

Legal Regulation for Artificial Intelligence in the European Union

Major Aspects for Minors

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Abstract

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Title: Legal Regulation for Artificial Intelligence in the European Union – Major Aspects for Minors

The purpose of this study is to answer in what ways EU regulation and national strategies protect individuals under the age of majority from the misuse of artificial intelligence. This is done by examining the Commission's current proposal for the Artificial Intelligence Act, and by analyzing the national AI strategies in twelve Member States. Additionally, AI experts are interviewed about children's rights in the EU and its Member States. This mixed-method approach is based on the need to consider legal, technical, and economic aspects of artificial intelligence and identify the ways in which EU regulation and national strategies protect children.

The findings of this study show that in the proposed Artificial Intelligence Act, there are four major ways in which the proposal protects children. These include protecting children's rights in accordance with the Convention on the Rights of the Child (Article 24), protecting children from high-risk AI systems, protecting children from AI systems that can distort human behaviour, and using AI systems to help victims of crime. Additionally, the analysis of national strategies shows four distinct aspects that contribute to children's rights, which are enabling children to obtain strong AI competencies, cultivating children as a future workforce, improving the quality of life and services for children, and protecting children's data and privacy. The expert interviews highlight that both the proposed regulation and national strategies would benefit from more holistic approaches and increased coordination between the Member States.

Keywords: Artificial Intelligence, Artificial Intelligence Act, Children, Children's Rights, Convention on the Rights of the Child, European Union, Minors

Foreword

For making this thesis possible, I would like to forward my gratitude to my supervisor Jonas Ledendal for his valuable critique, support, and ideas. I want to also deeply thank my family, friends, and colleagues for encouraging and tolerating me through the long hours of writing and even longer hours of rewriting.

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Abbreviations

AI	Artificial Intelligence
CI	Computational Intelligence
CJEU	Court of Justice of the European Union
CRC	Convention of the Rights of the Child
DL	Deep Learning
EC	European Commission
EEA	European Economic Area
EP	European Parliament
EU	European Union
ICCPR	International Covenant on Civil and Political Rights
ICT	Information and Communications Technology
ML	Machine Learning
STEM	Science, Technology, Engineering, and Mathematics
UN	United Nations
VDPA	Vienna Declaration and Programme of Action

1. Introduction

1.1 Background

In recent years, global digitization and the emergence of Artificial Intelligence (AI) have been the focus of an extensive debate, in which policy-makers, private companies, research institutions, and public sector organizations have issued principles and guidelines for legal and ethical regulation.¹ This is especially true in the European Union (EU), which has taken a leading role in AI regulation and proposed policies that try to mitigate the risks associated with AI, while at the same time facilitating a socially beneficial development.² As of 2022, the European Commission, the European Parliament, and the High-Level Expert Group on AI have given several proposals for AI regulation, and the Member States have also introduced their own national strategies.³

In 2021, the OECD estimated that around 60 countries have created over 620 national AI strategies, a number which has rapidly increased, being at over 700 in April 2022.⁴ Also private companies, research institutions, and non-profit organizations have been active in publishing the AI guidelines, and an earlier estimate by Jobin et. al. suggested that almost 80 percent of AI guidelines are created by non-governmental agencies.⁵ This shows that the AI regulation does

¹ Ulnicane, I., 2022. *Artificial intelligence in the European Union: Policy, ethics and regulation*. The Routledge Handbook of European Integrations, pp. 254.

Giuffrida, Fredric Lederer, and Nicolas Vermerys, 2018. *A Legal Perspective on the Trials and Tribulations of AI: How Artificial Intelligence, the Internet of Things, Smart Contracts, and Other Technologies Will Affect the Law*. 68(3) Case Western Reserve Law Review, pp. 747-781.

Jobin, Anna, Marcello Ienca, and Effy Vayena, 2019. *The global landscape of AI ethics guidelines*. Nature Machine Intelligence, 1, pp. 389-399.

Matthew U. Scherer. 2016. *Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies*. Harvard Journal of Law & Technology, 29, pp. 354-400.

Giuffrida, Fredric Lederer, and Nicolas Vermerys, 2018. *A Legal Perspective on the Trials and Tribulations of AI: How Artificial Intelligence, the Internet of Things, Smart Contracts, and Other Technologies Will Affect the Law*. 68(3) Case Western Reserve Law Review, pp. 747-781.

² Schuett, J., 2019. *A Legal Definition of AI*. SSRN Electronic Journal, pp. 1-14.

³ Ibid.

⁴ OECD.AI, 2022. *Powered by EC/OECD, database of national AI policies*. [online] Available at: <<https://oecd.ai/en/dashboards>> [Accessed 11 April 2022].

Galindo, L., K. Perset and F. Sheeka, 2021. *An overview of national AI strategies and policies*. Going Digital Toolkit Note, 14, pp. 5.

⁵ Jobin, Anna, Marcello Ienca, and Effy Vayena, 2019. *The global landscape of AI ethics guidelines*. Nature Machine Intelligence, 1, pp. 391.

not only interest governments but there is also a growing activity from non-governmental agencies to implement their own guidelines.

Despite the rapid increase in AI guidelines and national strategies, the core challenges still exist in defining technical standards, ethical requirements, and best practices.⁶ This includes finding the definition for AI and setting the rules of how the different AI applications should be regulated. Additionally, the areas such as algorithmic transparency, cybersecurity vulnerabilities, and privacy and data protection, require special care.⁷ These issues are especially crucial in terms of protecting vulnerable groups such as ethnic minorities, people with disabilities, and children.⁸ The latter is of particular interest to this study, which focuses on the children's rights perspective.

In the last few years, AI's effects on children have received increasing attention and have been widely discussed by both the technology industry and non-profit organizations. This includes the “AI for Children” project from United Nations Children's Fund (UNICEF), “AI for Safer Children Initiative” from the United Nations Interregional Crime and Justice Research Institute (UNICRI), as well as coverage from business and technology magazines such as Forbes and MIT Technology Review.⁹ The common theme in most of the publications has been

⁶ Ibid., p. 389

⁷ Giuffrida, Fredric Lederer, and Nicolas Vermerys, 2018. *A Legal Perspective on the Trials and Tribulations of AI: How Artificial Intelligence, the Internet of Things, Smart Contracts, and Other Technologies Will Affect the Law*. 68(3) Case Western Reserve Law Review, pp. 747-781.

⁸ Rodrigues, R., 2020. *Legal and human rights issues of AI: Gaps, challenges and vulnerabilities*. Journal of Responsible Technology, 4, 100005.

⁹ UNICEF, n.d. *AI for children*. Office of Global Insight & Policy. [online] Available at: <<https://www.unicef.org/globalinsight/featured-projects/ai-children>> [Accessed 11 April 2022].

UNICRI, n.d. *AI for Safer Children Initiative*. Security through Research, Technology and Innovation. [online] Available at: <<https://unicri.it/topics/AI-online-child-sexual-abuse-CSAM>> [Accessed 11 April 2022].

