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The arc of innovative progress has reached an inflection point.

Technological change has brought immeasurable benefits to billions through improved health, productivity, and convenience. Yet as recent events have shown, unless we actively manage their risks to society, new technologies may also bring unforeseen destructive consequences. Making technological change positive for all is the critical challenge of our time. We ourselves—not only the logic of discovery and market forces—must manage it. To create a future where technology serves humanity as a whole, we need a new approach.

To this end, Harvard Kennedy School's Belfer Center for Science and International Affairs has launched a new endeavor, the Technology and Public Purpose (TAPP) Project. Led by Belfer Center Director, MIT Innovation Fellow, and former Secretary of Defense Ash Carter, TAPP works to ensure that emerging technologies are developed and managed in ways that serve the overall public good.

Much as the reforms of the Progressive movement softened the edges of the farm-to-factory migration a century ago, we aim to create a set of conditions that leaven today's technological change across three domains: digital, biotech, and the future of work. TAPP leverages a network of experts from Harvard University, MIT, and Stanford, along with leaders in technology, government, and business to work on the following priorities:

- **Training & Mentorship** – Training today’s practitioners and tomorrow’s leaders in the responsible development and management of new technologies.

- **Convening Stakeholders** – Convening leaders in tech, policy, academia, and civil society to develop solutions to the societal dilemmas of emerging technologies.

- **Publishing Leading Edge Research** – Conducting world-class research on high-risk technologies and frameworks for effective development and governance.

This publication provides a brief overview of some of our Fall 2018 and Spring 2019 semester activities, ranging from trainings and workshops, speaker series, student groups, and publications.

We are grateful to everyone who has contributed to the formation and development of the Technology and Public Purpose Project and look forward to expanding our work in the years to come.

Ash Carter
Faculty Director

Laura Manley
Project Director
Over the past year, the TAPP Project has engaged hundreds of individuals across government, industry, civil society, and academia: from training today’s practitioners and leaders on big tech and democracy and the responsible development of new tech ventures to convening top experts on solutions to the dilemmas of emerging technologies and publishing leading edge research and tech fact sheets for policymakers.

| 600+ people convened for events on emerging tech and public purpose | 8 Boston Tech Hub Faculty Working Group sessions |
| 120+ Congressional staff members surveyed | 150+ students engaged in TAPP programming |
| 17 original research publications | 12 Technology Factsheets and Faculty Working Group Briefs |
Training & Mentorship

Training today's practitioners and tomorrow's leaders in the responsible development and management of new technologies

Policymaker Trainings on Technology

The TAPP Project has hosted and participated in several Congressional Trainings both in Washington, DC and Cambridge including Big Tech and Democracy: Policy Approaches to Address Tech Platforms; Privacy Policy + Design Workshop; Building 21st Century Congressional Tech Expertise; and the Bipartisan Program for Newly Elected Members of Congress.

Course Offering: Solving Tech’s Public Dilemmas

Taught by Secretary Carter, this is a foundational course identifies and analyzes alternative solutions to the dilemmas that disruptive technology is posing to public good in the digital, biotech, and jobs and training domains. The objective is for students to craft technologically-informed practical public-private approaches to some of the key policy issues of our time. While based at the Harvard Kennedy School, this course is open to students from across Harvard and MIT.

Emerging Tech Policy Network

Sponsored by the TAPP Project, the Emerging Tech Policy Network is a student-led study group open to individuals interested in tech policy careers from schools throughout the Greater Boston area. The group meets over weekly dinners throughout the year to discuss current trends in tech with the goal of inspiring the next generation of technology leaders to make advancing public purpose a part of their life calling.
Big Tech and Democracy: Policy Approaches to Address Tech Platforms

In March 2018, the Technology and Public Purpose (TAPP) Project at the Belfer Center and the Platform Accountability Project at the Shorenstein Center for Media, Politics and Public Policy hosted a workshop in the Capitol Visitors’ Center for congressional staff to identify and discuss policy approaches to the dilemmas of big tech platforms. The day-long workshop sought to create an open space for discussion among congressional staffers and experts in the field, and included chiefs of staff, committee counsels, and legislative directors from both Senate and House offices.

