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SPECIALTY GRAND CHALLENGE
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Politics of Technology—Specialty Grand Challenge

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Technology has transformed virtually every aspect of life across the globe. While its impacts are unprecedented in scale and significance, its political implications remain disputed, and its long-term repercussions are unknown. Technology is often celebrated as the engine of economic prosperity, an accelerant of cultural creativity, the means to health and longevity, an essential tool of governance and the cornerstone of security. It is proffered as the only viable means to safeguard humanity from global threats such as climate change, natural resource depletion, and asteroids. Dystopian visions, alternatively, depict artificial intelligence usurping humanity's planetary reign, self-replicating nanotechnology transforming everything it touches, robots annihilating human work and purpose while escalating military conflict and destabilizing international order, and synthetic biology rewriting the book of life. Even if the future charts a middling course between these starkly diverging perspectives, clearly there is a lot at stake.

While uncertainties abound, one thing is patent: in the coming decades technological developments across a wide range of fields will transform cultural mores and traditions, economic trends and structures, political behavior and institutions, legal processes and principles, environmental systems and conditions. The governance challenges associated with emerging technologies are formidable. Regulations, policies, laws, and constitutions seldom if ever stay abreast of technological advances. Political norms and institutions are always playing catch up. And by the time they get up to speed, new technologies will have moved the goalposts or, in some cases, completely changed the game.

The research challenges are heightened by the phenomenon of convergence, wherein one form of technological development, say in the arena of information technologies, rapidly advances the development of another form of technology, say in biotechnology or robotics. Convergence accelerates the pace of innovation and deepens associated uncertainties. That slow-moving norms and institutions must grapple with and govern hastening technological change seems a recipe for failure and frustration. But it also presents the crucial and fascinating task of evolving the public sphere to meet the most pressing challenges of our times.

All technologies produce unintended consequences, and emerging technologies will generate more than their fair share. That is a foreboding thought. At the same time, the unintended consequences of technology have not been solely, or even predominantly, bad. Many of our most valued products and services are the unforeseen by-products of pure research, or of technological tinkering aimed at some other end.

Today, however, we inhabit a new epoch: the *Anthropocene*. While natural climatic or tectonic events previously stamped the earth with lasting geologic markers, our current epoch is characterized by the massive technological impact of a single species: *Anthropos*—the Greek word for human. Whether we are centuries or decades deep into the Anthropocene is a moot point. One thing is clear: there is no going back to a planet that is insignificantly impacted and shaped by human hands. The important question is whether we will prudently carry out planetary stewardship for the benefit of humanity and myriad other species, or whether we will live in dangerous denial of our technological capacities and their downstream effects.

Shouldering this responsibility will, at times, entail traditional efforts of nature preservation, cultural conservation, and technological regulation. At times, it will entail stimulating more

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efficient and more beneficially targeted technologies. All available choices will be complex and compromised. Associated risks, benefits, and costs will be uncertain. The options we face span the spectrum from the exhilarating to the horrifying. But there is no good alternative to making the most informed choices. We cannot afford to neglect our responsibility to evolve political norms and institutions fit for the times.

There are no shortages of quandaries for the scholar of politics to confront. A few prominent examples illustrate the complexities involved.

ENVIRONMENTAL TECHNOLOGIES AND SUSTAINABILITY

Climate change presents an existential crisis, and efforts employing highly sophisticated technologies to conserve biodiversity, mitigate global warming, and reduce the human footprint are underway. Artificial intelligence, often coupled with drone technology, is used to monitor wildlife, identify poachers, exterminate invasive species, and power precision agriculture that grows more food without usurping natural habitats. Nanotechnology is employed in the molecular manufacturing of renewable energy sources, artificial photosynthesis, and membranes for the de-salination of ocean water. Geoengineering technologies are proposed as crucial means to remove carbon from the air, lower global temperatures, and conserve threatened ecosystems. And synthetic biology is being developed to green deserts, create new fuels, assist evolution, de-endanger species, and even resuscitate extinct organisms. These technologies, advocates argue, will provide a second life for the natural world in an age of environmental devastation. Critics worry that they will precipitate the wholesale end of nature—extending, amplifying, and intensifying humankind's conquest of the biosphere.

Which, if any, nature-preserving and footprint-reducing technologies should be developed and deployed in pursuit of sustainability? To answer this question, one must attend to their respective social, economic, ecological, and geo-political risks, costs, and benefits, as well as the risks, costs and benefits of not developing and deploying them. In turn, one must confront fundamental beliefs and values regarding humanity's prerogatives, responsibilities, and capacities. How we evaluate, advance, regulate and restrict technology will arguably be the most important factor in determining the livability of the planet and the character of our species.