UNICRI, n.d. *AI for Safer Children Initiative*. Security through Research, Technology and Innovation. [online] Available at: <<https://unicri.it/topics/AI-online-child-sexual-abuse-CSAM>> [Accessed 11 April 2022].

Mills, T., 2021. *Council Post: The Effects Of AI On Child Psychology*. Forbes. [online] Available at: <<https://www.forbes.com/sites/forbestechcouncil/2021/07/27/the-effects-of-ai-on-child-psychology/>> [Accessed 11 April 2022].

K. Hao, 2019. *Kids are surrounded by AI. They should know how it works*. MIT Technology Review. [online] Available at: <<https://www.technologyreview.com/2019/09/13/133056/kids-are-surrounded-by-ai-they-should-know-how-it-works/>> [Accessed 11 April 2022].

highlighting both the opportunities and threats associated with AI and reminding the long-term effects that AI can have on children's development

1.2 Purpose and Research Question

The purpose of this study is to gain a deeper understanding of how children are protected from the misuse of AI in the European Union. To better understand the gaps in the current legislation, and the direction in which the Member States are taking the AI-related questions, the national strategies on AI are examined together with proposed EU regulation for artificial intelligence. This is done with regard to children's rights, and therefore the research question for this thesis is as follows:

In what ways do the proposed EU regulation and current national strategies protect individuals under the age of majority from the misuse of artificial intelligence?

Here children are defined to be those under the age of majority, which is 18 years in all EU Member States except for Scotland (where full legal capacity starts from the age of 16 years).¹⁰ Also, the UN Convention on the Rights of the Child (CRC) defines children as all "human beings below the age of eighteen years", which is the definition used in this study.¹¹ Other definitions, especially in the field of medicine, often describe children as individuals "between birth and puberty", but these definitions are not applied to the research question.¹²

In terms of defining AI, there are multiple options, which can be used in the legal context, but the definition used in this study follows the EU proposal, where "artificial intelligence system", is described in Article 3(1) as "software that can, for a given set of human-defined objectives, generate outputs such as content,

¹⁰ European Union Agency for Fundamental Rights. n.d. *Age of majority*. [online] Available at: <<https://fra.europa.eu/en/publication/2017/mapping-minimum-age-requirements/age-majority>> [Accessed 11 April 2022].

¹¹ Ibid.

¹² Farlex, n.d. *Child*. The Free Dictionary. [online] Available at: <<https://www.thefreedictionary.com/child>> [Accessed 12 April 2022].

Mosby, 2013. *Mosby's Dictionary of Medicine, Nursing & Health Professions*. Elsevier Health Sciences. pp. 345.

predictions, recommendations, or decisions influencing the environments they interact with”.¹³ Since the definition gives a rather loose description of the nature of AI, for better understanding, it is also important to discuss aspects of AI such as algorithms, machine learning, deep learning, data science, and big data. These terms are presented in Figure 1 and are discussed separately in Chapter 2.

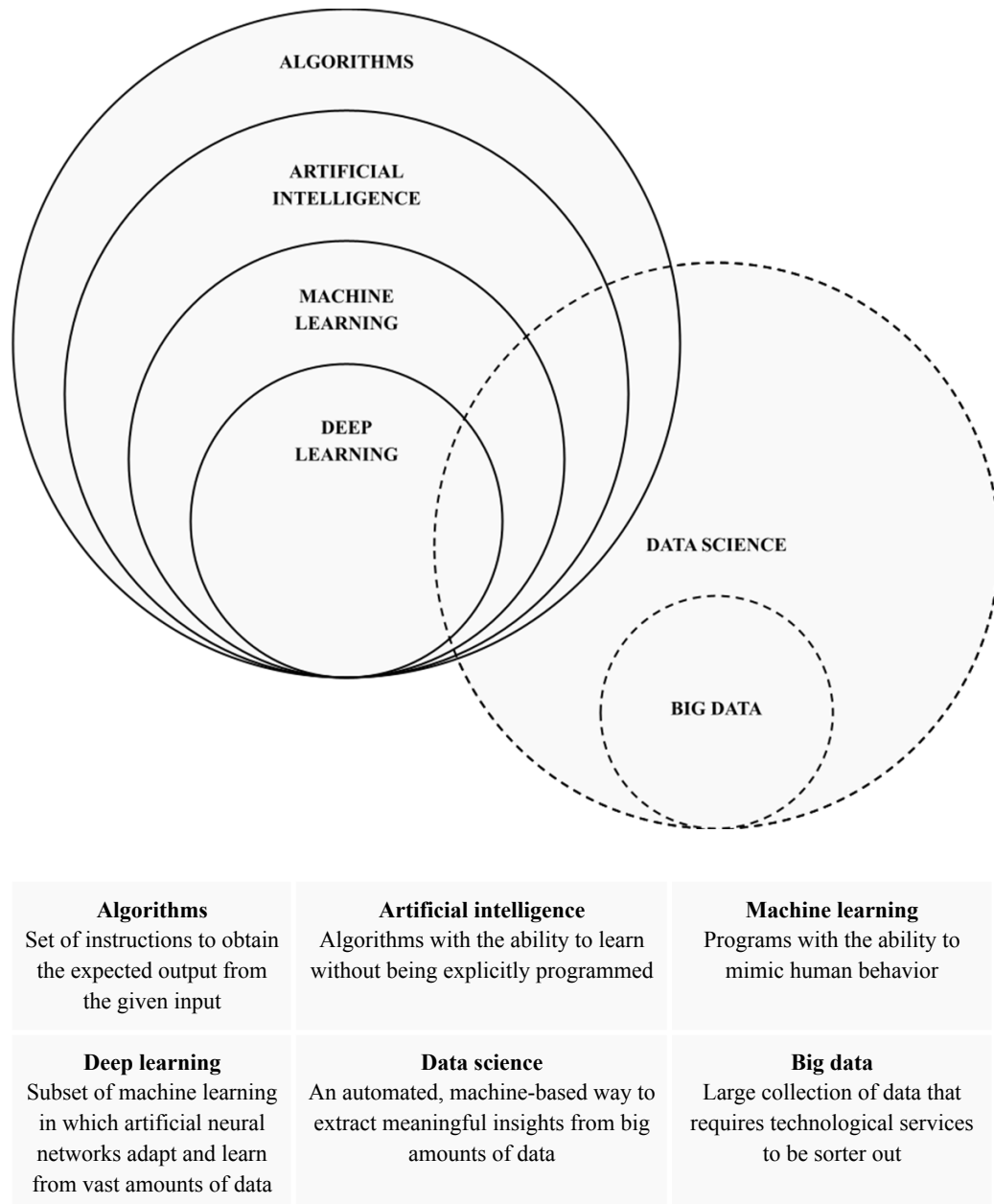


Figure 1: Illustration of how artificial intelligence relates to other ICT concepts.

¹³ Article 3(1) of the EU Commission’s Proposal for a Regulation of the European Parliament and of the Council Laying Down Harmonised Rules on Artificial Intelligence (Artificial Intelligence Act) and Amending Certain Union Legislative Acts. COM(2021) 206 final/01.

