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Tech Policy Lab
ANNUAL REPORT

AUGUST 2017

TECH POLICY LAB

Letter From the Directors

The Tech Policy Lab at the University of Washington has emerged as a leading resource for policymakers interested in wiser and more inclusive technology policy. This year the Lab built on its reputation for excellence in interdisciplinary research, published scholarship and tools to benefit tech policy, and had direct input into policymaking at multiple levels of government. Here are just a few highlights of our fourth year:

Policy Impact. Tech Policy Lab faculty testified before the United States Senate about augmented reality, advised the Government Accountability Office (GAO) on the Internet of Things, and helped the U.S. Court of Appeals for the Ninth Circuit and Office of the Secretary of Defense (OSD) think through artificial intelligence.

Cutting Edge Research. To gain traction on the often remarked, if seldom addressed problem that tech policy tends to reflect mainstream values, the Lab's Diverse Voices team released a How-To Guide for developing more inclusive tech policy. Our faculty, staff, and students hacked a DNA sequencing pipeline using code hidden in DNA itself (USENIX Security) and revealed how little parents and kids understand the privacy ramifications of connected toys (CHI).

Training Future Technologists. Leveraging the success of our first tech policy curriculum modules, which have reached over 500 students across 7 courses at the University of Washington, we are developing new modules in areas such as AI and IoT. Our weekly discussion groups attract students from all across campus, from neuroscience to electrical engineering, and Lab students are interning everywhere from the Allen Institute on Artificial Intelligence to the ACLU.

Distinguished Lecture Series. Our Distinguished Lecture Series continues to be a source of inspiration and innovation for the larger UW and Seattle public communities. In our fourth year, we experimented with a new format—that of a distinguished conversation. Our first conversation was held with Stanford Professor Terry Winograd and University of Washington Professor Emeritus Alan Borning around their personal experiences and challenges engaging as technologists in pressing political issues of their time. Winograd was a founding member of Computer Professionals for Social Responsibility, an organization of computer scientists that formed in response to the Star Wars proposal during the Regan administration; Borning later served as a member of the Board of Directors for the organization.

Growth and Sustainability. This year we—as we move from start-up mode to established lab—we engaged in a strategic planning process focused on sustainable, high impact research and policy work. As a result of that planning process, among other activities, we launched a TPL post-doc program.

In our fourth year, the Lab has become a go-to source for tech policy research.

TADAYOSHI KOHNO   **BATYA FRIEDMAN**   **RYAN CALO**

Research

The Lab has engaged in novel and high impact research on emerging technologies while providing guidance for creating inclusive, forward-thinking policy.

DIVERSE VOICES

A HOW-TO GUIDE FOR FACILITATING INCLUSIVENESS IN TECH POLICY

All too often, policy development for emerging technology neglects under-represented populations. The Diverse Voices Project at the UW Tech Policy Lab is a method to mitigate this situation. This year the Lab produced _Diverse Voices: A How-To Guide for Facilitating Inclusiveness in Tech Policy_, designed to give technology policy researchers the opportunity to solicit feedback on their whitepapers from under-represented communities. This guide is the product of the Lab's Diverse Voices Panels, an effort to innovate a process for creating expert panels that represent diverse communities, then seeking their input on policy documents.

Developed in the summer of 2015, the Lab initiated the Diverse Voices project to evaluate _a paper on the policy implications of augmented reality_. The three panels commenting on AR represented Formerly/Currently Incarcerated People, People with Disabilities, and Women. The feedback from the three panels were synthesized and contributed to a primer on augmented reality technologies, which was authored and released by members of the Tech Policy Lab in fall 2015. The

insights gained from these Diverse Voices panels were used to develop the Guide so that it can be used in the policymaking process to make informed decisions.