INFORMATION AND COMMUNICATION TECHNOLOGIES

Social media have had profound political impacts, beginning with Iran's Twitter revolution of 2009, Tunisia's Jasmine Revolution of 2011 followed by Egypt's Facebook revolution and the subsequent uprisings of the Arab Spring, the Occupy Wall Street protests, Spain's Movimiento 15-M, the 2013 Gezi Park demonstrations in Istanbul and across Turkey focusing on freedom of the press and assembly and the Brazilian Spring with protests against the lack of public services, corruption and police brutality. The #BlackLivesMatter movement in the US beginning in 2014 and Hong Kong's Umbrella Revolution challenging electoral decisions (along with more recent uprisings opposing mainland China's encroachment) were followed by the #MeToo movement in 2017. Many of these uprisings and movements provoked policy responses, institutional reform, and cultural shifts.

Notwithstanding the striking success of social media in advancing emancipatory movements and democratic values, cyberspace has not been as successful in translating uprisings into political policies or institutions, and it is systematically exploited by authoritarian regimes to quash resistance. It can also ensconce citizens in self-reinforcing communities of the like-minded. In these digital echo-chambers, people hear, see and share only those facts—or fictions—that support their personal interests and ideologies. Far from promoting widened horizons and critical thinking, the internet and social media often insulate users among their own ideological kith and kin, and these filter bubbles can heighten political polarization. Such impacts of social media, both domestically generated and sponsored by foreign interests, were prominent in the 2016 U.S. Presidential election and the Brexit vote that same year.

The prominence of disinformation and click-bait headlines designed to lure readers onto fake news websites exacerbates the trend. The phenomenon of viral outrage has a similar digital fingerprint. Newspapers and news programs have long employed the criterion that "if it bleeds it leads." The shocking sells, and always has. Today, however, social media bleeds continually, and with far less restraint. Tweets, posts and pics that shock, morally outrage, and stir deep emotions are shared more often, spreading faster and farther. The epistemological equivalent of Gresham's law applies: just as bad money can drive out good money in a large economy, so misinformation and high shock value posts can drown out responsible communication in the digisphere.

We have much to learn about the politics of cyberspace. Scholars, states people, and citizens will have to learn quickly to avoid the greatest dangers of these fast-moving waters, and make the most of opportunities.

DIVERSE CHALLENGES

Some argue that artificial intelligence can, and should, come to the rescue, keeping democracies secure and vibrant. Strategic thinking (iterative analysis, planning, forecasting, optimizing, and tactical innovation), long held to be the exclusive province of people, is now quickly falling into the domain of machine learning. In the coming years, AI will increasingly be employed by all branches of government and the military to improve or supersede slower and less rigorous forms of human judgment, analysis, prediction and decision making. Such deployments of AI will produce knock-on effects for which states and citizens are woefully unprepared.

There is no shortage of other intellectual and practical quandaries for scholars to confront:

- What is the relationship between technological development and growing economic inequality, and how might the former be mustered to combat the latter?

- Can human rights be secured, including personal data rights and rights to privacy, in an era of ubiquitous digital surveillance?
- Are virtual assistants, the Internet of Things and digital apps hampering the development and exercise human aptitudes and skills? If so, what might be done to prevent human downgrading in the wake of digital lifestyles and machine intelligence?
- What are appropriate and effective political responses to a world of growing automation and underemployment?
- What can and should be done to address digital addictions amidst proliferating brain hacking techniques within the attention economy?
- How can domestic and international security be maintained in the wake of high-tech innovation, including lethal autonomous robots and drones, bio-terrorism, and digital espionage or cyber-warfare employing AI or quantum computing?

The list could easily be expanded and enriched. But the goal of this grand challenge has been to vividly illustrate rather than comprehensively enumerate prominent issues, and to provoke ambitious research rather than corroborate existing scholarship.

Developing political institutions and policies to sustain human flourishing and conserve nature in the face of accelerating technological innovation deserves attention from the best minds. And the learning it requires has to be done on the quick, as many of the aforementioned technologies may hit point-of-no-return tipping points in the coming years. Yet inquiry must be solidly evidence based. Neither optimism nor cynicism can substitute for rigorous research, insightful theorizing, and persuasive argumentation. Good data have to be generated and analyzed, contrasting perspectives have to be lucidly articulated, and fertile debates must be facilitated.

Politics of Technology will provide a prominent forum for these crucial activities.

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