1.3 Delimitations

This study examines EU legislation and national strategies, meaning that the territorial scope is limited to the EU and its Member States. Although the proposed EU legislation for AI can eventually cover a larger population, including people living in EEA countries, and become even a global standard, this study focuses on the EU Member States and includes Norway and the United Kingdom for comparison purposes.¹⁴ In the research question, the personal scope is further limited to the population under 18 years, meaning that legally-binding international agreements, such as the Convention on the Rights of the Child, are central for this study as they are ratified by the EU.¹⁵

In addition to the territorial scope and the personal scope, the material scope (what is regulated) and temporal scope (when the regulation applies) must also be considered. In this paper, the material scope is closely related to the definition of AI, and the proposed EU regulation, which describes related terms such as ML approaches and deep learning.¹⁶ The temporal scope is somewhat less defined, as there is currently no definitive resolution on when the EU regulation will enter into force.

As the field of AI is changing fast, it should also be noted that the regulation is expected to adapt to technical development and may be a subject to change. Because AI research has increased a lot in recent years, this study does not reach for definitive conclusions but rather works as a time capsule for AI development and regulation in early 2022. There are also limitations in defining AI in the legal context, and thus, the development of AI regulation is difficult to predict.¹⁷ This leaves a lot of room for subsequent studies that describe AI systems and legislation as they develop.

¹⁴ Future of Life Institute, n.d. *The Artificial Intelligence Act*. [online] Available at: <<https://artificialintelligenceact.eu>> [Accessed 12 April 2022].

¹⁵ The Office of the High Commissioner for Human Rights, n.d. *Ratification Status for CRC*. UN Treaty Body Database. [online] Available at: <https://tbinternet.ohchr.org/_layouts/15/TreatyBodyExternal/Treaty.aspx?Treaty=CRC&Lang=en> [Accessed 12 April 2022].

¹⁶ Commission's Proposal for an Artificial Intelligence Act. Annex I.

¹⁷ Schuett, J., 2021. *Defining the scope of AI regulations*. Legal Priorities Project Working Paper Series, 9, pp. 1-17.

1.4 Methods and Materials

In relation to the research question, this study aims to answer in what ways children are protected from the misuse of artificial intelligence within the EU. In terms of method, this type of research is normally defined as descriptive legal research, which focuses on a specific phenomenon and its various characteristics.¹⁸ Descriptive legal research does not aim to find out the causes of the phenomenon but rather seeks to describe it as it is at present.¹⁹

In this study, the descriptive methods are combined with comparative elements, especially in analyzing different national strategies. Some elements are also taken from doctrinal (library-based) and non-doctrinal (social-legal) research as seen in the text analysis and interviews respectively.²⁰ This mixed-method approach is based on the notion that a combination of different methods of legal research can help to achieve a better understanding of the law.²¹ Especially when studying the proposed regulation and national strategies, the use of different methods helps to address the legal, technical, and economic aspects of the study.

In line with the mixed-method approach, content search was used to extract the data from the Member States' national strategies and the European Commission's proposed AI regulation. The process was done by using the search tool to find the relevant keywords such as “children”, “child”, “education”, and “minor” in the documents. Due to the vast amount of data, secondary sources, such as UNICEF's policy reports, were also used to contribute to the understanding and expand on the primary sources.²² The secondary sources were also used in creating the interview questions, which is typical for descriptive legal research and part of the mixed-method approach.²³ The interview questions were based on the earlier

¹⁸ Chui, W. H. and McConville, M., 2017. *Research Methods for Law Second Edition*. Edinburgh University, pp. 18-303.

¹⁹ Aynalem, F. and Vibhute, K., 2009. *Legal Research Methods*. Justice and Legal System Research Institute, pp. 16.

²⁰ Dahiya, N., 2021. *All about doctrinal and non-doctrinal research*. iPleaders. [online] Available at: <All about doctrinal and non-doctrinal research/> [Accessed 5 May 2022].

²¹ Iyer, K., 2019. *What is Doctrinal and Non-Doctrinal Legal Research?*. [online] Legodesk. Available at: <<https://legodesk.com/legopedia/what-is-doctrinal-and-non-doctrinal-legal-research/>> [Accessed 5 May 2022].

²² UNICEF, n.d. *AI for children*. Office of Global Insight & Policy. [online] Available at: <<https://www.unicef.org/globalinsight/featured-projects/ai-children>> [Accessed 11 April 2022].

²³ Jindal, S., 2021. *All you need to know about legal research*. iPleaders. [online] Available at: <<https://blog.ipleaders.in/all-you-need-know-about-legal-research/>> [Accessed 5 May 2022].

research (Appendix C) and UNICEF’s policy reports, and are presented in Appendix B.²⁴

When analyzing the data from the primary and secondary documents, and from the expert interviews, colour-coding (Appendix E) was used to divide the data into different topics (including, for example, educational aspects, data protection aspects, and healthcare aspects for AI). In the same way, the EU proposal for AI regulation was examined and the parts concerning children’s rights were assessed in connection with other relevant documents, such as the UN Convention on the Rights of the Child (CRC).²⁵ The topics related to children’s rights were also identified from the proposal and analyzed together with the topics introduced in the national strategies. This included comparative elements, which were used in analyzing national strategies, and in some cases national laws, between the Member States.

In terms of documents that were used for analysis, for the European Commission’s proposal, the latest publicly available version was used, which is officially known as “Proposal for a Regulation of the European Parliament and of the Council Laying Down Harmonised Rules on Artificial Intelligence (Artificial Intelligence Act) and Amending Certain Union Legislative Acts”.²⁶ For the national strategies, the chosen Member States were the Czech Republic, Denmark, Netherlands, Finland, France, Germany, Estonia, Italia, Lithuania, Malta, Portugal, and Serbia.²⁷ For comparison purposes also British and Norwegian

²⁴ Ibid.

²⁵ General Assembly resolution 44/25, 1989. *Convention on the Rights of the Child*. [online] Available at: <<https://www.ohchr.org/en/instruments-mechanisms/instruments/international-covenant-civil-and-political-rights>> [Accessed 18 April 2022].

²⁶ Commission’s Proposal for an Artificial Intelligence Act.

²⁷ Czech Republic, Ministry of Industry and Trade of the Czech Republic, 2019. *National Artificial Intelligence Strategy of the Czech Republic*. Czech Republic The Country For The Future, pp. 8-38.

Denmark, The Danish Government, 2019. *National Strategy for Artificial Intelligence*. Ministry of Finance and Ministry of Industry, Business and Financial Affairs, pp. 5-61.

Netherlands, De Rijksoverheid Voor Nederland, 2019. *Strategisch Actieplan voor Artificiële Intelligentie*. Ministerie van Economische Zaken en Klimaat, pp. 7-50.

