

INNOVATION

Is America's Science, Technology, and Innovation Policy Open for Business?

By [Joseph P. Lane](#) and [Benoit Godin](#) | Tuesday, June 12th, 2012



A recent series of reports on science and economic competitiveness from the Center for American Progress and its *Science Progress* project suggests ways to streamline government programs, realign inter-sector collaborations, and reallocate public resources.[\[1\]](#)

The recommendation for a Department of Competitiveness envisions a wide range of stakeholders collaborating to increase innovation. It would collect various programs from multiple organizations and improve coordination with mission-driven programs that must remain separate. But is that enough to achieve innovation in the context of maximizing socioeconomic benefits?

For programs that expect their technological innovation outputs to improve domestic quality of life and global competitiveness, there is yet another unspoken drag on their throughput. This drag is the pervasive weight of the scientific research framework—weight that dominates the design, content, and even the titles of all government-sponsored programs, including those which are expected to conduct both scientific research and engineeringdevelopment activities. Even commercialization-oriented programs—such as the cabinet-level Small Business Innovation Research—are branded and evaluated as “research” programs despite their intent to foster technological innovations in the marketplace. This orientation skews awards and outputs away from industry and toward academia, despite the latter sector’s structural and statutory

inability to manufacture, distribute, sell, or support innovative products in the marketplace.

Simply put, this scientific method is designed to generate new knowledge in the state of conceptual discoveries. But it is not sufficient for transforming such conceptual knowledge into the state of prototype inventions or into the state of commercial innovations.

These latter two states of knowledge are equally important in realizing the social value of innovation. Achieving them requires the subsequent application of two distinctly different methods: the methods of engineering development to transform scientific discoveries into tangible inventions and the methods of industrial production to transform prototypes into hardened commercial innovations.[2]

So who is the customer for so-called science, technology, and innovation, or STI, policy? Is it the government agencies that receive budgetary allocations from Congress? Is it the research universities that secure extramural funding through proposals? There is no denying that R&D is big business for the sponsoring agencies and the recipient institutions. Both operate administrative infrastructures that grow along with the funding levels, but resist shrinking because of the employment protections afforded to those in public services.

Indeed, rising tax and tuition rates show whose interests are actually being served through science-driven programs, policies, and funding priorities. Yet even these subjective interests cannot be sustained indefinitely if the world does not objectively value their outputs as innovations with commercial viability.

The science mindset driving the policies and programs in the government and academic sectors does not automatically or autonomously generate new net wealth for society. These sectors point to budgetary allocations and expenditures to characterize their role in economic stimulus, but such examples are erroneous at best. Such resources are not generated internally. They are instead only a pass-through of public money collected from the real revenue generators. It is the private sector that generates new net wealth through the* commercial sale of products and services that meet consumer and/or societal needs. Therefore, a rational analysis must conclude that the private sector is the customer for investment in innovation intended to generate socioeconomic benefit.

Yet where do engineering and industrial issues appear in STI policies and programs? We recently published a paper explaining why the three methods of research, development,

and production should be considered complementary and deserving of parity in policy and practice. A historical review shows that development as a method was gradually subordinated to science, while production methods are simply excluded.[3]

This science bias is even apparent in the language of innovation-oriented programs: the governmentwide program supporting high-technology entrepreneurs is called *Small Business Innovation Research*. Similarly the National Science Foundation operates a program of *Engineering Research Centers*. Despite their mission to support commercial outcomes, they do not even include the word “development,” let alone make mention of the downstream activities of industrial production. The language of scientific research permeates all aspects of these programs. Calls for proposals solicit research designs, scoring criteria emphasize research rigor, and peer reviewer panels are stocked with scholars.

This “science first” assumption creates perceptual and operational barriers to enter the most critical sector: business and industry. Companies assess the opportunity cost of competing for government funding and the time lags involved in the submission, review, and allocation. While U.S. Government and academic institutions rely on a continuing base of funding, and their personnel rely on employment security to bridge these ill-defined timeframes, U.S. companies must consider the reality of going out of business and their employees contemplate losing their jobs in the interim. Both the risks and the returns are different for the public versus private sectors, yet current U.S. policies do little to address the inequities underlying this reality.

A key barrier to more progressive policies in the United States is ideological. This paper’s position may be overgeneralized as advocating governmental subsidy of proper industrial investment in R&D investment, which it does not. Or it may be criticized as government interference in free market mechanisms, which it is not. We simply argue here that government policies and programs expressly intending to generate social or economic impacts must acknowledge industry as the customer for R&D outputs. Acknowledging industry as the vehicle for transforming government and academic sector outputs into commercial innovations actually reinforces their respective roles in the free market system.

Such practical policy realignments are underway elsewhere in the world. The Oslo Manual is a reference document for collecting innovation-related data. In place of the traditional scholarly metrics of expenditures, publications, or disclosures, it defines four types of innovation—product, process, organizational, marketing—all four of which are oriented

around a corporation's ability to improve productivity or commercial performance. Shifting the units of innovation analysis from inputs and outputs to outcomes and impacts is the single-most obvious yet entirely ignored change confronting U.S. government agencies and academic institutions engaged in technological innovation.

Even China's own Academy of Science is acknowledging the reality of global commercial competition by orienting its 2050 roadmap to be business oriented and market driven. Who is prepared to defend a position allowing "communist China's" STI policy to be more business friendly than that of the United States?[4]

What works for commercial endeavors supporting domestic quality of life and global competition is the business method, not the scientific method. Scientific discoveries and engineering technologies are both necessary but insufficient to realize the promise of innovation as understood by the public at large. Their expectations are for products and services that generate utility for the consumer; solutions to social, environmental, or public health problems; profits for the company; and tax revenues for government—all within the short-term timeframes where investments are made and returns are generated. While both government and academia play important enabling roles, it is industry that delivers commercial innovations to the marketplace.

Collectively, the CAP reports caution about high resistance to the proposed changes among the entrenched interests. There are fewer interests more highly respected and strongly positioned than those who keep the private sector outside the STI policy system. What will it take to convince them that their interests are best served by collaborating with industry and to avoid having their interests served, on a platter, to their global competitors?

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