

PPOL5380: Technology Disruptions and Public Policy
Spring 2022

Synopsis

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 of 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 the 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 socioeconomic 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.

Instructors

Professor Donald Low
Professor Masaru Yarime
Professor Xun Wu

Learning Outcomes

In this course, students can expect to:

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

Assessment

Assessment Task	Proportion of Final Grade (%)
Assignments <ul style="list-style-type: none">- Op-ed (20%) – <i>due on 8 April 12:00 pm</i>- Policy brief (20%)—due on 29 April- Comparative study: group project (40%)—due on 24 May	80%
Class participation	20%

Course Outline

Lecture #1 (8 February) Introduction: Opportunities and Challenges with Disruptive Technologies (Donald Low, Masaru Yarime, and Xun Wu)

Videos to watch before the class:

<https://www.mewatch.sg/watch/Why-It-Matters-E8-The-Digital-Divide-75565>

https://www.ted.com/talks/keller_rinaudo_how_we_re_using_drones_to_deliver_blood_and_save_lives

https://www.ted.com/talks/jennifer_pahlka_coding_a_better_government

https://www.ted.com/talks/stefaan_verhulst_using_corporate_data_to_improve_our_lives

Readings:

- McKinsey Global Institute (2013) Disruptive Technologies: Advances that will Transform Life, Business and Global Economy.
- Boucher, Naja Bentzen, Tania Laïci, Tambiama Madiega, Leopold Schmetzing and Marcin Szczepański (2020). Disruption by Technology: Impacts on Politics, Economics and Society. European Parliamentary Research Service (EPRS).
- Davide Strusani, Georges V. Hounghonon (2020). The Impact of COVID-19 on Disruptive Technology Adoption in Emerging Markets. International Finance Corporation.

Lecture #2 (15 February): Big Data and its Policy Applications, Implications and Paradoxes (Donald Low)

Videos to watch before the class:

<https://www.youtube.com/watch?v=J7B9xvzawmY>

<https://hbr.org/video/2226808799001/disruptive-innovation-explained>

<https://www.youtube.com/watch?v=2NhMldHjnuM>

https://www.ted.com/talks/maurice_conti_the_incredible_inventions_of_intuitive_ai

https://www.ted.com/talks/scott_galloway_how_amazon_apple_facebook_and_google_manipulate_our_emotions

Readings:

- The Economist, “Are data more like oil or sunlight?”, 20 Feb 2020
- McKinsey Global Institute (2016). The Age of Analytics: Competing in a Data-Driven World. McKinsey & Company
- Freakonomics podcast, “Is the Government More Entrepreneurial Than You Think?”, 5 Sep 2018 (<http://freakonomics.com/podcast/mariana-mazzucato/?fbclid=IwAR3QwsK-G5NBiO7DpOU7tMgPAXy4ShZsDH3Bn2iLxcQZiz5zrFitvwEXp0>)

Lecture #3 (22 February): Artificial Intelligence and the Future of Jobs (Donald Low)

Videos to watch before the class:

<https://www.mewatch.sg/watch/Why-It-Matters-E8-The-Digital-Divide-75565>

https://www.ted.com/talks/keller_rinaudo_how_we_re_using_drones_to_deliver_blood_and_save_lives

https://www.ted.com/talks/jennifer_pahlka_coding_a_better_government

https://www.ted.com/talks/stefaan_verhulst_using_corporate_data_to_improve_our_lives

Readings:

- Brynjolfsson, Erik, and Andrew McAfee (2012). Winning the Race with Ever-Smarter Machines. *MIT Slone Management Review*, 53(2).
- The Economist, “Special Report on Artificial Intelligence: The return of the machinery question”, 25 Jun 2016
- Kai-Fu Lee (2018), “AI Superpowers: China, Silicon Valley, and the New World Order”, Chapters 5-6

- Financial Times, “Robots will not be coming for our jobs just yet”, 3 Jan 2020
- S. Athey (2017), Beyond prediction: Using big data for policy problems. *Science*. 355(6324):483-485.

