

PPOL 5380: Technology Disruptions and Public Policy, Spring 2024-2025
14 March 2025

Time and Venue:

Tuesday, 18:30-21:20

Venue: Room 1032, LSK Building

Instructor:

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Course Description

Rapid advances in disruptive technologies over the last two decades have significantly altered our lives. They have upended old business models, disintermediated incumbent firms in many industries, disrupted traditional supply chains and created new ones, and challenged traditional policy and regulatory approaches in many government domains. We can expect the pace of change in disruptive technologies and the impacts on the economy and society to increase in the years ahead, and for these advances to be felt widely across the economy, society, and government. What is commonly referred to as the “fourth industrial revolution”—a revolution powered by increasing computing power, big data and data analytics, the internet of things, artificial intelligence and robotics, and blockchain technologies—is likely to produce profound, far-reaching changes in our lifetimes.

Advances in disruptive technologies, and the disruptive business models that they create, often necessitate policy, regulatory and legislative responses by governments. They may also disrupt jobs and labor markets and increase socioeconomic inequality. Meanwhile, the rise of the “gig economy” raises questions about how social security should be financed and organized. While advances in computing power and digital technologies are likely to raise (labor) productivity significantly, the benefits could be highly concentrated – generating higher inequality as these technologies spread and more industries take on “winner-take-all” characteristics. And even if these new digital technologies create more jobs than they destroy, there would still be issues of labor mobility and social inclusion that governments must deal with.

While governments clearly must respond to these technology disruptions, there is with no guarantee that they will do so in ways that promote early adoption of new technologies, digital innovation and entrepreneurship, and inclusive growth. This module gives students a broad introduction to the key disruptive technologies that are likely to transform our economy and society in the next decade or so. We will examine the practical applications of these technologies and discuss their policy implications and socio-economic impacts. We will also look at the potential for governments to leverage new digital technologies to deliver new services or improve existing ones to enhance public value. Above all, we will examine the implications for public policy and how government should respond.

In particular, we will examine four distinct roles of government: as a *user* of these technologies; as a *promoter* of these technologies; as a *regulator* to bolster public trust and confidence in these technologies and how they are deployed; and as a *social leveler* to ensure that the benefits of these technologies are widely shared.

Learning Outcomes

In this course, students can expect to:

1. Gain a broad understanding of key emerging technologies, their potential applications and impacts in business and government, and the attendant policy implications;
2. Anticipate how their operating environment might change as a result of technology disruptions and be reflected in the policy or regulatory responses that would be required of governments; and
3. Develop a sound understanding of the various roles of the government in dealing with technology disruptions, and the policy options corresponding to each of these roles.

Assessment

- Class Participation: 20%
- Case Study: 30%
- Group Research Paper: 50%

Class participation is an important part of the course. Students are expected to lead discussions and participate actively in class. Class participation is evaluated on the basis of the quality of contributions and critical and creative approaches to the topic of discussion.

Each student writes a case study of about 2,000-2,500 words, excluding references. The case study is expected to cover a particular case of an emerging technology and analyze the issues or challenges posed by that technology.

A group of four students is formed to work on a group project on any topic that would be related to issues concerning emerging technologies and public policy. Each group is expected to make a presentation and a research paper of about 5,000 words, excluding references. The research paper includes an abstract, table of contents, introduction, literature review, analysis, conclusions, and references. The policy analysis paper is expected to make policy recommendations for addressing the issues or challenges identified.

Evaluation would include the logic of the whole argument, appropriateness of the evidence presented, valid approaches of analysis, and usefulness of policy recommendations.

Course Outline

Class 1 – 4 February 2025

Introduction to Emerging Technologies and Public Policy

- The Economist, “The race of the AI labs heats up: ChatGPT is not the only game in town,” January 30 (2023). <https://www.economist.com/business/2023/01/30/the-race-of-the-ai-labs-heats-up>
- Editorial, “Tools such as ChatGPT threaten transparent science; here are our ground rules for their use,” *Nature*, **613** (January 24), 612 (2023). <https://www.nature.com/articles/d41586-023-00191-1>
- Cristina Criddle and Bethan Staton, “AI breakthrough ChatGPT raises alarm over student cheating,” *Financial Times*, December 18 (2022). <https://www.ft.com/content/2e97b7ce-8223-431e-a61d-1e462b6893c3>
- Boucher, Naja Bentzen, Tania Lațici, Tambiana Madiega, Leopold Schmertzling and Marcin Szczepański, *Disruption by Technology: Impacts on Politics, Economics and Society*. European Parliamentary Research Service (EPRS) (2020).
- Davide Strusani, Georges V. Hounghonon, *The Impact of COVID-19 on Disruptive Technology Adoption in Emerging Markets*, International Finance Corporation (2020).

