AI Plans and Strategies Summary DRAFT

The following document is a summary of plans and strategies that HPST jurisdictions are implementing in anticipating AI and digitalization. We expect to periodically refresh this document and encourage jurisdictions to share updates and new reports as they are available.

As of October 2019, Canada, Estonia (as part of the Nordic-Baltic Region), Finland, and Korea have all published master plans or documents outlining an AI strategy. Hong Kong and Singapore have key initiatives and have made targeted investments but do not have a single AI plan for the jurisdiction.

Most of the HPST jurisdiction plans focus on supporting research to develop jurisdiction expertise on new forms of AI, establishing data and digital infrastructures, coordinating government agency investments in innovation and R&D, and outlining ethical guidelines to make them competitive in the global race for AI. These high-level documents do not articulate the implications of AI for educational strategies or what kinds of skills students will need to develop in order to be successful in a future AI economy.

British Columbia/Canada

None of the Canadian provinces except Quebec has its own provincial AI strategy or plan. British Columbia and most of the provinces are, however, investing in and supporting the expansion of AI in their economies.

There are a number of BC agencies responsible for anticipating AI, including the Ministry of Education; Ministry of Advanced Education, Skills and Training; and the Ministry of Jobs, Trade and Technology (specifically, the Emerging Economy Task Force).

- In 2015, the Ministry of Education revised the K-12 curriculum to provide students with skills and competencies needed in today's and tomorrow's economy.
- The Ministry of Advanced Education, Skills and Training produces an annual Labor Market Outlook that includes assessment of the potential for automation/AI to impact job openings by occupation and the demand for 21st Century skills and competencies. It also is undertaking work on the interdependence of the labor market and postsecondary education and training.
- The Emerging Economy Task Force will make policy recommendations to the government in response to emerging trends, including transformative technologies and innovations that will change the nature of business and society. A report is expected fall 2019.

Canada was the first country to release a national AI strategy. The 2017 *Pan-Canadian Artificial Intelligence Strategy* is a five-year, C$125 million (US$94 million) plan to invest in AI research and talent. The strategy has four goals: (1) increase the number of AI researchers and graduates; (2) establish three clusters of scientific excellence; (3) develop thought leadership on the economic, ethical, policy, and legal implications of AI; and (4) support the national research community on AI. The Canadian Institute for Advanced Research leads the strategy in close partnership with the Canadian government and the three new AI Institutes: the Alberta Machine Intelligence Institute (AMII) in Edmonton, the Vector Institute in Toronto, and MILA in Montreal.

Canada's AI strategy focuses primarily on research and talent development. Its initiatives—the new AI Institutes, CIFAR Chairs in AI, and the National AI program— are all geared towards enhancing Canada's international profile as a leader in AI research and training. The CIFAR AI & Society Program examines the policy and ethical implications of AI, but the overall Canadian strategy does not include policies such as investments in strategic sectors, data and privacy, or skills development.

Estonia
Estonia has long been at the forefront of e-governance, instituting digital technologies into government and throughout its society. The Ministry of Economic Affairs and Communications (MEAC) together with the Republic of Estonia Government Office are responsible for implementing AI and digitalization in all sectors. An expert group of multidisciplinary experts headed by Estonia's Chief Information Officer was created by the Government and the MEAC for this purpose. The expert group developed an AI strategy known as the "Kratt Report" in May 2019. While not a legal document, it aims at outlining the principles upon which the legal framework for AI will be based.

In addition, in recent years, the Ministry of Education and Research has:
- launched a program called Digital Turn to improve students' digital literacy
- launched an evaluation of general competencies of students
- initiated a renewal of the national curriculum (added digital competencies, etc.)
- created with stakeholders the *Lifelong Learning Strategy 2020*
- initiated a new educational strategy, *Smart and Active Estonia 2035*, that suggests that education, research, and innovation must be prioritized to develop a smart skills policy and a seamless education system

The Estonian government also created the Information Technology Foundation for Education (HITSA) to monitor new technology trends to understand the skills and competencies students at all levels of education need and make policy recommendations to ensure the preparedness of teachers and educational institutions.

