OECD GOING DIGITAL TOOLKIT

POLICY NOTE

An overview of national AI strategies and policies

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going digital

This Toolkit note was written by Laura Galindo, Karine Perset and Francesca Sheeka. It was reviewed by the Committee on Digital Economy Policy (CDEP), and it was declassified by the CDEP on 8 April 2021. The note was prepared for publication by the OECD Secretariat.

This Toolkit note is a contribution to the OECD Going Digital project, which aims to provide policy makers with the tools they need to help their economies and societies thrive in an increasingly digital and data-driven world.

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An overview of national AI strategies and policies

As artificial intelligence (AI) advances across economies and societies, policy makers and AI actors around the world seek to move from principles to practice. To harness the benefits of AI while mitigating the risks, governments are investing in AI R&D; leveraging AI in specific industries such as transportation and healthcare; building human capacity on AI; ensuring a fair labour market transformation; reviewing and adapting relevant policy and regulatory frameworks and developing standards; and co-operating internationally. This Going Digital Toolkit note provides an overview of the various AI policy initiatives undertaken by governments and analyses these initiatives throughout the AI policy cycle: 1) policy design; 2) policy implementation; 3) policy intelligence; and 4) approaches for international and multi-stakeholder co-operation on AI policy.

Artificial intelligence (AI) already provides beneficial applications used every day by people worldwide. The fast-paced and far-reaching changes from AI offer dynamic opportunities for improving the economic and social sectors. AI can make businesses more productive, improve government efficiency, and relieve workers of mundane tasks. It can also help address many pressing global challenges, such as climate change and the lack of access to quality education and healthcare.

Alongside its benefits, AI raises socio-economic and ethical considerations - chief among them are questions of respect for human rights and democratic values, and the dangers of automating and amplifying biases. These concerns raise a number of challenges and opportunities. What does it mean to design transparent systems? How can AI systems' designers and users be accountable and to whom? What new safety and security issues are presented with AI?

AI is moving fast, and so must governments. National policies are needed to promote trustworthy AI systems, including those that encourage investment in responsible AI research and development. In addition to AI technology and computing capacity, AI leverages vast quantities of data. This increases the need for a digital environment that enables access to data, alongside strong privacy protection. AI-enabling ecosystems can also support small and medium-sized enterprises (SMEs) as they navigate the AI transition and ensure a competitive environment.

The development of national policies and strategies focusing specifically on AI is a relatively new phenomenon. To track these initiatives, the OECD AI Policy Observatory (OECD.AI) comprises over 620 national AI policies from over 60 countries and the European Union (EU). These resources provide a baseline to map countries' AI policy initiatives according to the recommendations to governments contained in the OECD AI Principles (Box 1).

Box 1. OECD AI Principles

The OECD Principles on Artificial Intelligence promote AI that is innovative, trustworthy and respects human rights and democratic values. They were adopted in May 2019 by OECD member countries when they approved the OECD Council Recommendation on Artificial Intelligence. The OECD AI Principles identify five complementary values-based principles for the responsible stewardship of trustworthy AI:

- AI should benefit people and the planet by driving inclusive growth, sustainable development and well-being.
- AI systems should be designed in a way that respects the rule of law, human rights, democratic values and diversity, and they should include appropriate

safeguards – for example, enabling human intervention where necessary – to ensure a fair and just society.

- There should be transparency and responsible disclosure around AI systems to ensure that people understand AI-based outcomes and can challenge them.
- AI systems must function in a robust, secure and safe way throughout their life cycles and potential risks should be continually assessed and managed.
- Organisations and individuals developing, deploying or operating AI systems should be held accountable for their proper functioning in line with the above principles

Consistent with these principles, the OECD also provides five recommendations to governments:

- Facilitate public and private investment in research & development to spur innovation in trustworthy AI.
- Foster accessible AI ecosystems with digital infrastructure and technologies and mechanisms to share data and knowledge.
- Ensure a policy environment that will open the way to the deployment of trustworthy AI systems.
- Empower people with the skills for AI and support workers for a fair transition.
- Co-operate across borders and sectors to progress on responsible stewardship of trustworthy AI.

To develop practical guidance to implement the AI Principles as mandated by the OECD Council, the OECD convened a multi-stakeholder and multi-disciplinary OECD Network of Experts on AI in early 2020 that is developing a report on the *State of implementation of the OECD AI Principles: Insights from national AI policies* (OECD, 2021[1]). The report provides good practices and lessons learned on the implementation of the five recommendations to policy makers contained in the OECD AI Principles.

Source: oecd.ai/ai-principles and oecd.ai/network-of-experts.

AI policy design

Countries are at different stages of the development and implementation of national AI strategies and policies. Some countries, such as Canada and Finland, developed their national AI strategies as early as 2017, closely followed by Japan, France, Germany and the United Kingdom in 2018. Other countries, such as Brazil, Egypt, Hungary, Poland and Spain, launched a national AI strategy more recently. Several countries are currently in AI policy consultation and development processes.

National AI strategies and policies are often initiated with a call to action in the form of a report, roadmap, or white paper that frames the high-level goals for a strategy. The policy design and development stages often follow.