Class 2 – 11 February 2025

Data-Driven Society and Data Governance

- Noboru Koshizuka, “Data-driven Society: Toward the Democratization of Innovation,” Keynote Speech, Data for Policy 2022 Conference, The Hong Kong University of Science and Technology, December (2022).
- Xie, Siqi, Ning Luo, and Masaru Yarime, "Data Governance for Smart Cities in China: The Case of Shenzhen," *Policy Design and Practice*, 7 (1), 66-86 (2024).
- Li, Veronica Qin Ting, and Masaru Yarime, "Increasing Resilience via the Use of Personal Data: Lessons from COVID-19 Dashboards on Data Governance for the Public Good," *Data & Policy*, 3, e29 (2021).
- The Economist, “Are data more like oil or sunlight?” *The Economist*, February 20 (2020).
- Anne Beaulieu & Sabina Leonelli, *Data and Society: A Critical Introduction*, SAGE (2022).
- Rob Kitchin, *The Data Revolution: A Critical Analysis of Big Data, Open Data & Data Infrastructures, Second Edition*, SAGE (2022).
- Franke, Johannes, and Peter Gailhofer, “Data Governance and Regulation for Sustainable Smart Cities,” *Frontiers in Sustainable Cities*, 3, 763788 (2021).
- G20 Global Smart City Alliance, “Model Policy - Privacy Impact Assessment, November (2022).
- Hardinges, Jack, Peter Wells, Alex Blandford, Jeni Tennison, and Anna Scott, “Data trusts: lessons from three pilots,” Open Data Institute, United Kingdom, April (2019).
- Jacobs, Naomi, Peter Edwards, Milan Markovic, Caitlin D Cottrill, and Karen Salt, “Who trusts in the smart city? Transparency, governance, and the Internet of Things,” *Data & Policy*, 2, e11 (2020).

Class 3 – 18 February 2025

Risks of Disruptive Technologies

Guest Lecture: Professor Kira Matus, Division of Public Policy, The Hong Kong University of Science and Technology

- James Temple, “A startup says it’s begun releasing particles into the atmosphere, in an effort to tweak the climate,” *MIT Technology Review*, December 24 (2022). <https://www.technologyreview.com/2022/12/24/1066041/a-startup-says-its-begun-releasing-particles-into-the-atmosphere-in-an-effort-to-tweak-the-climate/>
- Oliver Milman, “Can geoengineering fix the climate? Hundreds of scientists say not so fast,” *The Guardian*, December 25 (2022). <https://www.theguardian.com/environment/2022/dec/25/can-controversial-geoengineering-fix-climate-crisis>
- Editorial, “Give research into solar geoengineering a chance,” *Nature*, 593 (13 May), 167 (2021).
- Frank Biermann, et al., “Solar geoengineering: The case for an international non-use agreement,” *WIREs Climate Change*, 13, e754 (2022).
- Guston, David H., “Innovation policy: not just a jumbo shrimp,” *Nature*, 454, 940-941 (2008).

Class 4 – 25 February 2025

Regulation and Governance of Emerging Technologies

- Stephenson, Matthew, Iza Lejaraga, Kira Matus, Yacob Mulugetta, Masaru Yarime, and James Zhan, "AI as a SusTech Solution: Enabling AI and Other 4IR Technologies to Drive Sustainable Development through Value Chains," in Francesca Mazzi and Luciano Floridi, eds., *The Ethics of Artificial Intelligence for the Sustainable Development Goals*, Springer Nature, 183-201 (2023).
- Curley, Martin (2016). “Twelve principles for open innovation 2.0,” *Nature*, 533, 314-316.