In May 2018, the Ministers responsible for digital development from Denmark, Estonia, Finland, the Faroe Islands, Iceland, Latvia, Lithuania, Norway, Sweden, and the Åland Islands released a four-page *Declaration on AI in the Nordic-Baltic Region*. The set of countries agreed to collaborate and cooperate to maintain their position as the leading region in Europe for digitalization. The focus is using AI to assist in solving major societal challenges by increasing efficiency and promoting innovation. They specified that they will collaborate on: (1) improving opportunities for skills development; (2)

enhancing access to data; (3) developing ethical and transparent guidelines, standards, principles, and values; (4) developing standards for hardware and software that enable privacy, security, and trust; (5) ensuring AI gets a prominent role in European discussions of the Digital Single Market; (6) avoiding unnecessary regulations; and (7) using the Nordic Council of Ministers to facilitate policy cooperation. The declaration focuses on taking a cooperative, regional approach to using AI to promote economic growth. It does not address implications for education or particular skills.

Finland

Finland aims to be a world leader in practical applications of AI technologies. In May 2017, Finland's Minister of Economic Affairs, Mika Lintilä, appointed a steering group to examine the role Finland can play. The group released a series of reports:

- *Finland's Age of Artificial Intelligence* surveyed Finland's strengths and weaknesses in AI and provided eight recommendations to turn Finland into a global leader in the application of AI. Key initiatives include the creation of the Finnish Centre for AI (a joint partnership by Aalto and Helsinki Universities to increase AI research, talent, and industry collaboration), an AI accelerator pilot program, and the integration of AI in the public service. This first report in 2017 made Finland the first European Union country to put a national action plan on AI into writing.
- *Work in the Age of Artificial Intelligence* gives an additional 28 policy recommendations related to four aspects of the future of work: growth and employment; labor market; learning and skills; and ethics.
- *Turning Finland Into a Leading Country in the Age of Artificial Intelligence*, the final report, calls for a public discussion on the ethics of AI, continuous capacity building and investments. Finland's plan notes the country has a competitive advantage in its high standard of education and tech-friendly climate and commits to launching a study on how training and education programs for working adults can be made more flexible to allow for efficient reskilling.

There are multiple agencies that play a role in anticipating AI and digitalization:

- The Ministry of Finance, through programs such as the national AuroraAI program, which is described as a "national customer service robot network" designed to help citizens access both public and private services. Based on a preliminary study, Finland released an AuroraAI development and implementation plan for 2019-2023.
- The Ministry of Economic Affairs and Employment has an AI project focused on enhancing business competitiveness through the use of AI that has released two reports on how to make Finland a leader in the application of AI and work in the age of AI.
- The National Agency for Education, through national core curriculum planning and pilot projects, such as one using AI in guidance counseling as part of the AuroraAI program.
- Forum for Skills Anticipation released a report in May 2019 highlighting the competencies and skills that will be needed in 2035. In the forecast, digitalization and technological development play a key role, changing the operating practices of companies as well as consumer behavior.

As a related initiative, Finland has launched a "1 percent" AI scheme that aims to teach 1 percent of the country's population, or about 55,000 people, the basic concepts at the root of artificial intelligence technology. The initiative was first started as a free online university course and now over 250 companies have signed on to train their employees in AI. The government has embraced it as well. The self-paced Elements of AI course combines theory and practical exercises.

Hong Kong
Hong Kong has not yet released a formal AI plan. It has released some proposals to jumpstart the AI industry through research investments and partnerships with larger markets to increase opportunities for local and overseas AI talent.