The role of public consultations and stakeholder participation to promote an inclusive dialogue on AI

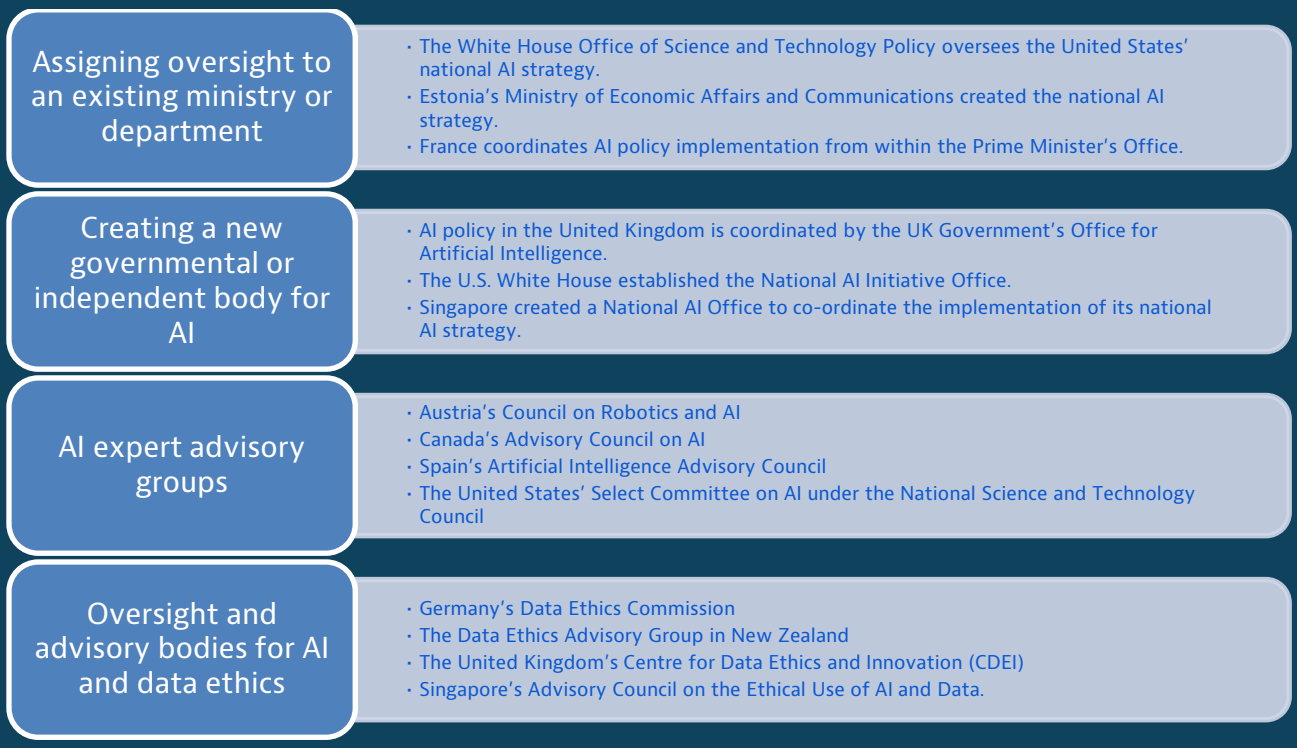
To seek input on the design of their national AI policies and strategies, governments often involve a broad range of stakeholders including citizens, civil society groups, private companies, research organisations and others. Public consultations leverage different tools including interviews, surveys, online discussion fora and events such as hearings, workshops, seminars, focus groups and conferences. Based on information from national policy initiatives collected at *OECD.AI*, the formation of expert groups and the organisation of workshops and seminars are the most common types of consultations. Expert consultations usually help define the issues, formulate policy objectives and, in some cases, assess policy effectiveness. In addition to expert consultations, countries such as Canada or Chile engage citizens to ensure that a diverse range of perspectives is taken into account.

Effective implementation of national AI initiatives hinges on co-ordination

Countries pursue different national governance models to co-ordinate the implementation of their national AI policies across government, offering regulatory and ethical oversight (Figure 1). Models include:

- Assigning oversight of the development and implementation strategies to an existing ministry, department or body. Among existing ministries or agencies tasked with developing or implementing an AI strategy, the following tend to drive the creation of AI strategies most often: 1) information technology and communications ministries; 2) economics or finance ministries; or 3) education, science (and technology) and innovation ministries.
- Creating a new governmental or independent AI co-ordination entity.
- Establishing AI expert advisory groups. These are generally multi-stakeholder groups comprising AI experts tasked with identifying and reporting on current and future opportunities, risks and challenges arising from the use of AI in society. These AI councils also provide recommendations to the government.
- Setting up oversight and advisory bodies for AI and data ethics.

Figure 1. A selection of national AI governance approaches



Note: This infographic offers a non-exhaustive selection of national AI governance implementation examples.
Source: Authors.

AI policy implementation

Investing in AI R&D

Enhancing national AI research and development (R&D) capabilities is a key component of many national AI strategies and policies. AI is a general-purpose technology with implications across industries. It is also called an "invention of a method of invention" (Cockburn, 2018[2]) and is already widely used by scientists and inventors to facilitate innovation. Entirely new industries could be created based on the scientific breakthroughs enabled by AI. This underscores the key role of governments in providing sustained investment in AI basic research with long term horizons, particularly in areas under-served by market-driven investments. In addition, research institutions in all areas require capable AI systems to remain competitive, particularly in biomedical science and life science fields.

The allocation of public budgets to AI R&D varies in scale across countries. Though some countries allocate a substantial amount of funding to AI R&D (e.g. the United States, the People's Republic of China (hereafter China) and the European Union), annual budget allocations for AI R&D are not always explicitly

mentioned. The OECD has begun to investigate how to assess government spending on AI-related R&D through proxy approaches, however, no comprehensive method exists yet to track and compare AI R&D funding across countries and agencies (OECD, 2021[3]).