- Pollman, Elizabeth (2019). "Tech, Regulatory Arbitrage, and Limits," *European Business Organization Law Review*, 20 (3), 567-590.
- Allen, Hilary J. (2020). "Sandbox Boundaries," *Vanderbilt Journal of Entertainment and Technology Law*, 22 (2), 299-321.
- Iizuka, Michiko and Yoko Ikeda (2021). "Regulation and innovation under the 4th industrial revolution: The case of a healthcare robot, HAL by Cyberdyne," *Technovation*, 108, 102335.
- Regulatory Horizons Council (2021). "The Future of Technological Innovations and the Role of Regulation," The Regulatory Horizons Council (RHC), United Kingdom, July.
- Eggers, William D. and Mike Turley (2018), "The future of regulation: Principles for regulating emerging technologies," Deloitte Center for Government Insights.
- Kate McEntaggart, Julien Etienne, Helene Beaujet, Laura Campbell, Knut Blind, Aisha Ahmad, Irina Brass, "Taxonomy of Regulatory Types and Their Impacts on Innovation," Final Report, UK BEIS Research Paper Series Number 2020/004, January (2020).
- Secretary of State for Digital, Culture, Media and Sport, "Establishing a pro-innovation approach to regulating AI," Policy paper, Government of the United Kingdom, July 20 (2022). <https://www.gov.uk/government/publications/establishing-a-pro-innovation-approach-to-regulating-ai/establishing-a-pro-innovation-approach-to-regulating-ai-policy-statement>
- Brass I. and Sowell J.H., "Adaptive Governance for the Internet of Things: Coping with Emerging Security Risks," *Regulation & Governance*, 15 (4), 1092-1110 (2021).

Class 5 – 4 March 2025

Governance of Artificial Intelligence

Guest Lecture: Gleb Papyshv, Research Assistant Professor, Division of Social Science, The Hong Kong University of Science and Technology

- Kate Crawford, "The Trouble with Bias, NIPS 2017 Keynote (2017). https://www.youtube.com/watch?v=fMym_BKWQzk
- Renee Shelby, Shalaleh Rismani, Kathryn Henne, AJung Moon, Negar Rostamzadeh, Paul Nicholas, N'Mah Yilla-Akbari, Jess Gallegos, Andrew Smart, Emilio Garcia, and Gurleen Virk, "Sociotechnical Harms of Algorithmic Systems: Scoping a Taxonomy for Harm Reduction," AIES '23, August 08–10, 2023, Montréal, QC, Canada (2023).
- Federico Bianchi, Pratyusha Kalluri, Esin Durmus, Faisal Ladhak, Myra Cheng, Debora Nozza, Tatsunori Hashimoto, Dan Jurafsky, James Zou and Aylin Caliskan, "Easily Accessible Text-to-Image Generation Amplifies Demographic Stereotypes at Large Scale," ACM FAccT 2023, Jul 28 (2023). <https://www.youtube.com/watch?v=ddi7N5KP1MM>
- Papyshv, Gleb, and Masaru Yarime, "The State's Role in Governing Artificial Intelligence: Development, Control, and Promotion through National Strategies," *Policy Design and Practice* (2023). <https://doi.org/10.1080/25741292.2022.2162252>.
- Papyshv, Gleb, and Masaru Yarime, "The Limitation of Ethics-Based Approaches to Regulating Artificial Intelligence: Regulatory Gifting in the Context of Russia," *AI & Society* (2022). <https://doi.org/10.1007/s00146-022-01611-y>.
- Chan, Keith Jin Deng, Gleb Papyshv, and Masaru Yarime, "Balancing the Tradeoff between Regulation and Innovation for Artificial Intelligence: An Analysis of Top-down Command and Control and Bottom-up Self-Regulatory Approaches," *Technology in Society*, 79, 102747 (2024).
- Papyshv, Gleb, and Masaru Yarime, "The Challenges of Industry Self-Regulation of AI in Emerging Economies: Implications of the Case of Russia for Public Policy and Institutional Development," in Mark Findlay, Ong Li Min and Zhang Wenxi, eds., *Elgar Companion to Regulating AI and Big Data in Emerging Economies*, Edward Elgar, 81-98 (2023).

Class 6 – 11 March 2025

Facial Recognition Technology

Guest Lecture: Ms. Elizaveta Dorrer, Division of Public Policy, The Hong Kong University of Science and Technology

- Li, Zhizhao, Yuqing Guo, Masaru Yarime, and Xun Wu, "Policy Designs for Adaptive Governance of Disruptive Technologies: The Case of Facial Recognition Technology (FRT) in China," *Policy Design and Practice*, **6** (1), 27-40 (2023).
- Francesca Palmiotto and Natalia Menéndez González, "Facial recognition technology, democracy and human rights," *Computer Law & Security Review*, **50**, 105857 (2023).

