In Harm's Way: Smart Regulation of Digital & Network Technologies

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This report is written from the perspective of an informed observer at the Aspen Institute Conference on Communications Policy. Unless attributed to a particular person, none of the comments or ideas contained in this report should be taken as embodying the views or carrying the endorsement of any specific participant at the Conference.

Foreword

Digital and network technologies have transformed the world in many positive ways. But it is increasingly clear that those benefits come with costs, many of which are difficult to measure and even harder to mitigate. Misuse of personal information, manipulation of platforms to influence elections, and failure to extend broadband to underserved areas are a just few of the problems facing society at all levels. Increasingly, policymakers are taking up the challenge of shaping legal solutions to these problems, only to find they lack the technical expertise, tools and in some cases jurisdiction, to regulate wisely, meaningfully and efficiently.

Given the current technological environment, what goals are appropriate to assure that emerging technologies are used to benefit the populace and do not harm society? How do those goals align among local/state regulation, Federal Trade Commission, Federal Communications Commission, European Commission and others?

The 34th Annual Aspen Institute Conference on Communications Policy, which took place August 11 to 14, 2019, sought to respond to these questions. Participants explored approaches to impede harms from digital and network technologies that address user protection, promote consumer choice and competition, and foster access to essential services. They also sought to create a framework to identify jurisdictional authority and enforcement, including my own suggestion that the federal government consolidate various functions and agencies into a new cabinet-level Department of Networks and Data.

The resulting report, written by rapporteur Carol Mattey, offers seven recommendations. These center on the need to reform government to be better equipped to address challenges in the future, address the responsibilities of technology companies, call for technology-focused job training and programs to advance digital literacy skills, and act to close the digital divide. Mattey highlights the harms and benefits brought on by artificial intelligence, 5G, and the Internet of Things and concludes by providing a map and compass for government and industry.

Acknowledgments

I would like to acknowledge and thank the organizations represented at this conference that have also contributed financial support to the Communications and Society Program. They are Google, Microsoft, AT&T, Comcast, Facebook, New Street Research, T-Mobile, Verizon, Charter, Dodge and Cox, the National Association of Broadcasters, and Emmis.

I also want to thank Carol Mattey, conference rapporteur, for her extensive and informative account of the conference discussions, and our participants for their contributions to these complicated topics. However, not every recommendation or statement in the report reflects the views of all attendees or their employers; rather, they are the rapporteur's view of the general sense of the group.

Finally, I want to thank Dominique Harrison, Project Director, for producing the conference and editing this report.

Charles M. Firestone
Executive Director
The Aspen Institute

Executive Summary

The topic for the 34th Annual Aspen Institute Conference was "In Harm's Way: Smart Regulation of Digital & Network Technology." The conference focused on the following questions: What harms should society be concerned about with the advent of the Internet of Things (IoT), artificial intelligence (AI), and 5G? Who should play a role in addressing these potential harms? What governmental action or collaboration should occur to minimize the harms and maximize the benefits of these new advances?

The individual working groups at the conference developed numerous recommendations. This report synthesizes the broad themes that permeated most of the discussion. While the recommendations reflect input from many conferees, no votes were taken. Accordingly, not every recommendation or statement in this report reflects the views of all attendees or their employers.

A broad theme of the conference was the role and capabilities that government has to address the challenges and issues of the digital age. One recommendation is to create a new federal agency to address data and technology policy. This agency could spearhead the development of a national plan for technology policy that allows the private sector to innovate and develop new business models, while ensuring U.S. technological leadership. A second recommendation is to create a new Federal Innovation Center that would develop a comprehensive digital-first strategy for federal government delivery of services and benefits, while serving as an expert resource to state and local governments engaged in similar efforts.

A second topic of discussion at the conference was the role of the technology sector in today's society. An overarching concern is that major online platforms have an enormous influence on what information people consume and disseminate. One recommendation is to ensure that antitrust policy evolves to include consideration of the impact of market structure, which includes consumer choice (or lack thereof) and large companies who are significant drivers of U.S. innovation. Another is that industry should be doing more to moderate extreme online content, such as hate speech and content that incites violence.

A third recurring theme of the conference was how to provide all Americans with the tools they need to succeed in a digital society. Artificial intelligence is transforming the workforce and the workers of tomorrow will need new training. The U.S. needs to strengthen public education in computer sciences and include ethics as a core component of the curriculum. Moreover, the U.S. needs to promote lifelong learning and training so that individuals of all ages are digitally literate.

A fourth focus of the conference was how to close the digital divide. Digital inequality will prevent all Americans from fully participating in the shared fabric of the nation. One concern is that discrete areas of the nation do not benefit from advances stemming from high-speed internet and other technologies. The digital divide has many dimensions—relevance, affordability and availability—and different solutions are appropriate to address each facet of the problem. Participants developed several ideas to ensure that all can pay for an in-home broadband connection/device and enjoy the value of broadband.

RECOMMENDATIONS	
1.	Government should create a new federal agency to address data and technology policy.
2.	Government should create a Federal Innovation Center to implement a digital-first strategy for delivery of government benefits and services.
3.	Ensure antitrust policy evolves to include greater consideration of the impact of market structure on innovation and consumer choice.
4.	Industry should be transparent regarding actions to address hate speech and content that incites violence.
5.	Government should do more to advance digital literacy and job skills.
6.	Ensure all can pay for an in-home broadband connection/device and appreciate the value of broadband.
7.	Government should impose a moratorium on federal and state funding for broadband deployment until improved broadband maps are available.

In Harm's Way: Smart Regulation of Digital & Network Technologies

Carol Mattey

In Harm's Way: Smart Regulation of Digital & Network Technologies

Carol Mattey

Introduction

The advent of new online platforms and tools has transformed the world in many positive ways. Technological advances have revolutionized the ways people communicate, engage in commerce, access and consume news, and interact with the broader world. But it is increasingly clear that those benefits come with potential costs, many of which are difficult to measure and even harder to mitigate. Misuse of personal information, manipulation of online platforms to influence elections and uneven access to digital opportunities are just a few examples of the problems that can occur. Increasingly, government officials are looking at ways to address these problems, only to find that they lack both the tools and technical expertise to regulate wisely, meaningfully and efficiently.

Decades ago, a world with computers processing vast amounts of information was the stuff of science fiction. Today, it is a reality. The volume and quality of data collected by devices and online platforms is staggering, and the practice is only going to accelerate in the future. What one person views as acceptable collection of data, another may deem a breach of privacy. And with the rise of artificial intelligence, data can be used and manipulated in ways that lead to unanticipated consequences. The question is whether these developments will threaten citizens' way of life and the fundamental principles upon which the U.S. was founded.

Policymakers wrestle with who is the cop on the beat in the digital world. Whose job is it to protect individuals or society at large from harms that arise out of the grey space between prevailing laws and regulations? Existing U.S. institutions such as the Federal Communications Commission (FCC) and the Federal Trade Commission (FTC) may need more resources and additional expertise to investigate and take action to mitigate all the challenges that arise in the online world. The

attempt by states and local officials to step into the void are subject to preemption at the federal level. Further, most technology companies operate globally and therefore are subject to varying laws abroad.

Today, more than ever, policymakers need to consider how to manage the digital ecosystem across local, state, federal and international jurisdictions. What steps are appropriate to assure that U.S. core values remain intact during this rapid digital transformation?

5G and Distributed Computing

Reed Hundt, Chief Executive Officer of Coalition for Green Capital and Making Every Vote Count, and former FCC Chairman, opened the conference with a quick history of the evolution of computing from the early days of centralized mainframe processing through the introduction of the iPhone to the present. Communications networks are the engine that delivers information to data centers where computing occurs. Computing is where value creation occurs.

Communications networks are the engine that delivers information to data centers where computing occurs. Computing is where value creation occurs. ***– Reed Hundt***

Each technological advancement brings more computing power, and each generation of communications technology represents a new evolution in how information is collected and used. Sensors will collect information on all activity, effectively coding the world. 5G will enable the transmission of 1,000 times the current volume of data, on ten times as many devices, with one-tenth the latency to the computing function.[1] This will be "the mother of all inflection points" for computing, noted Hundt.

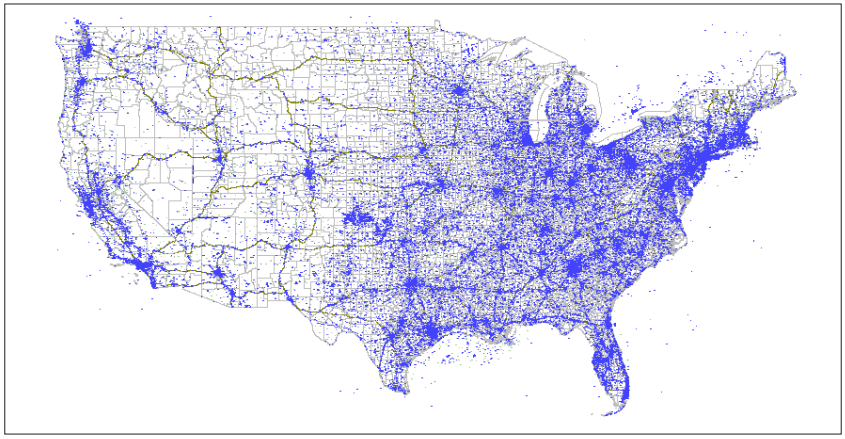
In the past, the pendulum shifted from distributed processing to the cloud, but now there is a shift in computing back to the edge, which moves processing and intelligence closer to the location where it is needed. Intelligent agents, natural language processing and augmented

reality/virtual reality all require full interactivity. This means many AI applications will require real-time processing at the edge to avoid the delay associated with transfer to the cloud.