Governments allocate funding for AI to: 1) support the establishment of national AI research institutes; 2) consolidate AI research networks and collaborative platforms; 3) prioritise AI investments in targeted sectors; 4) pursue AI mission-oriented innovation policies; and 5) procure AI systems for the public sector.

National AI strategies and policies often outline how countries plan to invest in AI to build or leverage their comparative advantages. They also encourage businesses to develop solutions that will boost growth and well-being. Countries tend to prioritise a handful of economic sectors, including mobility (such as logistics and transportation), energy, health, and agriculture (Figure 2).

In mobility, AI applications can help governments improve road safety, enhance public transportation efficiency, manage traffic and reduce carbon emissions. In health care, AI can help governments harness the latest breakthroughs to help detect health conditions early or remotely. They can also help deliver preventative services, optimise clinical decision-making and discover new treatments and medications (OECD, 2020[4]). AI tools and techniques have also been used to help policy makers and the medical community accelerate research and treatments for the COVID-19 virus by rapidly analysing large volumes of research data (OECD, 2020[5]).

AI can also be leveraged by governments to innovate and transform the public sector. AI promises to make government services "smarter": more agile, efficient and user-friendly. For instance, AI can help deliver personalised services to citizens. It can also enhance the efficiency and quality of administrative procedures by automating physical and digital tasks. In addition, it can improve decisions through better predictions based on patterns in large volumes of data. Building on their digital government approaches, many national AI strategies and policies explicitly encourage the adoption of AI in the public sector. Public entities can use AI to strengthen law enforcement capabilities and improve policy implementation. AI is also expected to free up public servants' time and allow them to shift to higher-value work (Berryhill et al., 2019[6]).

Figure 2. National AI strategies and policies prioritise a number of sectors

Sector(s) targeted	Australia	Czech Rep.	Denmark	France	Finland	Hungary	Japan	Korea	Latvia	Netherlands	Norway	Poland	Turkey	U.K.	U.S.	China	India	Singapore	Malta	Saudi Arabia	U.A.E.
Agriculture and food	✓		✓			✓	✓	✓	✓	✓		✓	✓		✓	✓	✓				
Cybersecurity							✓					✓	✓					✓			
Defence/ Security				✓				✓	✓				✓		✓	✓		✓			✓
Education		✓				✓	✓	✓					✓		✓		✓	✓	✓		
Energy			✓		✓	✓			✓	✓	✓	✓		✓	✓	✓			✓	✓	✓
Environment	✓			✓		✓				✓				✓	✓					✓	
Finance								✓	✓									✓			
Health care	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Manufacturing						✓	✓	✓					✓	✓	✓					✓	
Mobility and transportation		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Productivity					✓		✓					✓	✓								
Public administration				✓	✓	✓	✓	✓	✓		✓	✓	✓						✓		
Seas and oceans/Marine								✓	✓		✓										
Smart cities/ Construction	✓								✓			✓	✓				✓			✓	✓
Aerospace/ Space		✓						✓							✓						
Telecomms and IT							✓	✓	✓				✓		✓				✓		

Note: The Pan-Canadian AI strategy and the German AI strategy do not have a significant focus on specific sectors.
Source: OECD AI Policy Observatory (2021) database on national AI strategies and policies, https://oecd.ai, (accessed 3 March 2021).

Data access and sharing

Data access and sharing are key to accelerating AI uptake. Many countries continue to focus on providing access to public sector data, including open government data, geo-data (e.g. maps) and transportation data. Similarly, they also emphasise data sharing within the public sector. Countries are building on their open data access policies and strategies to promote data access and sharing for AI.

For example, Denmark plans to provide open access to weather, climate and marine data from the Danish Meteorological Institute, in addition to European co-operation on space data. The United Kingdom (UK) is making high-quality public data available in an open, reusable and accessible format for machine learning. The UK's Geospatial Commission aims to improve access to geospatial data, including for AI uses. In light of the United States' Executive Order on Maintaining American Leadership in AI, the Office of Management and Budget is consulting the public on needs for additional access to, or improvements in the quality of, federal data and models that would improve AI R&D and testing efforts.

Several national AI policies plan to develop centralised, accessible repositories of open public data. In Norway, the Brønnøysund Register Centre and the Norwegian Digitalisation Agency have established a national directory of data supplied by different public agencies. The directory provides an overview of the data each agency has and how it is shared across government, as well as datasets that are made publicly available. Portugal also plans to create a centralised repository for administrative data.

Organisations focused on data have also been created or are being considered. The Spanish AI strategy, for example, recommends the creation of a National Data Institute. In parallel, countries and regional institutions seek to incentivise data sharing in the private sector. The United Kingdom, in collaboration with the Open Data Institute and Innovate UK, has launched three pilot projects to explore data trust frameworks for safe, secure and equitable data transfers. European countries are co-operating to create a European data space (GAIA-X), which will include private and public data.

In addition, many software tools to manage and use AI exist as open-source resources, which facilitates their adoption and allows for crowdsourcing solutions to software bugs. Tools include TensorFlow (Google) and Cognitive Toolkit (Microsoft). A number of researchers and companies share curated training datasets and training tools publicly to help diffuse AI technology.

Infrastructure for AI

Developing and using AI requires access to AI technologies and infrastructure. This supposes affordable high-speed broadband networks and services, computing capacity and data storage, as well as supporting data-generating technologies such as the Internet of Things (IoT). In terms of network infrastructure, many countries are setting up high-quality connectivity and have, or plan to, deploy nationwide 5G technology and 5G networks.

