NS INITIATIVE
A New Synthesis of Public Administration

New Technologies: The Promise, Peril and Increasing Velocity of Change

Prepared by Marie Blythe-Hallman
Edited by Jocelyne Bourgon P.C., O.C.

April 2019

NS is an international co-operation initiative led by the Honourable Jocelyne Bourgon P.C., O.C.

Insights from PGI Literature Review on the 4th Technological Revolution

New Technologies: The Promise, tPeril and Increasing Velocity of Change

By: Marie Blythe-Hallman
Edited By: Jocelyne Bourgon P.C., O.C.

Published by Public Governance International (PGI)

April 2019

ISBN: 978-1-989294-09-3

New Technologies – The Promise, Peril and Increasing Velocity of Change

PGI's research program of the NS Initiative is moving forward on its third phase. The first and second phases identified several important factors at play in accelerating the velocity of change that is transforming the economic, social and political spheres. Among those accelerators of change is the digital technological revolution, which is underway and is gaining momentum. The digital technological revolution is generating disruptions and dislocations that exceed the absorptive and adaptive capacity of many governments. It is also transforming what it means to be a citizen and the relationship between the state and citizens. This raises questions about what it means to govern in the digital era. This literature review focuses on the digital revolution and the velocity of change.

One of the challenges of navigating through the literature on governing in the digital age is its abundance; as governments and societies struggle to keep pace with the velocity of technological innovation, so too do those trying to grasp the promise and perils of this unprecedented period of change, and discern what governments can do to guide their societies through. While this growing body of literature is united in the view that we have indeed entered a Fourth industrial Revolution, it differs in the assessment of the opportunities and risks the digital revolution presents: that which is guided by 'the excitement of unprecedented potential,' and that which cautions against "the capacity to absorb the dislocation associated with this transformation."

A sense of urgency about going digital has started to emerge; harnessing digital technology is seen as a requirement for governments to remain relevant to their citizens. The Honourable Scott Brison, former President of the Treasury of Canada, shares this view: "In the 21st century, you're either digital or you're dead. If a company fails to get digital right, it's out of business. If a government fails to get digital right, it's out of touch with its citizens…Right now we are a Blockbuster Government serving a Netflix citizenry."
As Wylie (2018) notes, there is "a cultural realization that technology may be going too far, too fast and that we are unclear on how to address it." While new technologies rally investors, developers and engineers, the public, unaware or lacking the expertise to understand them and their potential impact for societies, is being left behind. As Klugman (2018) describes, "this torrent of change often feels as if we're perched in the middle of a rapidly moving river on slippery stones that are being shunted around by the current." Much of this worry is galvanized around the growth and global nature of artificial intelligence (AI).

The Growth of Artificial Intelligence

A number of factors are converging to drive the digital revolution, among them the exponential growth of computing power, advancements in AI (including machine learning and probabilistic reasoning), the Internet of Things and blockchain. However, no technology more than AI has captured the attention of governments, industry, academe and civil society, whose impact is widely regarded as bringing about a wholesale shift in society as we know it today.

The findings of the 2017 AI Now Index, the first report of its kind to track progress in the field of AI in a comprehensive way, confirm that investment and work in AI is accelerating at an unprecedented rate. Its follow-up report in 2018 illustrates both the scope of growth and extent of its global reach.

Public interest in AI is on the rise. Publications on Scopus, the largest database of peer-reviewed papers, have increased eight-fold since 1996. Much of this activity is taking place in Europe and Asia, with China, Japan, and South Korea.

Europe is the largest publisher of AI papers last year (28%) while China is a rising competitor. In 2017, the Chinese government released a Next Generation Artificial Intelligence Development Plan, an ambitious plan to become the world leader in AI by 2030, setting aside US$2 billion alone for an AI research park, a figure topping the EU Commission's entire investment in AI to 2020 ($US 1.75 billion). It is the world's largest producer of government research in AI, its activity having increased 400% since 2007. And as university course enrolment in AI and Machine Learning (ML) increased worldwide, none has more so than at Tsinghua in China, whose combined AI and ML 2017 course enrolment was 16x greater than in 2010.

On the other hand, the U.S. produced 17% of all AI research papers last year, with research dominated by the private industry. By way of comparison, the proportion of corporate AI papers produced in the U.S. was almost seven times greater than that in China. Venture-back AI start-ups in the U.S. showed exponential growth, with the number more than doubling since 2015.

Interest in Machine Learning and Deep Learning is rising rapidly. The majority of AI research focused on Machine Learning and Probabilistic Reasoning (56%). Interest in Machine Learning was likewise matched by growth in university study, with the number of students enrolled in introductory Machine Learning courses growing. Job openings in Machine Learning tripled over the last three years, and the number of jobs requiring Deep Learning increased 34-fold.

In the field of computer vision, the accuracy of image recognition increased from around 72% in 2010 to roughly 97% in 2017, surpassing human performance (95%).

AI technologies are being adopted across all sectors and business functions around the world. A McKinsey (2018) survey found that while the pace and extent of adoption varies across sectors, the telecom, high-tech, and financial-services firms are leading the way in overall adoption.

Within the public sector, cities are adopting Smart City applications that use AI for service delivery, resource management, and energy utilization. Although there have also been controversial applications in the areas of surveillance and law enforcement; such as the use of facial recognition technology in China to monitor citizen behaviour, like jay walking, or in public schools to monitor student's facial expressions to gauge their level of classroom engagement, or to support the development of a social credit system. Likewise, the U.S. military's Project Maven has drawn strong criticism for its use of AI – with the help of Google computer vision experts – to sift through mountains of data and video to look for patterns of abnormal or suspicious activity.

The story of AI is its scope and scale. AI is global and growing at rapid rate. It is being researched, adopted, and advanced at a frenetic pace around the world and across industries. As this activity charts unfamiliar waters, it also raises concerns about the ethical and societal impact of these new discoveries. The challenge for governments is to keep pace with these technological advances, and in the process ensure that societies benefit from the best that AI has to offer while preventing the worst. PGI literature review will focus next on the ethical and societal challenges that advances in AI are bringing along with it.

Bibliography:

Government of Canada, 2017, Speaking Notes for The Honourable Scott Brison, Presi dent of the Treasury Board of Canada, at FWD50, (Nov 2, 2017), https://www. canada.ca/en/treasury-board-secretariat/news/2017/11/speaking_notes_forth ehonourablescottbrisonpresidentofthetreasury.html, accessed Dec.5, 2018.

Klugman, Ian, 2018, "Shift Happens: Governments and the Fourth Industrial Revolu tion," in *Government Digital: The Quest to Regain Public Trust*, edited by Alex Benay, Toronto: Dundurn.

McKinsey Analytics, 2018, "Notes from the AI frontier: AI Adoption advances, but foun dational barriers remain," (Nov), https://www.mckinsey.com/featured-insights/ artificial-intelligence/ai-adoption-advances-but-foundational-barriers-remain, accessed Feb. 21, 2019.

Wylie, Bianca, 2018, "Governance Vacuums and How Code is Becoming Law," in, *Data Governance in the Digital Age*, edited by the Centre for International Gover nance Innovation, (May 2), pp.86-90, https://www.cigionline.org/sites/default/ files/documents/Data%20Series%20Special%20Reportweb.pdf, accessed Nov. 8, 2018.

PGI
Public Governance International
Gouvernance Publique Internationale

NS INITIATIVE
A New Synthesis of Public Administration

NS is an international co-operation initiative led by The Honourable Jocelyne Bourgon P.C., O.C.