Summary of 14 May Workshop on Building Resilience in Telecommunications – In Canada and Beyond

by Erik Bohlin & Romel Mostafa, Ivey Business School, and workshop presenters

The workshop on the theme "Building Resilience in Telecommunications – In Canada and Beyond", was convened on 14 May, 2024, at the Ivey Donald K. Johnson Centre in Toronto. It attracted more than 70 in-person registrations and 15 webinar participants. It was convened by the Ivey Chair in Telecommunications Economics, Policy and Regulation, *Erik Bohlin*, and the Director of Lawrence National Centre for Policy and Management, *Romel Mostafa*, Ivey Business School at Western University.

The purpose of the workshop was to gather policy makers, industry representatives and researchers to address the increasing importance of resilience amid challenges in climate change, geopolitical tensions, and malign actions. The starting point of the workshop was telecommunications, but the conversation was much wider into many digital spheres of interest and action. And while the workshop did not try to define resilience in a standardized form, there was a general recognition that resilience is fundamentally some strength to withstand various types of threats: natural and malign.

Government officials from Canada, industry and international experts spoke during the day. Here follows a brief summary of each presentation, with implications toward the end. Complete presentations are available on https://www.ivey.uwo.ca/news/events/2024/05/building-resilience-in-telecommunications-in-canada-and-beyond/ together with the agenda of the day, also in the Annex of this report.

In the introduction, Professor *Erik Bohlin* emphasized that while the scientific field of telecommunications policy received prominence some fifty years ago, there is little conceptual and empirical research on the interaction between resilience and telecommunications policy. This is despite the obvious fact that resilience is a topic of increasing importance for our societies and for telecommunications policy both in practice and research. While an important purpose of the workshop was to bring together practical partners and researchers to discuss issues of common concern, a secondary aim of the workshop was to develop a research agenda on resilient telecommunications policy. To that end, a program has been devised with international experts both from practice and academia, together with Canadian government and industry.

Vice Chairperson *Adam Scott* of the Canadian Radio-television and Telecommunications Commission (CRTC) started the program with a speech that emphasized several roles of CRTC to improve resilience. Three key words are central: prevention, mitigation, and accountability. This triad were especially centered on network outages and other forms of network resilience – concerns within the role and regulations of CRTC. Essentially, the concern is about stopping network outages, reducing the impact and attributing responsibility. The presentation ended with several probing questions, such as: how to provide incentives for resilience by telecom service providers; what role for CRTC when outages occur completely outside the control of these

providers, such as power outages; how to match necessary redundancy with inefficient duplication; how can regulation keep up with increasing needs for resilience? Mr. Scott invited the audience to reflect on and discuss questions such as these.

Georg Serentschy, Managing Partner at Serentschy Advisory Services GmbH, provided an engaging overview of resilience efforts and threats around the world, with emphasis on Europe, and building on his recently published White Paper.[1] The purpose was to raise awareness of the necessity of urgent changes in the way the digital ecosystem is governed, against a backdrop of the seismic shifts in geopolitics and an ever-changing threat landscape to digital infrastructures and systems. Mr. Serentschy provided stark examples of various resilience threats, both at sea and land, impacting both consumers and industries. As a conclusion, ten important recommendations were presented, all emphasizing the interconnected nature of resilience on our digital infrastructures, with calls for greater collaboration between government and industry, including new processes and a holistic institutional reform.

Professor *Eli Noam* at Columbia Business School provided an encompassing overview that provided a hierarchy of resilience threats, starting with networks at the bottom, topped by a new type of networks of networks, this time AI of AI. The novel argument was that various applications and sector implementations of AI will need to be coordinated by super-AI:s. A malfunction at the top AI layer will have far-reaching and potentially devastating effects. The fundamental problem is how to maintain human control over essential systems that are highly complex black boxes operating at super-speeds. This can only be accomplished with the support of other AI modules. To deal with this conundrum, Prof. Noam offered several actions for technology and for management, and identified ten policy implications, ranging from various forms of rule-making and standard-setting, into new forms of institutional coordination. The inherent externalities in resilience call for government participation and support. The presentation was aptly named "Into Next Generation of Digital Protection: AI Resiliency as Public Responsibility."