Finland, Steering group and secretariat of the Artificial Intelligence Programme, 2019. *Leading the way into the era of artificial intelligence: Final report of Finland's Artificial Intelligence Programme 2019*. Publications of the Ministry of Economic Affairs and Employment, pp. 9-122.

France, Cédric Villani, 2018. *For a Meaningful Artificial Intelligence: Towards a French and European Strategy*. Mission assigned by the Prime Minister Édouard Philippe, pp. 4-147.

Germany, The Federal Government, 2018. *Artificial Intelligence Strategy*. AI Made in Germany, pp. 4-43.

strategies were included.²⁸ These strategies were the same, which were included in UNICEF's "AI for Children" project and therefore secondary sources from UNICEF's policy reports were also considered.²⁹ The main reasons why some Member States were left outside of the analysis were that the strategies did not include children (for example, the Swedish "National approach to artificial intelligence") and that the strategies were not available in English (for example, the Spanish and Polish strategies).³⁰

In terms of the expert interviews, the interviews were carried out with six respondents, and the answers were given in a semi-structured format. This means that the respondents were presented with open questions and the answers were written in the free-text fields. The interviews were made by using an online survey tool, Typeform, which is introduced in Appendix A. In addition to the initial answers, also phone calls were performed in certain cases, but this was done mainly for the purposes of clarifying the answers and having additional discussions. These discussions were not included in the data analysis but served the general purpose of better understanding respondents' viewpoints.

Estonia, Government of the Republic of Estonia, 2019. *Estonia's national artificial intelligence strategy 2019-2021*. KRATT Estonian Artificial Intelligence Deployment.

Italy, Agency for Digital Italy and Department for Public Administration, 2018. *Artificial Intelligence at the service of citizens*. AGID, pp. 4-71.

Lithuania, Kurk Lietuvai, 2019. *Lithuanian Artificial Intelligence Strategy: A Vision of the Future*. Ekonomikos ir inovacijų ministerija, pp. 4-21.

Malta, Parliamentary Secretary for Financial Services, Digital Economy and Innovation within the Office of the Prime Minister, 2019. *Malta The Ultimate AI Launchpad: A Strategy and Vision for Artificial Intelligence in Malta 2030*. Malta AI: Towards a National AI Strategy, pp. 4-44.

Portugal INCoDe.2030, 2019. *AI Portugal 2030, Portuguese National Initiative on Digital Skills, An innovation and growth strategy to foster Artificial Intelligence in Portugal in the European context*. pp. 10-37.

Serbia, The Government of the Republic of Serbia, 2019. *Strategy for the Development of Artificial Intelligence in the Republic of Serbia for the period 2020-2025*. pp. 3-54.

²⁸ Norway, Norwegian Ministry of Local Government and Modernisation, 2020. *National Strategy for Artificial Intelligence*. pp. 5-66.

United Kingdom, House of Lords, Select Committee on Artificial Intelligence, 2018. *AI in the UK: ready, willing and able?*. pp. 5-123.

²⁹ UNICEF, n.d. *AI for children*. [online] Available at: <<https://www.unicef.org/globalinsight/featured-projects/ai-children>> [Accessed 18 April 2022].

³⁰ Sweden, Government Offices, 2019. *National approach to artificial intelligence*. Ministry of Enterprise and Innovation, pp. 4-11.

Spain, Gobierno de España Ministerio de Asuntos Económicos y Transformación Digital, 2020. *En Estrategia Nacional de Inteligencia Artificial*. España Digital 2025, pp. 2-74.

Poland, Rzeczpospolita Polska, 2019. *Polityka Rozwoju Sztucznej Inteligencji w Polsce na lata 2019–2027*. Międzyresortowy zespół analityczno-redakcyjny, pp. 6-73.

The reasons for including the expert interviews in this study were based on the need to gain insights into the proposed legislation's applicability and address the restrictions that the research question imposes on the legal sources. For example, as the proposed Artificial Intelligence Act is not finished, and similar legislation does not exist in other jurisdictions, there are limited possibilities to refer to the case law. Instead, the expert interviews provided an opportunity to address questions related to the application of the law, and the needs for future legislation. This comes back to the mixed-method approach and was seen as especially important in analyzing the limitations of the proposed AI regulation and national strategies.

For the interview participants, this study had respondents from five different organizations, which were chosen based on their operations in various AI-related areas. The respondents worked for Future of Life Institute, VTT (Technical Research Centre of Finland), SEB Group, UNICEF, and Credo AI, and were chosen to represent both technological, legal, and economical aspects of AI and children's rights. To ensure the possibility to express their views freely, the respondents were granted anonymity and the answers were not linked to the organizations. The respondents themselves worked in different positions, including an AI policy researcher, a research scientist, a finance growth analyst, a digital expert, a postdoctoral researcher, and a tech policy advisor. This was seen important in answering the research question, as in addition to legal aspects, social and technological issues also needed to be considered.

In conclusion, this study used the proposed AI regulation, national strategies, secondary sources, and expert interviews for data sources. Additionally, previous research and legal sources connected to data science were used for background information. The various materials were collected and analyzed by using a mixed-method approach, as the combination of different methods helped to create a better understanding of the topic.³¹ To provide an illustration of the data sources, Figure 2 presents the different sources that were used for analysis and background information.

³¹ Iyer, K., 2019. *What is Doctrinal and Non-Doctrinal Legal Research?*. [online] Legodesk. Available at: <<https://legodesk.com/legopedia/what-is-doctrinal-and-non-doctrinal-legal-research/>> [Accessed 5 May 2022].



Figure 2: Description of sources used for the research. Data sources for analysis include proposed EU regulation, national strategies, secondary sources and agreements, and information from expert interviews. The sources for background information include previous research and publications (theoretical framework) and legal sources that are connected to data science (for example, GDPR regulation in the EU).

1.5 Outline

In the next chapter, the earlier research and the development of AI are discussed more in detail. Section 2.1 describes the key literature in the field of AI, including both legal, technical, and social publications. Some key concepts include the development of AI, its definition, academic arguments for legal regulation, and threats and opportunities that AI poses in the future. The legal sources include existing agreements and regulations, and earlier cases in data protection, which overlap with different aspects of AI, machine learning, and deep learning.

Following Section 2.1, Section 2.2 analyses the current EU proposal for AI regulation, EU Member States' national strategies, and expert opinions from the conducted interviews. The purpose of the multi-stage analysis is to achieve a holistic view of current AI strategies in the EU and combine this with earlier research and relevant international agreements, which are discussed in Section 2.1. To answer the research question, in what ways EU regulation and national strategies protect individuals under the age of majority from the misuse of artificial intelligence, the special emphasis is put on analyzing those parts of the EU regulation, national strategies, and expert interviews that are explicitly concerning the children's rights.

Following the analysis, Chapter 3 focuses on concluding remarks and summarising the findings from the previous sections. This is done for the purposes of answering the research question, discussing possibilities for future research, and exploring the general direction that AI development and AI regulation are taking. The conclusion also provides a summary of how this study contributes to the understanding of AI in relation to earlier research. Lastly, the final pages of this paper are reserved for the appendix and the bibliography, which cover used source materials.

