

Re-Embrace American Science and Technology: Reimagine, Reinvent, Restart

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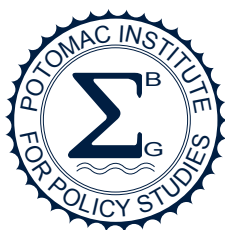
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Reimagine, Reinvent, Restart

Jennifer Buss, PhD

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America must invest in bold, imaginative, and inspirational endeavors to tackle the hardest challenges facing the world—challenges which may only be overcome through inspired scientific research and inventive technological development. As Americans begin emerging from the pandemic's long shadow, we look to the future and find ourselves at a unique crossroads. Congress and the Biden administration are considering massive infrastructure investments, economic stimuli, and funding for science and technology—programs on a scale not seen in nearly 100 years. The dramatic scale of these programs necessitates that we ask ourselves the following: How can we best leverage these investments to promote American interests, retain America's leadership of the science and technology enterprise, and ensure the nation's safety, security, and prosperity for years to come? The answer is to re-embrace American science and technology.

Inspire, Inform, and Re-imagine to Promote American Science and Technology

We must apply science and technology leadership to all aspects of American life. We must inspire talented people to continue the American tradition of innovation, ingenuity, and scientific advancement. A prerequisite to maintaining global leadership in science and technology is public support for the scientific enterprise. Generations of Americans, scientists, engineers, and informed citizens alike, were inspired by 20th century scientific accomplishments—the space race, the introduction of microelectronics and personal computers, and the challenges brought on by Cold War era defense research projects. But today, it seems that reverence has waned. Distrust of scientifically enabled advancements has spiked, and public support for such investments, particularly in fundamental research, has diminished.

It is now time to dream big, to think boldly, and to inspire society through the benefits of scientific and technological leadership. America should once again tackle grand, transformative challenges such as re-imagining the International Space Station as a cooperative International Lunar Habitat, re-envisioning transportation technologies (both personal and commercial) via smart infrastructure and autonomous vehicles, and revolutionize manufacturing with programmable and biological manufacturing techniques, sustainable

materials, and recycling. These are not small objectives, but they are possible. They will demand new discoveries, bring forth new products and market sectors, and stimulate a dynamic American economy. Most importantly of all, they will inspire the most talented people in the world to join together in the American science and technology enterprise.

Rebuild the Infrastructure for American Education

The United States has long enjoyed its place at the head of the global science and technology community. With the best universities and research laboratories, along with innovative industries that rapidly adapted and adopted new technologies, the United States leads the world in science Nobel prizes and remains the place for international students to come study, as well as for scientists around the world to reach the pinnacle of their career.

Continued American leadership in science and technology, however, is not guaranteed. Rivals to American dominance have observed the advantages of indigenous technological advances and have invested in long-range plans to attain excellence in science and technology across broad ranges of disciplines. US graduates in science are finding opportunities elsewhere, and American enthusiasm for science and technology has faded.

It is vital to restore American leadership in science and technology; to attract the best scientists, both domestically and internationally; to provide the best national security technologies; and to grow the economy with world leading products and capabilities. Re-invigorating American leadership in science and technology is possible because of the legacy of talent and resources still in existence. However, continued leadership requires a ready supply of scientists and technologists fed by a vibrant pipeline of training and engagement as well as protection of the intellectual property rights of the final product around the globe. The infrastructure for American science and technology includes education, training, institutions, jobs, and laboratories. In the same way that the American infrastructure of roads and bridges requires attention, the infrastructure for the American science and technology enterprise needs commitment and investment.

Capitalize on Biotechnology Advances to Remake Health Care

New technologies all around us are changing the way that we live. Changing the way we live will, naturally, change the way we provide our health care, too. Sensors, data analytics, and telemedicine are redefining 21st century health care.

Major biotechnology breakthroughs, many achieved in part due to necessity during the coronavirus pandemic, should be leveraged to provide other health benefits and redress long standing challenges such as the seasonal flu or perhaps even the common cold. Advanced sensors, wearables, and biometric data should inform doctors—not just individuals—and improve the care, and ultimately health of every American. We should continue to capitalize on the positive transformations to health care delivery as a result of the pandemic. Telemedicine should enable those in rural communities, juggling unpredictable work schedules in the gig economy, among other challenging scenarios, to receive the same high level of care enjoyed by millions of urban-dwelling Americans. Changing how we use technology changes the way we care for people and can aid in improving the lives of all Americans.

Due to its breadth and numerous applications, biotechnology research is conducted across multiple agencies in the US government. To build on recent advances, new and bold research projects and organizational structures should be promoted. Rapid progress is expected, and American leadership is required.

Leverage Science and Technology to Reduce the Greatest Risks Confronting Society

US science and technology is a lynchpin of our national security. The nation faces many threats, both natural and adversarial, a selection of which are enumerated in the Intelligence Community's 2021 Worldwide Threat Assessment. Each of these threats, among others, present daunting challenges. But we can still have faith that the American intellect can confront, mitigate, and/or deal with these serious threats. That science and technology in conjunction with sound

policy, diplomacy, and good practices can prevail. But again, we must think boldly, because mitigating these threats will often necessitate defending all of humanity.

Scientists need to develop technological solutions wherever possible, balancing short-term and long-term objectives with levels of acceptable risk. We need wise resource allocation based on a sensible prioritization and risk analysis. Leveraging international collaborations is worthwhile but needs to be handled carefully to avoid assisting adversaries against our interests. Management of the options is as hard as the development of ideas to explore. But the opportunity is to utilize our demonstrated excellence in science and technology to develop defenses against the most likely threats. The key is to both develop technological solutions whenever possible, and to balance long-term with short-term approaches.

We believe the United States should focus on scientific and technological means to perform data analytics at pace with events and improve situational awareness in a world awash with information; to promote cognitive security in the face of growing algorithmic warfare; to provide clean, reliable energy supplies; and to clean the atmosphere and combat global climate change through geoengineering.

Conclusion

The continuation of America's preeminence rests on the promise of America's minds and the might, both economic and military, that they produce through scientific research and technological adaptation. We live in a complex, competitive, and technical world, therefore the United States must re-imagine and re-invent its path forward by re-embracing American science and technology.

For Further Reading

"Re-embrace American S&T: Reimagine, Reinvent, Restart," Potomac Institute for Policy Studies, February, 2021. https://potomac institute.org/images/studies/RE-EMBRACE_AMERICAN_S&T.pdf.