Sensors will collect information on all activity, effectively coding the world.

The market is responding to this need. In 2019, in the U.S. alone, there were roughly 9,100 massive data computing centers, an increase of over 21% from the previous year.[2] These distributed computing systems may potentially track the location of wireless access points and base stations where congestion occurs, but distributed computing may not necessarily be the natural province of today's telecommunications carriers who provide those access points.

Figure 1. U.S. Internet Traffic Origination: Potential Sites for Distributed Computing



Source: Reed Hundt, Presentation at the 2019 Aspen Institute Conference on Communications Policy

The variety of information gathering networks is also splintering. Different computing architectures will exist for different verticals: for instance, the architecture necessary for distributed computing in an industrial plant will be different from the architecture that will enable

real time visualization and betting in a sporting arena. Policies governing the internet are also diverging with different regulatory approaches taken by the U.S., Europe and China. For example, in China, the centralized government power structure has made clear it intends to use Chinese technology with no Western influence. It will be making its own decisions regarding spectrum, distributed computing and security.

Hundt concluded with thoughts on the implications of this evolution. It is difficult to balance the bright prospects with the more frightening potential. AI potential is disrupting everything: transportation, healthcare, gaming, elections, communications, government, sports, manufacturing and even warfare. Predictions—and decisions—will be made instantaneously, with a computing system available at any location, every moment of the day.

...optimized and ubiquitously available 5G could help underserved communities cross the digital divide.

Ultimately, Hundt views this as a type of Armageddon: the final battle between technology and humans. It is not clear that humans will continue to play a major role in many sectors of the economy. With a focus on market-based approaches, the gulf between haves and have-nots will likely widen. Thus, it will be critical to also consider the necessary but limited capital and capacity needed to realize the potential of these technologies.

Dr. Nicol Turner-Lee, Fellow at the Center for Technology Innovation at the Brookings Institution, observed that next generation networks, including 5G, will lead to an expanded universe of interconnected devices—the Internet of Things. The availability and use of a voluminous amount of data could be a game changer for many sectors, including health, education, energy and transportation. Benefits could include remote diagnosis, home treatment monitoring, administrative task assistance, personalized learning, better outcomes for students with special needs, and more. Emerging technologies have the potential to efficiently and quickly solve many current and unforeseen societal

problems. Indeed, optimized and ubiquitously available 5G could help underserved communities cross the digital divide.

But the rise of new technologies comes with a cost. The potential for data exploitation and illicit data sharing is troubling. New forms of online bias and discrimination will continue to emerge. There are increased national security vulnerabilities, including the potential for election interference and a rising danger of cyber-breaches.

Dr. Turner-Lee offered the following recommendations:

- Address growing algorithmic biases through anti-discrimination laws, self-regulation and consumer literacy;
- Ensure inclusive 5G deployment plans that are widely deployed to enhance business-oriented tools, such as online shopping and payment processing;
- Adopt a federal privacy standard that, among other things, addresses online bias and discrimination;
- Change the digital narrative by empowering local solutions, in both urban and rural settings.

She concluded by calling for more interdisciplinary and collaborative efforts among government, industry and academics to develop models to address consumer harms. Turner-Lee underscored that it is important to look at how technology impacts real people.

A Framework for Effective Policy Intervention in the Digital Era

Richard Whitt, President of the GLIA Foundation, offered his perspective on developing a public policy framework for online activities. His core thesis is that form, to the extent possible, should follow function. The complexity and dynamism of the internet, and of web-based entities, processes and activities, merits a nuanced, contextual approach to achieve durable policy interventions.

A variety of players exist in the online world—content providers, applications providers, social/media platforms, computational systems, hardware manufacturers, operating systems, cloud providers, backbone providers, internet access providers, and others. The lifecycle of data begins with surveillance and extraction, followed by movement and storage, and then processing and distribution. The policy challenge is

assigning the appropriate accountability to the right player in the online ecosystem (culpability) consistent with that player's relevant contribution (proportionality).

…the choice between a bright future and a pessimistic future is not binary. The answer is not to oppose AI altogether but instead use situational judgement. *– Larry Downes*

Whitt identified various forms of potential intervention: structural, functional, behavioral and informational. Regulation can be *proscriptive*, seeking to restrict market activities, or *prescriptive*, seeking to encourage market activities. Individual institutional interventions can occur through the exercise of "hard" power, such as treaties, laws and regulations; "moderate" power exercised in multi-stakeholder forums, certifications and self-regulation; or "soft" power, such as best practices, codes of conduct, industry standards or regulators' use of the bully pulpit to steer conduct. The goal is to create an optimal fit to the targeted activity to avoid collateral damage by intervening beyond what is necessary, while at the same time remaining effective. The challenge is to make appropriate tradeoffs between accountability and flexibility. Whitt favors a ratchet approach in which government gives companies and the industry time to figure out solutions to problems, and then escalating if they fail to do so.

Other conference participants offered their own perspectives. Larry Downes, Senior Fellow at Accenture Research, pointed out that the choice between a bright future and a pessimistic future is not binary. The answer is not to oppose AI altogether but instead use situational judgement. Donna Epps, Senior Vice President of Public Policy and Strategic Alliances at Verizon, agreed with the hybrid approach, pointing out that society can extract the benefits of AI without sacrificing its core values. She suggested that there needs to be more transparency and accountability about the data that feeds into AI, and to do so in a way that does not disincentivize private investment.

These different approaches are not mutually exclusive. For instance, industry can develop and continue to evolve its codes of conduct or best practices with a requirement to publicly disclose adherence to those codes. Government can be the backstop for enforcement if companies do not comply with those codes of conduct, noted Koy Miller, Head - North America, Connectivity and Access Policy at Facebook. The challenge is keeping pace with the speed of technological innovation which can exceed our ability to assess its implications and amend policy.

The challenge is keeping pace with the speed of technological innovation which can exceed our ability to assess its implications and amend policy.

Robert Atkinson, Founder and President of the Information Technology and Innovation Foundation (ITIF), pushed back on the notion that computers will outpace us. In his view, we should be focusing solely on governance.

There was consensus among conference participants that policymakers need to be paying closer attention to the evolution of AI. They need to identify when to intervene and when to let market participants figure out a solution. Paula Boyd, Senior Director of Government and Regulatory Affairs at Microsoft, suggested that it is helpful to provide a forum for people to discuss the issues and develop best practices as technology evolves.

Additionally, what is appropriate today may not be appropriate under future market conditions. Susan Fox, Vice President of Government Relations at The Walt Disney Company, made an observation about the temporal element of government decisions: when policymakers decide that an issue does not warrant regulation at a particular point in time, they rarely revisit that conclusion. Nonetheless, time-limited preemption has value because it allows policymakers to revisit past decisions, suggested Jennifer Bradley, Director of the Center for Urban Innovation at the Aspen Institute.

Identifying Potential Harms

Smart regulation of digital and network technologies requires solid understanding of both benefits and risks. Before moving to solutions, conferees brainstormed about potential harms associated with new technologies, such as AI, 5G and IoT. These harms include:

Misuse of personal data/loss of privacy. Many individuals feel they have lost control over their personal data. Some may be willing to give up personal data in exchange for free services, but others are suspicious of how their data are used. The Pew Research Center has found that a majority of Americans are wary of computer algorithms being used to make decisions in areas with a real-life impact on their lives, such as resume screening, job interview evaluations, personal finance scoring and assessments of criminals up for parole.[3] For many, the lack of transparency and control creates anxiety. Some are alarmed by the potential loss of personal freedom and manipulation stemming from data collection.

Algorithmic bias. Artificial intelligence is only as good as the algorithms that power the underlying decision-making. Algorithms are trained to make inferences from massive data sets, aided by machine learning. The risk is that AI may have implicit biases through either coding decisions made by engineers or as a result the specific datasets used to create the algorithm. For instance, the failure to include data from marginalized communities can lead to profiling and stereotyping regarding products and services. At the same time, others are concerned about the potential harm to innovation if we overly constrain technologies, like AI.

Artificial intelligence is only as good as the algorithms that power the underlying decision-making.