2. Proposed EU Regulation and National Strategies for AI

2.1 Earlier Research and Legislation

2.1.1 Short History of AI

The first seeds of modern AI research were planted in the arguments of classical philosophers, who described the process of human thinking as mechanical manipulation of symbols.³² These arguments lasted for centuries and culminated in the invention of programmable computers in the 1940s, which in turn led into a serious discussion about the possibility of building an “electronic brain”.³³ Following the second world war, in the 1950s, academic research took the next major steps when Alan Turing published his essay, “Computing Machinery and Intelligence”, and the field of AI research was founded at the campus of Dartmouth College.³⁴ This early research established the academic groundwork for AI studies, and concepts such as the “Turing test” are still relevant in modern AI research.³⁵

After the academic interest in AI in the 1950s, and promising experiments with symbolic artificial intelligence in the 1960s, the AI research was largely halted in

³² Kravets, A., Shcherbakov, M., Parygin, D. and Groumpos, P., 2019. *Creativity in Intelligent Technologies and Data Science: Third Conference, CIT&DS 2019, Volgograd, Russia, September 16–19, 2019, Proceedings, Part I*. Springer Nature, pp. 21.

³³ Martin, C., 1995. *ENIAC: press conference that shook the world*. IEEE Technology and Society Magazine, 14(4), pp. 3-10.

BBC, 2015. *Radio 4: Computing Britain - Electronic Brains: Series 1 Episode 1*. [online] Computer Literacy Project 1980-1989. Available at: <<http://34.242.82.140/efb1ec060f9dc10b94f6e43d8bb39d60>> [Accessed 20 April 2022].

³⁴ Turing, A., 1950. *Computing Machinery and Intelligence*. Mind, LIX(236), pp. 433-460.

Kaplan, A. and Haenlein, M., 2019. *Siri, Siri, in my hand: Who's the fairest in the land? On the interpretations, illustrations, and implications of artificial intelligence*. Business Horizons, 62(1), pp. 15-25.

³⁵ Turing, A., 1950, pp. 442.

Tardif, A., 2020. *What is the Turing Test and Why Does it Matter?*. [online] Unite.AI. Available at: <<https://www.unite.ai/what-is-the-turing-test-and-why-does-it-matter/>> [Accessed 18 April 2022].

BBC, 2015. *Radio 4: Computing Britain - Electronic Brains*. [online] Computer Literacy Project 1980-1989. Available at: <<http://http://34.242.82.140/36e06867225096c7f209e48d9733769b>> [Accessed 20 April 2022].

the 1970s as the U.S. and British Governments restricted the funding.³⁶ This was partly caused by the Lighthill report, which gave a pessimistic prognosis for many core aspects of AI research and started the period that would be later known as an "AI winter".³⁷ There was a partial revival in the 1980s with academic outputs such as Hopfield's, McClelland's, and Rumelhart's work in connectionism, but this was again set back by cut funding at the turn of the 1990s.³⁸ The biggest boom in AI investment has therefore only taken place in the 21st century as the new concepts in deep learning, big data, and artificial general intelligence have emerged.³⁹

2.1.2 Modern Approach and Legal Research

Based on the rapid increase in AI research in the 21st century, the legal debate around AI legislation has also gained attention. This has included topics varying from liability for self-driving cars to the weaponization of artificial intelligence systems.⁴⁰ Some key steps have also been taken in robot rights, such as Saudi Arabia's decision to grant an android a citizenship in 2017.⁴¹ Even more, the ethical issues have been raised in popular culture, including in books, movies, and

³⁶ Russell, S. and Norvig, P., 2009. *Artificial Intelligence A Modern Approach*. 3rd ed. Prentice Hall, pp. 18-21.

³⁷ Ibid.

³⁸ Berkeley, I., 2019. *The Curious Case of Connectionism*. Open Philosophy, 2(1), pp. 193-194.

Lewis, T., 2014. *A Brief History of Artificial Intelligence*. [online] Live Science. Available at: <<https://www.livescience.com/49007-history-of-artificial-intelligence.html>> [Accessed 20 April 2022].

³⁹ Jani, N., 2019. *Changing Business Dynamics Due to AI Revolution in the 21st Century*. [online] Towards Data Science. Available at: <<https://towardsdatascience.com/changing-business-dynamics-due-to-ai-revolution-in-the-21st-century-661dae501098>> [Accessed 18 April 2022].

⁴⁰ Pattinson, JA., Chen, H. & Basu, S., 2020. *Legal issues in automated vehicles: critically considering the potential role of consent and interactive digital interfaces*. Humanit Soc Sci Commun 7, 153.

Bradshaw, T., 2018. *Self-driving cars raise fears over 'weaponisation'*. [online] Financial Times. Available at: <<https://www.ft.com/content/a8dbd4e0-f807-11e7-88f7-5465a6ce1a00>> [Accessed 18 April 2022].

Piccone, T., 2018. *How can international law regulate autonomous weapons?*. [online] Brookings. Available at: <<https://www.brookings.edu/blog/order-from-chaos/2018/04/10/how-can-international-law-regulate-autonomous-weapons/>> [Accessed 18 April 2022].

Defense Innovation Board, 2019. *AI principles: recommendations on the ethical use of artificial intelligence by the Department of Defense*. U.S. Department of Defense, pp. 1-74.

⁴¹ Weller, C., 2017. *Meet the first-ever robot citizen — a humanoid named Sophia that once said it would 'destroy humans'*. [online] Business Insider. Available at: <<https://www.businessinsider.com/meet-the-first-robot-citizen-sophia-animatronic-humanoid-2017-10?r=US&IR=T>> [Accessed 18 April 2022].

video games (e.g. Ex Machina and Detroit: Become Human).⁴² These works have also brought attention to the challenges in legislation if AI systems further develop and gain more human-like qualities.

In the academic and legal discussion, the questions related to AI have been centered around the AI definition and finding an ethical way to govern AI systems.⁴³ Efforts have also been made to align the AI regulation between different jurisdictions, most notably between the European Union and the United States.⁴⁴ AI regulation has also been considered a national priority in China, where the national strategy has set explicit goals to develop a regulatory framework for AI.⁴⁵ The dynamic in AI regulation between the European Union, United States, and China has already been framed as a “race to regulate AI”, and due to new outputs in the form of national strategies and the EU’s proposed AI regulation, this race is expected to accelerate in the near future.⁴⁶

From the legal and regulatory perspective, the main challenges for AI have remained the definition and the material scope for regulation (what is regulated).⁴⁷ The definition of AI has been discussed in comprehensive works such as “Artificial Intelligence: A Modern Approach” (Stuart Russell and Peter Norvig) and “Artificial Intelligence: A New Synthesis” (Nils Nilsson), but rather than finding one ultimate definition, the researchers have ended up with different distinct definitions, as illustrated by Legg’s and Hutter’s paper “A Collection of Definitions of Intelligence”.⁴⁸

⁴² Bektic, E., Bruns, D., Gabriel, S., Kelle, F., Pölsterl, G. and Schniz, F., 2020. *Mixed Reality and Games: Theoretical and Practical Approaches in Game Studies and Education*. [transcript], pp. 176.

