EDITORIAL

Don't quit the long game

Living cells that produce biofuel; robots that assist factory workers; intelligent machines that guide drug discovery—these technologies are "deep" in that they achieve something extraordinary—often thought impossible—and push society forward. Indeed, so-called "deep tech" powers the future of medical breakthroughs, resilient energy grids, and clean industrial processes, among other frontiers. But deep tech requires more of everything to become a reality—research and development, specialized talent, time, risk-taking, and funding. The US government has been the world's largest investor in this enterprise. Yet cuts to federal support for deep tech threaten this entrepreneurial engine at its source—university labs. Without sustained federal support, the country risks losing its technological edge, threatening economic competitiveness and national security.

Deep tech ventures are launched by scientist-entrepreneurs and thrive in ecosystems where labs, highly trained individuals, government funding, and risk capital intersect. Universities are key to cultivating deep-tech innovations by supplying the talent, infrastructure, and intellectual freedom essential for the long-term, high-risk research required. Cuts to major sources of support, including the National Science Foundation, National Institutes of Health, and Department of Defense, now endanger this innovation environment.

Translational research funding is crucial for moving discoveries and early-stage technologies from labs to real-world applications. Government support gives scientists the time to refine nascent technologies, which can be a long and uncertain process. But this approach has had substantial payoffs. Boston Metal, founded by researchers at the Massachusetts Institute of Technology, developed a cleaner, cost-effective steel production process using molten oxide electrolysis. Early grant support advanced the idea to technology, positioning the company to transform one of the world's most carbon-intensive industries.

Unlike software startups, deep tech depends on specialized equipment and prototyping facilities to incubate ideas and convert intellectual capital into tangible products. Losing federal funds for university equipment and labs will deprive scientist-entrepreneurs of the resources needed to navigate this leap. Pascal, a startup developing solid refrigerants to replace harmful greenhouse gases in heating, ventilation, and air conditioning systems, made its breakthrough at Harvard University, where the labs and expertise were essential to advancing the technology.

The United States has long attracted top talent in engineering and science, offering opportunities for academic and entrepreneurial excellence, along with flexible early-stage funding through government and university programs that align with a project's needs as it progresses through technological milestones. It is a serious concern that as government support declines, fewer scientists will have the resources to pursue entrepreneurship, stifling innovation and reversing the trend of PhDs and postdocs entering startups. The cuts to research support across higher education institutions are provoking scientists in the US to seek opportunities in other countries with stronger public support for science, signaling the onset of a brain drain. For example, the Max Planck Society in Germany has seen a recent surge in applications from US researchers and is expanding its programs to accommodate them. Other countries in Europe with burgeoning innovation ecosystems, including ETH Zurich and the University of Oxford, will also likely benefit from the movement of top-tier talent from the United States. This is undermining decades of US research investment.

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The current funding cuts are not just an academic issue—they are also an economic and national security concern. The United States built its technological dominance by investing in the long game, in areas such as semiconductors, aerospace technology, and mRNA vaccines. The government, philanthropists, and universities funded the frontiers of knowledge, seeding deep-tech breakthroughs. Venture capital, corporations, and government customers then drove the growth of these endeavors. US leadership has also placed the country at the forefront of developing policies and regulations for new technologies. It now risks losing a prominent seat at this table as well.

Replacing or restoring federal support will be a formidable challenge. But universities must take decisive steps now—diversifying funding sources, strengthening private-sector collaborations, and engaging in policy dialogue—to preserve an ecosystem that has shaped the world in revolutionary ways.

–Stefan Raff-Heinen and Fiona E. Murray

Stefan Raff-Heinen is a professor at the Institute for Digital Technology Management, Bern University of Applied Sciences, Bern, Switzerland, and a research affiliate at the MIT Sloan School of Management, Massachusetts Institute of Technology, Cambridge, MA, USA. stera127@mit.edu

Fiona E. Murray is the associate dean of innovation and the William Porter (1967) Professor of Entrepreneurship at the MIT Sloan School of Management, Massachusetts Institute of Technology, Cambridge, MA, USA, and vice chair of the NATO Innovation Fund. fmurray@mit.edu

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