The discussions surfaced four key insights on tech policy challenges facing Congress and how legislators could more effectively engage with the dilemmas of big tech:

- The digital marketplace and new business models are creating gaps in governance authority and coordination;
- A healthy mix between self-regulation and government policy is necessary;
- Congressional hearings are underutilized on technology-relevant topics;
- Tech policy debates are still ‘pre-partisan.’

The current tech policy environment is nascent and presents a rare opportunity to advance sustainable solutions through a united, bipartisan front.
“BIG TECH AND DEMOCRACY” CAPITOL HILL EVENT
MARCH 21, 2019
» **Convening leaders** in tech, policy, academia, and civil society to develop solutions to the societal dilemmas of emerging technologies

August 2019

In 2017, we decided to convene some of the world’s leading minds in the sciences, law, economics, and humanities to discuss the direction of technology and its unbounded opportunities. The decision rested on a key principle: **Boston provides the ideal environment to develop not only leading-edge technology, but also civically informed solutions for today’s tech dilemmas.** Because rapid innovation in technology can circumvent the values of privacy, inclusion, transparency, and security, public purpose needs to be valued as a fundamental requisite of innovation. By recognizing its potential for both good and bad, technology can be guided toward the greater benefit of society.

With its rich history and vast resources, Boston is the perfect place to take the lead. Throughout most of our nation’s history, Boston has been at the epicenter of America’s technological progress. The industrialization of New England—and the diversity of its sunrise industries—concurrently impacted the development of its universities. Beginning as early as the mid-1800s, Harvard and later MIT embarked on a mandate that stretched beyond the role of a traditional liberal arts institution and looked toward the development of practical innovations. The two universities became closely intertwined with commercial enterprise, and today’s leaders in technology can often be traced back to these origins.

Boston’s success and technological prowess is also predicated on a close relationship with government. Over the last century, federal research dollars have flooded into the city’s basic science research, but particularly toward unprecedented advances in the applied sciences. In biotech, materials, robotics, space, defense and other industries, both Harvard and MIT are well positioned to solve the country’s most demanding technical and policy challenges. The invaluable connection between Boston and Washington D.C. aligns technologists with honorable work and a duty to secure a positive future for their inventions.

**The Faculty Working Group** set out to explore today’s unique challenges. In the fall, we focused on new technologies, or their novel applications, including: do-it-yourself medical devices, solar geoengineering, quantum computing, and remote sensing. In the spring, we put forward potential solutions for current dilemmas and discussed topics such as: reinstating the **Office of Technology Assessment**; the **role of venture capitalists** in weighing public purpose when investing; the right approach for **sharing intellectual property**; and the role of **international norms for emerging technologies**.

Each session addressed a new frontier in technology that our society is only beginning to grapple with or struggling to adapt to. The participants included interdisciplinary faculty scholars, technologists, and other stakeholders from across Harvard and MIT, as well as government and industry. The candid discussions that arose from these sessions frame the key takeaways in this report.

A critical challenge of our time is making technological change positive for all. The fate of our collective future requires that experts—in academia, government, or industry—apply their knowledge in the service of civic duty and public purpose. The brightest and most creative problem solvers seek the hardest, most interesting problems. In Boston, this has been a tradition.

Sincerely,

**Ash Carter**

**Frank Doyle**
Ash Carter and Kara Swisher on Pressing Tech Challenges

In April 2019 during a JFK Jr. Forum conversation with Belfer Center Director Ash Carter on tech issues, Recode Editor-at-Large Kara Swisher underscored the need to consider possible negative as well as positive impacts when technologies are first being developed. Using social media as an example, Swisher said it is deeply problematic that we have allowed private tech companies to become society’s public square, and now rely on these platforms for everything from general discourse to news.