Warrantless government surveillance. Surveillance is increasingly common, both by governmental agencies and private entities.[4] An emerging issue is how that information is being used. Facial recognition technology is particularly an area of concern. It has been reported

that the Federal Bureau of Investigation is scanning photos from state Department of Motor Vehicle databases, and several cities have banned the use of facial recognition software by local law enforcement.[5] Critics fear of a loss of privacy, unchecked surveillance and a chilling of First Amendment rights.

Misinformation. People do not agree on which source of information they can trust. Individuals lack the ability to validate information that is presented as a fact. Content can be digitally altered, potentially causing great harm. Misinformation on online platforms can spread and quickly go viral.

Harmful content/extremist speech on online platforms. Harmful and extreme speech can be amplified online, reaching a much larger audience. Algorithms sometimes drive users towards more extremes. Technology companies are struggling to respond.

Violations of civil rights. Existing laws prohibit discrimination, but AI techniques bring new challenges to the forefront. Machine learning may be used to discriminate against protected groups—even if that is not the intent of engineers designing the algorithms—by targeting advertisements to groups with certain characteristics. Discrimination laws may need to be modernized for the digital age, or existing laws may require new enforcement mechanisms.

Cyber risk. Digital communications provide new opportunities for fraudulent activity ranging from extortion to malicious actions to the complete shutdown of critical systems. Fraudsters create virtual personalities to extract benefits from unsophisticated or trusting individuals. IoT exponentially increases the number of points of attack. In a connected world, anything can be subject to a crippling cyber-attack—banks, utilities, hospitals, stores, offices and even entire cities.

Potential loss of U.S. technological leadership. The U.S. led the world with the advent of the smart phone and the creation of 4G applications. The rest of the world took note, and now other nations want to lead in 5G. The potential loss of U.S. technological leadership represents a significant threat to American consumer choice, innovation, competition and security. A pervasive concern of the U.S. is the threat of China supremacy in these areas.

Threats to U.S. entrepreneurship. Some individuals view the dominance of the largest U.S. technology firms as a threat to continued inno-

vation and entrepreneurship. Absent a continuous cycle of new entrants, some people fear the loss of the benefits of disruptive innovation.

Digital divide. The digital divide is a multi-dimensional problem that harms individuals, communities and society at large. It includes problems of broadband access, affordability and adoption resulting in the inability of individuals to fully participate in the digital economy. Specific harms stemming from digital inequality include reduced civic participation and limited access to employment opportunities, healthcare benefits, educational opportunities, commerce and social media.

Uneven or disproportionate distribution of benefits that come from technological advances. When portions of the population remain unconnected, there are significant, unquantified costs to society at large. The challenge for policymakers is to devise effective interventions to address these harms without stifling the benefits. Policymakers need to be mindful that by taking action to prevent some of these harms, they may create new, even more serious problems.

Solutions for Smart Regulation

New Government Agencies

The group identified seven recommendations that center on the need to reform government to be better equipped to address challenges in the future, address the responsibilities of technology companies, call for technology-focused job training and programs to advance digital literacy skills, and act to close the digital divide. The first two recommendations focus on reforming government to be better equipped to address the challenges of an online world. There is a mismatch between the potential harms that need to be addressed and the responsibilities of existing federal government institutions. For example, there is currently no federal agency responsible for the collection, use and flow of information. Therefore, participants suggested it is time to start talking about the creation of the Communications and Data Strategy Act of 2021, an updated iteration of the Telecommunications Act of 1996 to better regulate the current digital ecosystem.

Conferees agreed that federal agencies will need more tools to combat today's technological challenges. As Reed Hundt put it, the structure of government today reflects the industrial economy of the 1930's through the 1950's. Neither the FCC nor the FTC are well equipped

to address today's problems without additional resources. The FCC's organizational structure—with separate media, wireline and wireless bureaus—may be at odds with the increasingly diversified business interests of today's communications companies. The platform companies that represent the largest portion of the internet economy appear beyond the FCC's jurisdictional reach, and the FTC largely constrains activities through enforcement action, not regulation.

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Additionally, efficiency and implementation issues arise when there is overlap of responsibilities among independent agencies and the executive branch. For example, some attendees noted that U.S. spectrum management strategy may be hampered by both the National Telecommunications and Information Administration (NTIA) and the FCC exerting authority over federal and private spectrum use, respectively. Likewise, attendees were critical of the division of responsibility for antitrust enforcement between the U.S. Department of Justice (DOJ) and the FTC. Addressing these structural inefficiencies will help streamline regulation of the communications sector at the federal level.

More critically, some attendees questioned the continued need for federal independent agencies to regulate the communications sector. Congress needs to periodically reevaluate the authority of independent agencies given the rapid pace of technological change. Moreover, the notion that independent agencies regulate without political influence is naive, at best. In recent years, under both political parties, the chairs of the FCC have advanced priorities advocated by the executive branch.

Recommendation 1: Government should create a new federal agency to address data and technology policy.

Given the structural issues noted above, the group agreed that new government institutions are needed to address today's problems, but participants had different opinions on the scope and responsibilities

of any such newly created bodies. Some suggested that Congress has delegated too much authority to regulatory agencies.

Today, individual federal agencies and departments are addressing AI in the context of their particular sphere of responsibility. Similarly, multiple congressional committees are looking at AI in the context of issues under their jurisdiction, but no one in Congress is in charge of thinking about AI from a multi-sector perspective.

Some attendees initially suggested the creation of a task force, special commission or federal expert agency to study algorithmic decision-making. Such a body could compile information on existing best practices for algorithmic decision-making, both in the U.S. and abroad. It could convene multi-stakeholder gatherings to identify safe harbors for industry players. It could also provide a regulatory sandbox for anti-bias experimentation and collaborate with industry to develop a framework for self-certification. Ideally, Congress would appropriate funding for research in this area.

Others pushed back at the idea of a special agency dedicated to AI. They suggest that the better course is to make sure that each agency has the institutional AI expertise that can be integrated into agency policy-making, with some level of coordination at the federal level to ensure the government is looking at issues consistently.

Johanna Shelton, Director of Government Affairs & Public Policy at Google, pointed out that no company would share its algorithmic trade secrets with the government. If such an effort is to be successful, it must build on an industry collaboration model. Nicol Turner-Lee suggested there is a need for interdisciplinary research to help develop norms and an ecology of best practices.

Marc Rotenberg, President and Executive Director of the Electronic Privacy Information Center (EPIC), argued for the creation of a Data Protection Agency. He noted that other democratic governments around the world have such an agency, and the failure of the U.S. to establish such an agency has come at a cost. Under his proposal, the new Data Protection Agency would focus on issues relating to privacy and data protection, but it would not assume other regulatory functions that currently reside in agencies such as the FCC. Moreover, it would be an independent agency, not part of a larger communications and technology department. The FCC and FTC would remain in place, in his view.

Others were receptive to this idea, agreeing that a new data protection agency should have comprehensive responsibility for all data, not just that generated by the communications sector. While the group agreed on the need for federal privacy legislation, they fundamentally disagreed about whether such federal legislation should represent a floor, with states free to take additional action, or if federal legislation should preempt state authority.

The boldest proposal was for all regulatory authority over communications and technology issues to be consolidated at the federal level in a new agency, with existing agencies abolished. Proponents of this approach argue that it no longer makes sense to have the communications sector regulated by an independent agency, such as the FCC, while important issues of national and international scope remain under the domain of the NTIA, including input from the White House Office of Science and Technology Policy, and the National Economic Council. Issues relating to networks and data need to be examined comprehensively and together. Conference moderator Charlie Firestone, Executive Director of the Aspen Institute Communications and Society Program, called for a new Department of Networks and Data, and others offered similar approaches.

David Redl, former Administrator at the NTIA and Assistant Secretary for Communications and Information, argued that the new agency should be a Cabinet-level organization, rather than located within an existing department in the executive branch. Only then would the U.S. regulator have equivalent rank and stature to counterparts abroad. Moreover, this proposed executive branch agency would be more directly accountable than an independent regulator.

The focus of such a new Cabinet-level department would be to develop and streamline rules and policies in an effort to establish a comprehensive communications and technology strategy. Some of the focus areas include universal access to broadband; comprehensive spectrum management for both the public and private sector; a national data policy regarding the collection, manipulation, use and dissemination of data by both governmental actors and the private sector; action to protect people from invasions of privacy, discrimination, fraud and misrepresentation; and the ethical use of AI and related issues in the communications and information arena.

Participants recognized that it is difficult to create a new agency unless there is a national crisis. The Department of Homeland Security was created in the wake of the September 11, 2001 attacks and the Consumer Financial Protection Bureau after the Great Recession of 2008, but in ordinary times Congress is loath to create a new agency, particularly one that upends existing jurisdictional assignments of congressional committees. It is not clear whether battles over spectrum management and recurring data breaches will create enough impetus for Congress to reorganize the federal government.

"We need to recognize that there are good reasons why we have deliberative government," noted Larry Downes, Senior Fellow at Accenture Research. "We have a Constitution that slows down the pace of legal change because, in most situations, in most circumstances, that's the right thing," he added. The institutional roadblocks to rapid change in government may protect us from our own worst possible behavior.