⁴³ Robles Carrillo, M., 2020. Artificial intelligence: From ethics to law. *Telecommunications Policy*, 44(6), 101937.

Schuett, J., 2019. *A Legal Definition of AI*. SSRN Electronic Journal, pp. 1-14.

⁴⁴ Engler, A., 2022. *The EU and U.S. are starting to align on AI regulation*. [online] Brookings. Available at:

<<https://www.brookings.edu/blog/techtank/2022/02/01/the-eu-and-u-s-are-starting-to-align-on-ai-regulation/>> [Accessed 18 April 2022].

⁴⁵ Schuett, J., 2019, pp. 1.

⁴⁶ Ibid.

⁴⁷ Ibid. pp. 1-14.

⁴⁸ Russell, S. and Norvig, P., 2009. *Artificial Intelligence A Modern Approach*. 3rd ed. Prentice Hall, pp. 1-1062.

Nilsson, N., 1998. *Artificial Intelligence: A New Synthesis*. China Machine Press, pp. 1-450.

Legg, S. and Hutter, N., 2007. *A Collection of Definitions of Intelligence*. Technical Report, arXiv, pp. 2-9.

One of the major challenges in defining AI includes the various applications for AI, and different AI branches and subcategories, such as machine learning (ML) and deep learning (DL). In the European Union, there have been attempts to address these problems, by creating different AI regulatory categories, namely "minimal risk", "limited risk", "high risk", and "unacceptable risk" (Figure 3).⁴⁹ Each of the categories contains different AI applications and has its own regulation to combat the risks. Although these categories do not cover all the possible uses for AI and are yet to be tested in practice, they comprise the central part of the EU's proposed AI regulation and provide one of the first outlooks on what the risk assessment for AI could look like.⁵⁰

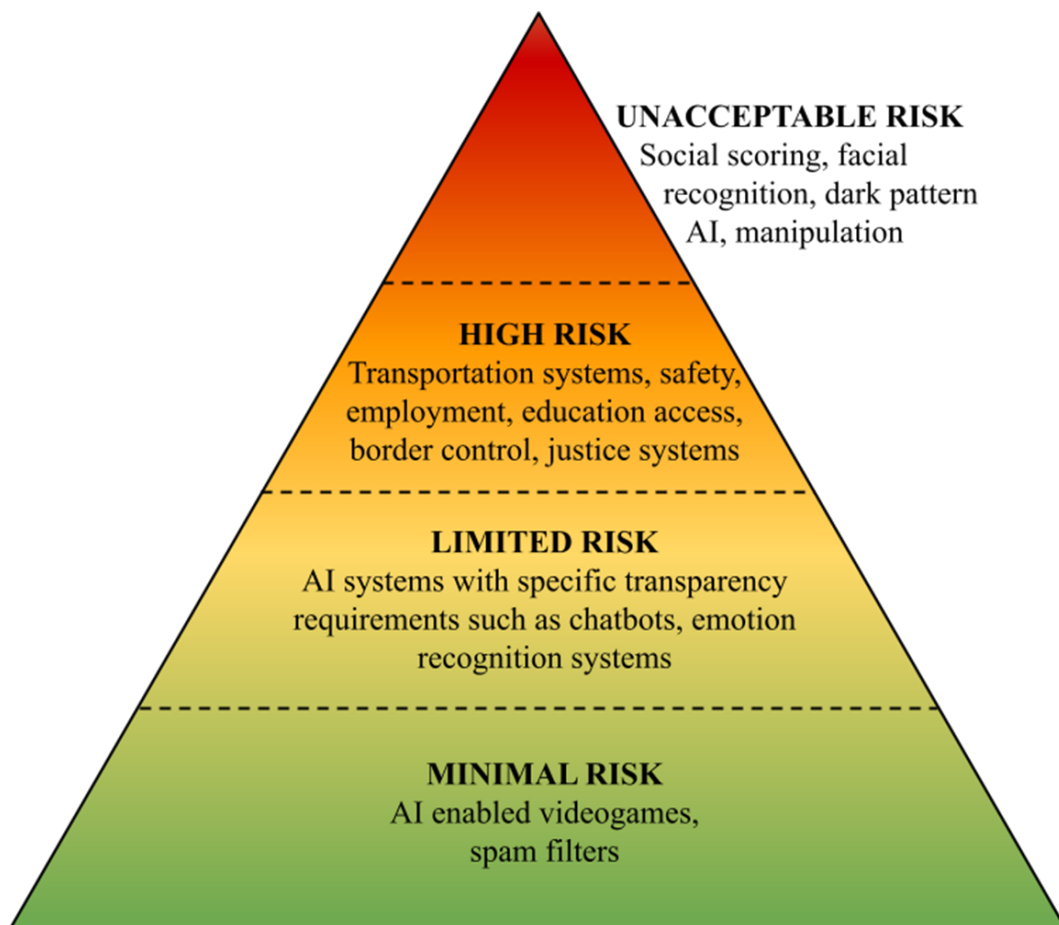


Figure 3: Different risk categories for AI

⁴⁹ European Commission, 2022. *Regulatory framework on AI*. [online] Shaping Europe's digital future. Available at: <<https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-ai>> [Accessed 18 April 2022].

⁵⁰ Commission's Proposal for an Artificial Intelligence Act.

Together with the proposed AI regulation, the EU has also been active in data protection regulation, which in many places is closely related to AI. Notable cases include the Schrems I and Schrems II judgments, where the CJEU invalidated the Safe Harbor agreement and Privacy Shield framework between the EU and the U.S. and restricted the transatlantic data transfers.⁵¹ Earlier “Google Spain and Google” judgments also recognized the “right to be forgotten” principle, which grants data subjects a right to get certain personal information removed from search results.⁵² These decisions, together with the GDPR regulation as a whole, currently comprise a framework for many AI operations and are likely to be used in the future closely together with the EU’s proposed AI regulation.

2.1.3 Children’s Rights

In terms of children’s rights, the regulation on AI is still taking place, but the earlier research has already pointed out several factors of how children are impacted by AI. For example, in the 2018 report, the Human Rights Center, UC Berkeley School of Law, and UNICEF examined the various ways that AI-based technologies can positively and negatively impact children’s human rights. These included various aspects of education, the usage of AI at home, and the usage of smart toys, among other things.⁵³ The report was followed by a more comprehensive “AI for children” project, where UNICEF established an AI advisory group, consisting of AI experts, economists, and media experts from different countries.⁵⁴

In the international human rights law, children’s rights are protected by the “International Covenant on Civil and Political Rights” (ICCPR, 1966), the “Convention on the Rights of the Child” (CRC, 1989), and the “Vienna Declaration and Programme of Action” (VDPA, 1993).⁵⁵ Both ICCPR and CRC

⁵¹ CJEU Judgement, 6 October 2015, in case C-362/14. *Schrems*. ECLI:EU:C:2015:650. Para. 106. CJEU Judgement, 16 July 2020, in case C-311/18. *Facebook Ireland and Schrems*. ECLI:EU:C:2020:559. Para. 201.

