such proposals are well aware of new funding opportunities. Because they have deep roots in the federal bureaucracy, they are often apprised of a pending solicitation well before its release. From long experience they know what federal bureaucrats like to see and have a well-oiled proposal apparatus in place that can quickly generate proposals with a high probability of success.

Innovators outside the mainstream research community are severely disadvantaged by the rules of solicitation funding programs. Critical forms and solicitation information is often diffused across many different federal procurement websites not easily accessible to members of the public because of difficult search procedures and site signup requirements.

Rules for participation in these programs further require gathering up specific editions of "splintered" documents that are not included in the solicitation itself. And as if that was not bad enough, there are many different versions of these splinter documents. The respondent

must search the fine print of the solicitation, sometimes published on other websites apart from the one where the solicitation summary itself is published, in order to secure the specified editions of the additional documents.

If the would-be participant doesn't get everything exactly right and follow these solicitations TO THE LETTER, the agency arbitrarily rejects of the submission as a "non-responsive" regardless of how beneficial such innovation may be.

Access to basic solicitation forms and documents typically require foreknowledge of program designators and terminology as well as arcane search protocols on federal procurement websites. And federal Internet sites do not always work properly due to browser compatibility issues and other technical problems. Many solicitations are amended during the open period and these changes, some quite numerous, must be dealt with in order to have the submission accepted by the soliciting agency.

Finding an open solicitation and completing a submission often comes down to a battle against time. Program open periods often are often too brief for newcomers to properly draft a response. The agency takes all the time it needs to craft the solicitation but then creates an open period so short as to make it virtually impossible for new participants to respond.

By way of example, by the time I found out about the ARPA-E "Transformational Energy Technology" program, (DE-FOA-0000065) I had only two weeks to complete a submission. The full open period was only about 30 days, a ridiculously short time for an understaffed, under-funded microbusiness to prepare the required comprehensive response, given all the preparation required before the main effort can even begin.

Drafting a response to such a solicitation includes solicitation and related document gathering, multiple Website registration, complicated document preparation methods and multi-step submission procedures. (using DUNS, CCR and FedConnect and the like) The entire process is very time intensive and fraught with many pitfalls for the unwary.

Solicitation programs also suffer from micro-management issues such as requirements for document length, formatting and font style. Another problem is agency assumptions regarding availability of special document manipulation software and file editing packages to allow generating, editing and merging PDF and other types of files required by the solicitation. These tools are available, but not everyone has them or can afford them. And it is all but impossible to take the time to troubleshoot issues they cause when installed while at the same time dealing with overly brief solicitation deadlines.

Some solicitation rules are simply too limiting to allow the participant to provide adequate information for even a minimal evaluation of complex transformational technology. Other procedures like pre-registering, encryption and log-in requirements are even more daunting.

And following all these bureaucratic rules doesn't necessarily solve the problem either. I prepared a first-round concept paper that nominally met all these requirements. This "legitimate" submission drew a reply from ARPA-E that strongly discouraged submission of a full proposal.

It seems that the PRELIMINARY paper was rejected because it did not contain detailed second-stage information would only have appeared in a full proposal - a proposal that could only have been submitted after acceptance of the preliminary paper. Such circular logic is typical of the reasoning routinely used by government bureaucrats to rid themselves of innovation they are not comfortable with.

Lest some be confused by the terminology here, strong discouragement used in connection with rejection of submissions by such programs does not mean that your proposal, if submitted anyway, will convince the agency that their initial finding was wrong.

Sure, you can submit the proposal. But it will immediately be rejected because the agency has already determined that it does not meet their requirements. This wording is really intended to cover bureaucratic backsides because if the new innovation somehow prevails, the agency will simply say that it could have been submitted in spite of the discouragement.

Program bureaucrats swiftly eject any outsiders who somehow manage to get past the barriers to submitting a solicitation. Funding is then awarded to those in the R&D mainstream because their proposals are fashioned in a way that appeals to the funding bureaucracy.