The Diverse Voices method is distinct from the process of writing a whitepaper. Rather, once a draft of a tech policy document exists, the method can be employed to integrate input from experiential experts before a final version of the document reaches policymakers. Practical by design, the Diverse Voices method seeks to improve the inclusivity of tech policy documents in a manner that is low cost—both to tech policy document authors and to the experiential experts who provide critical feedback on those documents. Facilitators fill this gap—leading and managing the Diverse Voices process. To be clear: the Diverse Voices method improves inclusivity but it does not claim to be fully representative or comprehensive of diverse perspectives. Rather, the method helps to identify some critical aspects in the tech policy document that could be improved and to provide suggestions for those improvements. In brief, the method offers progress—better tech policy documents—not perfection.

AUTONOMOUS VEHICLES

Preparing for the integration of a new technology such as artificial intelligence into government processes requires forethought and was behind the Lab's new whitepaper, *Driverless Seattle: How Cities Can Plan for Automated Vehicles*. Focusing on Seattle, the Lab's team, engaging with the public-private partnership Challenge Seattle, identified the major legal and policy issues that Seattle and similar cities will need to consider in light of new automated technologies. The whitepaper was released with support of the City of Seattle Department of Transportation; Seattle DOT director Scott Kubly remarked that the "report captures the big picture and provides a solid foundation for next steps on AV policymaking and implementation." *Driverless Seattle* was also presented at a Council of State Governments education session on autonomous vehicle policy at the Washington State Legislature in Olympia.

DNA SECURITY

Modern DNA sequencing techniques can sequence hundreds of millions of DNA strands simultaneously, resulting in a proliferation of new applications in domains ranging from personalized medicine, ancestry, and even the study of the microorganisms that live in your gut. Computers are needed to process, analyze, and store the billions of DNA bases that can be sequenced from a single DNA sample. New and unexpected interactions may be possible at this boundary between electronic and biological systems. A multi-disciplinary group of researchers who study both computer security and DNA manipulation, including Lab faculty and students in collaboration with the UW Security and Privacy Lab and the UW Molecular Information Systems Lab, wanted to understand what new computer security risks are possible in the interaction between biomolecular information and the computer systems that analyze it. The researchers detail two key findings in their paper: (1) the failure of DNA sequence processing software to follow best practices in computer security and (2) the possibility to encode malware in DNA sequences. This paper appeared at the peer-reviewed USENIX Security Symposium in August 2017, and was covered in a variety of news outlets. The Tech Policy Lab plans to explore the policy implications of this research in the coming year, leveraging our interdisciplinary context to examine potential recommendations.
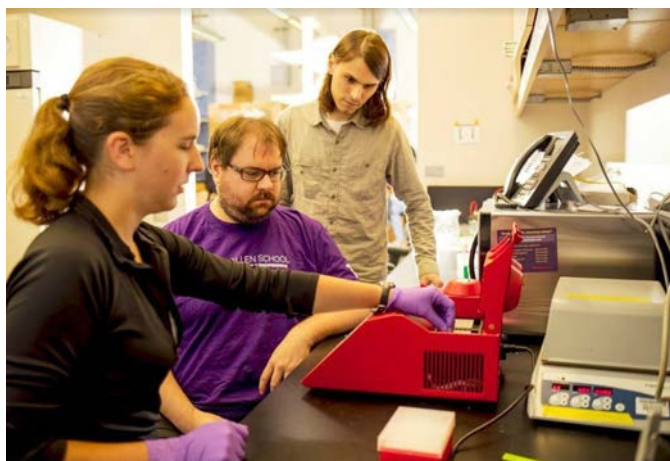
INTERNET OF LISTENING THINGS

The Lab is interested in the social impacts of the Internet of Things and has begun a series of projects exploring the psychological and other effects of the introduction of connected devices into private environments. With a grant from the Rose Foundation Consumer Privacy Rights Fund, an interdisciplinary team, including experts in law, computer security, and human-robot interaction, sought to better understand "toys that listen." The team conducted interviews with parent-child pairs interacting with commercially available connected toys, shedding light on children's expectations of the toys' "intelligence" and parents' privacy concerns and expectations for parental controls. Their findings provided a foundation for recommendations to toy designers and policymakers. The *Toys That Listen* paper was published at CHI 2017, the leading human-computer interaction conference. We plan to build on this work over the coming year, exploring the broader set of devices coming into the home.