⁵² CJEU Judgement, 13 May 2014, in case C-131/12. *Google Spain and Google*. ECLI:EU:C:2014:317. Para. 89-99.

⁵³ UNICEF Innovation, 2018. *Executive Summary Artificial Intelligence and Children's Rights*. UNICEF, pp. 2-14. Available at: <<https://www.unicef.org/innovation/media/10726/file/Executive%20Summary:%20Memorandum%20on%20Artificial%20Intelligence%20and%20Child%20Rights.pdf>> [Accessed 18 April 2022].

⁵⁴ UNICEF, n.d. *AI for children*. [online] Available at: <<https://www.unicef.org/globalinsight/featured-projects/ai-children>> [Accessed 18 April 2022].

⁵⁵ General Assembly resolution 2200A (XXI), 1966. *International Covenant on Civil and Political Rights*. [online] Available at:

are some of the most widely ratified human rights treaties in the world, having 173 and 196 parties, respectively, and provide a universal legal standard for children's rights today.⁵⁶ However, as the treaties were written in the 1960s and 1980s, they do not cover explicitly issues related to AI, but rather provide a general framework for children's safety and welfare, and therefore leave room for interpretations in AI-related questions. Consequently, the need for the new AI regulation both on the EU and national levels has increased.

2.2 Views on the Proposed Regulation and National Strategies

2.2.1 Introduction

To answer the research question, in what ways do EU regulation and national strategies protect individuals under the age of majority from the misuse of artificial intelligence, this section looks at the current situation at the EU and national levels. The analysis starts with the proposed EU regulation and is followed by a closer look at national strategies in the different Member States. Lastly, the expert interviews, which were conducted for this study, are analyzed and the answers are used to expand the understanding of the current and future challenges that the AI regulation can meet.

2.2.2 Proposed EU Regulation

The EU's proposed AI regulation was published in 2021 and is the Commission's first legal attempt to govern AI.⁵⁷ According to UNICEF's policy specialist, Steve Vosloo, the first draft of the regulation did not mention children, but due to the inputs that UNICEF Brussels submitted to the EC, the current version mentions

<<https://www.ohchr.org/en/instruments-mechanisms/instruments/international-covenant-civil-and-political-rights>> [Accessed 18 April 2022].

General Assembly resolution 44/25, 1989. *Convention on the Rights of the Child*. [online] Available at:

<<https://www.ohchr.org/en/instruments-mechanisms/instruments/international-covenant-civil-and-political-rights>> [Accessed 18 April 2022].

The World Conference on Human Rights in Vienna, 1993. *Vienna Declaration and Programme of Action*. [online] Available at:

<<https://www.ohchr.org/en/instruments-mechanisms/instruments/vienna-declaration-and-programme-action>> [Accessed 18 April 2022].

⁵⁶ The Office of the High Commissioner for Human Rights, 2022. *Status of Ratification*. [online] Indicators OHCHR. Available at: <<https://indicators.ohchr.org>> [Accessed 18 April 2022].

⁵⁷ Commission's Proposal for an Artificial Intelligence Act.

children ten times.⁵⁸ These mentions can be divided into four categories, which include protecting children in accordance with the CRC (Article 24), protecting children from the AI systems that can distort human behaviour, protecting children from high-risk AI systems, and using AI systems to protect the victims of crime (e.g., finding missing children).⁵⁹ Additionally, the proposal also includes themes that are closely related but not exclusive to children, such as education and data protection, which are examined more closely in Section 2.2.3 together with the national strategies.

To start with the first aspect of the EU's proposal (the protection of children in accordance with the CRC), the proposed regulation does not include new guidelines but mentions Article 24 of the EU Charter, which considers children's right to protection and care for their well-being.⁶⁰ Article 24(1) also protects children's rights to express their views freely and Article 24(2) requires that in all actions related to children, their best interests must be a primary consideration.⁶¹ Furthermore, Article 24(3) recalls children's rights to maintain a regular relationship with their parents, and the UNCRC General Comment No. 25 elaborates on this and other aspects in terms of the digital environment.⁶² The wording in the proposal goes as follows (underlines added):

*"... it is important to highlight that children have specific rights as enshrined in Article 24 of the EU Charter and in the United Nations Convention on the Rights of the Child (further elaborated in the UNCRC General Comment No. 25 as regards the digital environment), both of which require consideration of the children's vulnerabilities and provision of such protection and care as necessary for their well-being."*⁶³

⁵⁸ Vosloo, S., 2021. *Children now feature in the Proposal for a Regulation on a European approach for AI*. [online] Available at: <<https://stevevosloo.com/2021/04/26/children-now-feature-in-the-proposal-for-a-regulation-on-a-european-approach-for-ai/>> [Accessed 18 April 2022].

⁵⁹ Commission's Proposal for an Artificial Intelligence Act.

⁶⁰ Article 24. Convention on the Rights of the Child.

⁶¹ Ibid.

⁶² General comment No. 25 (2021) on children's rights in relation to the digital environment. 02 March 2021. CRC/C/GC/25.

⁶³ Recital 28. Commission's Proposal for an Artificial Intelligence Act.

*“Furthermore, as applicable in certain domains, the proposal will positively affect the rights of a number of special groups, such as ... the rights of the child (Article 24)”*⁶⁴

As presented in the above quotations, the proposal refers to the CRC and General Comment No. 25, which covers multiple aspects of children’s rights. The General Comment is especially important in implementing the CRC with the digital environment as the CRC itself was introduced in 1989.⁶⁵ Examples of this include comments on non-discrimination in terms of digital illiteracy, privacy, and online safety, as well as taking children’s age into account when engaging with them in digital services.⁶⁶

In the second aspect of the proposal, in connection with Article 24(3), the proposal sets rules for using AI in order to help the victims of crime, while at the same time preventing the misuse of AI in criminal investigations. One example of helping the victims of crime includes using AI to find missing children, which is mentioned twice in the proposal. To prevent the misuse, the proposal demands that the use of AI must serve the purpose of achieving “a substantial public interest”, where the importance “overweighs the risks”, and the use is “strictly necessary”. It has to also be limited to “the targeted search for specific potential victims”, meaning that searching for larger groups of people is not allowed in the proposed regulation. The wording for the proposal goes as follows (underlines added):

*“The use of those systems [AI systems] for the purpose of law enforcement should therefore be prohibited, except in three exhaustively listed and narrowly defined situations, where the use is strictly necessary to achieve a substantial public interest, the importance of which outweighs the risks. Those situations involve the search for potential victims of crime, including missing children: ...”*⁶⁷

⁶⁴ Explanatory Memorandum, 3.5. Fundamental rights. Commission’s Proposal for an Artificial Intelligence Act.