Seasoned grant and proposal writers, wise in the ways of federal procurement, will immediately protest that the issues I am raising are unjustified and only reflect my neophyte proposal writer status. I freely admit to my inexperience in dealing with the federal procurement apparatus, which is a career in and of itself.

Let me say in my defense, however, that programs seeking transformational technologies specifically aim to reach a wider innovative population beyond the professional grant writing organizations who routinely propose "safe" incremental research. The goal here is to find radical new innovation from the population at large, where knowledge of government procurement procedures is likely to be sketchy at best. Such programs are looking for technology inventors, not procurement specialists.

And make no mistake - radical new innovation is very hard to find. It makes no sense at all to refuse to look such inventions because they weren't submitted in a way that doesn't happen to conform to arbitrary bureaucratic rules. Whether through bureaucratic incompetence or by design, something is terribly wrong with federal policies aimed at discovering and funding new technology. These policies result in programs that are constructed and administered in a way that eliminates exactly the sort of technology they are intended to find.

Rejection of breakthrough innovation by government agencies vividly illustrates why government organizations are time and again unable to identify and fund inventions that change the course of history. How can anyone, especially a government technology bureaucrat, write a solicitation seeking innovation that is widely believed by experts to be impossible and unachievable?

Yet this is just the sort of innovation that gets submitted to the government, often by means of an unsolicited proposal. There are famous historical examples of breakthrough

technology that was submitted by innovators without regard to a solicitation schedule. Submissions of this kind will almost certainly NOT follow the rules of solicitation programs because they are not submitted in response to one.

Neither DARPA nor ARPA-E accepts unsolicited proposals. Both agencies refuse to look at unsolicited material. The fact that an organization like DARPA and ARPA-E can't find a way to evaluate compelling innovation submitted this way is strong evidence that they both lack the ability to fulfill the Obama administration's mandate of funding transformative technology.

I have some experience with unsolicited submissions to the U.S. Government. I sent an unsolicited early-stage concept document to the DOE Unsolicited Proposal Program as the first step in submitting an unsolicited proposal. The DOE Unsolicited Proposal Guide recommends an informal process to establish agency interest before submitting a full proposal. I first submitted an abstract limited to 250 words as recommended by the guide.

In about a month (which is about how long each response cycle takes) I received a further request for a "...structured/detailed... summary ...of at least 500 words..." because DOE evaluators trying to understand a broad, complex technology felt the original 250 word abstract did not contain enough information. (DUH!) Because it didn't make any sense to continue to submit the material piecemeal, with a month between response letters, each requesting incrementally more information than the last, I sent a detailed concept document instead.

A concept document of this kind (sometimes called a "white paper") is not intended to fully disclose all relevant technical elements. It is not a "how to" technical blueprint or a proposal. Its purpose is to diagram a development pathway and provide basic general information needed for establishing the overall validity of a contemplated solution.

This particular paper covered the scope of the technology, background information showing the concept was feasible, experimental history, and actual device applications. Material that provided context about unique problems faced by innovators in an economically disadvantaged microbusiness when developing a radically new concept of this kind was also included. The latter was necessary to explain why expensive research facilities were not used and why staffing levels were not on par with mainstream industrial laboratories.

The document did not contain detailed technical specifications, as those are targeted at a particular application and would have been forthcoming in a full proposal aimed at a single device. The material did, however, contain a copy of a letter from a legitimate scientific authority in the field who had reviewed technical specifications for one of the more useful applications and found that the technology was achievable.

This letter was important to eliminate any misconception that the concept involved perpetual motion – a scientific impossibility. Moreover, the document included photographs of a successful experimental prototype and pointed out solutions for various major technical hurdles that most evaluators would consider barriers to success.

I was astounded when in due course I heard from the DOE evaluator passing news that the DOE would not be interested in my technology! A powerful, compact device that uses the sun's energy 24 hours a day, 7 days a week, 365 days a year without massive solar collector arrays is "not interesting" to the DOE. Really?

As I read the introduction of the Unsolicited Proposal Guide, it says that the DOE accepts proposals that demonstrate unique and innovative energy research concepts with emphasis on high-risk, high-payoff technologies.