The Innovation and Technology Bureau (ITB), established in late 2015, is the lead governmental agency responsible for launching and supporting various initiatives to make Hong Kong a preferred location for innovation and technology (I&T) research and businesses. In addition to investing in I&T development, Hong Kong has introduced a super tax deduction for corporations of up to 300 percent for R&D expenditures. Going forward, Hong Kong is focused on four areas of strength: biotechnology, artificial intelligence and robotics, smart city, and financial technologies. This work is summarized in an ITB publication, *Innovation Hong Kong*.

Hong Kong's Innovation and Technology Fund, a government initiative administered by the Innovation and Technology Commission, invests in AI and robotic projects to support innovation in the business sector. It has established two innovative clusters in Hong Kong Science Park focusing on AI and robotics technologies (AIR@InnoHK) and healthcare technologies, bringing together top universities and institutions to collaborate and undertake R&D activities.

Hong Kong also has a plan to establish the Guangdong-Hong Kong-Macao Greater Bay Area as an international technology and innovation center by coordinating the use of resources and maximizing cooperation in innovation development. An agreement was signed in September 2018 between the Chinese Ministry of Science and Technology and the Hong Kong government to serve as an action guide and framework to take forward various I&T cooperation initiatives—all highlighting AI—in the coming few years. The goal is to enhance cooperation in six areas: scientific research, development of platforms, nurturing of talents, transfer of results and incubation of I&T industry, integration into national development strategies, and cultivation of an I&T atmosphere.

Korea
The Korean government published the *Intelligent Information Industry Development Strategy* in March 2016 that outlined national policies to respond to the changes and challenges of the Fourth Industrial Revolution and a vision of a "human-centric intelligent society." In 2017, Korea's government announced a ₩1 trillion (US$882 million) investment in AI research over the next five years as a way of developing an intelligent information technology ecosystem and encouraging private investment.

This was followed by another announcement in 2018 of a national AI R&D strategy established by the Ministry of Science and the Ministry of Information and

Communication. The strategy announcement included a five-year, ₩2.2 trillion (US$1.9 billion) investment to strengthen the country's R&D in AI. The strategy has three parts: AI talent; AI technology; and investment in infrastructure.

To develop AI talent, the government will establish six research institutes in AI by 2022 with the goal of training 5,000 AI specialists (1,400 AI researchers and 3,600 data management specialists). The government also announced an initiative to train 600 young people in AI to address the immediate short-term need for AI talent. Korea plans to create an AI specialized curriculum and incorporate it into university majors.

There are also several more recent initiatives as well. The government will fund large-scale projects in AI related to national defense, medicine, and public safety; will start an AI R&D challenge similar to the one funded by the U.S. Department of Defense's Defense Advanced Research Projects Agency; fund the creation of an AI semiconductor by 2029; and create an AI-oriented start-up incubator to support emerging AI businesses.

Singapore
Launched in November 2014, the Smart Nation initiative is the national effort to support better living and offer opportunities for all by transforming Singapore through technology, including AI. Education is central to the Smart Nation goal with Singapore focused on giving students the breadth of skills they need to prosper in a changing economy. The Ministry of Education is in the early stages of exploring the development and use of AI-enabled adaptive assessment and learning systems to support the work of teachers in schools. Three key pillars have been identified to support Singapore's Smart Nation goals: Digital Economy; Digital Government; and Digital Society. These have been articulated in documents such as the *Digital Economy Framework for Action*, the *Digital Government Blueprint*, and the *Digital Readiness Blueprint*.

