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POLICY BRIEF

National AI strategies and children

Reviewing the landscape and identifying windows of opportunity

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Purpose

As progress in the field of artificial intelligence (AI) accelerates, policymakers around the world are realizing the value of proactively engaging in AI debates and are motivated to cultivate national expertise to lead the development and use of AI.[1] Much of this energy has been directed at establishing national task forces and publishing reports on the implications of AI. In 2017, Canada published the first national AI strategy and since then, over 25 national AI strategies have been published[2] to address areas including digital infrastructure, regulation, research and education, the future of work, data management, security and ethics. To date, approximately 35 additional country strategies are in various stages of development.[3]

Given the profound impact AI will have on life and work in the 21st century, the stakeholders who will be most affected by these developments are children. It is estimated that "in 104 countries, more than 80% of the youth population are online"[4] and according to the ITU, those "with the most data and the most robust digital infrastructure will be the first to reap the benefits of [AI] technologies".[5] As children witness the proliferation of AI enabled systems and devices, they will need to gain the necessary skills to prepare for this reality. Today, children are acquiring social norms, building personal identities and pursuing educational opportunities, under the influence of AI systems.[6]

The purpose of this brief is to bring immediate attention to the lack of meaningful or directional recommendations regarding children's issues in most national AI strategies that exist today. The analysis has been conducted through a literature review of national AI strategies. It is important to note that due to the disparities in the length (word count) and maturity of strategies, this brief does not attempt to compare countries to one another, but rather to advocate for the prioritization of children's rights and needs in AI policies. Given the dramatic ramifications AI is having on children, both now and into the future, policymakers should not overlook its implications for this unique and fast-growing demographic. For an AI strategy to robustly engage with children's issues, policymakers must ensure that children are not just shielded from the harms of AI, but that they are meaningfully enriched, informed and aided by it.

Key findings

- Most national AI strategies make only cursory mention of children and their specific needs. While there are instances of strategies adopting a human-centred or societal approach, there is insufficient acknowledgement about how AI is currently affecting children.
- Very little attention is explicitly being given to safeguarding the rights of children in an algorithmic-oriented economy and society. Mentions of upholding children's rights tend to be focused on improving access to education and healthcare. However, other rights, including protection against discrimination, abuse and exploitation or the rights to freedom of expression, association and access to information, are generally not explored, with the exception of privacy rights.
- There is some engagement with preparing children to live in an AI world and develop basic AI literacy skills, but these efforts need to be significantly expanded to ensure that all children have holistic access to AI technologies in a way that best benefits their particular situations.

- When children are specifically addressed in national AI strategies, it is most often in the contexts of education or the future workforce. In these cases, countries are emphasizing the importance of preparing children to work in an AI-centric economy, with the assumption that the benefits of AI will be available to all children and adults, which is not the case.

Definitions

The United Nations Convention on the Rights of the Child (CRC) defines the health, social, civil, political, economic and cultural rights of all children. In this treaty, the signatories affirm that while children do have the same human rights as adults, they also require unique protections and provisions. The CRC includes tenets like “the right to rest, play, recreation and leisure as appropriate to their age” and “the right to resources necessary for life, survival and development” to underscore the fact that children are malleable, meaning that society must empower them to reach their potential. This analysis follows the Convention’s definition of a **child** as any individual under the age of 18.[7]

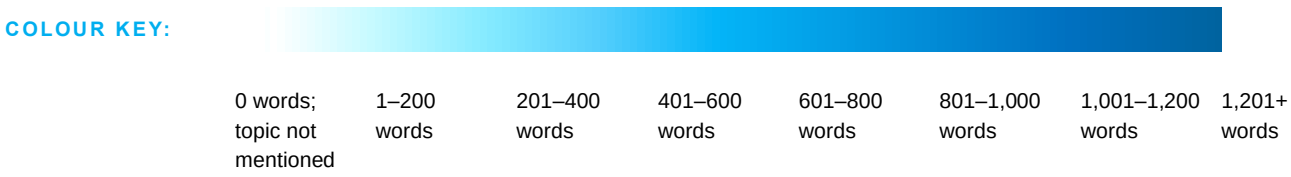
This brief defines **Artificial Intelligence systems** as a general-purpose suite of technologies or machine-based systems “that can, for a given set of human-defined objectives, make predictions, recommendations, or decisions influencing real or virtual environments.”[8] In terms of AI techniques, this definition includes machine learning, natural language processing and robotics.