The group agreed nonetheless that existing agencies are not well equipped to tackle the important issues that arise from the use of data in today's world. Each has its own institutional culture and is subject to varying degrees to regulatory capture. Too often, regulators are focused on solving yesterday's problems. To establish meaningful change, it is important to start anew.

One of the first jobs of such a new agency would be to develop a National Advanced Technology Strategy. Such a strategy starts with the premise that the private sector should be free to innovate and develop new business models, without restrictive regulation by the government. An equally critical imperative is to focus U.S. tax, research and development (R&D), and other policies to ensure U.S. technological leadership. At a minimum, the U.S. needs to have a national plan for technology policy with goals and dates for key actions to focus attention and galvanize action.

Within this context, the rise of China was top of the mind for many conference attendees. China's dominance stems in large part from its economic model and the concerted effort on the part of the Chinese government to implement its strategic "Made in China 2025"—a plan to become the world leader in advanced manufacturing of high-tech goods. China is using government subsidies, state-owned firms, and aggressive pursuit of Western intellectual property to achieve dominance. Many

see China's ambition as an existential threat to U.S. technological leadership. The consensus of the group is that the U.S. cannot "out-China" China; that is antithetical to the U.S. free market system.

Nonetheless, it is critical to realign U.S. national priorities to promote the American economy, security and core values. The U.S. needs a concerted effort to bring the benefits of technological innovation and jobs to a greater number of its cities. To help accomplish this, federal funding for R&D at U.S. universities should be carefully calibrated to promote U.S. strategic goals. It is also imperative to reduce the influence of foreign investment in university R&D. Intellectual property developed in the U.S. should remain American intellectual property.

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Another critical imperative is for the U.S. to win in standards battles vis-à-vis non-market-based competitors. The U.S. government should promote U.S. participation in international standards setting and other fora via private sector groups such as the 3rd Generation Partnership Project (3GPP),[6] and the Institute of Electronics and Electrical Engineers (IEEE),[7] government-run entities like the International Telecommunications Union (ITU),[8] or non-treaty fora such as the Organization for Economic Co-operation and Development (OECD). Antitrust law should not thwart U.S. companies from working together in the national interest at these standards bodies. The R&D tax credit should be extended to cover standards work.

The group generally agreed that consumer protection policies for the online world are inherently national, and those policies should be developed at the federal level. David Redl said that providing localities power over local issues is fine, but data policy is not local. Data transits through a particular place to anywhere in the world, so local decisions inherently create externalities beyond the local borders. Kevin O'Scannlain, Special Assistant to the President for Economic Policy at the White House National Economic Council, agreed, observing that in

the case of data privacy, preemption makes sense because technology is inherently cross-border. State attorney generals should be charged with enforcing federal laws and policies, where appropriate.

Recommendation 2: Government should create a Federal Innovation Center to implement a digital-first strategy for delivery of government benefits and services.

A second, more narrowly focused recommendation is to create a Federal Innovation Center, similar to the California Office of Digital Innovation.[9] Such an office could build on the successful efforts of the existing U.S. Digital Service, which was created in 2014 to bring talented engineers and others into the federal government for short-term tours of duty to advise existing departments on the delivery of public-facing government services and the use of digital platforms. The creation of this type of center could help federal agencies change the way they approach service delivery and technology investments.

One goal of the Federal Innovation Center should be to implement a comprehensive digital-first strategy for the dissemination of governmental benefits and services. That, in turn, would create more incentives to adopt broadband because people would be able to easily access government benefits and services online, saving both time and expense. It is critical that the government do more to show non-adopters the relevance of broadband to their lives.

In addition, the federal government should lead by example in integrating AI into the delivery of government services. For instance, the federal government is both the largest single provider of health care and the largest health care insurer in the U.S. Significant opportunities exist to use AI in both the delivery of care and in the payment process. The federal government could advance the ball by focusing on its own role in the healthcare ecosystem.

Efforts to bring tech experts into government to work on specific problems also should be expanded beyond the federal government to state governments and to cities. A Federal Innovation Center could serve as a resource to state and local government officials that are similarly working to transform how they deliver services at the local level.

Big Technology Companies and Competition Policy

A recurring topic of discussion among participants was the role of the largest technology companies in today's marketplace. Two decades ago, Google and Facebook did not exist; today, they are dominant forces. But, as Johanna Shelton was quick to point out, in 2014 only four of the top twenty internet and technology companies were Chinese; now, nine of them are.

At the time of this writing, there are multiple active antitrust inquiries into the major online platforms, at both the federal and state level.[10] Antitrust authorities are investigating whether these companies are engaged in practices that have reduced competition, stifled innovation or otherwise harmed consumers.

Recommendation 3: Ensure antitrust policy evolves to include greater consideration of the impact of market structure on innovation and consumer choice.

Given this context, the group recommended that antitrust issues should be addressed at the federal level by a single agency. It is not efficient to have antitrust responsibility split between the DOJ and the FTC.

The consumer welfare standard should be retained, but with a more robust focus on the impact on innovation. Antitrust policy should recognize the role of consumer choice (or lack thereof) in competition analysis. Without choice, people feel disempowered. Remedies should be tailored to address identified consumer harms. To do so antitrust authorities must become nimble and address their own gaps in expertise to understand better the business models of technology companies.

"Big" is not per se "bad." Returns to scale are inherent in a digital economy, and big data can lead to big results in key verticals like healthcare. Instead, the focus should be on bad behavior, not sheer size. As Robert Atkinson, Founder and President of the Information Technology and Innovation Foundation (ITIF), pointed out, most R&D is funded by the big companies and the U.S. does not want to lose that. China would have an enormous advantage if the U.S. were to break up the U.S. technology companies, noted Kevin O'Scannlain, Special Assistant to the President for Economic Policy at the White House National Economic Council. Big technology companies are significant drivers of innovation which is critical to maintaining relevance

in a rapidly changing world economy. Large U.S. companies have both the resources and incentives to compete with international competitors, which ultimately benefits consumers.

At the same time, the potential for harm exists, and it is important to inquire whether large companies are abusing their market power in a way that is harmful to competition or consumers. We do not know where we're going, lamented Jeff Smulyan, Founder and Chairman of the Board of EMMIS Communications. Moreover, the largest companies have the ability to overwhelm both Congress and regulators.

Eli Noam, Professor at Columbia University and the Director of the Columbia Institute for Tele-Information, offered a counter proposal. In his view, it is necessary to create and protect consumer choice in near-monopoly situations. He proposed that when there is convincing evidence that a multi-product vertically integrated firm has significant market power in a service that is important to many people or for services that exhibit strong economies of scale, the company should be required to offer that service unbundled from its other services and products, without preferential treatment to itself. In cases where individualization of service exists, companies should be required to provide consumers with the ability to customize such individualization. This includes the option of delegating customization to independent non-profit entities and commercial providers selected by the consumer.

In response, Paula Boyd, Senior Director of Government and Regulatory Affairs at Microsoft, asked whether those trusted third parties would perform those functions for free or at some cost. If consumers must pay to get the customized experience, then that would exacerbate a world of haves and have-nots.

Marc Rotenberg, President and Executive Director of the Electronic Privacy Information Center, reacted by noting that models that allow users the ability to change preferences regarding data collection and use do not work because users have given up on exercising their option to make choices. The problem is information asymmetry: people have no idea what factors are causing an algorithm to recommend another site or product. What is necessary is greater transparency, which promotes accountability and greater trust. Eli Noam disagreed, arguing that transparency does not solve anything.

Opportunities for Greater Self-Regulation

Not all potential harms associated with the digital transformation warrant pro-active government intervention. But there were varying views on the need to reform Section 230 of the Communications Decency Act, which shields "interactive computer services" from legal liability for the content published on their websites, with limited exceptions. When it was enacted in 1996, the intent was that liability protection would foster content moderation by websites and nurture the growth of the internet. In recent times, however, some have questioned whether it needs to be re-examined given the growth of the darker side of the internet, such as the use of online platforms by bad actors to facilitate international terrorism and sexual exploitation of children. Indeed, subsequent to the conference, both the U.S. Senate and the U.S. House of Representatives held hearings to explore the effectiveness of industry online content moderation practices.

Conferees debated what responsibility online platforms should have to address harmful and extreme speech. The group agreed that the answer is not heavy-handed government regulation; not all problems relating to online content can or should be solved by government. Indeed, government intervention on content moderation could do more harm than good. Many content issues are best left to the industry to solve, at least for a time, with the possibility of a government backstop to industry efforts to moderate content.

Recommendation 4: Industry should be transparent regarding actions to address hate speech and content that incites violence.

Industry needs to ensure due diligence and be transparent about their content decisions to gain public trust in their implementation of content moderation standards. Koy Miller, Head - North America, Connectivity and Access Policy at Facebook, suggested that the key is to manage user expectations through transparency about content moderation policies, adopt appropriate oversight and appeals mechanisms, and have industry come together to develop substantive content standards that increase predictability for users. This has been accomplished in other contexts, such as movie and television ratings, where industry develops standards and then self-enforces those standards.