Class 7 – 18 March 2025

Blockchain

Guest Lecture: Dr. Yushi Chen, Chief Researcher, New Energy Nexus, Shanghai

- Chen, Yushi, and Zhen Yu, "Digitalization, trust, and sustainability transitions: Insights from two blockchain-based green experiments in China's electricity sector," *Environmental Innovation and Societal Transitions*, **50**, 100801 (2024).
- Chen, Yushi, and Ulrich Volz, "Scaling up sustainable investment through blockchain-based project bonds," *Development Policy Review*, **40**, e12582 (2022). <https://doi.org/10.1111/dpr.12582>
- Ahl, Amanda, Mika Goto, Masaru Yarime, Kenji Tanaka, and Daishi Sagawa, "Challenges and opportunities of blockchain energy applications: Interrelatedness among technological, economic, social, environmental, and institutional dimensions," *Renewable and Sustainable Energy Reviews*, **166**, 112623 (2022).
- Ahl, Amanda, Masaru Yarime, Mika Goto, Shauhrat Chopra, Manoj Kumar Nallapaneni, Kenji Tanaka, and Daishi Sagawa, "Exploring Blockchain for the Energy Transition: Opportunities and Challenges Based on a Case Study in Japan," *Renewable and Sustainable Energy Reviews*, **117**, 109488 (2020).
- Ahl, Amanda, Masaru Yarime, Kenji Tanaka, and Daishi Sagawa, "Review of Blockchain-Based Distributed Energy: Implications for Institutional Development," *Renewable and Sustainable Energy Reviews*, **107**, 200-211 (2019).

Class 8 – 25 March 2025

Global Political Economy of Emerging Technologies

- Michael A. Cusumano, Annabelle Gawer, and David B. Yoffie, *The Business of Platforms: Strategy in the Age of Digital Competition, Innovation, and Power*, HarperCollins (2019).
- Bruno Jullien and Wilfried Sand-Zantman, "The Economics of Platforms: A Theory Guide for Competition Policy," *Information Economics and Policy*, **54**, 100880 (2021).
- Matthew S. Erie and Thomas Streinz, "The Beijing Effect: China's Digital Silk Road as a Transnational Data Governance," *New York University Journal of International Law and Politics*, **54** (1), 1-92 (2021).
- Alex Engler, "The EU AI Act will have global impact, but a limited Brussels Effect," Report, Brookings Institution, June 8 (2022).
- Schneider-Petsinger, Marianne, Jue Wang, Yu Jie and James Crabtree (2019). *US-China Strategic Competition: The Quest for Global Technological Leadership*. Asia-Pacific Programme and the US and the Americas Programme.
- Brass, IC; Hornsby, D; (2019), "Digital Technological Innovation and the International Political Economy," in Shaw, T and Mahrenbach, L and Modi, R and Yi-Chong, X, eds., *The Palgrave Handbook of Contemporary International Political Economy*, 615-631, Palgrave Macmillan.

Deadline for Case Study: 8 April 2025, 18:29

Class 9 – 8 April 2025

Digital Twins

Guest Lecture: Dr. Masahiko Haraguchi, Postdoctoral Fellow in the Science, Technology, and Public Policy Program, Harvard Kennedy School, Harvard University

- Haraguchi, M., Nishino, A., Kodaka, A., Allaire, M., Lall, U., Kuei-Hsien, L., Onda, K., Tsubouchi, K., & Kohtake, N. (2022). Human mobility data and analysis for urban resilience: A systematic review. *Environment and Planning B: Urban Analytics and City Science*, **49** (5), 1507-1535.
- Papyshchev, Gleb, and Masaru Yarime, "Exploring city digital twins as policy tools: A task-based approach to generating synthetic data on urban mobility," *Data & Policy*, **3**, e16 (2021).
- Lei, B., Janssen, P., Stoter, J., & Biljecki, F. (2023). Challenges of urban digital twins: A systematic review and a Delphi expert survey. *Automation in Construction*, 147, 104716. <https://doi.org/10.1016/j.autcon.2022.104716>
- White, G., Zink, A., Codecá, L., & Clarke, S. (2021). A digital twin smart city for citizen feedback. *Cities*, 110, 103064. <https://doi.org/10.1016/j.cities.2020.103064>
- Revolutionizing Urban Planning: Esri Canada's Digital Twin Technology in Action - YouTube https://www.youtube.com/watch?v=_yFC10MHUcQ&ab_channel=EsriCanada
- Digital Twin Cities: Framework and Global Practices | World Economic Forum https://www3.weforum.org/docs/WEF_Global_Digital_Twin_Cities_Framework_and_Practice_2022.pdf
- Cities are being cloned in the virtual world. Here's what that means for the future | CNN <https://www.cnn.com/2023/01/31/world/digital-twin-cities-tnf-spc-intl/index.html>