Lecture #4 (1 March) Value Conflicts with Disruptive Technologies: Uber, DiDi, AirBnb and Digital Platform Economy (Xun Wu)

Videos to watch before the class:

https://www.ted.com/talks/rachel_botsman_the_currency_of_the_new_economy_is_trust

https://www.ted.com/talks/joe_gebbia_how_airbnb_designs_for_trust

<https://www.youtube.com/watch?v=hzmjnar000k>

https://www.ted.com/talks/amane_dannouni_how_online_marketplaces_can_help_local_economies_not_hurt_them

Readings:

- PwC: Share Economy 2017 – The New Business Model
- Slee, Tom (2017). *What's yours is mine: Against the sharing economy*. Chapter 3-4
- Acquier, Aurélien, Thibault Daudigeos, and Jonatan Pinkse. 2017. “Promises and Paradoxes of the Sharing Economy: An Organizing Framework.” *Technological Forecasting and Social Change* 125 (December): 1–10.
- Hofmann, S., Sæbø, Ø., Braccini, A. M. & Za, S. (2019) The public sector's roles in the sharing economy and the implications for public values, *Government Information Quarterly*, 36.
- Julliena, Bruno , Wilfried Sand-Zantman. *The Economics of Platforms: A Theory Guide for Competition Policy. Information Economics and Policy*, 2020
- Varian, Hal R. *Seven Deadly Sins of Tech? Information Economics and Policy*, 2020.

Lecture #5 (8 March) Ethical Dilemma for Disruptive Technologies: Synthetic Biology and CRISPR (Xun Wu)

Videos to watch before the class:

<https://www.youtube.com/watch?v=jAhjPd4uNFY&t=202s>

https://www.ted.com/talks/jennifer_doudna_how_crispr_lets_us_edit_our_dna

https://www.ted.com/talks/paul_root_wolpe_it_s_time_to_question_bio_engineering

https://www.ted.com/talks/paul_knoepfler_the_ethical_dilemma_of_designer_babies

Readings:

- Kaebnick, G. Should moral objections to synthetic biology affect public policy? *Nat Biotechnology* 27, 1106–1108 (2009) doi:10.1038/nbt1209-1106
- Tucker, Jonathan and Raymond A Zilinskas, The promise and perils of synthetic biology. *The New Atlantis*. No. 12. 2006
- Baylis, Françoise, Marcy Darnovsky, Katie Hasson, and Timothy M. Krahn. Human Germline and Heritable Genome Editing: The Global Policy Landscape. *The CRISPR Journal*, 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*. 2020

Lecture #6 (15 March) Harnessing the Power of Disruptive Technologies in Government: Potential and Trade-offs (Xun Wu)

Readings:

- Deloitte (2012). Public sector, disrupted How disruptive innovation can help government achieve more for less.
- Stilgoe, J., Owen, R., Macnaghten, P., 2013. Developing a framework for responsible innovation. *Research Policy* 42, 1568–1580.

- Thierer, Adam, Andrea Castillo O’Sullivan, and Raymond Russell (2019). Artificial Intelligence and Public Policy. Mercatus Center, Georgetown University
- Krawiec, RJ., Alan Holden, Josh Schoop, and Shabab Hussain (2019). *Push innovation in government: How to change emerging technology’s potential from disruptive to transformative*. Deloitte Insights
- World Bank (2017). Big Data Action for Government: Big Data Innovation in Public Services: Policy and Engagement.
- Desouza, Kevin (2014). Realizing the Promise of Big Data. Implementing Big Data Projects. IBM Center for The Business of Government

Lecture #7 (22 March) Regulatory Approaches to Disruptive Technologies and Innovation (Masaru Yarime)

Video to watch before the class:

<https://www.youtube.com/watch?v=WR6uSXW-8p4&feature=youtu.be>

Readings:

