

Biotechnology Policy Briefing

To diffuse technology or not to diffuse: that's the question

On the one hand, access is the first ingredient in innovation. On the other, letting technology flow freely could lead to misuse and regulatory trouble.



Marc Saner

Technological knowledge

Let me give you a choice between two compelling narratives on the topic of diffusion—or

efforts to make technologies available by means of government policies. The first is an argument for the broad diffusion of biotechnologies, including synthetic biology and CRISPR (a genome editing tool). The other is an argument for a slow-down or clamp-down. You be the judge. But please do choose, because the stakes are high and the time is now.

The moral case for technological diffusion is sound and internationally shared. Monopolizing enabling technologies in wealthy nations hinders international development and fosters inequalities. UNESCO, the UN's educational and scientific organization, for example, has called for abolishing the "digital divide" for more than 10 years. Without active efforts to diffuse technologies, technological divides will likely multiply.

A more self-interested case for technological diffusion is also very credible. Biotechnology is now taught at high schools, and high school teams may even participate in an annual international competition at the Massachusetts Institute of Technology (MIT). Millennials can develop an interest in STEM disciplines (science, technology, engineering, and mathematics),



Sound arguments can be made both for and against the diffusion of modern biotechnologies, writes Prof. Marc Saner. *The Hill Times* photograph by Sam Garcia

including biotechnology, at hackathons and makerspaces. Fostering an interest in high technology and harnessing the minds of citizen innovators may be exactly what we need most to develop a more knowledge-based economy. Access is the first ingredient in innovation and progress. That's why Prometheus gave us fire.

Sound arguments can also be made against the diffusion of modern biotechnologies. Regulators will struggle to find resources to inspect highly diffused innovation sites. The prospect of many people tinkering away, possibly ignorant about their legal duty to notify

governments, is a concern. Even more worrying is the possibility that individuals and nations with bad intentions will weaponize biotechnology. The more widely technology is diffused and the lower its cost of entry, the harder it is to control its misuse. The Pentagon is taking

this threat seriously.

What do the innovators themselves say about the issue? In July, *Science* reported under the headline "How Canadian researchers reconstituted an extinct poxvirus for \$100,000 using mail-order DNA" that the project was accomplished without the need for exceptional biochemical knowledge or skills, significant funds, or significant time. Although his research had important medical objectives, the lead investigator, David Evans of the University of Alberta, also wanted to provide a proof-of-concept for synthesizing extinct viruses using mail-order DNA. This is a clear hint

that some leading innovators want policy-makers, ethicists, and regulators to reflect on the issue.

Another example was provided this month by U.S. scientist Craig Venter, who was instrumental in decoding the human genome. One of his companies showcased a technology for the digital recreation of individual faces from DNA samples. Portrayed as hype by many other experts, it is noteworthy that the study was "intended to spur discussion about how to share genetic information while protecting a person's privacy," according to a report in *Nature*. A discussion on access and diffusion of research data is, of course, linked to the diffusion of research capacity.

What is the verdict? Arguments for and against diffusion pit the direction of two key activities of government against each other: innovation policy and regulation. I will let you judge if the pendulum should swing further toward accelerating diffusion or swing against it.

Let me leave you with one idea that could help steer this pendulum. I believe we would improve both efficiency and public trust if the federal government (or better yet, the nation) were to systematically align innovation and regulatory strategies. Even in the absence of formal national strategies, joint planning by innovation and regulation policy champions ought to be possible.

Dear Canadian government: would you please hold an annual hackathon where innovation and regulation champions collaborate on inventing integrated strategies?

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