AI computing capacity has emerged over recent years as a key enabler for AI and AI-driven economic growth and competitiveness. Algorithms and data play strong roles in the development and performance of AI systems. However, as AI projects move from concept to commercial application, they often need

specialised and expensive computing resources. Several economies allocate high-performance and cloud computing resources to AI-related applications and R&D. Some are setting up supercomputers designed for AI use and devoted to research and/or providing financial support to develop the national high-performance computing infrastructure. Formulating effective AI policies increasingly requires an understanding of key components of domestic AI compute capacity. To advance this agenda, the OECD formed an OECD AI Compute task force in early 2021.

Shaping an enabling environment

Countries aim to support an agile transition from AI R&D to the commercialisation or deployment of AI by:

1. ***Providing controlled environments for the experimentation and testing of AI systems***. Controlled environments for AI experimentation and testing facilitate the timely identification of potential technical flaws and governance challenges. They can reveal public concerns through testing under quasi real-world conditions and can provide impact assessments of AI use on various aspects of people's lives, such as jobs, education and the environment (European Commission, 2021[7]), (European Commission, 2021[8]).

2. ***Providing access to funding, including for SMEs and start-ups.*** To spur private-sector investment in AI projects, some countries have created financial incentives. Since January 2018, the United Kingdom has provided an AI R&D Expenditure Credit (12% tax credit) designed to stimulate AI uptake, including within the public sector. Malta has also reformed the Seed Investments Scheme with more favourable tax credit conditions for innovative AI firms.

3. ***Connecting emerging companies with business opportunities through networking and collaborative platforms.*** Another way that countries boost the development of innovative AI research ecosystems is by establishing networking and collaborative platforms, such as AI hubs, AI labs and AI accelerator programmes. They facilitate cooperation between industry, academia and public research institutes.

4. ***Providing tailored advisory to support business scale-up.*** Countries are introducing a wide range of policy measures and initiatives to spur innovation and AI adoption by businesses, particularly SMEs. For example, the European Commission's AI4EU project is an AI-on-demand platform to help EU SMEs adopt AI.

AI skills, jobs and labour market transformation

As AI systems take over some tasks previously performed by humans, new opportunities are expected to emerge in the workplace. However, AI will also bring new challenges and transitions in the labour market. Governments have begun to adopt policies and strategies to prepare citizens, educators and businesses for the jobs of the future and to minimise the negative impacts. Many national AI policies emphasise retraining for those displaced by AI, and education and training for workers coming into the labour force, including vocational training and lifelong learning programmes.

In parallel, several countries are offering fellowships, postgraduate loans and scholarships to increase domestic AI research and expertise. Many national AI strategies also include incentives to retain and attract both domestic and foreign skills and top talent in AI. All national AI strategies support a persistent and robust AI education ecosystem.

In 2020, the OECD launched the Programme on AI in Work, Innovation, Productivity and Skills (AI-WIPS), supported by German Ministry of Labour. AI-WIPS analyses the impact of AI on the labour market, skills and social policy while providing opportunities for international dialogue and policy assessments.

In addition, as AI policy affects several sectors, ensuring cross-governmental co-ordination is one of the key considerations for governments when implementing effective AI policies (Box 2). To that end, countries often co-ordinate and collaborate across government and with business, educational and non-profit communities when developing educational programmes, tools and technologies.

Box 2. Key considerations when implementing AI strategies and policies

When designing and implementing AI policies and strategies, policy makers should consider the following to ensure they foster innovation while promoting the implementation of trustworthy, human-centred AI systems:

- Like with digital transformation more broadly, AI touches upon all sectors and all areas of public policy. Implementing AI policies therefore requires strong co-ordination across government to ensure coherence. Cross-governmental co-ordination helps ensure ministries and agencies develop processes and criteria that are aligned with national AI objectives, such as in public procurement of AI systems.
- Incentive mechanisms launched by governments, as well as consultancy services and programmes to help up-skill SMEs, are useful for companies. Ensuring these programmes are offered by governments only when the

market does not offer similar services minimises the risk of public programmes making themselves indispensable and distorting the market.

- Governments face challenges with data access and management. The better the data used to train and optimise machine learning-based AI systems, the more impactful and inclusive the outcome. Despite evidence of economic and social benefits, challenges remain when creating a digital environment that enables access to data alongside strong data and privacy protections.
- Managing economic shifts and inequalities, facilitating transitions in the labour market and ensuring continuous education, training and skills development are also recognised across countries as key challenges.

AI policy intelligence to monitor implementation

To evaluate the implementation of their national AI policies and strategies some countries have launched issued annual reports. By July 2020, Canada, the United Kingdom, the United States, Germany, and the European Union published reports that monitored and evaluated the implementation of their AI strategies and highlighted milestones and accomplishments. Singapore had published detailed information on the implementation of its AI strategy. Monitoring and evaluation are expected to become more prevalent across countries as national AI strategies move into later stages of implementation.

Some countries also report more detailed monitoring assessments of the implementation of their AI strategies and policies, including information such as budgets, funding, and specific targets. In addition, several national or regional institutions have established AI observatories to oversee the implementation of national AI strategies and policies. For example, the German Labour Ministry launched the KI-Observatorium in March 2020 to help implement parts of Germany's AI strategy and encourage the responsible, people-centred and participatory use of AI in the world of work and society. Other observatories include: Quebec's International Observatory on the Social Impacts of Artificial and Digital Intelligence in Canada; France's Observatory on the Economic and Social Impact of Artificial Intelligence; the Italian Observatory on Artificial Intelligence; and the Czech Republic's AI Observatory and Forum.