Dr. *Jieun Park*, of Korea Institute of Science and Technology, and nominated as the Workshop Rapporteur, provided a succinct and engaging mid-term summary. She briefly went over the gist from the three previous talks and then suggested several key questions are addressed at the workshop. Moreover, she pointed out that the participants should identify the major and potential threats and the sources of those threats, and then see how those threats are different depending on geographical or geopolitical context. She also highlighted that one of the most important goals of this workshop is to figure out what would be the optimum institutional approach in supporting resiliency, and the resulting "homeworks" for each stakeholder.

Professor *Jenifer Sunrise Winter* at University of Hawai'i at Mānoa made a striking presentation on the implications of the Maui wildfires on resilient telecommunications. She described the several unexpected combinations that for a region very used to natural calamities, such as hurricanes and volcano outbreaks, yet took everyone by surprise. Critical components here were the co-dependency between power and telecommunication networks, and missing communication between telecom operators and first responders. A terrible catastrophe emerged, with the worst

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[1] See https://www.serentschy.com/digital-infrastructure-resilience-and-securitypolicy-implications-and-mitigation-measures/ and also available on https://www.ivey.uwo.ca/news/events/2024/05/building-resilience-in-telecommunications-in-canada-and-beyond/

fire-based death count in over a century for the United States. An extensive public debate has ensued in Hawai'i with many proposals forward.

Professor *Seongcheol Kim* at Korea University gave a very informative and fact-packed presentation on the status of resilience in Korea, and ways forward, also for Canada. Prof. Kim first gave an overview of the vulnerability of Korea, and then moved into several important examples, ranging from natural disasters into very significant examples of state-sponsored hacking. Moreover, examples of significant outages of service providers were explained. The response by both Korean government and industry has been significant and very ambitious. Prof. Kim exhorted the audience to consider South Korea as an example, and for Canada to adopts similar measures.

Vice President for Business Continuity and Emergency Response, *Phil Moore*, of Telus, gave a real tour de force on what the industry brings to enable further resilience. Mr. Moore provided many personal examples of the proactive readiness activities that Telus deploys, as one of the large Canadian telecom service providers. He emphasized both the bravery and dedication of its team members to provide support in times of resiliency threats. He spoke about the importance of the fiber-based infrastructure, significant investments in network redundancy and developing new technology to advance network resiliency and emergency response. Very concretely, extensive efforts of vegetation management around towers and aerial plant infrastructure have proven effective at reducing the effects of wildfire damage. Getting to resilience requires moreover the cooperation of communities, governments and industry. British Columbia, where Telus is headquartered, is leading efforts in emergency response because nature there has historically provided the biggest challenges. Telus has taken their learnings in the West across Canada where climate change evolves and increasingly threatens communications infrastructure. There is a need for consistent response strategies across provinces and territories in Canada. In the resilience area, government is both a source of risk and opportunity. Regulatory resale policies which concentrate more and more traffic on single regional networks amplify the adverse consequences of an outage.   Opportunities exist for government in terms of more harmonized and consistent emergency responses across provinces and territories and through funding to support additional network resiliency.

A final panel discussion was moderated by *Romel Mostafa*, Director of the Lawrence National Centre for Policy and Management. The panel engaged the audience with a conversation across several topics and themes, but before taking off in a conversation, several brief presentations started the session.

Director General at ISED *Andre Arbour* started first to elaborate on how much the general population relies on electronic services and mobile phones for so many mundane activities, such as concert tickets, and into more critical activities such as banking. For even more critical activities such as evacuations during wildfires, having access to mobile networks in vital. For Canada, the great impact of climate-related changes is notable. There is an estimate by the insurance bureau of Canada that there is a five-fold increase in catastrophic losses in the last 15 years. New resilience threats have emerged as well, such as rampant copper cable theft which halts services. What is the government doing now? The federal government has promoted reliable telecom services for a number of years, with many initiatives, such as an industry-wide Memorandum of Understanding on Telecommunications Reliability; setting a Telecommunications Reliability Agenda, including

keywords such as robustness, accountability and coordination; developing national strategies for both cyber security and critical infrastructure; putting together a Canadian Security Telecommunications Advisory Committee (CSTAC); and also a Canadian Forum for Digital Infrastructure Resilience; just to name a few. In addition, ISED is considering how to use satellite technologies to further resilience, including improving spectrum conditions for satellite to device access without interference. Last year, ISED instructed CRTC to implement an explicit goal of resilience, and the pending bill C-26 sets out to include resilience as a fundamental goal of the 1993 Telecommunications Act. ISED is in addition considering how to measure resilience in a way which is not too burdensome on industry but helpful for us all.