## SECURING OUTPUTS OF AUGMENTED REALITY

The Lab continues to explore the impacts of Augmented Reality. With the AR industry expected to grow to $100 billion by 2020 and increasing interest in head-mounted displays (HMDs) and automotive windshields, a fully-immersive AR environment could heighten existing safety and security concerns.

This is one of the challenges that Lab members addressed in their new paper, *Securing Augmented Reality Output*. In this paper, the authors address how to defend against buggy or malicious AR software that may unintentionally or inadvertently augment a user's view of the world in undesirable or harmful ways. They ask, how can we enable the operating system of an AR platform to play a role in mitigating these kinds of risks? To address this issue, the team designed Arya, an AR platform that controls output through a designated policy framework, drawing policy conditions from a range of sources including the Microsoft HoloLens development guidelines and the National Highway Traffic and Safety Administration (NHTSA)'s driver distraction guidelines.

By implementing Arya in a prototype AR operating system, the team was able to prevent undesirable behavior in case studies of three environments: at home, on the road, and at the office. Additionally, performance overhead of policy enforcement was acceptable even in the un-optimized prototype. The team, among the first to raise AR output security issues, demonstrated the feasibility of implementing a policy framework to address AR output security risks, while also surfacing lessons and directions for future efforts in the AR security space. The paper was presented at this summer's IEEE Symposium on Security and Privacy and was covered by *Science*.

SEAGLASS

A team of researchers including Lab student Peter Ney and Lab alumnus Ian Smith, with Faculty Co-Director Tadayoshi Kohno released SeaGlass, a system built to detect IMSI-Catchers also known as cell-site simulators. IMSI-Catchers are devices purportedly used by governments and criminals to inject themselves into the cellular network and track the locations of cell phone users, among other things. To provide independent information on when, where, and how often cell-site simulators are used, the team developed a measurement system that could detect them. The project, supported by a grant from the Knight Foundation, aims to help communities maintain their privacy by building a community-driven, open data service to detect cellphone surveillance and produce high-quality cellular network data for research. The paper was published in Privacy Enhancing Technologies (PETS) this summer and has been covered by *WIRED* and other news outlets. The Lab plans to explore the policy implications of this research in the coming year.
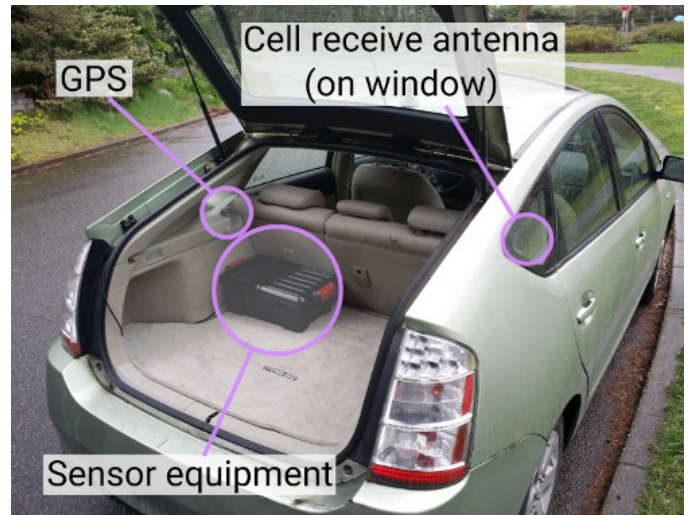
Policy Impact

The Lab further developed our presence in policy activities at the regional and national level, with Lab members serving as experts to congress, the GAO, and the Ninth Circuit in areas including Augmented Reality, Internet of Things, and Artificial Intelligence.