International co-operation on AI

International co-operation to promote the beneficial use of AI and address its challenges is a priority for many countries. Co-operation for the development and adoption of AI and AI governance is being conducted at the bilateral, plurilateral, regional and international level. Moreover, many inter-governmental organisations with complementary mandates are engaged in AI initiatives and projects. International co-operation on AI is taking place in fora

including the Council of Europe, the EU, the Global Partnership on AI (GPAI), the Group of Seven (G7), the Group of Twenty (G20), the Inter-American Development Bank (IDB), the International Telecommunications Union (ITU), the OECD, the United Nations, the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the World Bank.

Cross-border research on AI is also significant. For example, the French National Research Agency, the German Research Foundation and the Japan Science and Technology Agency have called for trilateral French-German-Japanese collaborative research on AI over three years (2019-2021). In 2020, the United Kingdom and the United States signed a declaration on co-operation for AI R&D through which they plan to drive technological breakthroughs, promote research collaboration and advance the development of trustworthy AI.

Many European Union member states are also participating in European AI research projects and networks such as BVDA/EURobotics, the Confederation of Laboratories for Artificial Intelligence Research in Europe (CLAIRE) and the European Laboratory for Learning and Intelligent Systems (ELLIS). AI is also a priority in Horizon Europe, the EU's current framework programme for research and innovation.

Annex: A selection of national AI policies

Policy design

National AI strategies

Pan-Canadian AI Strategy

Responsible entity: The Canadian Institute for Advanced Research (CIFAR)

Description: The CIFAR led the development of the Pan-Canadian AI Strategy from 2016. The process involved multi-stakeholder partners from 54 organisations. The strategy aims to strengthen AI research capabilities. CIFAR and Canada's Department of Innovation Science and Economic Development (ISED) work closely together to implement the strategy. The strategy includes an 'Innovation Supercluster Initiative' to enhance commercial use of, and investment in AI, as well as the creation of Canada's AI Advisory Council. ISED also engages in international co-operation, including through the recent creation of the Global Partnership on AI.

Read more: *https://oecd.ai/dashboards/countries/Canada*.

Singapore National AI Strategy

Responsible entity: National AI Office

Description: The Singapore National AI Strategy was launched in 2019 and aims to accelerate the development and deployment of AI in Singapore. The strategy adopts a human-centric approach to AI and focuses on an initial five national projects of high social and economic value in logistics, municipal services, healthcare, education and border security. It also outlines plans to strengthen five ecosystem enablers, which include talent and education, data architecture, a progressive and trusted environment, international collaboration, and a "triple-helix" partnership between the research community, industry and government. The strategy also identifies key non-technological hurdles in AI deployment which Singapore believes it is uniquely positioned to address (e.g. stakeholder buy-in, governance, process change) and outlines Singapore's plans to become a global hub for developing, test-bedding, deploying, and scaling AI solutions.

Read more: *https://oecd.ai/dashboards/countries/Singapore*.

Formal consultation processes

Canada's Public Engagement Processes

Responsible entity: Canada's AI Advisory Council

Description: Canada's AI Advisory Council created its public engagement and consultation processes using both consultation and deliberation. The national survey elicited an array of citizens' input on AI use in different sectors. The results will shape deliberative workshops that take place online due to the pandemic. The workshops aim to find ways to address ethical concerns raised by citizens via the survey. The goal of the deliberative process is to shape a new set of guidelines and recommendations for the development of AI.

Read more: *https://oecd.ai/dashboards/countries/Canada*.

Lithuania's AI Foresight Exercise

Responsible entity: Ministry of Economy and Innovation of Lithuania

Description: Lithuania's vision for an eventual strategy lays out specific objectives that a national strategy should develop, and this vision roadmap was shaped heavily by formal consultations. In the fall of 2018, a group of private and public sector representatives began meeting with the Ministry of Economy and Innovation in Lithuania to discuss the current AI landscape and discuss plans for the way forward. The group consisted of industry leaders, academic experts and government representatives, all with knowledge of the Lithuanian AI ecosystem. A Landscape report released by the group in November of 2018 highlights both the key areas where Lithuania is successful in AI and where there is room for growth.

Read more: *https://oecd.ai/dashboards/countries/Lithuania*.

Policy implementation

Investing in AI R&D

AI Research Competence Centres

Responsible entity: German Federal Ministry of Education and Research

Description: Some strategies call for the establishment of AI hubs, research centres that will help with R&D efforts as they relate to AI. As part of Germany's AI strategy, "AI research competence centres" in Munich, Tübingen, Berlin, Dortmund, and Dresden aim to become more deeply interconnected, and funding from the government will double by 2022.

Read more: *https://www.oecd.ai/dashboards/countries/Germany*.

Horizon Europe

Responsible entity: European Commission

Description: The European Commission has committed EUR 1.5 billion to AI research over two years as part of its Horizon 2020 programme. The European Union expects the private sector and its member states at the national level to complement this investment, reaching at least EUR 20 billion invested by the end of 2020. It is also expected that the private sector and EU member states will continue investing at least EUR 20 billion annually for the next ten years in AI R&D. Funding through Horizon Europe and the new Digital Europe programme targets AI research, innovation and deployment, and the development of digital skills. Support for AI R&D also includes grants to establish centres of excellence. This includes EUR 20 million to build the European Network of AI Excellence Centres (AI4EU), a European online platform that allows the exchange of AI tools and resources.