“The public square is now owned by private billionaires” who have created “cities” that are unregulated and often used for ill rather than good, Swisher said. And, she added, the owners have “no ability or compunction to fix the situation.”

Responsible AI: A Guide to the Future

The rapid progress of artificial intelligence is occurring on many different fronts. As a ubiquitous technology, its applications and uses will increasingly extend into the everyday aspects of our lives and society at large. On January 23, 2018, the Technology and Public Purpose Project sponsored an event to explore how the development of new technologies and innovations can be developed according to guiding principles and rooted in values.”
Convening Stakeholders

Tech Innovation and Public Purpose: A HUBWeek Event

In October 2018, the TAPP Project and the Harvard Innovation Lab convened experts from industry, government, civil society, and academia to discuss the unintended impacts of technology on society will feature a keynote address by Ash Carter, former US Secretary of Defense and now the Director of the Belfer Center for Science and International Affairs at the Harvard Kennedy School.

ALTERING THE HUMAN GENOME

What Do China’s Gene Edited Babies Mean for Humanity?

Gene-editing technology is no longer confined to laboratories and experimentation. CRISPR applications have now been used on adults to treat disease, such as cancer, and in late 2018, Chinese scientist He Jiankui claimed to have created the world’s first genetically edited babies resistant to HIV. This unprecedented experiment has alerted biotech scientists, policymakers, and ethicists alike — a community deeply focused on the unanswered questions about the safety of embryo editing, as well as the ethical and moral issues. In December 2018, the TAPP Project hosted leading experts in gene editing technology to discuss the consequences of this recent news, including Feng Zhang, CRISPR Lead and Core Institute Member, Broad Institute; Jeantine Lunshof, Research Scientist / Ethicist, MIT Media Lab; and Jamie Metzl, Author of Hacking Technology and Public Purpose: A Hubweek Event.
Reimagining Investing in Frontier Technologies

What venture capitalists should consider to promote public purpose in tech

In May 2019, the TAPP Project and Harvard Business School’s Arthur Rock Center for Entrepreneurship co-hosted Reimagining Investing in Frontier Technology convening over 70 investors (Limited Partners and General Partners), entrepreneurs, technologists, and others investing in and building frontier technologies. The convening explored the challenges investors and entrepreneurs face in bringing products to market in ways that maximize their benefits to society while minimizing harms. Four key insights include:

1. The coming wave of technological innovation will look very different from those of recent years.

The coming wave of frontier technologies will likely be fundamentally different from other recent technological developments—with a more rapid pace of development and potentially higher stakes for society. Innovations in artificial intelligence and sensors could impact a broad range of applications from health care, education systems, policing, criminal justice, elections, military, and national security infrastructure. Frontier biotechnologies such as CRISPR and neurotechnologies could also open new possibilities of human enhancement, which could dramatically change the structures of societies around the world.

2. Investors and entrepreneurs need to better anticipate potential problems and unintended consequences of what they build.

Investors and entrepreneurs need to do better in considering the hidden risks and unintended consequences of technologies and how they will safeguard against them. More engagement with key stakeholders earlier in the product design process—such as labor leaders, cybersecurity specialists, and persons knowledgeable on the community or issue in question—is one way to do this.

3. Investors have many levers to influence the shape of technological development.

Venture capitalists have many levers they can use to shape the overall direction of technological development. This begins with creating a fund thesis that seek overall positive impact and defining which applications of a technology the fund will not support. VCs also have many levers as board members engaging in active management by ensuring diversity of viewpoints and experiences are represented on the board, leadership teams and product development teams and that founders have clarity on mission, values, and are building a culture that empowers employees to raise concerns on issues of safety and risk.

4. Tech entrepreneurs need additional supports to help them consider societal impacts earlier on in their product design and business model development.

Ventures typically have small teams with very limited time and resources. Training needs to be provided to entrepreneurs to help them develop an understanding the first- and second-order effects of their technology’s impacts and how to factor these considerations into their product designs and business models.