Some of the large technology companies are taking new steps to address these issues. In September of 2019, Facebook released its charter

for an independent oversight board that will review the company's decisions about what posts, photos and videos are removed or left up on its platform under Facebook's community standards. Among other things, the board will issue written explanations of its decisions, which will be available in a public archive, and its decisions will bind the company.[11]

In addition, AI is helping to facilitate content identification and removal. AI is being used today to flag extreme content online. For instance, nearly 90 percent of the 9 million videos that YouTube removed from its platform in the second quarter of 2019 were flagged by automated tools, and more than 80 percent of those auto-flagged videos were removed before they received a single view.[12] Through the use of AI, Facebook has reduced the average time it takes to identify a violation of its community standards to 12 seconds.[13]

Blair Levin, Senior Fellow with the Metropolitan Policy Program at the Brookings Institution, suggested that the three large online content platforms—Facebook, YouTube and Twitter—are effectively running individual experiments on content moderation. Several participants suggested that it is critical that the industry at least agree on the key terms—such as what constitutes hate speech—so that the public can have a consistent understanding, even if the individual companies decide independently of one another how to implement any content moderation policies. Moreover, it would be beneficial for an outside independent entity, such as a university, to evaluate the effectiveness of the different approaches against defined public policy outcomes.

Another area where self-regulation may be desirable is cyber security. Robert Atkinson, Founder and President of ITIF, argued that the private sector has strong financial and reputational incentives to protect itself and its customers against cybercrime. He sees little upside to government dictating specific steps regarding what industry should do. Moreover, limiting the proper role of the U.S. government in cyber security provides a principled basis for industry to argue for similar limitations on the role of the Chinese government and other foreign nations in cyber security abroad. While there remains an important role for government, industry should have flexibility to develop standards for how to protect against cyber threats on emerging technologies. As a practical matter, industry is more likely to be nimble in this area than government.

Improving Digital Competence

Another set of recommendations centers around the need for technology-focused job training and programs to advance digital literacy skills. Not all Americans are benefiting from new technologies and more needs to be done to give individuals the tools to succeed in a digital society. Critical focus areas include training workers of tomorrow, providing broadband users the skills to evaluate online content and embedding ethics into algorithmic decision-making.

To participate fully in a digital world, both in the workplace and on a personal level, individuals need to be digitally literate.

The American Library Association defines digital literacy as "the ability to use information and communication technologies to find, evaluate, create and communicate information, requiring both cognitive and technical skills."[14] Individuals must know how to access and create content on digital platforms, assess the validity of third-party content and take appropriate action to disseminate such content. As one report explains, "Part of digital literacy is not just understanding *how* a tool works but also *why* it is useful in the real world and *when* to use it. This concept can be described as digital citizenship—the responsible and appropriate use of technology, underscoring areas including digital communication, digital etiquette, digital health and wellness, and digital rights and responsibilities."[15]

To participate fully in a digital world, both in the workplace and on a personal level, individuals need to be digitally literate. According to one estimate, 90 percent of the workforce will require basic digital skills to be able to function effectively in the workplace. More than half of workers will need to be able to use, configure and build digital systems.[16] As AI increasingly is used to perform routine tasks requiring relatively low levels of judgment, those workers will be displaced. If American workers are not properly equipped to perform the jobs of tomorrow, then our country will face social and economic instability.

Unfortunately, there is reason to worry the U.S. will be ill equipped to compete effectively in the digital world in the years ahead. According to the OECD, millennials in the U.S.—who now comprise one-third of the American workforce—placed nearly last in digital skills (defined as literacy, numeracy and problem-solving) as compared to the same age group in other developed nations.[17]

To remediate this gap, it requires a concerted effort by both government and the private sector, which leads to the next recommendation.

Recommendation 5: Government should do more to advance digital literacy and job skills.

The U.S. government should focus on training the next generation for future employment. It is not sufficient to simply ensure all individuals have the basic skills to get online; government and anchor institutions need to help prepare people for the changes in the workforce stemming from the integration of AI into key verticals. Every major market sector of the economy will be using AI as a force multiplier to perform tasks more quickly and effectively, including inventory management, human resources, logistics and procurement.

Anchor institutions can play an important role in delivering programs for training and broadband access. As trusted members of the community, anchor institutions meet significant needs for a population that may not be aware of more sophisticated platforms for career development and job skills training. Community colleges and technical programs will be the entry point for many to re-train for the jobs of tomorrow. Moreover, as Francella Ochillo, Executive Director of Next Century Cities pointed out, local community colleges and community centers can provide technical training to people seeking the necessary skillset to build and operate communications networks.

Singapore MySkillsFuture platform, with its focus on lifelong learning and job skills training, could be a scalable model for U.S. action. This portal is a one-stop shop that includes online aptitude tests to identify compatible industries or occupations; information on different industries and what types of skills those industries require now and in the future; an online job bank to help job seekers find and apply for employment; a tool to identify skills shortfalls between an individual's profile and a selected occupation as well as resources to fill those gaps;

and an education management system to let individuals and employers track certifications and accreditations obtained over the course of one's career. The U.S. Department of Labor already sponsors a version of this platform, MySkillsMyFuture, in partnership with the American Job Center Network in the U.S.[18]

There is also recent legislation sponsored by U.S. Senator Patty Murray of Washington state to establish a State Digital Equity Capacity Grant program within the NTIA to provide funding for state-driven digital inclusion initiatives. Funding would be available for targeted digital inclusion efforts, skills training and other workforce development programs, the construction and operation of public computing centers, and making technology available to covered populations at low or no cost.[19] It is currently pending in the Senate Committee on Commerce, Science, and Transportation.

With digital competence becoming a necessity for many career paths, a critical U.S. goal should be to promote lifelong learning and specialized training so individuals of all ages can become digitally literate. One idea is to make changes to traditional 529 accounts so they can be used for various types of courses and not just post-secondary education. Another idea is to dedicate one percent of unemployment taxes to retraining workers displaced by the advent of AI in the workplace. A third idea is to establish rural innovation centers to educate populations less familiar with technology due to availability and adoption shortfalls.

Computer science education needs to include ethical considerations as a core component of the curriculum.

In order to promote U.S. leadership in computer sciences, government and industry should focus on strengthening public education. A focus on college and graduate-level education is not enough; K-12 education is important, as well. Young people need not only specific job training, but also training in AI creation.

The deep challenges of AI will not be solved without a new generation of technologists who can bring to bear their unique insights into the

problems at hand. Shireen Santosham, Chief Innovation Officer of the San Jose Mayor's Office of Technology & Innovation, pointed out that the U.S. cannot graduate more engineers to catch up with China because China is graduating half of all the engineers in the world. But the U.S. can do a better job of integrating macroeconomic policy concerns into engineering curricula so those who come to the U.S. from other nations for an advanced degree are grounded in core American values.

Google's Johanna Shelton said engineers need to be thinking about ethics at a much earlier stage in their education journey. Computer science education needs to include ethical considerations as a core component of the curriculum. It is too late to be talking about ethics on the back-end after a new platform or application is created. Product designers need to be thinking about how to give users meaningful choices regarding what they want and do not want rather than designing a product that can only be used in one way. Moreover, as Brookings Institution Fellow Nicol Turner-Lee suggested, social scientists should be working with computer scientists; not all decisions should be made by engineers. Potential bias can be reduced by increasing diversity in those who are creating AI.

Closing the Digital Divide

The final set of recommendations center on addressing the digital divide, which includes issues of digital inclusion. The critical issue is that people who are not online—for whatever reason—cannot take advantage of a wide range of applications and services that most people take for granted. Diane Griffin Holland, Senior Advisor for Tech and Telecom at the National Urban League, identified three dimensions of the digital divide—relevance, affordability and availability. Each dimension warrants a different menu of potential solutions. The ultimate objective is to ensure every person has meaningful access to broadband connectivity, can pay for such connectivity and understands the value of fully participating in the digital economy. It is critical that all people can benefit from advances in technology and connectivity and that no one is disproportionately harmed or excluded from these benefits.

Participants expressed concern that the rise of emerging technologies, like AI, 5G and IoT, could have a disproportionately negative impact on certain communities. Digital data deserts will lead to algo-

rithmic bias, which in turn will exacerbate the exclusion of marginalized communities. Redlined communities will not have access to the same information as the rest of the world. Where 5G connectivity is lacking, communities cannot realize the benefits of IoT or AI.

Digital data deserts will lead to algorithmic bias, which in turn will exacerbate the exclusion of marginalized communities.

In the years to come, the internet will be used for more than just connecting people; the promise of IoT is the ability to connect millions upon millions of devices for specialized purposes. Real-time processing of information by AI achieves better outcomes. There is growing recognition across the federal government of the importance of connectivity for such use cases as precision agriculture and connected care.[20] The danger is that the benefits of IoT for these applications may not be fully realized in discrete areas of the country.