Read more: *https://www.oecd.ai/dashboards/countries/EuropeanUnion.*

AI in the public sector

Aurora AI Project

Responsible entity: Finland's Ministry of Finance

Description: Aurora AI is a network of different smart services and applications to "allow [the] public administration to better anticipate and provide resources for future service needs" and to allow citizens to access high-quality 24/7 digital services. The project aims to use AI to provide personalised, one-stop-shop and human-centric AI-driven public services.

Read more: *https://oecd.ai/dashboards/countries/Finland.*

Canada's Directive on Automated Decision-Making Systems and the Pre-qualified AI Vendor Procurement Program

Responsible entity: Canada's Treasury Board Secretariat

Description: Canada's Treasury Board Secretariat (TBS) recognised increased use and experimentation with AI in government, which led to the development of a whitepaper entitled 'Responsible AI in the Government of Canada' in 2019. This white paper, produced with stakeholders through online and in-person consultations, highlighted the need for oversight regarding the government's use of AI systems. From this, TBS developed the 'Directive on Automated Decision-Making Systems' as a first policy approach for AI. A cornerstone of the Directive includes an Algorithmic Impact Assessment to calculate the risks of an AI tool to foster innovation while protecting the public. In a parallel effort to support the Directive, TBS worked in partnership with Public Services and Procurement Canada to establish a 'Pre-qualified AI Vendor Procurement Program' which aimed to enhance the accountability of AI tools used within the

government. 89 companies are currently pre-certified to provide AI tools and solutions to the government under this programme.

Read more: *https://oecd.ai/dashboards/countries/Canada*.

Data access and sharing

Digital Platform sprogteknologi.dk

Responsible entity: Danish Ministry of Finance and Agency for Digitalisation

Description: In its national AI strategy, Denmark highlights the importance of high-quality language technology to support the development and deployment of AI in Danish. In June 2020, the Danish government launched the website sprogteknologi.dk where metadata of existing linguistic resources are gathered and displayed. This will enable businesses, researchers and public authorities to develop solutions efficiently using voice recognition and language understanding in Danish.

Read more: *https://www.oecd.ai/dashboards/countries/Denmark*.

Digital Infrastructure for AI

European High-Performance Computing Joint Undertaking (EuroHPC)

Responsible entity: European Union Joint Undertaking

Description: The European High-Performance Computing Joint Undertaking (EuroHPC) is a EUR 1 billion undertaking by the EU and other European countries. It aims to develop a petascale and pre-exascale supercomputing and data infrastructure to support European scientific and industrial research and innovation. The EuroHPC declaration, signed on 23 March 2017 by 7 countries, marked the beginning of EuroHPC and this portal. As of November 2020, five EuroHPC petascale supercomputers are planned in Slovenia, Luxembourg, Czech Republic, Bulgaria, and Portugal along with three EuroHPC pre-exascale supercomputers in Spain, Finland and Italy.

Read more: *https://oecd.ai/dashboards/countries/EuropeanUnion*.

Fugaku Supercomputer

Responsible entity: Japan's Ministry of Education, Culture, Sports, Science and Technology

Description: In Japan, the RIKEN Center for Computational Science in Kobe and Fujitsu is developing a Supercomputer named Fugaku to create outstanding results in various fields such as AI, data science, medicine, climate, space and disaster prevention.

Read more: *https://oecd.ai/dashboards/countries/Japan*.

AI Bridging Cloud Infrastructure（ABCI）

Responsible entity: Japan's Ministry of Economy, Trade and Industry

Description: ABCI is the world's first large-scale Open AI Computing Infrastructure, constructed and operated by the National Institute of Advanced Industrial Science and Technology (AIST). ABCI accelerates joint AI R&D with industries, academia and governments in Japan.

Read more: *https://oecd.ai/dashboards/countries/Japan*.

Controlled environments for AI experimentation

Colombia's regulatory system for AI

Responsible entity: Presidency of the Republic of Colombia, Ministry of Information Technology and Communications, National Planning Department

Description: The Colombian government has designed a specific model to develop a regulatory sandbox for AI in the region, which is expected to be implemented in 2021. The main purpose of this initiative is to have an innovative approach to the design of regulations applicable to AI systems.

Read more: *https://oecd.ai/dashboards/countries/Colombia*.

Germany's Regulatory Sandboxes and Testbeds

Responsible entity: German Federal Ministry for Economic Affairs and Energy and other Federal Ministries

Description: Germany's AI strategy plans the establishment of AI regulatory sandboxes and testbeds, such as the "Digital Motorway testbed A9" for autonomous vehicle projects (administrated by the Federal Ministry of Transport and Digital Infrastructure). These make it possible to test technologies in a real-life setting and to screen the regulatory environment and make adjustments.

Read more: *https://oecd.ai/dashboards/countries/Germany*.

Networking and collaborative platforms

European network of Digital Innovation Hubs

Responsible entity: European Commission

Description: The European network of Digital Innovation Hubs (DIHs) is a network of one-stop shops for SMEs requiring support for digitalisation. The programme, which was announced in 2016 as part of the Digitising European Industry initiative, places emphasis on the specialisation of DIHs with respect to local/territorial needs. DIHs can provide test beds for technologies, advice on financing options, and networking and training opportunities. The EU's role is to provide funding and to encourage co-operation between DIHs in different regions so that beneficiaries are informed about services not provided in their regional DIH. As part of the Digital Europe Programme, an expansion of existing DIHs is foreseen to include AI and other technologies.

Read more: *https://oecd.ai/dashboards/countries/EuropeanUnion*.