Senior Director *David Short* of Independent Electricity System Operator (IESO) highlighted the extensive regulation faced by electricity power networks, and how various outages have driven changes of regulation and industry practice. Examples include extensive vegetation and forest management around electricity installations, and implementation of detailed KPI:s. An important starting point were outages and wildfires in 2005 where the heat of the fires caused highly elevated power lines to sag to the ground, which then hit vegetation and trees to further the fires. After that, important standard setting for resilience was initiated both by the regulators and industry-wide associations. Generally, there are a lot of complementarities between the lessons learned by the power industry and the telecom industry. The power industry has learned to do wide drills on scenarios for resilience problems, to quickly find solutions, coordinated across North America every two years. In the last exercise in November 2023, several lessons were emphasized, some of which are telecom-related. One important issue is how to manage all the data that is available to the power companies – there is a huge inflow of data 24/7 and there important tools are being developed to harness this data. The availability of voice communications in the control rooms are absolutely vital as well, so please keep up these important services!

Associate Professor *Laurel Austin* at Ivey Business School told of a teaching case she wrote on challenges SME's face in recovering from cyber ransomware attacks. The case is used in courses on risk management at Ivey and provides an in-depth and lively account of the challenges a firm faces when everything on it's network is encrypted. The firm was an Ontario-based manufacturer of intelligent building solutions, attacked by hackers in 2019. The whole operation shut down; nothing worked – no invoicing, no customer relations, no email, no manufacturing, etc. Notably, the hackers gave the company a ticket number so that negotiations were easier to handle, to allow the hackers to manage communications. Cyber attacks have become big and organized business! The hackers need to follow hacked firms with ticket numbers to keep track of them all! How then should a ravaged firm respond, when its core business is taken hostage? Fortunately, in this case, the SME was able to recover without paying ransom through a series of wise decisions and investment in recovery efforts, aided by a stroke of luck. In this particular instance, on the day of the attack, a server with a backup was off network, and hence saved from the attack. Prof. Austin shared several lessons with the audience – among them redundancy; taking inventory of what is critical in terms of resilience; active budgeting for resilient systems; establishing contracts with firms specializing in resilience to contact when in crisis, and additional precautions. In addition, Prof. Austin commented upon a recent report by the World Economic Forum which focused on the tension between short-term shareholder value and long-term resiliency. The challenge is getting businesses to invest in a more long-term perspective.

In addition, *Heather Hudson*, Affiliate Professor, University of Alaska Anchorage, and Professor Emerita, University of San Francisco, shared additional slides with the audience on the many challenges faced by the Canadian far north, for instance in terms of geography, access, wildfires and floodings. Prof Hudson developed four issues: network architecture with fiber rings for redundancy; using several technologies for redundancy including satellite; using more local talent and knowledge for maintenance by hiring more local staff; using more subsidies for operational expenditures, not just capital expenditures.

An engaged discussion with the audience as moderated by Director Mostafa followed with a number of questions and remarks. Key themes and issues were as follows:

- The increasing importance of a resiliency job market, and the need for strategic thinking, which should be a foundation for many new jobs
- The trade-offs between satellite vs. regular fiber networks in terms of capacity, reach and costing
- The interaction between satellite to device such as mobile phones, and the associated capacity constraints and spectrum availability
- The jurisdiction of telecommunications services provided in Canada, regardless of their potential origin as satellite signals outside of Canada
- The need to create incentives for telecom service providers to invest in resilience, and the consequent need to raise rates for managing increased resiliency, vs. the constraints of government to meet these needs either by financial support or revised policies on competitive efficiency
- The need for power suppliers and telecom providers to work together for resiliency
- The tension between short-term returns of private companies vs. investments in resiliency

At the end of the discussion, Dr. *Jieun Park*, the Workshop Rapporteur, provided a succinct and engaging overall workshop summary, highlighting (1) how the emergency response is quite local in nature and thus the city/province-level of government or telecom companies may be more agile in response while federal government can focus on long-term actions such as providing initiatives or fundings, or supporting facilities-based competition to make sure there are multiple competing physical networks, and (2) a holistic approach that embraces diverse stakeholders and that mediates their roles so that Canada can break out of its vertical silos.

As the final speaker, Prof. *Erik Bohlin* expressed confidence that Canada, in international comparisons, is particularly suited for a mutually beneficial collaboration between government and industry, with its capacity to engage in conversations rather than polarizing debates, and the great civility that characterizes Canadian discourse. A future workshop is planned for October 15, with a theme to be announced. Input to the theme is welcome!