AUGMENTED REALITY IN CONGRESS

Lab Faculty Co-Director Ryan Calo testified before the U.S. Senate Committee on Commerce, Science, and Transportation at a hearing exploring augmented reality. Testifying about the Lab's research exploring AR in our whitepaper, *Augmented Reality: A Technology and Policy Primer*, Faculty Co-Director Calo emphasized the need to address "privacy, free speech, and novel forms of distraction and discrimination" in the design process through answering questions such as "Will the constant recording of a user's environment give hackers, companies, and government unparalleled access to the bedroom, the boardroom, and other private spaces? Could the superimposition of information over reality render the AR user vulnerable or unsafe? And are there situations—such as job interviews—where knowing everything about an individual could result in discrimination or subject the AR user to legal liability?" In answering the senators' questions, Professor Calo highlighted the importance of threat modeling during development, as well as researcher's ability to find security flaws without running into legal issues.

U.S. GAO REPORT ON THE INTERNET OF THINGS

Lab Faculty Co-Director Batya Friedman, along with Associate Director Emily McReynolds, joined approximately two dozen experts consulted by the U.S. Government Accountability Office on IoT technologies. Co-Director Friedman emphasized the digital divide and environmental impacts on her panel, Consequences of the Internet of Things: Social Implications. The Lab members also gave feedback on drafts that provided direction for the GAO report entitled *Internet of Things: Status and Implications of an Increasingly Connected World*. The report, targeted towards policymakers, reviewed the use of IoT devices in industry, consumer, and public sectors. It discusses potential challenges in increased adoption of IoT devices, including information security, privacy, safety, standards, economic, and environmental issues.

2017 NINTH CIRCUIT JUDICIAL CONFERENCE

In July, the Ninth Circuit held its annual Judicial Conference, which aims to provide an educational program and facilitate court governance. Attendees include judges from the Ninth Circuit Court of Appeals, U.S. district courts and bankruptcy courts of the circuit, lawyers, court staff, and special guests.

Faculty Co-Director Ryan Calo joined a panel discussing artificial intelligence where he outlined some of the issues the federal judiciary needs to be thinking about when it comes to AI. The panel was also joined by California Supreme Court Justice Mariano-Florentino Cuéllar and discussed, among other items, the risks or benefits of using AI in legal practices.

FEDERAL TRADE COMMISSION
INTERNET OF THINGS CONTEST

This year, Faculty Co-Director Yoshi Kohno was one of five expert judges for the FTC's Internet of Things Home Inspector Challenge. The contest, which launched in January, challenged the public to create innovative tools to address security vulnerabilities in home IoT devices. After review from the panel of judges, the FTC announced in late July that the winning submission was "IoT Watchdog" from Steve Castle. "IoT Watchdog" is a mobile app that allows users to scan their home Wi-Fi and Bluetooth networks to identify connected IoT devices. The app also provides information about any out-of-date software or security vulnerabilities, along with instructions to resolve them. The FTC effort was an important step toward catalyzing broader discussion and interest in methods to improve IoT security.

Education

Advancing our commitment to create technologists conversant in policy and attorneys conversant in technology, this year we expanded the Lab's education initiatives.

EDUCATION MODULES

Among the Lab's commitments is the enhancement of tech policy capacity and fluency through the creation of tech policy curriculum modules that can be introduced in early STEM undergraduate education. Two of these modules, piloted by Lab Faculty Associate and Information School Associate Professor David Hendry, have already reached over 500 students across 7 courses at the University of Washington. The modules prompt students to consider the socio-technical aspects of a setting and to engage a design activity that involves both technical and policy design, and include Drones Okay Playground, to design a playground for having fun with drones, and NeighborSpin, about the design of a peer-to-peer laundry sharing service. The Lab continues to build additional modules for distribution, and pilot them within the University of Washington, with modules on artificial intelligence and the Internet of Things planned for the coming year.