Tailored advisory to support businesses' scale-up

Digital Catapult

Responsible entity: UK Government

Description: The UK has a network of catapults helping to promote the adoption of technologies. The digital catapult leads on AI-related efforts and offers access to compute credits to businesses and links to cloud computing resources, which are vital for businesses that could benefit from AI but lack the technical infrastructure. The digital Catapult works with 30 start-ups per year and uses a competitive process. To monitor the efficacy of R&D projects, the project relies on a wider framework in place with partners at UK Research and Innovation. Innovate UK focuses on commercialisation in some of its programmes like Knowledge Transfer Networks; which can show "wins" but generally uses indirect measures of impact and influence such as citations. The U.K. is focusing on building the ecosystem this decade and will focus on AI applications next decade.

Read more: *https://www.oecd.ai/dashboards/countries/UnitedKingdom*.

AI skills and education

Federal STEM Education Strategic Plan

Responsible entity: National Science and Technology Council, Committee on STEM Education, Department of Education of the USA

Description: The American AI strategy emphasises STEM education as a key priority. It devotes at least USD 200 million in grant funds per year to promote high-quality computer science and STEM education, including the training of teachers.

Read more: *https://oecd.ai/dashboards/countries/UnitedStates*.

Finland's Elements of AI programme

Responsible entity: University of Helsinki

Description: Finland's Elements of AI programme is a ten-hour Massive Open Online Course that seeks to ensure that all citizens have a basic understanding of AI. Finland's AI strategy is interesting because it sets out to educate the country's entire population – including people who are employed and the elderly – in basic AI, which it sees as a "civic competence". While Finland initially targeted the training of 1% of its population, the course attracted more than 100 000 participants. This represents more than 2% of the population.

Read more: *https://oecd.ai/dashboards/countries/Finland*.

AI policy intelligence to monitor implementation

AI Watch

Responsible entity: European Commission Joint Research Centre

Description: The EU's 2018 Coordinated Action Plan on the development of AI announced the creation of AI Watch, the "European Commission Knowledge Service to Monitor the Development, Uptake and Impact of Artificial Intelligence Policy for Europe". AI Watch is a project developed by the Joint Research Centre and DG CONNECT of the European Commission. It monitors AI-related development and provides analyses to support the implementation of the European AI initiatives. JRC is also developing a methodology to identify risks and opportunities, drivers and barriers of the use of AI in public service provision. In February 2020, JRC launched a report on national AI strategies of EU member countries, the objective of which is "to present and gather information on all EU Member States' national AI strategies in a structured and comprehensive way". It aims to help Member States compare their strategy and identify areas for strengthening synergies and collaboration. The EU's effort to monitor implementation develops a harmonised policy framework by assessing each Member State's strategy through specific policy areas: human capital,

research, networking, infrastructure, and regulation. The purpose of this framework is to enable comparisons by policy makers in each country.

Read more: *https://oecd.ai/dashboards/countries/EuropeanUnion*.

Observatory for Artificial Intelligence in Work and Society

Responsible entity: German Federal Ministry of Labour and Social Affairs

Description: Germany established an AI policy observatory that will: conduct technology foresight and impact assessment on AI in work and society; foster the use of human-centred AI in the labour and social affairs administration; support the building up of European and international structures, that are dedicated to AI (e. g. observatories), and; contribute to the development of a legal/regulatory framework on AI in work and society.

Read more: *https://oecd.ai/dashboards/countries/Germany*.

International Co-operation on AI

Ad Hoc Committee on Artificial Intelligence (CAHAI)

Responsible entity: Council of Europe (CoE)

Description: In September 2019, the Committee of Ministers of the Council of Europe (CoE) set up the Ad Hoc Committee on Artificial Intelligence (CAHAI). This committee was examining the feasibility of developing a legal framework for the development, design and application of AI, based on CoE standards on human rights, democracy and rule of law. In April 2020, the same Committee of Ministers issued a set of guidelines calling on governments to take a precautionary approach to the development and use of algorithmic systems. It further called for the adoption of legislation, policies and practices that fully respect human rights. In June 2020, the CAHAI established three working groups. The Policy Development Group developed a feasibility study for a legal framework on AI applications and proposals for engaging with and consulting the relevant external stakeholders. The Consultations and Outreach Group is taking stock of the results of the online consultations and preparing a stakeholder analysis and mapping. The Legal Frameworks Group is preparing key findings and proposals on possible elements and provisions of a legal framework and will develop specific regulatory proposals for the development, design and application of AI in the areas identified as risky by member states and other stakeholders.

Read more: *https://www.coe.int/en/web/artificial-intelligence*.

The High-Level Expert Group on Artificial Intelligence (AI HLEG)

Responsible entity: European Commission (EC)

Description: The High-Level Expert Group on Artificial Intelligence (AI HLEG) was convened by the European Commission in 2016 to support the implementation of the European Strategy on AI and completed its mandate in July 2020. The AI HLEG comprised representatives from academia, civil society, and industry that produced three outputs: the April 2019 Ethics Guidelines for Trustworthy Artificial Intelligence, the June 2019 Policy and Investment Recommendations for Trustworthy Artificial Intelligence, and the July 2020 Assessment List for Trustworthy Artificial Intelligence (ALTAI). The European AI Alliance is a multi-stakeholder forum for engaging in a broad and open discussion of all aspects of AI development and its impact on the economy and society.