The workshop was adjourned.

Annex   Agenda of the Day – 14 May

Building *Resilience* in Telecommunications
IN CANADA AND BEYOND

Tuesday, May 14, 2024
12 – 6 p.m.
Donald K. Johnson Centre, First Canadian Place / Exchange Tower
130 King Street, Toronto, Ontario

Host
Ivey Business School, Western University, Ontario

Organizer
Erik Bohlin, Ivey Chair in Telecommunication Economics, Regulation and Policy – with support from Lawrence National Centre for Policy and Management, Ivey Business School

Moderator
Romel Mostafa, Director, Lawrence National Centre for Policy and Management, Ivey Business School

Rapporteur
Jieun Park, Senior Researcher, Korea Institute of Science and Technology (KIST)

Schedule

Time	Location
12:00 – 1:00 p.m.	**Welcome Buffet Lunch**
1:00 – 1:10 p.m.	**Welcome and Introduction** Erik Bohlin, Professor, Ivey Business School
1:10 – 1:35 p.m.	**Opening Keynote: A Resilient Canada** Adam Scott, Vice Chair, Canadian Radio-Television and Telecommunications Commission (CRTC)
1:35 – 2:00 p.m.	**Digital Infrastructure Security and Resilience – Policy and Governance Implications** Georg Serentschy, Managing Partner, Serentschy Advisory Services, Austria
2:00 – 2:25 p.m.	**Re-conceptualizing Communications in Emergencies** Eli Noam, Professor, Columbia Business School, United States *Note: Virtual presentation*
2:25 – 2:30 p.m.	**Mid-stream Rapporteur Note** Jieun Park, Senior Researcher, Korea Institute of Science and Technology (KIST)
2:30 – 3:00 p.m.	**Coffee Break**
3:00 – 3:15 p.m.	**Resilience Lessons from the Maui Wildfires: Implications for Telecommunications** Jenifer Sunrise Winter, Professor, University of Hawaiʻi at Mānoa *Note: Virtual presentation*
3:15 – 3:40 p.m.	**Network Security and Resilience Risks: The Korean Case** Seongcheol Kim, Professor, Korea University, South Korea
3:40 – 4:10 p.m.	**Perspectives from Industry** Phil Moore, Vice President, Corporate Real Estate and Emergency Response, TELUS

4:10 – 4:55 p.m.	**Panel Discussion**
	Moderated by Romel Mostafa, Director, Lawrence National Centre for Policy and Management, Ivey Business School
	Key-note Panel Address: Andre Arbour, Director General, Innovation, Science and Economic Development Canada (ISED)
	Comments by: Laurel Austin, Associate Professor, Ivey Business School; David Short, Senior Director, Independent Electricity System Operator (IESO); together with earlier speakers and audience
	Panel closing with Rapporteur Summary by Jieun Park, Korea Institute of Science and Technology (KIST)
4:55 p.m.	**Outlooks and Next Workshop**
	Erik Bohlin, Professor, Ivey Business School
5:00 – 6:00 p.m.	**Networking Reception with Cocktails and Hors d'oeuvres**

Speakers

Andre Arbour is the Director General of Telecommunications and Internet Policy at Innovation, Science and Economic Development Canada. He is responsible for leading policy development on various telecommunications matters including Internet and mobile wireless competition, rural and remote access, international Internet governance and in relation to the Telecommunications Act. Prior to his current role he occupied a series positions working in telecommunications and public policy. Past initiatives including leading development of Canada's first national Connectivity Strategy, leading policy for $4 billion in connectivity program funding, and policy development on various issues related to net neutrality and consumer protection.

Laurel Austin is an Associate Professor in Management Science at Ivey Business School. She uses behavioural and decision science methods to study how people make decisions when faced with risk and uncertainty. Her interest is in informing development of evidence-based communications, policies, and interventions to improve how people make decisions and manage risk. In research, Laurel works with interdisciplinary teams to take a system's approach

to modelling and assessing how cognitive, economic, social, policy, environmental, health, and context factors influence risk decisions and behaviours. She is currently leading a team in study of the sudden shift to digital self-triage and virtual medical care during the COVID-19 pandemic, to leverage learnings for 'digital first' care going forward. Prior to joining Ivey, Laurel was an Associate Professor of Strategic Decision Making and Risk Management at Copenhagen Business School in Denmark. She has published research on medical and health decision making, insurance decisions and behaviour, occupational safety, and computer supported group decision making. She earned her PhD in Management and Decision Sciences at Carnegie Mellon University, and an MSE in Industrial and Operations Engineering at University of Michigan. In decision making and risk management courses that she teaches, Laurel is increasingly focused on helping students to understand the increasing threat of systemic risks, the need to therefore build resilience in organizations and communities, and the challenges of doing so.

