PPOL 5380: Technology Disruptions and Public Policy, Spring 2022-2023
7 March 2023

Time and Venue:
Tuesday, 18:30-21:20
Venue: LSK 1009

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: 10%
- Extended outline: 20%
- Draft paper: 30%
- Final policy analysis paper: 40%

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.

An extended outline of about 1,000 words would be based on the discussion covered in class and the identification of case material to be covered in the final paper. Each student is expected to identify the topic or issue that he or she would like to write a policy analysis paper on at an early stage of the course so that the lectures and discussions provided for the course can be effectively utilized. Each student should provide a complete structure of the expected policy analysis paper, indicating the topic or issue, relevant literature, research methods, and indicative sources of information.

A draft paper of about 2,500 words is expected to cover an abstract, table of contents, introduction, analysis, conclusions, and references. The draft paper would include four broad sections: (1) a description of the issue or challenge posed by an emerging technology; (2) a theoretical framework to analyze the issue or challenge; (3) analysis with empirical cases and information; and (4) identification of measures for policy intervention.

A final policy analysis paper of about 5,000 words is expected to include all the contents of the paper, including an abstract, table of contents, introduction, analysis, conclusions, and references. The policy analysis paper will be developed in stages involving topic identification, an outline of the paper, a draft, and a final paper. The policy analysis paper is expected to make policy recommendations for action regarding the issue or challenge identified.

Deadlines

Extended outline: 14 March 2023, 18:29

Draft paper: 18 April 2023, 18:29

Final policy analysis paper: 23 May 2023, 23:59

Course Outline

Class 1 – 7 February 2023
Introduction to Disruptive Technologies and Public Policy

Readings
- 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 Laţici, Tambiama Madiega, Leopold Schmertzing and Marcin Szczepański, Disruption by Technology: Impacts on Politics, Economics and Society. European Parliamentary Research Service (EPRS) (2020).
- Davide Strusani, Georges V. Houngbonon, The Impact of COVID-19 on Disruptive Technology Adoption in Emerging Markets, International Finance Corporation (2020).

Class 2 – 14 February 2023
Data-Driven Society and Data Governance
(Guest Lecturer: Professor Noboru Koshizuka, The University of Tokyo)

Readings:
- 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 – 21 February 2023
Risks of Disruptive Technologies
(Guest Lecturer: Professor Kira Matus, Division of Public Policy, The Hong Kong University of Science and Technology)

Readings:
- 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 – 28 February 2023
Regulation and Governance of Emerging Technologies

Readings
- 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

Class 5 – 7 March 2023
Synthetic Biology and Gene Editing
(Guest Lecturer: Professor King Chow, Division of Life Science, The Hong Kong University of Science and Technology)

Readings:
- Li, Jing, Huimiao Zhao, Lanxin Zheng, and Wenlin An, "Advances in Synthetic Biology and Biosafety Governance," *Frontiers in Bioengineering and Biotechnology*, **9**, 598087 (2021).
- Keiper, Felicity and Ana Atanassova, "Regulation of Synthetic Biology: Developments Under the Convention on Biological Diversity and Its Protocols," *Frontiers in Bioengineering and Biotechnology*, **8**, 310 (2020).
- Kirksey, Eben, "Does Gene Editing Have a Future in Reproductive Medicine?" *New York Times*, March 4 (2023).
- McLeod, Carmen, Stevienna de Saille, and Brigitte Nerlich, "Risk in synthetic biology - views from the lab," *EMBO reports*, **19**, e45958 (2018).
- Mackelprang, Rebecca, Emily R. Aurand, Roel A. L. Bovenberg, Kathryn R. Brink, R. Alta Charo, Jason A. Delborne, James Diggans, Andrew D. Ellington, Jeffrey L. "Clem" Fortman, Farren J. Isaacs, June I. Medford, Richard M. Murray, Vincent Noireaux, Megan J. Palmer, Laurie Zoloth, and Douglas C. Friedman, "Guiding Ethical Principles in Engineering Biology Research," *ACS Synthetic Biology*, **10**, 907-910 (2021).
- Baylis, Francoise, Marcy Darnovsky, Katie Hasson, and Timothy M. Krahn, "Human Germline and Heritable Genome Editing: The Global Policy Landscape," *The CRISPR Journal*, **3** (5), 365-377. (2020).