While governments are taking various approaches to developing their **national AI strategies** and are at different stages of development, this brief analyzes a sample of coordinated government AI policies which have been published online and are available in English. Given that new strategies and policies are continuously being published and updated, this brief is not intended to be comprehensive. Rather, the aim is to illustrate trends and knowledge gaps in national AI strategies with respect to children.

Children’s issues in national AI strategies

To analyze the inclusion of children's issues in AI strategies, four child-centred issues emerged from a literature review of 20 national strategies. These findings are categorized as: (1) improving quality of life and services for children; (2) protecting children's data and privacy; (3) enabling children to obtain strong AI competences; and (4) cultivating children as a future workforce. The data represented in Table 1 is based on an approximate word count and is intended to offer an at-a-glance illustration of each strategy’s engagement with children’s issues. Key search terms included the following words: child, children, minor, youth, young, student, primary, secondary, high school and education. As previously mentioned, the focus of this review is limited to children under 18 years of age and therefore omits efforts related to higher education and post-graduation. It is also necessary to emphasize that this visualization is not meant to compare strategies to each other, but rather to provide an overall sense of how children are being incorporated, and overlooked, in the literature.

Table 01	Engagement with key issues for children in national AI strategies			
	Improving quality of life & services for children	**Protecting children's data & privacy**	**Enabling children to obtain strong AI competences**	**Cultivating children as a future workforce**
CANADA				
CHINA				
CZECH REPUBLIC				
DENMARK				
ESTONIA				
FINLAND				
FRANCE				
GERMANY				
INDIA				
ITALY				
JAPAN				
LITHUANIA				
MALTA				
NETHERLANDS				
NORWAY				
PORTUGAL				
SERBIA				
SINGAPORE				
SOUTH KOREA				
UNITED KINGDOM				



The research reveals that governments are, unfortunately, engaging far less with the impact of AI technologies on the full range of children's rights, presenting very few comments on children's inclusion, data protection or digital rights. Furthermore, efforts to improve quality of life and services for children tend to be concentrated in the area of education. For example, by establishing adaptive learning systems, increasing teacher's AI competences and skills, introducing AI-enabled automated grading systems and, in

some cases, outlining plans to develop schools' technology infrastructure. Encouragingly, the strategies reveal that efforts are being made to introduce Science, Technology, Engineering and Mathematics (STEM) subjects and basic digital and AI literacy in schools from an early age. However, a greater emphasis could be placed on expanding AI education to include studies on ethics and humanities. Additionally, very few of the reviewed strategies included recommendations to teach children soft skills, such as critical thinking and emotional intelligence, which are equally important to technical skills and necessary to flourish in an AI world. The most immediate takeaway is that relatively little is being said about how AI is currently impacting children – as opposed to society overall – or how it is likely to affect them in the future. Notably, no existing national AI strategy meaningfully discusses all four of the aforementioned key issues, indicating significant room for improvement in how children's rights are considered in the AI policy space.

1. IMPROVING QUALITY OF LIFE AND SERVICES FOR CHILDREN

Although the reviewed strategies dedicate little attention to the protection of children from actual and potential harms of AI systems, several of them describe ways in which AI can enhance their well-being[9] through the provision of public services, including health care and education. For instance, **Finland's** strategy mentions AI in the context of improving health care for children, describing an initiative at Helsinki University Central Hospital where researchers are developing a new tool for predicting blood glucose levels in diabetic children.[10]

In **Japan**, there is a goal to improve data science and AI literacy among high school teachers and expand access to learning materials for teacher training across the country. Furthermore, the document lists initiatives such as establishing a digital library of contents on "STEAM education through industry-academia collaboration" and collecting good practices "to improve lessons from the perspective of...active learning in science and mathematics in high school",[11] which the authors regard as basic foundations to AI.