A complicating factor in addressing the digital divide are the respective roles of localities, states and the federal government. Preemption of local processes for 5G deployment can achieve a uniform national approach, but it removes local decision-making and power. Blair Levin, Brookings Institution Fellow, argued that Google Fiber changed this dynamic by creating a competition among cities, thereby motivating cities to devise ways to make their localities more hospitable for investment in next-generation networks. He declared that the FCC has preempted cities without obtaining anything in return from industry.

Enormous investment is being made by the industry, noted Len Cali, Senior Vice President of Global Public Policy at AT&T. He said cities should reduce barriers to deployment and not view 5G as a near-term revenue opportunity, but rather as a growth opportunity. Shireen Santosham of the San Jose Mayor's Office of Technology & Innovation offered a different perspective: local governments should not be viewed simply as another source of regulation. Local governments also are a vehicle for feedback and community data input. Those voices need to bubble up to the federal level. Christopher Lewis, President and Chief

Executive Officer of Public Knowledge, emphasized two sets of values that must be balanced: rapid 5G deployment and accessibility for all Americans versus local control and historic preservation. It is important to recognize the tension of values in the conversation about solutions.

…local governments should not be viewed simply as another source of regulation. Local governments also are a vehicle for feedback and community data input.

The respective role of various levels of government is also relevant to determining who should provide broadband. Nearly half of the states in the country have laws in place that serve to preclude municipalities or electric cooperatives from providing retail broadband to end users. While some believe government should not be in the business of competing with the private sector, municipalities are now stepping in to fill the void because in some instances the private sector has failed to serve the community. Often, local efforts to promote broadband are galvanized by dissatisfaction from key constituencies regarding the level of service provided by the current incumbent, whether telecommunications carrier or cable operator. As GLIA Foundation's Richard Whitt put it, if people want to tax themselves to do municipal broadband they should be allowed to do that.

However, others argue that municipalities are legal creations of states, and states should have the power to determine what local governments can and cannot do. If local constituencies exert enough pressure at the state level, then state laws limiting broadband deployment can be changed. And even if localities are barred by state law from directly providing broadband, they can take other important steps to galvanize local action.[21]

Conference attendees voiced differing opinions on where policymakers should focus their attention in addressing the digital divide. Blair Levin believes government efforts have been too focused on making broadband available, to the detriment of focusing on strategies to increase utilization. Digital inclusion is more than just an infrastructure

issue. He argued that several developments on the horizon—including the launch of low-earth orbiting satellites, resolution of the C-band proceeding, and merger commitments made in the T-Mobile-Sprint transaction—suggest that market forces will, in the next few years, substantially improve broadband availability. In that light, given the number of affected individuals, there should be a greater focus on barriers to adoption, such as affordability, relevance and digital literacy.

Digital inclusion is more than just an infrastructure issue.

Jonathan Chaplin, Managing Partner of New Street Research, cautioned that people should not conflate lack of access with affordability. In his view, mobile is available to almost the entire country and areas served by mobile should not be viewed as unserved. Others disagreed, pointing out that usage caps and the higher pricing of mobile make it unusable for home broadband needs. Access to video is essential to ensure equitable access to education today and will increasingly become important for health care in the future. But Chaplin countered that not every single use case needs to be solved with the same kind of network. Moreover, efforts should be focused on how to make mobile an affordable substitute. While today the focus may be on wired and fixed wireless in-home broadband solutions, there needs to be further exploration of the role of mobility in solving the divide over the longer-term.

Recommendation 6: Ensure all can pay for an in-home broadband connection/device and appreciate the value of broadband.

Martha Guzman Aceves, Commissioner of the California Public Utility Commission, noted that affordability is the elephant in the room: broadband simply is too expensive, even in areas where there is competitive choice. To remedy this problem, the government should increase funding for low-cost broadband offerings to make broadband affordable for vulnerable populations. In 2016, the FCC modernized the Lifeline program to provide a $9.25 discount on qualifying broadband service, which typically provides access to a relatively restricted level of service. It is a problem when low-income households are run-

ning out of data halfway through the month. One innovative solution, offered by Brookings Institution Fellow Nicol Turner-Lee, would be to exempt access to government websites from monthly usage caps for Lifeline subscribers. That would at least enable those households to access workforce development training materials and educational resources without restriction. This is something that might be pursued through sponsored data programs.

In addition, the group suggested that the FCC's existing Lifeline program is not appropriately structured to make broadband affordable for low-income households. One way to improve Lifeline is to reduce the administrative burdens of participation so that more service providers are willing to participate. A more radical idea, possibly requiring legislative action, is to provide vouchers and subsidies directly to the consumer rather than routing funds through a service provider.

Second, carriers could adopt common eligibility requirements for their low-cost broadband offerings. For instance, Comcast's Internet Essentials program was originally available for low-income households with school-aged children but has expanded to include a much broader population including low-income veterans, residents in public housing and people with disabilities. Similar programs of other companies are more narrowly focused.

Third, the homework gap can be solved by allowing communities to gain broadband connectivity through E-rate funded Wi-Fi. One way to do this is to permit E-rate funds to be used to support Wi-fi enable school buses.

A fourth effort is to encourage public-private partnerships to ensure students have access to the devices used for broadband connectivity. The FCC's universal service programs pay for broadband service, not end user devices. Comcast's Internet Essentials program provides access to subsidized computers as well as digital training.

Affordability is not the only problem, however. Other reasons for non-adoption include lack of need, lack of interest and the related lack of digital literacy skills. Efforts to close the digital divide must address the full panoply of reasons why people may be unwilling or unable to adopt broadband. As discussed elsewhere in this report, a digital-first strategy for delivery of government benefits and services will encour-

age broadband adoption. Likewise, concrete actions to promote digital literacy through education and workforce training should promote greater usage of broadband.

Recommendation 7: Government should impose a moratorium on federal and state funding for broadband deployment until improved broadband maps are available.

Turning to the issue of broadband access, the most striking recommendation was to slow down current efforts to award new funding for broadband deployment to address availability. Government funding to supplement private capital is critical to closing the digital divide in infrastructure availability. But there is a growing fear among experts that the problem of availability is much bigger than it currently appears.

The FCC initiated a rulemaking in August 2019 to determine the rules that it will use to award up to $20.4 billion in funding from the newly renamed Rural Digital Opportunity Fund (RDOF). This fund carries forward the FCC's vision of awarding funding to support the deployment of broadband in rural areas through a competitive bidding process rather than automatically providing such funding to incumbent telecommunications carriers. Subsequent to the Aspen conference, in January 2020, the FCC adopted rules for the first phase of funding ($16 billion over ten years) and decided it would use the current FCC Form 477 data to identify areas eligible for funding. Funding will be available in areas lacking 25/3 Mbps fixed broadband service. The FCC expects to award the second phase of funding (at least $4.4 billion over ten years) using data from its new and improved, more granular data collection.[22]

Congress and other interested stakeholders have voiced a widespread, bi-partisan dissatisfaction with the current data utilized by the FCC and other agencies to target funding to support the deployment of broadband in rural areas. The methodology used by the FCC to determine how many people lack fixed broadband—treating all residents in a given census block as served even if only one resident has access to service—masks the true extent of the broadband availability gap. Moreover, the current Form 477 collects data regarding advertised service availability, which some parties argue may be overstated. Finally, the FCC has no process in place to independently validate the Form 477 data submitted by service providers.

The FCC needs access to better broadband availability data before it sends billions and billions of dollars out the door, said FCC Commissioner Geoffrey Starks. Moreover, good data about broadband availability is critical to detecting digital redlining.

In July 2019, shortly before the Aspen event, the FCC adopted an order mandating a new data collection process—the Digital Opportunity Data Collection—which collects more granular information regarding broadband service availability. This will enable the government to target funding more effectively. Under this new data collection, all broadband providers will be required to submit geospatial maps showing the precise boundaries of where they offer service.[23] Moreover, the FCC has decided to establish a more robust process to gather public input on where coverage is overstated. Local leaders will play a valuable role in this process as they are better situated to know conditions in their own jurisdictions.

The new mapping requirements are expected to take some time to implement, so new broadband maps will not be publicly available before the FCC plans to hold the first Rural Digital Opportunity Fund auction in October 2020. The FCC has decided to proceed with an auction to award most of its RDOF budget of funding while work continues to improve the maps to pinpoint where service is lacking. The open question is whether the FCC will raise the minimum performance requirement–now 25/3 Mbps for fixed broadband–when it is ready to proceed with a second round of RDOF funding. With an evolving standard for universal service, it does not make sense to lock up all available FCC funding for the next decade based on a 2020 view of the world. An understanding of what constitutes universal availability undoubtedly will change as consumers increasingly subscribe to more robust services over time. Today's definition of broadband will become tomorrow's old news.

While conferees disagreed about the extent of the broadband availability problem in this country, many believed more money is necessary to fully address broadband availability and affordability. Today, funding for the FCC's current universal service programs is largely derived from an assessment on a percentage of interstate or international telecommunications service retail end user revenues. While the group did not offer a specific proposal for contributions reform, it agreed almost

any alternative methodology would be an improvement over the current system. It is time for the FCC to increase and sustain the federal universal service fund.