Erik Bohlin (Professor and Ivey Chair in Telecommunication Economics, Policy and Regulation, BEPP) is an expert in telecommunications policy, an inter-disciplinary topic concerned with the impact of digitalization in the economy and society. He is Editor-in-Chief of Telecommunications Policy, a premier journal in the field. He is on leave as Professor at Chalmers University of Technology, Sweden. His graduate degree is in Business Administration and Economics at the Stockholm School of Economics (1987) and his Ph.D. is from Chalmers University of Technology (1995). He is a Member of the Swedish Royal Academy of Engineering, and Past Chair of the International Telecommunications Society, an inter-disciplinary professional society convening conferences on the evolving digital society and policy needs.

Seongcheol Kim received his BBA and MBA from Seoul National University in Korea and an MA in Telecommunication and PhD in Mass Media from Michigan State University in the U.S. From 1989 to early 2008, Dr. Kim has worked for SK Group, Seoul Metropolitan Government and Korea Advanced Institute of Science and Technology (KAIST). He is the former president of the Korean Association for Information Society (KAIS) and Korea Media Management Association (KMMA), and the former director of Korea University Library. He received the Order of Merit from the President of Korea in 2018. He also received the Seoktop Research Award of Korea University 6 times and the Seoktop Teaching Award of Korea University 12 times. He became the winner of the 2022 Academic Achievement Award presented by Korea University Alumni Association (KUAA). His research was selected as one of the Top 50 Research Achievements of National Research Foundation of Korea, so he received the Commendation from Minister of Ministry of Education in 2022. In 2023, he recieved the Top Research Center Achievements (Smart Media Service Research Center) from the Minister of Ministry of Science and ICT.

Phil Moore is Vice President, Corporate Real Estate and Emergency Response at TELUS. He has been with TELUS for over 25 years and has held a variety of senior positions. Since 2018 he has been the Chair of TELUS Emergency Management Operating Committee. He has led the organization through preparation and response for impacts from floods, wildfires, atmospheric rivers, Derechos and the COVID-19 pandemic. His team takes each response as an opportunity to learn and direct further investment into climate risk mitigation and response. TELUS response goes beyond infrastructure protection, service continuity and safety and has evolved into a more impactful humanitarian response both domestically and internationally. Phil has a Master of Business Administration from the University of Calgary, a post-diploma from the British Columbia Institute of Technology and a Bachelor of Arts from the University of Western Ontario.

Romel Mostafa is an Assistant Professor of Business, Economics and Public Policy at the Ivey Business School. Romel's areas of research and expertise include strategy & capability development in new firms, innovation & competitive dynamics, industrial evolution & policy, as well as behavioural decision-making. He has published in a number of leading academic journals, including Academy of Management Journal, Journal of Behavioral Decision Making, Journal of Risk & Uncertainty, Organization Science and Management Science. His research and commentaries have been featured in global media outlets such as CNN, NPR and the New York Times. Romel has taught both at graduate and undergraduate levels, and received several teaching awards. He obtained his PhD and MSc from Carnegie Mellon University, and BA from Lawrence University. As the Director of Ivey's Lawrence National Centre for Policy and Management, Romel spearheads the Centre's research, outreach and teaching initiatives. The Centre advocates for sound policy and corporate action towards unlocking national competitive advantage, by focusing on critical challenges and opportunities around digital, trade and social infrastructural pillars.

Eli Noam has served as Professor of Economics and Finance at the Columbia Business School and its Garrett Professor of Public Policy and Business and is Director of the Columbia Institute for Tele-Information, a research center focusing on management and policy issues in telecommunications, internet, and electronic mass media. Served for three years as a Commissioner for Public Services of New York State. Appointed by the White House to the President's IT Advisory Committee. He has also taught at Columbia Law School, Princeton University's Economics Department and Woodrow Wilson School, and the Swiss universities of St. Gallen and Fribourg, and is active in the development of electronic

distance education. Noam published 37 books and over 350 articles in economics journals, law reviews, and interdisciplinary journals, and was a regular columnist for the Financial Times online edition.