Malta's strategy contains concrete actions to foster the adoption of AI in education and develop teachers' knowledge and awareness of this topic. For example, the Ministry for Education and Employment (MEDE) plans to set up a working group comprised of schools and teachers' unions to "develop a strategy for a wider rollout of AI in education", implement the project, and assess its outcomes.[12] Additionally, the MEDE will develop AI training for education officers, school management, teachers and learning support assistants. To disseminate best practices in AI for teaching, the Ministry will organize an annual conference on AI in education, bringing in global experts to share key learnings.[13]

In **Italy**, the use of intelligent technologies for public administration are either currently being utilized or developed. Specific examples mentioned for the school system include the use of "automatic evaluation tools; personalisation of teaching material; automated tutoring, by means of recommendation tools to maintain attention; suggestions concerning personalised variations to be introduced in the school programme; and extraction of predictive indicators for school drop-out risk".[14]

2. PROTECTING CHILDREN'S DATA AND PRIVACY

Despite the extensive attention given to AI ethics research in recent years, the vast majority of national strategies fail to comment on how these issues specifically relate to children. Children are rarely mentioned as a population in need of unique protections in a technologically advancing world. Therefore, there are

limited instances that refer to the protection of children's data and digital rights. The most common right that was found in the literature review pertains to the right to privacy.

For instance, the **United Kingdom's** strategy comments on the importance of educating children about protecting their online information, particularly since the ramifications of leaked personal data can remain hidden for years.[15] **India's** national strategy stresses the importance of privacy as a fundamental right and states that "the protection of this right with its multiple facets in a fast-changing technological environment will not just depend on State enforcement, but by also making the citizens aware of their rights and how they can protect them."[16] The document states that the inclusion of privacy rights in school curricula can serve as a means to spread awareness about the importance of consent and data ethics. In such cases, awareness raising could be complemented by clear requirements and regulations for users and providers to ensure privacy protection.

Rather than attempting to enumerate various recommendations for protecting children in a digital world, the **German** framework alludes to existing national protocols for mitigating the harms youth may experience from media or technology. While these laws and protocols are generally targeted at the censorship of inappropriate digital content, the model of creating a dedicated body to review AI systems for their suitability for children may be necessary to navigate the complexities of rapidly developing technology.[17]

3. ENABLING CHILDREN TO OBTAIN STRONG AI COMPETENCES

While children are the workforce of the future, the effects of AI will not be confined to their professional lives. However, few of the national strategies engage with the notion that children need preparation to live in an AI world today, despite several possible angles through which it could be addressed. These include curricula for children beyond STEM education or programming to ensure that AI is developed and used responsibly. For instance, greater attention could be placed on bolstering the capacity of children to better understand AI and its ethical, legal, social and cultural aspects and implications. This could be delivered in the form of access to AI literacy programmes to help children understand the use of AI in different domains (health, economy, social media, education) and how it affects them. As AI systems affect and shape children's online and offline experiences, national AI strategies need to further engage with these issues now.

Based on the literature review of national AI strategies, some positive examples include **Lithuania's** strategy which introduces a policy recommendation to promote ethics by design and encourage high school students to discuss the ethical implications of AI technology.[18] In **Denmark**, "a trial programme has been launched to enhance understanding of technology in compulsory programmes at municipal primary and lower-secondary schools. The objective is to ensure that all students learn to reflect critically about technology and shape it rather than use it."[19] Furthermore, **Germany** enacted a constitutional amendment to strengthen the federal government's capacity to direct resources toward technological literacy in schools nationwide. As the strategy states, "All children who start school in the year 2018/2019 or after are to have acquired a broad set of digital skills by the time they graduate. This will ensure that all pupils gain a sound, basic understanding of the digital transformation and its consequences." The document underscores the importance of "helping young people develop an understanding for AI early in their lives."[20]