Read the full report at belfercenter.org/FrontierTech
MAY 2019 EVENT: REIMAGINING INVESTING IN FRONTIER TECHNOLOGIES
HARVARD KENNEDY SCHOOL
Today, Congress is facing a wave of policy issues arising from the advent and application of new technologies. The rapid development of these technologies has often kept industry ahead of the legislative process or regulatory response. Under this steep learning curve, Congress has high expectations to not only grasp the technical aspects of each new technology or application, but simultaneously understand their policy implications and influence on societal values and rights.

The Technology and Public Purpose Project (TAPP) at the Harvard Kennedy School and the Center for Research on Computation and Society (CRCS) at the Harvard John A. Paulson School on Engineering and Applied Sciences have joined forces to address this widening gap between the halls of Congress and the technology firms in Silicon Valley.

The Technology Factsheet Series offers a brief overview of the technical aspects of salient technologies and their policy relevance for Congressional members and their staff. As a collaboration between policy and technical experts, this series aims to provide the legislative branch with an accessible resource that brings its readers up to speed at a conversational level, without overburdening them with an exhaustive briefing. Each brief is accompanied with a series of questions that policymakers should consider as they pursue future work on these evolving issues.

In the coming months and years, Congress will encounter these topics on a regular basis. The communication barrier that frequently exists between technical industry experts and policy makers has sometimes prevented a productive discussion on science and technology issues. A successful national debate, including testimony hearings and any subsequent legislation, will require a minimal base knowledge of complex technical issues. This series aims to bridge the gaps and bring different actors, with different interests, more closely aligned for the greater benefit of society as a whole.

The first installment includes factsheets on: Machine Learning, Genome Editing, the Internet of Things, and Solar Geoengineering.

Stay tuned for our next round of Technology Factsheets this fall.
Building a 21st Century Congress: Improving Congressional Science and Technology Expertise

The increasing pace of technological change has led to unparalleled opportunities for development and advancement of our society, but it has also created new dilemmas and challenges for our government, including the U.S. Congress, to monitor and address. As the ultimate generalists, many Members of Congress and their staff struggle to keep up with the scale and complexity of emerging technologies.

Today, several legislative support agencies such as the Congressional Research Service and Government Accountability Office offer limited science and technology (S&T) advice for Congress. Academic institutions, think tanks, and industry associations also provide technical expertise and guidance, but may present self-interested or overly simplified information. Still, there is a significant gap in their capabilities to fill the growing need for this type of technical expertise for Members and their staff on an ongoing basis.

In fall 2019, the TAPP Project published “Building a 21st Century Congress: Improving Congressional Science and Technology Expertise” that examined the needs of the members of Congress and their staffs, while providing suggested options for addressing ongoing gaps in science and tech capacity.

Read the full report at belfercenter.org/CongressSciTech
On the Horizon

Over the past year, we have accomplished a great deal: from training today’s practitioners and leaders on big tech and democracy and the responsible development of new tech ventures to convening top experts on solutions to the dilemmas of emerging technologies and publishing leading edge research and tech fact sheets for policymakers.

We are now turning to a new exciting initiative. After decades of excitement around unbounded innovation, the tech community has begun to experience a public backlash. Society’s need for accountability is rapidly superseding old notions of impunity. And the values of privacy, safety and security, transparency, and inclusion—all which fall within the greater ideal of public purpose—are on the rise. Around the world, there is an active community of individuals, groups, and organizations striving to make these advances in technology more accessible, safer, and fairer. When the development and deployment of technology is grounded in the greater good of humanity, these efforts—in digital technologies, biotech, and the future of work—should be acknowledged and encouraged. The ultimate goal is to foster a tech culture that embraces responsibility and actively works to promote public purpose.

