

OPINION SCIENCE

Priority setting in the knowledge ecosystem

Australia, the U.K., and U.S. all have their science policy goals. What should Canada's be?



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As the federal government contemplates a considered course on fundamental science and the Council of Canadian Academies reboots another assessment of the state of science, technology, and innovation in Canada, it is worth remembering why we do these exercises.

The reasons can be numerous: to improve global prestige, enhance culture, develop excellence, achieve breakthroughs, strengthen economic returns, manage security, deploy bright talent, deepen learning; or simply send signals that knowledge matters in a democratic society.

Of course, there are other temptations at the political level: can we leverage science for national objectives? We see this in the recent examples of various nations targeting priorities in which they wish to invest.

The United States president has announced a cancer "moonshot" that aims to cure cancer once and for all; the National Science Foundation director has singled out six "research big ideas" and three "process ideas" that she thinks will lead to transformative discoveries. The United Kingdom has its eight great technologies. Australia has stipulated its nine science and research priorities with corresponding practical challenges. And Canada enunciated its four priority areas for science, technology, and innovation with numerous sub-priorities in the previous government.

And so it goes. With a newly appointed advisory panel to review federal support for fundamental science, no doubt we will have revised priority lists in the coming year as the panel findings and innovation agenda are made public.

Inevitably, there will be calls for more opportunities than can be funded, more researchers competing than can be sustained, and more institutions and organizations seeking to expand than any one government can fund. Expectations are high—too high, given the limited fiscal capacity and constrained commitments of stakeholders.

Investing in knowledge requires a strong sense of how it can contribute to overall societal goals. At the end of the day, for a nation like Canada, maintaining a portfolio of investments is needed where strength is apparent, excellence and ingenuity are rewarded, and a talent pool developed and well supported. In any ecosystem that is properly designed, "market forces" should ideally drive the research system, but there is always a tension inherent within a political system to set targets or priorities.

Let's not kid ourselves. Priorities are set every day at all levels and in all public policy arenas. Research councils establish longish-range plans, both for the respective institutions but also for the research fields they are mandated to support. Moving beyond institutions, a trickier issue is setting priorities that cut across councils or research fields.

Increasingly, the evolving nature of the sciences themselves is altering this approach as institutions originally created to address traditional disciplinary areas, for example, need to adjust and grapple with fast-moving knowledge—often an endless frontier. How does one support the growth of synthetic biology or nanotechnology

while keeping an eye on the potentially dark shadows inherent in such knowledge? What is to be done with large-scale facilities that provide the tools to explore breakthrough science? What of global health challenges that traverse national borders, or impending climate change and its impacts?

At times, as was the case with genomics research in Canada or global health contributions, part of the solution is to establish a new organization with capacity to address the public policy gaps, such as Genome Canada or Grand Challenges Canada. Or when a perceived lack of analysis and evidence exists, flexible responses can be launched such as the Council of Canadian Academies or a proposed chief science adviser. Once created, how then does one track impact and measure progress? More critically, how does one assess if the policy innovation led to meaningful results for the country?

All of these are valid issues when exploring new public policy experiments. They are neither simple nor simply dealt with. They require measured inputs from the scientific

and creative communities as well as the informed public to be interpreted by decision-makers who have competing interests for further or re-profiled funding.

A half-century ago, a report on vital interests of the U.S. science and technology (S&T) system noted: "the federal government has displaced the university, industry, and the private foundation as chief patron and has fashioned a host of institutions to administer vastly increased commitments to scientific and technological excellence. Sustaining and managing this system is the challenge of the decade ahead."

Fast forward 50 years, and we are still dealing with this challenge, with ever-increasing players in the landscape.

But if we are to truly launch so-called moonshots for Canada in 2017, the role of the government and public-interest science should not be forgotten. It is all well and good to examine and "optimize" governance mechanisms and granting councils along with universities, colleges, and private sector players, but the value and role

of our national government assets in this should equally be considered.

A key recommendation from a report on federal science from a couple years ago is worth underscoring here: "Launch Federated Anticipatory, Adaptive, Advanced S&T Networks (FA3STnets) to rapidly mobilize national S&T capacity for urgent, horizontal, public policy priorities, and grand challenges."

There is no question Canadians will be faced with ever-more rapid transitions to society, the economy, and environment. As Stephen J. Toope noted in his July 4 *Hill Times* piece, "In order to address these important economic, social, and policy challenges, we need a more complete understanding of innovation that includes research and insight from all disciplines." We will certainly require the necessary innovative, responsive, and anticipatory ecosystem that can tackle these emerging and constantly shifting developments.

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