4. CULTIVATING CHILDREN AS A FUTURE WORKFORCE

Adult education on AI is a central focus for many countries, but numerous strategies also mention the need to prepare younger generations for careers in the development and use of emerging technologies. This includes increasing children's digital skills to prepare them for an ever-evolving labour landscape. While this is an essential starting point for children to learn digital and computing skills, there is a risk in only seeing and cultivating children as future workers, rather than enabling them to enjoy their childhood and preparing them for lifelong learning, including careers in the arts or other areas that may not be dependent on AI. Furthermore, education about AI must include a recognition that technologies risk expediting systemic biases and injustices that exist in society.[21] Efforts to be expanded and built upon include the following examples:

In **Lithuania's** national AI strategy there are policy recommendations "to develop the skills needed for a future with AI from the beginning of education".[22] This includes mechanisms for children to gain first-hand experience by visiting businesses that are developing innovative AI products, modernizing the teaching of STEM subjects, and designing curricula for children that integrate AI basics as a learning objective. Similarly, **Portugal's** strategy articulates its goal to be "at the forefront of AI education",[23] by preparing every student with computer science knowledge and AI general skills. The aim is that this strategy will extend teaching from the early stages of education to lifelong learning.

In **Singapore**, the AI strategy includes an ambitious plan to "teach basic computing skills and computational thinking to all". In this effort, the government intends to scale AI literacy courses to 100,000 adults and school children by 2025.[24] Furthermore, **Malta's** national strategy sets out to build awareness of AI among students and parents through specific actions that include an annual, hands-on AI education programme for families and schools, as well as an annual AI Olympiad for students in primary and secondary school to learn how to use AI methods to solve real-world problems.[25]

Identifying windows of opportunity

Overall, while many countries are considering ways to prepare children for jobs of the future, and some are exploring opportunities to improve children's welfare with AI technologies, engagement on children's issues in national AI strategies is immature. Furthermore, even less is being said about the risks children may be exposed to from AI systems or mitigation efforts for certain services that utilize predictive analytics or other types of algorithmic modelling to make determinations about children's futures. However, this presents a window of opportunity to focus on the prioritization of children's well-being in which AI systems help them flourish, rather than solely determining the course of their education or future work. Given that AI governance strategies are rapidly developing around the world, the question becomes how can these documents be built upon to ensure meaningful consideration of children's issues? To begin to address the pressing need for governments to develop greater child-centred and child-specific AI policies, UNICEF is producing a Policy Guidance on AI for Children that includes a list of key requirements for both policymakers and industry. While this guidance will delve into more detail, the following section identifies two initial opportunities for intervention.

1. BUILDING ON HUMAN-CENTRED PRINCIPLES

In general, the AI policy space is becoming increasingly aware that technology must be developed with the priorities of end-user needs and values at the outset of design. For example, the Organisation for Economic Co-operation and Development's (OECD) Recommendation of the Council on Artificial Intelligence[26] lists "human-centred values" as one of its key principles for the responsible stewardship of trustworthy AI. There are several instances in which national AI strategies are already laying the foundation for thoughtful technology policies and regulations by taking a "human-centred" approach. However, these policies could be taken a step further to ensure that this term does not only apply to adults. Further consideration of children's issues is needed to safeguard the equitable and inclusive development of AI. Some instances in which governments can begin to apply a child-centred lens are to:

Protect children by:

- **Designing data consent procedures:** Regulations regarding consent for data collection may be expanded to differentiate the definition of consent for particular age groups.
- **Regulating privacy requirements for children:** Existing legal mechanisms and regulatory frameworks should be reviewed to ensure that they cater to AI-related scenarios.

Provide for children by:

- **Mitigating age bias in machine learning:** Efforts to mitigate racial discrimination and gender bias in AI systems may also incorporate age as a sensitive variable.

Enable children's participation by:

- **Soliciting public opinion on AI by including children:** Public forums on the uses and ethics of AI may be specifically designed to include children and advocates of their perspectives, such as teachers, parents and social workers.
- **Educating children and those in their ecosystem about AI risks and harms:** Public education efforts on navigating AI technologies may be adapted to meet the unique needs of children across different age groups.