- Asquer, Alberto, and Inna Krachkovskaya, "Uncertainty, Institutions and Regulatory Responses to Emerging Technologies: CRISPR Gene Editing in the US and the EU (2012-2019)," *Regulation and Governance*, **15** (4), 1111-1127 (2021).

Extended outline: 14 March 2023, 18:29

Class 6 – 14 March 2023
Smart Cities
(Guest Lecturer: Professor Kris Hartley, Department of Public and International Affairs, City University of Hong Kong)

Readings:
- 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 7 – 21 March 2023
Global Political Economy of Emerging Technologies

Readings:
- The Economist, "Technology Quarterly: China", 4 Jan 2020.
- Indermit Gill (2020), "Whoever leads in artificial intelligence in 2030 will rule the world until 2030", Brookings Future Development blog. (https://www.brookings.edu/blog/future-development/2020/01/17/whoever- leads-in-artificial-intelligence-in-2030-will-rule-the-world-until- 2100/?fbclid=IwAR2lPLPNFAc8joxzJ6rAlfiWVUwmhz5xQ-eFxIJDkweSOGYs03BCx2v8hfE)
- George S. Yip (2018), "China's Next Strategic Advantage: From Imitation to Innovation". (https://www.youtube.com/watch?v=NRqEPGOcEfI)
- 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.

Class 8 – 28 March 2023
Big Data and Public Policy

Readings
- S. Athey, "Beyond prediction: Using big data for policy problems," *Science*, **355** (6324), 483-485 (2017).

- Eleonora Bertoni, Matteo Fontana, Lorenzo Gabrielli, Serena Signorelli, Michele Vespe, eds., *Handbook of Computational Social Science for Policy*, Springer (2022).

Class 9 – 4 April 2023
Fintech
(Guest Lecturer: Professor Donald Low, Division of Public Policy, The Hong Kong University of Science and Technology)

Readings:
- Financial Times, "A pound of flesh for your Libra Inclusion", 24 Jun 2019
- Gita Gopinath, "Digital currencies will not displace the dominant dollar", Financial Times, 7 Jan 2020
- Bank of International Settlements (2019), "Annual Economic Report", Chapter 3
- PwC (2019). Establishing Blockchain Policy. Future Blockchain Summit.

Draft paper: 18 April 2023, 18:29

Class 10 – 18 April 2023
Emerging Technologies in the Public Sector

Readings
- World Bank (2017). Big Data Action for Government: Big Data Innovation in Public Services: Policy and Engagement.
- Deloitte (2019). 5G in Government: The Future of Hyper-connected Public Service. Deloitte Insights.

Class 11 – 25 April 2023
Artificial Intelligence
(Guest Lecturer: Dr. Zeynep Engin, Founding Director, Data for Policy CIC, and Editor-in-Chief, *Data & Policy*, Cambridge University Press)

Class 12 – 2 May 2023
Internet of Things (IoT)
(Guest Lecturer: Professor Irina Brass, Department of Science, Technology, Engineering and Public Policy, University College London)

Readings:
- Taylor, P., Allpress, S., Carr, et al. (2018). Internet of Things: realising the potential of a trusted smart world. Royal Academy of engineering: London.
- Brass, I., Pothong, K., Tanczer, L. and M. Carr. 2019. IoT Standards, Governance and Policy. In K. Pothong, I.Brass and M. Carr (eds) Cybersecurity of the IoT: PETRAS IoT Stream Report.
- Brass, I., Pothong, K. and M. Haisham. 2019. Navigating and Informing the IoT Standards Landscape: A Guide for SMEs and Startups. The BSI Group.
- Blythe, J. M. and Johnson, J. 2018. Rapid Evidence Assessment on Labelling Schemes and Implications for Consumer IoT Security. London: Dawes Centre for Future Crime, PETRAS IoT Hub, Department for Digital, Culture, Media and Sport (DCMS).

- Brass, I., Tanczer, L., Carr M., Elsden, M. and J. Blackstock. 2018. Standardising a Moving Target: The Development and Evolution of IoT Security Standards. In Living in the Internet of Things: Cybersecurity of the IoT Conference London, UK: IET.
- 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).
- Schneier, B. 2020. Securing A World of Physically Capable Computers. Live Lecture at CERN. Available at: https://cds.cern.ch/record/2746305
- Anderson R, Moore T., "The Economics of Information Security," *Science*, **314**, 610-613 (2006).

Class 13 – 9 May 2023
Opportunities and Challenges in the Governance of Emerging Technologies

Final policy analysis paper: 23 May 2023, 23:59