The Tech and Public Purpose Spotlight recognizes products, initiatives, and policies that demonstrate a commitment to public purpose the areas of digital, biotech, and future of work. Through a nomination process, independent reviewers will evaluate entries based on their proven ability to reduce societal harms and protect public purpose values including:

- Privacy
- Safety and Security
- Transparency and Accountability
- Inclusion

We will recognize selected entries at an event hosted at Harvard Kennedy School in Spring 2020 and feature them as case studies in a “Tech and Public Purpose Spotlight” report. Recognized products, initiatives, and policies aims to represent a diverse set of examples of public purpose in technology from a variety of sectors.

To learn more about the Tech and Public Purpose Spotlight or submit a nomination, visit belfercenter.org/TechSpotlight
Ash Carter

Ash Carter is a former United States Secretary of Defense and the current Director of the Belfer Center for Science and International Affairs at Harvard Kennedy School, where he leads the Technology and Public Purpose project. He is also an Innovation Fellow and Corporation Member at MIT.

For over 35 years, Secretary Carter has leveraged his experience in national security, technology, and innovation to defend the United States and make a better world. He has done so under presidents of both political parties as well as in the private sector. Most recently, he served as Secretary of Defense and before that in the number two ("COO") and number three ("weapons czar") positions. He was awarded the Defense Distinguished Service Medal, the Department's highest civilian honor, on five separate occasions.

As Secretary of Defense from 2015 to 2017, he pushed the Pentagon to "think outside its five-sided box." He led the creation of the military campaign and international coalition to destroy ISIS, designed and executed the strategic pivot to the Asia-Pacific, established a new playbook for the U.S. and NATO to confront Russia's aggression, and launched a national cyber strategy.

Secretary Carter spearheaded new technological capabilities and a more agile approach to the relationship between the Pentagon and the tech sector. He also transformed the way the Department of Defense recruits, trains, and retains quality people, including opening all military positions to women without exception.

He earned a BA from Yale University and a PhD in theoretical physics from Oxford University where he was a Rhodes Scholar. Carter is the author or co-author of over 12 books and more than one-hundred articles on physics, technology, national security, and management.
Laura Manley

Laura Manley is the inaugural Director of the Technology and Public Purpose Project. Laura is also a Senior Consultant for the World Bank Group and the United Nations Department for Economic and Social Affairs.

Previously, Laura co-founded the Center for Open Data Enterprise (CODE) in Washington DC, which is a nonpartisan research organization that works with governments to leverage data for social and economic good. At CODE, she worked with over a dozen U.S. federal agencies on their data management strategies and with eight national governments on their digital economy policies and IT modernization efforts. She is also the lead author of the Open Data for Business Tool, which is a World Bank assessment methodology for private sector use of government data.

Laura is an Adjunct Professor at the NYU Wagner School of Public Policy, where she teaches Data for Social Innovation, Instructor at Harvard Extension School, teaching Data-Driven Decision Making...

Bogdan Belei

Bogdan Belei is a Research Associate at Harvard Kennedy School’s Belfer Center for Science and International Affairs, where he works with Belfer Center Director and former Secretary of Defense Ash Carter. His work focuses on U.S. foreign policy, international security, technology and innovation.

Prior to joining the Belfer Center, Bogdan was a James C. Gaither Junior Fellow at the Carnegie Endowment for International Peace. He has previously worked at the Center for New American Security and the Council on Foreign Relations. Bogdan graduated with high honors from the University of Michigan, with a double major Bachelor’s Degree in Political Science and History.

Christopher Li

Christopher Li is a Research Assistant at the Belfer Center for Science and International Affairs, where he focuses on Chinese foreign policy, Asia-Pacific security, and the effects of scientific and technological innovation on great power competition.