2. INCORPORATING ETHICAL FRAMEWORKS

Another opportunity for policymakers to incorporate greater consideration of children in AI strategies lies in the body of existing ethical guidelines, which serve as a starting place for governance.[27] For an immediate step toward increasing engagement with children's issues, policymakers can make a conscientious effort to incorporate insights from non-governmental research that emphasizes principles of inclusive development. Given that ethical guidelines are relatively silent on children's issues, it is necessary to examine how to best apply them to children, for example, in thinking about unique privacy, consent and explainability considerations for children and those in their ecosystem (e.g. parents, caretakers and teachers). Although there are over 160 documents describing ethical guidelines and principles for AI,[28] multi-stakeholder and multilateral efforts such as the IEEE's Ethically Aligned Design,[29] the European Commission's Ethics Guidelines for Trustworthy AI[30] and the OECD's Principles on AI,[31] can provide national governments with guidance to set AI standards that are lawful, reliable, respect human rights and ultimately serve as a framework to operationalize them.

Literature review methodology

This brief's methodology is based on three main steps: first, identifying a set of key issues regarding children and AI; second, selecting relevant literature for the landscape; and third, reviewing the selected literature for comments related to the key issues. The researchers reviewed a variety of AI policy areas including, but not limited to, research and development, skills and employment, AI ethics, data and digital infrastructure, equity and inclusion and AI application across sectors. To ground this analysis, the following key issues on children in an AI world were identified to evaluate the relevant documents. The main issues were then validated by AI experts who also provided valuable inputs to the findings.

Table 02 **Summary of key issues for children and AI policy**

KEY ISSUE	EXAMPLES
Improving quality of life and services for children	building tools to improve children's social services and education systems
Protecting children's data and privacy	safeguarding vulnerable populations from harms, discrimination and exploitation
Enabling children to obtain strong AI competences	promoting ethics of technology and basic AI and digital literacy skills
Cultivating children as a future workforce	improving STEM education and incorporating AI in curricula

Limitations

It is important to note several limitations of this research methodology. First, given that AI policies are being developed on an ongoing basis, the documents reviewed here may not be fully up to date at the time of publication. Governments may also be producing additional reports on certain topics around AI that are not fully documented in their main strategies. Second, national governments are at varying stages in the process of developing, funding and implementing AI policies, meaning that the documents reviewed in this brief range from initial guidelines to in-progress initiatives. While the type of document reviewed for each country is captured in the appendix, these distinctions are not treated as significant for the purposes of identifying child-specific content. Third, as these publications vary in length, their respective word counts on children's issues are not a precise measurement but are indicative of the degree to which children are considered in national AI strategies. Finally, this research primarily relies on documents available in English.

Conclusion

Based on this literature review, it is evident that policymakers urgently need to prioritize children's issues in the development of their national AI strategies. This is increasingly critical as more countries continue to craft and/or expand their AI initiatives, as well as explore new ways to engage in the AI policy sphere. While governments may communicate a desire to ensure the benefits of AI are dispersed across their societies, equitable development requires the application of frameworks which address children's unique needs. AI policies and recommendations that are grounded in children's rights are essential to effectively guide the development and deployment of AI systems in order to enable protection, provision and participation for all children.

Acknowledgements

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DOCUMENTS REVIEWED IN THIS REPORT*

Canada
Pan-Canadian Artificial Intelligence Strategy
2017

China
A Next Generation Artificial Intelligence Development Plan
July 2017
Note: An English translation was utilized for this analysis.

Czech Republic
National Artificial Intelligence Strategy of the Czech Republic
May 2019

Denmark
National Strategy for Artificial Intelligence
March 2019

Estonia
Estonia's National Artificial Intelligence Strategy 2019–2021
July 2019

Finland
Leading the Way into the Age of Artificial Intelligence: Final Report of Finland's Artificial Intelligence Programme 2019
June 2019

France
For a Meaningful Artificial Intelligence: Towards a French and European Strategy
March 2018

Germany
Federal Government's Artificial Intelligence Strategy
November 2018

India
National Strategy for Artificial Intelligence
June 2018

Italy
Artificial Intelligence: At the Service of Citizens
March 2018

Japan
AI Strategy 2019
AI for Everyone: People, Industries, Regions and Governments
June 2019
Note: A tentative translation was utilized for this analysis.