PRIMER VIDEOS

The Lab has continued to promote and use our primer videos, developed by a group of interdisciplinary students to explain basic topics of robotics policy including explanations of bots, machine learning, and robots; as well as legal topics providing explanations of administrative law and product liability. Through these videos, the Lab aims to educate technologists about law and lawyers about technology across UW and the broader general public. We provide links to these videos on our website for reference, which have been viewed over 80,000 times combined. Viewers have commented on the engaging format and helpful explanations; recently, the FBI sought permission to use our videos for internal training.

TECH LAW SUMMIT FOR GIRLS

In the fall, the Lab sponsored the UW Tech Law Summit for Girls, which welcomes girls from high school to learn about technology, law, and access to justice issues. It aims to empower girls to take part in tech policy discussions and encourage them to consider pursuing a law degree. Lab Associate Director Emily McReynolds joined the Summit to discuss the Lab's research on Toys That Listen, discussing what it means to have these toys in your home or use them. The girls were also prompted to think through current tech policy issues, discussing where responsibility lies if someone is injured by a drone or an autonomous vehicle.

WEEKLY DISCUSSIONS

We continued the Lab's popular weekly discussions on newsworthy tech policy topics. These discussions continue to be popular among graduate students, drawing from communications, computer science, electrical engineering, and law, among others. Frequent participants in the discussion group have included a material engineering Ph.D. student who is currently working at a patent firm, and a Ph.D. student in the department of electrical engineering who interned this past summer with the ACLU's Technology and Liberty Project in Washington State.
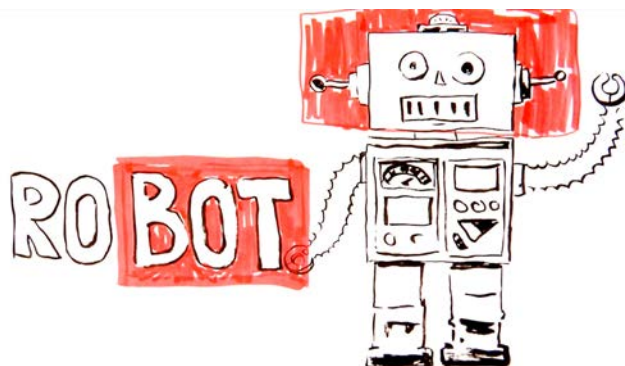
Lecture Series, Events, & Workshops

Our Distinguished Lecture Series brings to Seattle individuals the public might not otherwise hear from and shares their work with the community. This year we were honored to organize a discussion with Professor Terry Winogrand and Professor Alan Borning around the tension between research and social responsibility.

PROFESSOR TERRY WINOGRAD AND PROFESSOR ALAN BORNING:

My Politics
as a TECHNOLOGIST

On November 30th, 2016, the Tech Policy Lab held our Fall Distinguished Lecture, with a discussion at the intersection of personal politics and technical expertise led by Faculty Co-Director Batya Friedman. Terry Winograd is a leader in human-computer interaction and the design of technologies for development. Professor Winograd advised the creators of Google and was a founding member of Computer Professionals for Social Responsibility. Alan Borning is an expert in programming languages and human computer interaction. Professor Borning pioneered information systems for civic engagement, among them OneBusAway, a set of digital tools that provide real-time transit information; UrbanSim (think SimCity for real); and the Living Voters Guide, an experiment in social media for an informed electorate.

Professor Winograd and Professor Borning discussed their research careers, focused on navigating the relation between research and personal responsibility. In discussing their research, collaborations, and involvement in organizations such as Computer Professionals for Social Responsibility, Professors Winograd and Borning highlighted the importance of asking questions around the intersection between technology and politics. Professor Borning highlighted the following questions: "Who is affected by this technology? Who benefits? Who might be harmed? Where might it go in the future? Also who's funding it? And who is controlling the directions because that matters." Describing his time at MIT's Artificial Intelligence Lab in the late 1960s, Professor Winograd recalled his deliberation of "who am I: am I this graduate student working on technology or am I working on, am I a student, an engaged student who wants to get out and make things change?" They discussed how these questions not only shaped some of their previous work, but also how they apply to current situations, and highlighted the importance of bringing in stakeholders along with technologists in addressing issues raised.