Conclusion

Many of the issues of interest at the 34th Annual Aspen Institute Conference on Communications Policy were outside the purview of the companies in the communications sector traditionally regulated by the FCC. Rather, the focus was the role of *technology* companies in society. The overarching concern is that certain online platforms have an enormous influence on the way people think, what people hear and what they know.

AI and the IoT are likely to fundamentally change the world in many ways. Computational systems that people do not see or understand are making decisions for and about them. These technologies have ushered society to the cusp of a revolution, similar to the beginning of the First Industrial Revolution. Yet, there is fear that the benefits will at best be uneven across our country, while the harms to some may be significant. The ability of government to navigate this transformation successfully is not clear. Government is not well suited to intervene when the pace of change is accelerating, and the institutional framework to respond is, at best, static. Further cooperation between government and the private sector is necessary to address identified harms and to ensure that all Americans can benefit from the advent of 5G, AI and the IoT. It is time for all stakeholders to focus on the guardrails that can best serve society, and also consider the areas that are best left to the market to address.

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APPENDIX

In Harm's Way: Smart Regulation of Digital & Network Technologies

Aspen, Colorado
August 11-14, 2019

Conference Participants

Martha Guzman Aceves
Commissioner
California Public Utilities Commission

Rebecca Arbogast
Senior Vice President
Global Public Policy
Comcast NBCUniversal

Robert Atkinson
Founder and President
The Information Technology and Innovation Foundation

Paula Boyd
Senior Director
Government and Regulatory Affairs
Microsoft

Jennifer Bradley
Director
Center for Urban Innovation
The Aspen Institute

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Jonathan Chaplin
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Donald Cravins
Vice President
Policy & External Affairs
Charter Communications

Larry Downes
Senior Fellow
Accenture Research

Donna Epps
Senior Vice President
Public Policy and Strategic Alliances
Verizon

Note: Titles and affiliations are as of the date of the conference.

Charlie Firestone
Executive Director
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The Walt Disney Company

Diane Griffin Holland
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National Urban League

Kathleen Ham
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Director, Columbia Institute for Tele-Information
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Francella Ochillo
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Kevin O'Scannlain
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Arun Palakurthy
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Former Assistant Secretary for Communications and Information, and
Administrator
National Telecommunications and Information Administration
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Note: Titles and affiliations are as of the date of the conference.

Marc Rotenberg
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Shireen Santosham
Chief Innovation Officer
San Jose Mayor's Office of Technology & Innovation

Johanna Shelton
Director
Government Affairs & Public Policy
Google

Jeff Smulyan
Founder and Chairman of the Board
EMMIS Communications

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About the Author

Carol Mattey is the Principal of Mattey Consulting LLC, based in the Washington, D.C. metro area. Mattey Consulting provides regulatory, strategic and public policy advisory services to broadband providers, governmental entities, non-profit organizations and others active in the telecommunications industry, with a particular focus on government broadband funding programs.

Ms. Mattey has more than 30 years of experience formulating, enforcing and advising on federal communications regulation. Prior to launching her own firm, Ms. Mattey was Deputy Chief of the Wireline Competition Bureau at the Federal Communication Commission (FCC) from March 2010 to February 2017, where she focused on modernizing the FCC's universal service programs. Before that, she developed the universal service recommendations in the FCC's National Broadband Plan delivered to Congress in March 2010. From 2005 to 2009, she was a director in Deloitte's Technology, Media and Telecommunications practice advising private sector clients on business strategy and regulatory compliance matters. Between 1994 and 2004, she held several management positions at the FCC, including Deputy Bureau Chief, focusing on wireline policy issues including local competition, privacy and universal service. Previously, she worked on telecommunications, media and spectrum issues at the National Telecommunications & Information Administration. She started her professional career as an attorney at Wilmer Cutler & Pickering (now WilmerHale) in Washington, D.C.

Ms. Mattey received a J.D. *cum laude* and M.A. in Public Policy Analysis from the University of Pennsylvania, and a B.A. from the University of Virginia.

Previous Publications from the Aspen Institute Communications Policy Project

Spectrum Policy and the Future of Satellites by Doug Brake

There is a growing demand for spectrum resources that have traditionally been reserved separately for terrestrial or satellite uses. In an effort to expand their services, spectrum users are looking to use or share the bands reserved for others. While there are some regulatory provisions to enable sharing of spectrum, current guidelines do not facilitate sharing among satellite or terrestrial services. This report focuses on tensions between satellite use of spectrum and terrestrial uses. Written by rapporteur Doug Brake, it explores how best to enable the flourishing of satellite operations through effective spectrum policy while balancing the unique requirements of satellites with competing spectrum uses. 2019, 53 pages, $12.00

Next Generation Digital Infrastructure: Towards a New Regime for Promoting Investment, Competition and Consumer Protection, by Carol Mattey

Advances in information communication technologies are providing greater penetration, new services and connectivity to the world. In a connected nation, traditional norms of federalism are increasingly challenged and policymakers are wrestling with difficult questions of whether and how to manage the ongoing transformation of the communications sector. The report of the 32nd annual Aspen Institute Conference on Communications Policy, written by rapporteur Carol Mattey explores regulatory structures to incentivize the deployment of communications infrastructure to unserved areas, and ways to promote competition and protect consumers on the internet. 2019, 40 pages, $12.00

Rethinking Institutions of Spectrum Management, by Ruth Milkman

There is rapid growth in spectrum demand. With the emergence of 5G, Internet of Things, and unmanned vehicles, spectrum policy issues have become more complex. The report, Rethinking Institutions

of Spectrum Management, written by roundtable rapporteur Ruth Milkman, examines the urgency for a different structure for spectrum management that could better serve spectrum-related needs and includes recommendations for incremental change within the current institutional framework. 2018, 57 pages, $12.00

Streams of Connectedness & New Media: Fragmentation, Innovation and Democracy, by John B. Horrigan

While greater consumer choice in media has spurred connectedness and diversity of creative voices, it can breed fragmentation, which in turn can degrade public debate. Participants of the 32nd Annual Aspen Institute Conference on Communications Policy, which took place in Aspen, Colorado in August 2017, explored policies for the new media landscape and identified two issues stakeholders should confront going forward: inclusion and content quality. Conferees grounded their recommendations in current Federal Communications Commission Chairman Ajit Pai's statement of principles—digital empowerment, the need for ubiquitous Internet access, the power of competitive free markets, and light-touch regulation. The report, written by John Horrigan, includes three proposals to address challenges in the new media landscape, such as investment in access and inclusion, changes in regulation to promote network deployment, and leadership and education. 2018, 40 pages, $12.00

Revisiting Spectrum Policy: Seven Years after the National Broadband Plan, by David Boldlier

In Autumn 2016, the Aspen Institute Communications and Society Program convened 25 leaders and experts in the technology, business, regulation and public interest for the Aspen Institute Roundtable on Spectrum Policy. The report, a result of the Roundtable, synthesizes the ideas that emerged from participant dialogue and recommends new spectrum policies that incorporate emerging technologies, consider various licensing approaches, and frame U.S. spectrum policy from a global perspective. 2017, 48 pages, ISBN Paper: 0-89843-660-5, $12.00

Setting the Communications Policy Agenda for the Next Administration, by Richard Adler

The 31st Annual Aspen Institute Conference on Communications Policy took place several months before the 2016 presidential election. "Setting the Communications Policy Agenda for the Next Administration" is the resulting report, synthesizing the ideas that emerged during the three-day dialogue. It explores areas where the new Administration should focus its efforts concerning communication policy. The report also includes recommendations to promote inclusion and expand opportunities for all citizens, how to encourage continued investment and innovation, and offers strategies to create a trusted online environment to protect citizen's digital lives. 2017, 59 pages, ISBN Paper: 0-89843-655-9, $12.00

Preparing for a 5G World, by Richard Adler

In October 2015, experts and leaders gathered on the Eastern Shore of Maryland to discuss the range of needs that the next generation of wireless innovation, 5G, is intended to address. This change in technology will bring forth many legal and regulatory issues as 5G reaches its full potential. Participants in the Aspen Institute Roundtable on Spectrum Policy focused on defining the key policy issues raised by the move to 5G and recommended actions to address these concerns. 2016, 67 pages, ISBN Paper: 0-89843-646-X, $12.00

Skirting Bottlenecks: Policies to Support Network Evolution, Digital Inclusion and Data Security, by John B. Horrigan

The Thirtieth Annual Aspen Institute Conference on Communications Policy, titled "The Future of Broadband Competition," took place on August 12-15, 2015 in Aspen, CO. Robust competition among communications providers has always been a crucial goal for policymakers, leading to robust, innovative and efficient delivery of services. But what does the competitive communications marketplace of the future look like? 32 leading communications policy leaders and experts gathered in Aspen to investigate policy goals that can ensure this robust, competitive marketplace, and consider how broadband markets can promise delivery of economic and social benefits that improve the quality of life in America for all. The report, written by rapporteur John B. Horrigan, offers five recommendations for the future of broadband competition. 2016, pages, ISBN Paper: 0-89843-643-5, $12.00