Lithuania
Lithuanian Artificial Intelligence Strategy: A Vision of the Future
April 2019

Malta
Malta: The Ultimate AI Launchpad
October 2019

Netherlands
Strategic Action Plan for Artificial Intelligence
September 2019

Norway
National Strategy for Artificial Intelligence
January 2020

Portugal
AI Portugal 2030: Portuguese National Initiative on Digital Skills
February 2019

Serbia
Strategy for the Development of Artificial Intelligence in the Republic of Serbia for the period 2020–2025
December 2019

Singapore
National Artificial Intelligence Strategy
November 2019

South Korea
Toward AI World Leader, Beyond IT: National Strategy for Artificial Intelligence
October 2019

United Kingdom
AI in the UK: Ready, Willing, and Able?
April 2018

*The links to the strategies were accessible as of 5 September 2020. The following national AI strategies were also researched, but not included in this review for the following reasons: the Sweden and United States documents do not explicitly mention children. The updated Italy AI strategy and Poland and Russia strategies are not available in English. The Egypt, Taiwan and UAE documents are not publicly accessible.

ENDNOTES

[1] Saran, S., Natarajan, N. and Srikumar, M. (2018). In Pursuit of Autonomy: AI and National Strategies. https://www.orfonline.org/wp-content/uploads/2018/11/Ai_Book.pdf
[2] Bradley, C., Wingfield, R. and Metzger, M. (2020). National Artificial Intelligence Strategies and Human Rights: A Review. https://www.gp-digital.org/wp-content/uploads/2020/04/National-Artifical-Intelligence-Strategies-and-Human-Rights%E2%80%94A-Review_.pdf
[3] OECD.AI (2020), powered by EC/OECD (2020), STIP Compass database. https://oecd.ai/dashboards
[4] S*ee* ICT Facts and Figures 2017 https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2017.pdf
[5] ITU (2018). Module on Setting the Stage for AI Governance: Interfaces, Infrastructures, and Institutions for Policymakers and Regulators. https://www.itu.int/en/ITU-D/Conferences/GSR/Documents/GSR2018/documents/AISeries_GovernanceModule_GSR18.pdf
[6] See for example, UC Berkeley and UNICEF (2019). Memorandum on Artificial Intelligence and Child Rights. https://www.unicef.org/innovation/reports/memoAIchildrights
[7] United Nations General Assembly (1989). Convention on the Rights of the Child. Available at: https://www.refworld.org/docid/3ae6b38f0.html
[8] OECD (2019). Recommendation of the Council on Artificial Intelligence. https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449
[9] For an example of a framework to improve children's well-being (which could be aligned with a national AI strategy), see the Government of New Zealand's Child and Youth Wellbeing Strategy (2019). https://childyouthwellbeing.govt.nz/sites/default/files/2019-08/strategy-on-a-page-child-youth-wellbeing-Sept-2019.pdf
[10] Ministry of Economic Affairs and Employment (2019). Leading the Way into the Age of Artificial Intelligence: Final Report of Finland's Artificial Intelligence Programme 2019. http://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/161688/41_19_Leading%20the%20way%20into%20the%20age%20of%20artificial%20intelligence.pdf
[11] Integrated Innovation Strategy Promotion Council (2019). AI Strategy 2019 - AI for Everyone: People, Industries, Regions and Governments (tentative translation) https://www8.cao.go.jp/cstp/english/humancentricai.pdf.
[12] Malta Digital Innovation Authority (2019). Malta: The Ultimate AI Launchpad. https://malta.ai/wp-content/uploads/2019/11/Malta_The_Ultimate_AI_Launchpad_vFinal.pdf
[13] Ibid.
[14] The Agency for Digital Italy (2018) Artificial Intelligence: At the Service of Citizens. https://ia.italia.it/assets/whitepaper.pdf
[15] House of Lords Select Committee on Artificial Intelligence (2018). AI in the UK: ready, willing and able? Report of Session 2017–19. https://publications.parliament.uk/pa/ld201719/ldselect/ldai/100/100.pdf
[16] NITI Aayog (2018). National Strategy for Artificial Intelligence. https://niti.gov.in/sites/default/files/2019-01/NationalStrategy-for-AI-Discussion-Paper.pdf
[17] Federal Ministry of Education and Research, Federal Ministry for Economic Affairs and Energy, and Federal Ministry of Labour and Social Affairs (2018). Artificial Intelligence Strategy. https://www.ki-strategie-deutschland.de/home.html?file=files/downloads/Nationale_KI-Strategie_engl.pdf
[18] Ministry of Economy and Innovation (2019). Lithuanian Artificial Intelligence Strategy: A Vision of the Future. http://kurklt.lt/wp-content/uploads/2018/09/StrategyIndesignpdf.pdf
[19] Ministry of Finance and Ministry of Industry, Business and Financial Affairs (2019). The Danish Government National Strategy for Artificial Intelligence. https://eng.em.dk/media/13081/305755-gb-version_4k.pdf
[20] Federal Ministry of Education and Research, Federal Ministry for Economic Affairs and Energy, and Federal Ministry of Labour and Social Affairs (2018). Artificial Intelligence Strategy. https://www.ki-strategie-deutschland.de/home.html?file=files/downloads/Nationale_KI-Strategie_engl.pdf