Class 10 – 15 April 2025

Artificial Intelligence in the Public Sector

Guest Lecture: Professor Naomi Aoki, Graduate School of Public Policy, The University of Tokyo

- Aoki, Naomi, Tomohiko Tatsumi, Go Naruse, and Kentaro Maeda, "Explainable AI for government: Does the type of explanation matter to the accuracy, fairness, and trustworthiness of an algorithmic decision as perceived by those who are affected?," *Government Information Quarterly*, **41**, 101965 (2024).
- Aoki, Naomi, Melvin Tay, and Masaru Yarime, "Trustworthy Public-Sector AI: Research Progress and Future Agendas," in Yannis Charalabidis, Rony Medaglia, and Colin van Noordt, eds., *Research Handbook on Public Management and Artificial Intelligence*, Edward Elgar, 260-273 (2024).
- Barth, Thomas J. and Eddy Arnold, "Artificial Intelligence and Administrative Discretion: Implications for Public Administration," *The American Review of Public Administration*, **29**, 332 (1999).
- Wirtz, Bernd W., Jan C. Weyerer, and Carolin Geyer, "Artificial Intelligence and the Public Sector - Applications and Challenges," *International Journal of Public Administration*, **42** (7), 596-615 (2019).
- von Eschenbach, W.J., "Transparency and the Black Box Problem: Why We Do Not Trust AI," *Philosophy and Technology*, **34**, 1607-1622 (2021).

Class 11 – 22 April 2025

Public Policy and Governance for Smart Cities

Guest Lecture: Dr. Masanori Kobayashi, Chief Economist for Infrastructure Policy, Policy Bureau, Ministry of Land, Infrastructure, Transport, and Tourism (MLIT)

- Kobayashi, Masanori, *Transnational Private Regulations for Sustainable Urban Development*, Singapore: Springer (2023).
- Florentin, Kevin Macarius, Motoharu Onuki, and Masaru Yarime, "Facilitating Citizen Participation in Greenfield Smart City Development: The Case of a Human-centered Approach in Kashiwanoha International Campus Town," *Telematics and Informatics Reports*, **15**, 100154 (2024).
- Barrett, Brendan, Andrew DeWit, and Masaru Yarime, "Japanese Smart Cities and Communities: Integrating Technological and Institutional Innovation for Society 5.0," in Hyung Min Kim, Soheil Sabri, and Anthony Kent, eds., *Smart Cities for Technological and Social Innovation: Case Studies, Current Trends, and Future Steps*, London: Academic Press, 73-94 (2021).
- Sakuma, Natsumi, Gregory Trencher, Masaru Yarime, and Motoharu Onuki, "A comparison of smart city research and practice in Sweden and Japan: Trends and opportunities identified from a literature review and co-occurrence network analysis," *Sustainability Science*, **16**, 1777-1796 (2021).
- Yarime, Masaru, and Martin Karlsson, "Examining Technological Innovation Systems of Smart Cities: The Case of Japan and Implications for Public Policy and Institutional Design," in Jorge Niosi, ed., *Innovation Systems, Policy and Management*, Cambridge, UK: Cambridge University Press, 394-417 (2018).
- Google (2019): *Collaborating For A Smarter Hong Kong Today: Smart Digital City 3.0*.
- Tang, Winnie (2021). *Smart City 4.0*. Esri China (Hong Kong).
- Kris Hartley, "Public Trust and Political Legitimacy in the Smart City: A Reckoning for Technocracy," *Science, Technology, & Human Values*, **46** (6), 1286-1315 (2021).
- Kris Hartley, "Smart and Sustainable? Capitalism and City Futures in the Age of Crisis," in Hiroyuki Mori, Tomohiko Yoshida, and Ari-Veikko Anttiroiko, eds., *City, Public Value, and Capitalism: New Urban Visions and Public Strategies*, Evanston, IL: Northwestern University Libraries (2022).
- Glen David Kuecker and Kris Hartley, "How Smart Cities Became the Urban Norm: Power and Knowledge in New Songdo City," *Annals of the American Association of Geographers*, **110** (2), 516-524 (2020).
- Ayona Datta, "The digital turn in postcolonial urbanism: Smart citizenship in the making of India's 100 smart cities," *Transactions of the Institute of British Geographers*, **43**, 405-419 (2018).

Class 12 – 29 April 2025

Presentation of Group Projects 1

Class 13 – 6 May 2025

Presentation of Group Projects 2

Deadline for Group Research Paper: 20 May 2025, 23:59