Making Waves: Alternative Paths to Flexible Use Spectrum, by Dorothy Robyn

The 2014 Aspen Institute Roundtable on Spectrum Policy (AIRS) gathered 26 of the top telecommunications policy experts at the Aspen Wye River Conference center in Queenstown, MD, to investigate whether the U.S., in light of recent progress in alternative approaches to spectrum allocation, should make the more drastic move to a regime that has all spectrum, other than some carved out for specific public benefit, to be considered general use spectrum eligible for the highest and best use available. The report, written by Roundtable rapporteur, Dorothy Robyn, tackles the task of describing what general purpose spectrum actually is; discusses the practical, political and institutional limits and ways to overcome them; and details the necessary technical advances and regulatory actions to make general purpose spectrum a reality. 2015, 68 pages, ISBN Paper: 0-89843-625-7, $12.00

The Atomic Age of Data: Policies for the Internet of Things, by Ellen P. Goodman

The Twenty-Ninth Annual Aspen Institute Conference on Communications Policy, titled "Developing Policies for the Internet of Things," took place August 13-16, 2014 in Aspen, CO. As the world becomes increasingly connected and more objects become embedded with sensors, the Internet of Things is poised to explode, with estimates of 25 billion connected devices by 2020. 35 knowledgeable participants gathered to examine how specifically should communications policies accommodate the new Internet of Everything? This report explores the nascent promises and challenges of the IoT. In examining the interplay between the vast increase in data created on the Internet of Things (IoT), and the resultant strain on the networks that carry this information, and the group came to a realization. Data needs to be thought of as "infrastructure." 2015, 72 pages, ISBN Paper: 0-89843-623-0, $12.00

Video Veritas: Building a 21st Century Video Platform for a High-Performance Society, by John B. Horrigan

The Twenty-Eighth Annual Aspen Institute Conference on Communications Policy focused on the future of video regulation. The resulting report, written by John B. Horrigan, looks at the changing landscape of video regulation and the fundamental shift in how video is being viewed. While cable and broadcast television continue to be the dominant

modes of transmission, over the top delivery of content via the Internet provides new ways to distribute personalized and targeted programming directly to the viewer. This, and the proliferation of mobile devices and tablets can deliver video to the viewer anywhere, anytime. As a result, the advertising-based broadcast business model is undergoing significant challenge and change. This report examines the evolving video ecosystem and offers recommendations for policy that can accommodate the new video market. 2014, 54 pages, ISBN Paper: 0-89843-603-6, $12.00

Spectrum as a Resource for Enabling Innovation Policy, by William Webb

The 2012 Aspen Institute Roundtable on Spectrum Policy (AIRS) convened shortly after the presidential election to consider ways that spectrum policy could improve the economy through innovation. The 32 leading communications policy experts in attendance focused on how spectrum policies could help create an environment that makes it easier to use spectrum as a resource for innovative new goods and services. The participants first identified problems facing new entry and innovation today, and then recommended solutions, looking specifically at the interstices among licensed and unlicensed approaches, spectrum sharing and flexibility, and new institutional arrangements to manage these solutions. The report, written by British spectrum expert William Webb, sets forth 11 recommendations that he gleaned from the conference dialogue to guide future spectrum policy development with regard to facilitating innovation. 2013, 45 pages, ISBN Paper: 0-89843-584-6, $12.00

Rethinking Communications Regulation, by Richard Adler

As the Internet and other information and communications technologies grow exponentially, and as a new ecosystem is emerging that could conflate previously distinct methods of communication into a single digital medium, questions arise as to whether the traditional silos of regulation are still appropriate. The report resulting from the 27th Annual Aspen Institute Communications Policy Conference addresses the overarching concern as to whether the Communications Act needs a radical revision. Written by rapporteur Richard Adler, the report considers the key goals of a new communications regime and offers regulatory and non-regulatory approaches for achieving these goals in a digitally connected world. 2013, 65 pages, ISBN Paper: 0-89843-583-8, $12.00

The Reallocation Imperative: A New Vision for Spectrum Policy, by Preston Marshall

The report resulting from the 2011 Aspen Institute Roundtable on Spectrum Policy addresses new ways of allocating, clearing, using and/or sharing spectrum controlled by private parties and government agencies. Written by rapporteur Preston Marshall, the report attempts to step back and establish a broad vision for reallocating spectrum in the United States in the public interest, discussing new approaches that will facilitate more effective and efficient spectrum use. A number of recommendations are laid forth to guide future spectrum policy development, Congressional actions, and technology explorations. 2012, 54 pages, ISBN Paper: 0-89843-570-6, $12.00

Updating Rules of the Digital Road: Privacy, Security, Intellectual Property, by Richard Adler

Given the current growth and importance of the Internet, the report of the 2011 Aspen Institute Conference on Communications Policy titled *Updating Rules of the Digital Road: Privacy, Security, Intellectual Property*, highlights the elements that will allow for greater use of broadband as the common medium: security, privacy and intellectual property regulation. Written by rapporteur Richard Adler, the report explores a range of threats that plague the use of today's communications media and provides a series of recommendations which aim to ensure that users' communications are secure, private and protected.

The report reflects the issues and ideas raised by business leaders, academics, and policy experts at the Twenty-Sixth Annual Aspen Institute Conference on Communications Policy. 2012, 70 pages, ISBN Paper: 0-89843-563-3, $12.00

Spectrum for the Next Generation of Wireless, by Mark MacCarthy

Spectrum for the Next Generation of Wireless explores possible sources of spectrum, looking specifically at incentives or other measures to assure that spectrum finds its highest and best use. It includes a number of recommendations, both private and federal, of where and how spectrum can be repurposed for wireless use. In November 2010, the Aspen Institute Communications and Society Program convened the Aspen Institute Roundtable on Spectrum Policy, where 31 experts and leaders

addressed the consequences and solutions to the increasing demand for spectrum. Spectrum for the Next Generation of Wireless is the report resulting from the Roundtable discussions. 2011, 68 pages, ISBN Paper: 0-89843-551-X, $12.00

Rewriting Broadband Regulation, by David Bollier

The report of the 25th Annual Aspen Institute Conference on Communications Policy in Aspen, Colorado, considers how the United States should reform its broadband regulatory system. Participants looked at international models and examples and examined how data and communications should be protected in the international arena. The resulting report explores a range of policies for U.S. broadband regulation, many of them derivative of the National Broadband Plan adopted by the Federal Communications Commission only a few months before the conference.

Participants also ventured into new and interesting territory with the novel concept of "digital embassies." They saw this as a way of dealing with jurisdictional issues associated with the treatment and protection of data in the cloud, i.e., data that is provided in one country but stored or manipulated in another. The concept is that the data would be treated throughout as if it were in a kind of virtual embassy, where the citizenship of the data (i.e., legal treatment) goes along with the data. This policy seed has since been cultivated in various other regulatory environments. 2011, 37 Pages, ISBN Paper: 0-89843-548-X, $12.00

Scenarios for a National Broadband Policy, by David Bollier

The report of the 24th Annual Aspen Institute Conference on Communications Policy in Aspen, Colorado, captures the scenario building process that participants used to map four imaginary scenarios of how the economy and society might evolve in the future, and the implications for broadband policy. It identifies how certain trends—economic, political, cultural, and technological—might require specific types of government policy intervention or action. 2010, 52 pages, ISBN Paper: 0-89843-517-X, $12.00

Rethinking Spectrum Policy: A Fiber Intensive Wireless Architecture, by Mark MacCarthy

Rethinking Spectrum Policy: A Fiber Intensive Wireless Architecture is the report resulting from the Aspen Institute Roundtable on Spectrum Policy, held at the Aspen Wye River Conference Center in November 2009. Written by rapporteur Mark MacCarthy, the report captures the insights of the participants, exploring innovative ways to respond to the projections of exponential growth in the demand for wireless services and additional spectrum. In addition to discussing spectrum reallocations, improved receivers, shared use and secondary markets as important components for meeting demand, the report also examines opportunities for changes in network architecture, such as shifting the mix between fiber and wireless. 2010, 58 pages, ISBN Paper: 0-89843-520-X, $12.00

Reforming Telecommunications Regulation, by Robert M. Entman

The report of the 19th Annual Aspen Institute Conference on Telecommunications Policy describes how the telecommunications regulatory regime in the United States will need to change as a result of technological advances and competition among broadband digital subscriber lines (DSL), cable modems, and other players, such as wireless broadband providers. The report proposes major revisions of the Communications Act and FCC regulations and suggests an interim transitional scheme toward ultimate deregulation of basic telecommunications, revising the current method for universal service subsidies, and changing the way regulators look at rural communications. 2005, 47 pages, ISBN Paper: 0-89843-428-9, $12.00

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