[21] For examples of how discriminatory designs encode inequity see Ruha Benjamin (2019). Race After Technology: Abolitionist Tools for the New Jim Code. https://www.wiley.com/en-us/Race+After+Technology:+Abolitionist+Tools+for+the+New+Jim+Code-p-9781509526437
[22] Ministry of Economy and Innovation (2019). Lithuanian Artificial Intelligence Strategy: A Vision of the Future. http://kurklt.lt/wp-content/uploads/2018/09/StrategyIndesignpdf.pdf
[23] Foundation for Science and Technology (2019). AI Portugal 2030. https://www.incode2030.gov.pt/sites/default/files/julho_incode_brochura.pdf
[24] Smart Nation and Digital Government Office (2019). Singapore National Artificial Intelligence Strategy. https://www.smartnation.gov.sg/docs/default-source/default-document-library/national-ai-strategy.pdf?sfvrsn=2c3bd8e9_4
[25] Malta Digital Innovation Authority (2019). Malta: The Ultimate AI Launchpad. https://malta.ai/wp-content/uploads/2019/11/Malta_The_Ultimate_AI_Launchpad_vFinal.pdf
[26] OECD (2019). Recommendation of the Council on Artificial Intelligence. https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449
[27] Fjeld, J., Achten, N., Hilligoss, H., Nagy, A. and Srikumar, M. (2020). Principled Artificial Intelligence: Mapping Consensus in Ethical and Rights-based Approaches to Principles for AI. https://dash.harvard.edu/bitstream/handle/1/42160420/HLS%20White%20Paper%20Final_v3.pdf?sequence=1&isAllowed=y
[28] United Nations (2020). Report of the Secretary-General Roadmap for Digital Cooperation. https://www.un.org/en/content/digital-cooperation-roadmap/assets/pdf/Roadmap_for_Digital_Cooperation_EN.pdf
[29] The IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems (2019). Ethically Aligned Design: A Vision for Prioritizing Human Well-being with Autonomous and Intelligent Systems, First Edition. https://standards.ieee.org/content/ieee-standards/en/industry-connections/ec/autonomous-systems.html. *See also* the Personal Data and Individual Agency chapter in the Ethically Aligned Design report which features a section on children's data issues. https://standards.ieee.org/content/dam/ieee-standards/standards/web/documents/other/ead1e_personal_data.pdf?utm_medium=undefined&utm_source=undefined&utm_campaign=undefined&utm_content=undefined&utm_term=undefined
[30] European Commission High-Level Expert Group on Artificial Intelligence (2019). Ethics Guidelines for Trustworthy AI. https://ec.europa.eu/digital-single-market/en/news/ethics-guidelines-trustworthy-ai
[31] OECD. (2019). Recommendation of the Council on Artificial Intelligence. https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449