In May 2017, Singapore began AI Singapore, a five-year, S$150 million (US$111 million) national program to enhance Singapore's capabilities in AI. It is a government-wide partnership involving six different organizations. Its goals are to invest in the next wave of AI research, address major societal and economic challenges, and broaden adoption and use of AI within industry. AI Singapore incorporates a number of key initiatives:

1. AI Research encourages national research collaborations and funds efforts to explore innovative, multidisciplinary applications relating to topics such as collaborative AI, lifelong learning AI, privacy-aware AI, resource efficient AI, and trustworthy AI.
2. AI Technology supports the work of multidisciplinary teams that provide innovative solutions to "grand challenges" Singapore and the world face. Currently, the program focuses on health, urban solutions, and finance.
3. AI Innovation is aimed at accelerating the adoption of AI by Singapore-based companies and organizations and provides research and funding to apply AI solutions to industry-identified problems.
4. AI Talent Development offers skill-building courses and experiences to build the technical skills and data-readiness of citizens, including:
   a. AI for Everyone, a free three-hour workshop that introduces the latest AI technologies and applications to interested citizens,

      b. [AI for Industry](#), a hybrid online and in-person program for technically inclined individuals who want to understand and use AI appropriately and be able to program basic AI and data applications,

      c. [AI for Students](#) that uses DataCamp, a data science education platform to teach data skills and data fluency to secondary and postsecondary students,

      d. [AI for Kids](#) that introduces AI to upper primary school children ages 10-12 through blended learning and hands-on workshops, and

      e. [AI Apprenticeship](#), a nine-month structured program available to university graduates interested in machine learning and data science.

5. AI Makerspace is a new effort under development and expected to roll out by April 2020.

The [SkillsFuture](#) lifelong learning initiative also has a focus on responding to digitalization and AI. For example, [SkillsFuture for Digital Workplace](#) is a two-day program for adults, including those who plan to return to the workforce, to help them understand emerging technologies and how they impact work; interpret and use data; and adopt a positive mindset for change. Another SkillsFuture initiative, the [TechSkills Accelerator](#), offers various programs to cultivate digital leaders, upskill the ICT workforce and support various non-ICT professionals who wish to transition to the ICT sector.

In June 2018, the government announced [three new initiatives on AI governance and ethics](#). Principally, the new Advisory Council on the Ethical Use of AI and Data will help the government develop standards and governance frameworks for the ethics of AI. In January 2019, Singapore released a [Model AI Governance Framework](#) that outlines key ethical principles and practices in AI deployment. Additionally, Singapore has set up initiatives such as the Research Program on the Governance of AI and Data to develop local capabilities to understand and mitigate AI risks.

In March 2019, the government [announced](#) the formation of an inter-agency task force to assess how the country should develop AI as a strategic capability and be a global testbed for the deployment of AI applications.

EU Commission

In April 2018, the EU Commission adopted the *Communication on Artificial Intelligence*, a 20-page document that lays out the EU's approach to AI. The EU Commission aims to: (1) increase the EU's technological and industrial capacity and AI uptake by the public and private sectors; (2) prepare Europeans for the socioeconomic changes brought about by AI; and (3) ensure that an appropriate ethical and legal framework is in place. A High-Level Expert Group on Artificial Intelligence acts as the steering group for the European AI Alliance. Key initiatives include a commitment to increase the EU's investment in AI from €500 million (US$561 million) in 2017 to €1.5 billion (US$1.7 billion) by the end of 2020, the creation of the European AI Alliance, and two reports:

- *Ethics Guidelines for Trustworthy AI*, published in April 2019, outlines seven requirements that AI systems should meet in order to be fair, safe, and transparent. These requirements will go through a [piloting process](#) expected to conclude with the presentation of a revised document in early 2020.

- *[Policy and Investment Recommendations for Trustworthy AI](#)*, released in June 2019, is addressed to EU institutions and Member States. The 33 recommendations address the main enablers in helping AI achieve a beneficial impact: availability of data and infrastructure; skills and education; appropriate governance and regulation; and funding and investment. The recommendations will help the Commission and Member States to update their joint coordinated plan on AI at the end of 2019. This is expected to play a key role in building the future of AI in Europe.

The new president of the European Commission, Ursula von der Leyen, unveiled her [policy agenda](#) in summer 2019 and promised to put forward legislation "for a coordinated European approach on the human and ethical implications of AI" within her first 100 days in office.