Moving Promising Technologies off the Shelf

Synopsis of Policy Brief No. 7
September 2013

This is an overview of a GPS Policy Brief commissioned by Genome Canada from researchers Jeremy Hall, Jonathan Linton, Robin Downey, Stelvia Matos and Vernon Bachor. Their task was to synthesize current knowledge into a range of options that can inform policy.

The goal: translating research into new technologies

In order to realize the social and economic benefits of translating publicly-funded research into innovation, commercialization and economic development, promising technologies must be taken up by diverse industry sectors. This goal is shared by Genome Canada, a not-for-profit research agency with the mandate of supporting Canada's presence in the global 'bioeconomy'.

The challenge: complexities in innovation and industry

Challenges in translating publicly-funded research into new technologies arise from complexities within the innovation process and variations across industry sectors.

The complex process of innovation

While many kinds of participants are involved in the innovation cycle, decision-making and incentives differ among technology developers, users and other stakeholders. Technology can be best shaped for adoption and use when the earliest phases of development incorporate technological, commercial and social knowledge—but these kinds of knowledge from diverse stakeholders add complexity and ambiguity to decision-making.

Diverse industrial settings

While some industries actively monitor and engage with university researchers, most are more passive. Because technology transfer offices, scientists and early developers are not oriented toward managing relationships with passive industry sectors, promising technologies with longer-term societal benefits can be left sitting on the shelf.

Three major issues to tackle

Three major issues must be tackled in order to advance the goal of translating publicly-funded research into technological innovations that benefit Canadian industries and citizens.

Timing

Because moving through the innovation cycle from science to market typically takes much longer than the span of current research funding models, evaluating science by outcome measures focused on translation within a given period is likely to be inaccurate or misleading. It may lead scientists to focus on developing short-term options at the expense of much larger long-term opportunities.

Incentives to collaborate

Translational research requires scientists to work in close coordination with social scientists and business. The added objectives and expectations call for additional skills and knowledge, and can detract scientists from their core areas of expertise. Furthermore, because 'lab to market' activities may not bear fruit within currently used assessment periods, it is difficult to assess and reward scientists' participation.

Heterogeneity

Because the translational model calls for collaboration across diverse stakeholders and in different industrial settings, a 'one size fits all' approach to technology development will result in many promising technologies sitting on the shelf.

GenomeCanada

In the full GPS Policy Brief, the authors describe the 'TCOS' Framework of Innovative Uncertainties as a tool enabling developers to identify key technical, commercial, organizational and social uncertainties at an early phase of a technology's development. They further demonstrate how the TCOS Framework can help identify the innovation path toward better commercialization opportunities through two examples of genomic-based technologies, one aimed at the detection of disease in trees and the other at the degradation of plant material, a key process in the production of biofuels.

Policy Options

These three options may help policymakers improve the translation of scientific research into successful commercial technologies:

1. ***Improve scientists' awareness of organizational, commercial and social aspects at an early stage in the innovation process***

The key to more effective technological innovation is early scanning of industry features, market dynamics, firm capabilities, benefit appropriation, and potential social and environmental impacts. Project leaders must ensure that 'gatekeepers' interface in these ways between the internal and external environment. Innovation specialists can help scientists understand the larger context by conducting assessments of broader commercial, organizational and social uncertainties.

2. ***Improve the ability of technology transfer offices to partner with more passively knowledge-seeking industries***

University technology transfer offices (which link universities to industry) often focus on medical research, a lucrative field in which industry actively seeks opportunities from science. However, they must be more active in identifying applications for genomic technologies in other industry sectors as well. Further work is needed to understand how to encourage such partnerships through opportunity recognition, raising awareness of research, suitable modes of interaction, and relevant measures and rewards for technology transfer offices.

3. ***Fund longer-term research projects enabling a technology's benefits to be explored and developed***

Early interaction between scientists and social scientists can help identify opportunities and potential users unknown at a project's outset. However, most research activities are established as individual projects on a schedule aligning with the funding period. Wider societal benefits often emerge long after the project is completed, resulting in promising technologies being left on the shelf for an extended time or even indefinitely. In order to exploit such opportunities, long-term funding commitments are needed.

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The full GPS Policy Brief 'Moving Promising Technologies Off the Shelf' is available at:
http://www.genomecanada.ca/en/ge3ls/policy-portal/directions.aspx