- Guston, D.H. (2008). “Innovation policy: not just a jumbo shrimp,” *Nature*, **454**, 940-941.
- Regulatory Horizons Council (2021). “The Future of Technological Innovations and the Role of Regulation,” The Regulatory Horizons Council (RHC), United Kingdom, July.
- Kate McEntaggart, Julien Etienne, Helene Beaujet, Laura Campbell, Knut Blind, Aisha Ahmad, Irina Brass (2020). “Taxonomy of Regulatory Types and Their Impacts on Innovation,” Final Report, UK BEIS Research Paper Series Number 2020/004, January.
- Eggers, William D. and Mike Turley (2018), “The future of regulation: Principles for regulating emerging technologies,” A report from the Deloitte Center for Government Insights.
- 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.
- Curley, Martin (2016). “Twelve principles for open innovation 2.0,” *Nature*, **533**, 314-316.

Lecture #8 (29 March): Would Fintech make the world a better place? (Donald Low)

Videos to watch before the class:

[https://www.mewatch.sg/watch/Why-It-Matters-S2-E5-On-the-Menu-Blockchain-\(Part-1\)-71117](https://www.mewatch.sg/watch/Why-It-Matters-S2-E5-On-the-Menu-Blockchain-(Part-1)-71117)

[https://www.mewatch.sg/watch/Why-It-Matters-S2-E6-On-the-Menu-Blockchain-\(Part-2\)-63938](https://www.mewatch.sg/watch/Why-It-Matters-S2-E6-On-the-Menu-Blockchain-(Part-2)-63938)

https://www.ted.com/talks/don_tapscott_how_the_blockchain_is_changing_money_and_business

<https://www.youtube.com/watch?v=bBC-nXj3Ng4>

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.

Lecture #9 (12 April): Internet of Things (IoT) and Cloud Computing (Masaru Yarime)

Videos to watch before the class:

<https://www.youtube.com/watch?v=QSIPNhOiMoE>

https://www.youtube.com/watch?v=mzy84Vb_Gxk

<https://www.youtube.com/watch?v=pGtnC1jKpMg>

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., Elsdon, 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.
- Jones, Nicola (2018). “The Information Factories: Data centres are chewing up vast amounts of energy,” *Nature*, **561**, 163-166.

Lecture #10 (19 April): Smart Cities and Data Governance (Masaru Yarime)

Readings:

- Deloitte (2019). 5G in Government: The Future of Hyper-connected Public Service. Deloitte Insights.
- Google (2019): *Collaborating For A Smarter Hong Kong Today: Smart Digital City 3.0*.
- Hardinges, Jack, Peter Wells, Alex Blandford, Jeni Tennison, and Anna Scott (2019), “Data trusts: lessons from three pilots,” Open Data Institute, United Kingdom, April.
- 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).
- Franke, Johannes, and Peter Gailhofer (2021). “Data Governance and Regulation for Sustainable Smart Cities,” *Frontiers in Sustainable Cities*, **3**, 763788.
- Tang, Winnie (2021). Smart City 4.0. Esri China (Hong Kong).
- G20 Global Smart City Alliance (2020). Model Policy - Privacy Impact Assessment, v1.0, November.
- Global Partnership on AI (2021). Climate Change & AI: Recommendations for Government, in collaboration with Climate Change AI and the Centre for AI & Climate, November.

Lecture #11 (26 April) Global Political Economy of Disruptive Technologies (Donald Low and Xun Wu)

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=IwAR2IPLPNFAC8joxzJ6rAlfiWVUwvmhz5xQ-eFxIJDkweSOGYs03BCx2v8hfE>)
- George S. Yip (2018), “China’s Next Strategic Advantage: From Imitation to Innovation”. (<https://www.youtube.com/watch?v=NRqEPGOcEfl>)
- 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. (pp. 615-631). Palgrave Macmillan:
London, UK

Student Presentations (3 May and 10 May)