In February 2020, the European Commission issued a "White Paper on Artificial Intelligence" – A European Approach to Excellence and Trust. The paper considers requiring a pre-marketing conformity assessment for "high-risk" AI applications such as facial recognition, as a core element of a potential regulatory framework for AI. In addition, the white paper proposes a voluntary "quality label" for AI applications considered not to be high-risk. In parallel, the European Commission is reviewing EU product safety and liability regimes in light of AI.

Read more:

https://ec.europa.eu/digital-single-market/en/artificial-intelligence.

Global Partnership on AI (GPAI)

Responsible entity: Consortium of countries

Description: GPAI is an international and multi-stakeholder initiative that advances cutting-edge research and pilot projects on AI priorities to advance the responsible development and use of AI that respects human rights and shared democratic values, as elaborated in the OECD's Recommendation on AI. The Partnership was conceived by Canada and France during their G7 presidencies and, at its launch on 15 June 2020, counted 13 other founding members: Australia, the EU, Germany, India, Italy, Japan, Korea, Mexico, New Zealand, Singapore, Slovenia, the United Kingdom and the United States. With its Secretariat hosted at the OECD, the GPAI brings together experts from industry, government, civil society and academia.

GPAI's mission is to "support the development and use of AI based on human rights, inclusion, diversity, innovation, and economic growth while seeking to address the United Nations Sustainable Development Goals". Two Centres of Expertise (the International Centre of Expertise in Montréal for the Advancement of Artificial Intelligence (ICEMAI) in Montréal, and the National

Institute for Research in Digital Science and Technology (INRIA) in Paris) support the operation of four expert working groups on: Responsible AI (Montréal); Data Governance (Montréal); the Future of Work (Paris); and Innovation & Commercialisation (Paris).

Read more: *https://gpai.ai/*.

OECD Network of Experts on AI (ONE AI)

Responsible entity: Organisation of Economic Co-operation and Development (OECD)

Description: OECD member countries adopted a set of AI principles in May 2019, the first set of intergovernmental principles and recommendations to governments for trustworthy AI. In early 2020, the OECD launched OECD.AI, a platform to share and shape AI policies that provide data and multidisciplinary analysis on artificial intelligence. Also in early 2020, the OECD's Committee on Digital Economy Policy tasked the OECD Network of Experts on AI (ONE AI) with proposing practical guidance for implementing the OECD AI principles for trustworthy AI through the activities of three working groups. The ONE AI working group on the classification of AI systems is developing a user-friendly framework to classify and help policy makers navigate AI systems and understand the different policy considerations associated with different types of AI systems. The ONE AI working group on implementing trustworthy AI is identifying practical guidance and shared procedural approaches to help AI actors and decision-makers implement effective, efficient and fair policies for trustworthy AI. The ONE AI working group on national AI policies is developing practical guidance for policy makers on investing in AI R&D; data, compute, software & knowledge; regulation, testbeds and documentation; skills and labour markets; and international co-operation.

Read more: *https://oecd.ai*.

UNESCO's Ad Hoc Expert Group on AI (AHEG)

Responsible entity: UNESCO

Description: UNESCO has organised events to exchange knowledge about AI, focusing on the dimensions of ethics, policy and capacity building. In March 2020, UNESCO appointed 24 leading experts to an Ad Hoc Expert Group (AHEG) on the ethics of AI. UNESCO's November 2019 General Conference tasked the AHEG with elaborating a recommendation on the ethics of artificial intelligence.

Read more: *https://en.unesco.org/artificial-intelligence*.

References

Berryhill, J. et al. (2019), *Hello, World: Artificial intelligence and its use in the public sector*, OECD Publishing, Paris, https://doi.org/10.1787/726fd39d-en. [6]

Cockburn, I. (2018), "The impact of artificial intelligence on innovation", No. 24449, National Bureau of Economic Research, Cambridge, US, http://dx.doi.org/10.3386/w24449. [2]

European Commission (2021), *European legal framework for AI to address fundamental rights and safety risks specific to the AI systems*, https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-ai. [8]

European Commission (2021), *Revised Coordinated Plan on AI*, https://digital-strategy.ec.europa.eu/en/library/coordinated-plan-artificial-intelligence-2021-review. [7]

Government of the Grand Duchy of Luxembourg (2019), *Artificial Intelligence: A Strategic Vision for Luxembourg*, https://digital-luxembourg.public.lu/sites/default/files/2020-09/AI_EN_0.pdf. [12]

Lithuanian Ministry of the Economy and Innovation (2020), *Lithuanian Artificial Intelligence Strategy: A Vision of the Future*, https://eimin.lrv.lt/uploads/eimin/documents/files/DI_strategija_ENG(1).pdf. [11]

OECD (2021), *AI measurement in ICT usage surveys: A review*, OECD Publishing, Paris, https://doi.org/10.1787/72cce754-en. [9]

OECD (2021), *Measuring the AI content of publicly funded R&D projects - A proof of concept for the OECD Fundstat initiative*, OECD Publishing, Paris, https://doi.org/10.1787/7b43b038-en. [3]

OECD (2021), *State of implementation of the OECD AI Principles: Insights from national AI policies*, https://doi.org/10.1787/1cd40c44-en. [1]

OECD (2020), *Identifying and measuring developments in artificial intelligence*, OECD Publishing, Paris, https://doi.org/10.1787/5f65ff7e-en. [10]

OECD (2020), *Trustworthy Artificial Intelligence in Health*, OECD Publishing, Paris, https://www.oecd.org/health/trustworthy-artificial-intelligence-in-health.pdf. [4]

OECD (2020), *Using artificial intelligence to help combat COVID-19*, OECD Publishing, Paris, https://doi.org/10.1787/5b0fd8cd-en. [5]