Jieun Park is a Senior Researcher in the Technology Policy Research Department at the Korea Institute of Science and Technology (KIST), which is the first and largest government-funded R&D institute in Korea. She received her M.A. and Ph.D. in Media & Communication, and a B.A. in International Studies from Korea University. Prior to joining the KIST, she has worked as a Policy Researcher at the Seoul Digital Foundation, leading research on open innovation platform strategies for the Seoul Metropolitan Government, and shortly joined the USC Annenberg Research Network on International Communication as a visiting scholar. Jieun is currently serving multiple roles at the KIST; a Korean R&D policy specialist in global scientific collaboration, a researcher who focuses on catalyzing strategies for interdisciplinary research, and a science communicator endeavoring to become a bridge between the science community and the public.

Adam Scott is currently the Vice-Chair of Telecommunications at the Canadian Radio-television and Telecommunications Commission. With over 20 years of telecommunications policy and regulatory experience, Adam has managed complex files with technological, economic, social and legal dimensions, including Canada's 5G spectrum auctions. He has 12 years of experience at the executive level and brings a wealth of legislative, policy, regulatory, and program expertise to the telecommunications space. During his time at Innovation, Science and Economic Development Canada, he was responsible for developing strategies on how to optimize social and economic benefits of wireless spectrum in Canada. For many years, he developed government programs to improve broadband access in rural and remote parts of Canada, and developed a vision and strategy for improving Canada's communications infrastructure, addressing rural gaps, affordability issues, competition, innovation and investment. Adam brings significant experience to the table in consulting and cooperating with industry, civil society, other levels of government, departments and agencies.

Georg Serentschy advises C-level and top experts in the digital sector (platforms, telecommunications, media, and technology) on strategy, regulation & competition, spectrum policies, cybersecurity policies and innovation. A prime focus of his advisory work is the strategic positioning of companies in a specific regulatory environment. Experience shows that regulation is the most critical lever for driving commercial performance, investment and innovation in

the digital sector. Georg's professional career spans more than 40 years. It began in nuclear physics, after which he turned to industrial research and development in various high-tech industrial areas such as software development, solar energy, aerospace, and telecommunications. After his career in industry, he joined Arthur D. Little, a strategy consulting firm. Then, for over a decade, he headed up the Regulatory Authority for Telecommunications in Austria (RTR-GmbH). The highlight of Georg's regulatory career was chairing and vice-chairing BEREC (Body of European Regulators for Electronic Communications). In 2014, he founded his consulting boutique, focused on advising C-suite and top digital sector experts on strategy, artificial intelligence, regulation & competition, spectrum policy, cybersecurity policy and innovation. In parallel, he continues to work with leading consultancies on a project basis.

David Short holds the position of Senior Director, System Integration for the Independent Electricity System Operator (IESO). In this role his teams are responsible for managing system changes, event analysis and performance validation, as well as engineering studies that define our system models and operating limits. He is a past member of NERC's Planning Committee, past chair of the ISO/RTO Planning Committee, and is currently a member of NPCC's Reliability Coordination Committee. Mr. Short has 30 years of industry experience in Ontario and British Columbia. He holds a Bachelor of Science (Electrical Engineering) from Queen's University and is a registered Professional Engineer in Ontario.
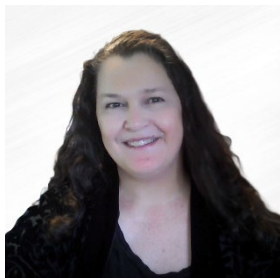
Jenifer Sunrise Winter is a Professor in the School of Communication and Information at the University of Hawaiʻi at Mānoa. Her research addresses data governance and policy related to big data, artificial intelligence (AI), and the Internet of Things (IoT). She is Co-chair of the Pacific Telecommunications Council Research Committee and a member of the Hawaiʻi Broadband Hui. Her work has been published in leading journals such as *Telecommunications Policy*, *The Information Society*, *Information and Organization*, the *European Journal of Information Systems*, and the *Journal of Information Technology*. She has recently been guest editor of special issues in *Information and Organization* and the *Journal of Information Policy*. She is Editor-in-Chief of the *Journal of Information, Communication and Ethics in Society*, Associate Editor of *Telecommunications Policy*.