The technology I submitted to the DOE Unsolicited Proposal Program fell squarely within this rubric. The risk, while high, is manageable and the payoff for success in even one small application of the overall scope is so great that it would fundamentally alter the energy industry and catapult solar technology firmly into the mainstream energy mix.

The DOE evaluator explained his reasons for rejecting the concept document, placing most of his criticism on the lack of a detailed set of technical specifications and the fact that the document was "unsolicited". He seemed not to understand or appreciate that the DOE Unsolicited Proposal Program was precisely intended to encourage unsolicited documents. The rules specifically encourage informal preliminary contact (such as my concept paper) before submitting a technical proposal.

You can imagine my disappointment with the way the DOE unsolicited proposal program appears to subvert the very goals it claims to support. My non-technical concept document was referred to an organization within the DOE that:

- (A) Does not accept unsolicited material in the first place.
- (B) Does not review anything other than technical material.
- (C) Objected to a full proposal containing the very technical information being sought.

The DOE review ignored virtually everything of consequence in the concept document, labeling such information, "historical", "philosophical" and "unrelated". To say that the reviewer missed the whole point of an informal concept document is an understatement. Such a review process guarantees that ANY unsolicited energy technology will be rejected, however deserving. To say the process is "rigged" is putting it mildly.

American history is replete with examples of breakthrough research and inventions that were ignored by the government. The Wright Brothers submitted an unsolicited proposal to the government. The rejection of their proposal is a case study of one of the worst examples of blundering experts and inept U.S. Government agencies on record.

Here are a few of the many examples of the lack of vision displayed by experts and agency heads in regard to flying machines in general and the Wright Brothers Flyer in particular:

"Heavier-than-air flying machines are impossible." - Lord Kelvin, president, Royal Society, 1895.

"To affirm that the aeroplane is going to 'revolutionize' naval warfare of the future is to be guilty of the wildest exaggeration." – Scientific American, 1910

In 1905 the Board of Ordnance and Fortifications at the United States War Department sent correspondence to the Wright Brothers responding to their unsolicited proposal for a contract to provide airplanes to the United States Government after they flew at Kitty Hawk. The government wrote back to the Wrights:

"... to decline to make allotments for the experimental development of devices for mechanical flight."

Noting in the rejection that:

"... the device must have been brought to a stage of practical operation, without expense to the United States. It appears from the letter of Messrs. Wilbur and Orville Wright, that their machine has not yet been brought to the required stage of practical operation."

The United States had a golden opportunity to support development of the only practical flying machine in existence at the time. The government tragically lost a virtual monopoly on aircraft technology that was to cost the nation dearly in the Second World War.

And even after the lesson of the airplane was evident to the most closed-minded skeptic, some individuals STILL had not taken it to heart. In 1936, Richard van der Riet Wooley, a noted British astronomer, dismissed the notion of space flight this way:

"The whole procedure of shooting rockets into space. . . presents difficulties of so fundamental a nature, that we are forced to dismiss the notion as essentially impracticable, in spite of the author's insistent appeal to put aside prejudice and to recollect the supposed impossibility of heavier-than-air flight before it was actually accomplished."

Early-stage technology is not obvious or compelling to experts and innovation itself often appears in settings where it is completely unexpected. The very definition of a patentable invention in the United States is one that is not obvious to those ordinarily skilled in the art. When confronted by an innovator with a new idea, the government has it examined by an expert, typically, someone who is ordinarily skilled in the art. Is it any wonder, then, why the government is nearly always "not interested" in breakthrough technology?

For many innovators, funding simply comes down to blind luck. A lottery ticket is often as effective in raising capital as submitting a proposal to a government funding source. It is an urgent priority to reform the way that federal agencies deal with innovators. The alternative is to write off badly needed breakthroughs and get surprised in war by our enemies and beaten in the marketplace during peacetime.

The United States Government needs to learn to listen to innovators, not suppress their ideas by refusing to review their inventions and withholding development funding.