Prior to joining Belfer, Chris was special assistant for life sciences strategy in the Office of the Provost at Harvard and conducted research on stem cell reprogramming at Massachusetts General Hospital. He previously worked as a legislative intern for Senator Mazie Hirono and as an editorial and book researcher for former New York Times Executive Editor Jill Abramson. A 2018 Hertog Fellow at the Institute for the Study of War, Chris received his A.B. with high honors in Human Developmental and Regenerative Biology from Harvard University.
Michael Miesen is a Research Assistant for former Secretary of Defense Ash Carter and the Technology and Public Purpose Project at the Belfer Center for Science and International Affairs. Prior to joining the Belfer Center, Mike was a Dukakis Fellow at the Office of Rhode Island Governor Gina M. Raimondo, where he analyzed the state’s efforts to reduce transportation-related greenhouse gas emissions. He previously worked as a strategy consultant focused on population health at Evolent Health, a social entrepreneur focused on anesthesia in low-resource health centers at Gradian Health Systems, a freelance journalist focused on social entrepreneurship and global health, and a health care operations consultant at Huron Consulting Group.

Mike received his Master in Public Policy from Harvard’s Kennedy School of Government. He received his Bachelor in Business Administration from the University of Madison-Wisconsin, where he majored in both Finance and Entrepreneurship, with a minor in Health Care Management.

Stephanie Thien Hang Nguyen is a research scientist at MIT Media Lab focused data privacy. She focused on implementing data privacy protecting features with the National Institutes of Health’s million person genome project and Johns Hopkins’ Precision Medicine team. Through U.S. Digital Service at the Obama White House, Stephanie led user experience research and design for large data-collecting systems in federal government relating to immigration, student loans and Medicare.

Emily Roseman is a politics, media and technology researcher and digital media consultant. Recently, she was the Research Project Manager for the Single Subject News Project, a two year study at the Harvard Kennedy School’s Shorenstein Center that analyzes how newsrooms can build sustainable business models in the digital age. In that role, she helped launch data analytics tools and co-authored guides, white papers and best practices related to the digital transformation of news. Emily has a Bachelors in Politics from Bates College.
Susan Winterberg

Susan Winterberg is a Fellow in the Technology and Public Purpose Project. Her current research interests focus on how technologists, entrepreneurs, government funders, and private investors in emerging technologies can better integrate considerations for environmental, social and governance issues into product designs and business models. Susan previously worked at Business for Social Responsibility (BSR), a global non-profit membership organization of sustainability departments at more than 250 multinational companies. At BSR Susan led the team on Inclusive Economy which worked with business, investors and governments to tackle challenges of economic inequality and to prepare for the future of work in the face of increasing automation and artificial intelligence. Among the initiatives she worked on were the Inclusive Sharing Economy Initiative on improving sustainable business models in major Silicon Valley digital platform companies, the Healthy Business Coalition on integrating public health considerations across industries, and the Health Care Working Group...

Raj Gambhir

Raj Gambhir is a rising junior at Harvard College studying Social Studies and pursuing a citation in Modern Standard Mandarin. He has previously interned at the Office of Congressman Ami Bera and currently works at the Defending Digital Democracy Project, a Belfer Center initiative focused on fortifying US election infrastructure against cyber-threats. He is originally from Southern California and loves watching movies, baking, and podcasting.

Chris Kuang

Chris Kuang is a rising senior at Harvard College studying Economics and Mathematics, originally from Winchester, MA. He is a co-founder of Coding it Forward, a nonprofit organization that empowers young people with technical skills to create social impact. He leads Coding it Forward’s work in placing talented student technologists in innovative positions across the federal government through the Civic Digital Fellowship, working closely with agencies including the Census Bureau, Department of Health and Human Services, and U.S. Citizenship and Immigration Services.
**Naomi Silverstein**

Naomi Silverstein is rising senior at the University of Michigan, Ann Arbor where she is studying Biopsychology, Cognition and Neuroscience (BCN) and Political Science. She was studying in Geneva, Switzerland last semester at the School of International Training (SIT) where conducted research on cognitive warfare, disinformation, and big data. Last summer, Naomi interned in D.C. where she focused on nuclear proliferation research at the Institute for Science and International Security.