WORKSHOPS AND CONFERENCES

Start with Privacy

On February 3, the Lab, with Washington State Office of Privacy & Data Protection, organized the 2017 Start with Privacy conference. The conference included participants from state and local government, tech companies, law firms, and public records experts. Faculty Co-Director Ryan Calo and Associate Director Emily McReynolds participated in a panel on "Technology as the Game Changer for Data Protection," along with Washington State CIO and director of WaTech Michael Cockrill. During the panel, Prof. Calo highlighted the importance of rigorous, sustained analysis of augmented reality, looking at how AR can affect people of different demographics. Emily McReynolds discussed the Lab's research on Toys that Listen, highlighting the need for threat modeling with IoT devices, especially around consumer privacy.

SELECTED TALKS

Professor Chris Hoofnagle: Privacy's Past & Future

In March, Professor Chris Hoofnagle gave a talk titled "Privacy's Past & Future: The Federal Trade Commission in the Trump Administration." He is the author of *Federal Trade Commission Privacy Law and Policy* and holds dual appointments in the School of Law and the School of Information at UC Berkeley. His lecture highlighted the history and impact of the FTC and provided an expert lens on what we might expect in the coming years.

Jennifer Granick: Modern Surveillance

On February 21, author Jennifer Granick gave a talk based on her book *American Spies: Modern Surveillance, Why You Should Care, and What to Do About It*, which won the 2016 IIT Chicago-Kent College of Law/Roy C. Palmer Civil Liberties Prize. Jennifer Granick is surveillance and cybersecurity counsel with the ACLU's Speech, Privacy and Technology Project. From 2012 to 2017 she was the Civil Liberties Director at the Stanford Center for Internet and Society. Her talk included an overview of the technologies involved, how they are deployed, and led to a vibrant discussion.
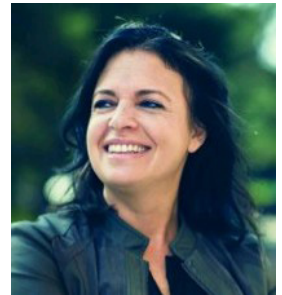
Looking Ahead

We've had a tremendously rewarding four years and look forward to continued expansion of our impact. Here are just a sampling of our goals and research plans going forward:

New research. The Lab will continue our cutting edge research, focusing on a wide range of topics, including studying policy and technology directions for consumer IoT systems, investigating the intersection between legal process and AI-assisted decision-making, and devising deliberate, systematic methods for setting thresholds that ensure AI systems remain safe and efficient even under unpredictable circumstances. We also plan to explore the policy implications of Lab member's research on, for example, the use of targeted ads for surveillance (or ADINT), and forthcoming adversarial machine learning research that fools machine learning through real-world alterations to objects.

Diverse Voices Method. We will continue to promote and support adoption of the Diverse Voices Method in the wake of our How-To Guide, a first step in positioning other organizations to incorporate diverse perspectives in their development of technology policy. We will apply the method to future emerging technologies and, over the coming year, explore training workshops to empower others to employ the method in their own organizations and settings. We are also writing about the Diverse Voices process, including case studies in augmented reality and driverless cars, for academic audiences in the policy, law, and social studies of technology.

Education and Outreach. We plan to pursue and test additional tech policy modules to enhance tech policy capacity and fluency, including modules specifically around AI, IoT, and human values. In addition, we intend to engage in a concerted effort to stimulate informed public discourse through popular writing and public events. These events include, over the coming year, the continuation of our Distinguished Lecture Series with James Suzman, anthropologist and author of *Affluence without Abundance*, and Kate Crawford, co-founder of AI Now.

Thank you for your interest in the Tech Policy Lab!