⁶⁵ General comment No. 25 (2021) on children’s rights in relation to the digital environment. 02 March 2021. CRC/C/GC/25.

General Assembly resolution 44/25, 1989. *Convention on the Rights of the Child*. [online] Available at: <<https://www.ohchr.org/en/instruments-mechanisms/instruments/international-covenant-civil-and-political-rights>> [Accessed 18 April 2022].

⁶⁶ General comment No. 25 (2021).

⁶⁷ Recital 19. Commission’s Proposal for an Artificial Intelligence Act.

*“The following artificial intelligence practices shall be prohibited ... the use of ‘real-time’ remote biometric identification systems in publicly accessible spaces for the purpose of law enforcement, unless and in as far as such use is strictly necessary for one of the following objectives: (i) the targeted search for specific potential victims of crime, including missing children ...”*⁶⁸

The third aspect of the proposal considers the high-risk AI applications (Figure 3, pp. 21) and requires that it must be evaluated whether the AI system is likely to impact or be accessed by children. This calls out for risk management systems, testing procedures, risk evaluations, and documentation, which would prevent foreseeable misuse. In the proposal, the high-risk AI systems and children are mentioned as follows (underlines added):

*“When implementing the risk management system described in paragraphs 1 to 7, specific consideration shall be given to whether the high-risk AI system is likely to be accessed by or have an impact on children.”*⁶⁹

Lastly, the fourth aspect of the proposal prohibits the misuse of AI in order to manipulate, exploit, or take advantage of social control practices. This ties together with the CRC, where the parties are committed to protecting children from the information that may be injurious to their well-being, while simultaneously guaranteeing children’s right to freely receive, seek and impart information.⁷⁰ This can also be tied together with privacy and data protection, as the AI regulation is also connected to the GDPR. Although, the proposal does not explicitly mention the GDPR, especially Article 8(1) GDPR is closely related to children’s data protection.⁷¹ In the proposal itself the wording goes as follows (underlines added):

“... technology can also be misused and provide novel and powerful tools for manipulative, exploitative and social control practices. Such practices are particularly harmful and should be prohibited because they contradict Union values of respect for human dignity, freedom, equality, democracy and the rule of

⁶⁸ Article 5(1). Commission’s Proposal for an Artificial Intelligence Act.

⁶⁹ Article 9(8). Commission’s Proposal for an Artificial Intelligence Act.

⁷⁰ Article 17. Convention on the Rights of the Child.

Article 13(1). Convention on the Rights of the Child.

⁷¹ Article 8(1). GDPR.

law and Union fundamental rights, including the right to non-discrimination, data protection and privacy and the rights of the child.”⁷²

*“The prohibitions covers practices that have a significant potential to manipulate persons through subliminal techniques beyond their consciousness or exploit vulnerabilities of specific vulnerable groups such as children or persons with disabilities in order to materially distort their behaviour in a manner that is likely to cause them or another person psychological or physical harm.”*⁷³

In conclusion from the four aspects, the proposed AI regulation lays emphasis on children’s protection from manipulative and social control practices, makes references to data protection, takes into account high-risk AI systems, and allows the use of AI in limited high-risk settings like finding the missing children. The proposal also makes references to earlier conventions such as the CRC and the UNCRC General Comment No. 25, the latter of which is used to provide guidelines on how the CRC can be applied in the digital environment. As the proposal gives limited practical inputs for the application, the national strategies have an important role in improving the children’s protection on the national level. Thus, in the following section, the national strategies are explored in more detail.

2.2.3 National Strategies

Within the EU, most of the Member States have introduced national strategies for AI, but only a limited amount of strategies mention children.⁷⁴ Many strategies, such as the Swedish “National approach to artificial intelligence”, ignore children completely, while other strategies, including Spanish and Polish strategies, are only available in the original language, and therefore left outside of this study.⁷⁵ The remaining twelve national strategies, which are examined in this paper,

⁷² Recital 15. Commission’s Proposal for an Artificial Intelligence Act.

⁷³ 5.2.2. Prohibited Artificial Intelligence Practices (Title II). Commission’s Proposal for an Artificial Intelligence Act.

⁷⁴ Penagos, M., Kassir, S., and Vosloo, S. *National AI strategies and children: Reviewing the landscape and identifying windows of opportunity*. UNICEF, Office of Global Insight and Policy, pp. 10-12.

⁷⁵ Sweden, Government Offices, 2019. *National approach to artificial intelligence*. Ministry of Enterprise and Innovation, pp. 4-11.

Spain, Gobierno de España Ministerio de Asuntos Económicos y Transformación Digital, 2020. *En Estrategia Nacional de Inteligencia Artificial*. España Digital 2025, pp. 2-74.

Poland, Rzeczpospolita Polska, 2019. *Polityka Rozwoju Sztucznej Inteligencji w Polsce na lata 2019–2027*. Międzyresortowy zespół analityczno-redakcyjny, pp. 6-73.

include Czech, Danish, Dutch, Finnish, French, German, Estonian, Italian, Lithuanian, Maltase, Portuguese, and Serbian strategies.⁷⁶ For comparison purposes British and Norwegian strategies are also looked into.⁷⁷ These are the same strategies that have been studied in UNICEF's "AI for Children" project and therefore secondary sources from UNICEF are also used for the analysis.⁷⁸

Based on the earlier work from UNICEF, four distinct aspects can be extracted from the national strategies, consisting of children's AI competencies, quality of life and services for children, cultivating children as a future workforce, and protecting children's personal data and privacy.⁷⁹ These aspects partly overlap with the topics introduced in the EU proposal, but also provide new insights, especially in the form of practical action plans that aim to improve children's lives on the national level. The scope in which the different aspects are represented in the national strategies is illustrated in Figure 4, which shows each of the four aspects and the extent to which they are implemented in the Member States. The figure is based on information from national strategies and secondary sources and was created by using the MapChart tool.⁸⁰

⁷⁶ Czech national strategy for AI.
Danish national strategy for AI.
Finnish national strategy for AI.
French national strategy for AI.
German national strategy for AI.
Estonian national strategy for AI.
Italian national strategy for AI.
Lithuanian national strategy for AI.
Maltese national strategy for AI.
Portuguese national strategy for AI.
Serbian national strategy for AI.

⁷⁷ Norwegian national strategy for AI.
British national strategy for AI.

⁷⁸ UNICEF, n.d. *AI for children*. [online] Available at:
<<https://www.unicef.org/globalinsight/featured-projects/ai-children>> [Accessed 18 April 2022].

⁷⁹ Penagos, M., Kassir, S., and Vosloo, S. *National AI strategies and children: Reviewing the landscape and identifying windows of opportunity*. UNICEF, Office of Global Insight and Policy, pp. 9.

⁸⁰ National strategies listed in the Bibliography.
Secondary sources including UNICEF's policy documents, "AI for Children", and Appendix C.
MapChart, 2022. *Europe - Detailed map*. [online]. Available at:
<<https://www.mapchart.net/europe-detailed.html>> [Accessed 1 May 2022].

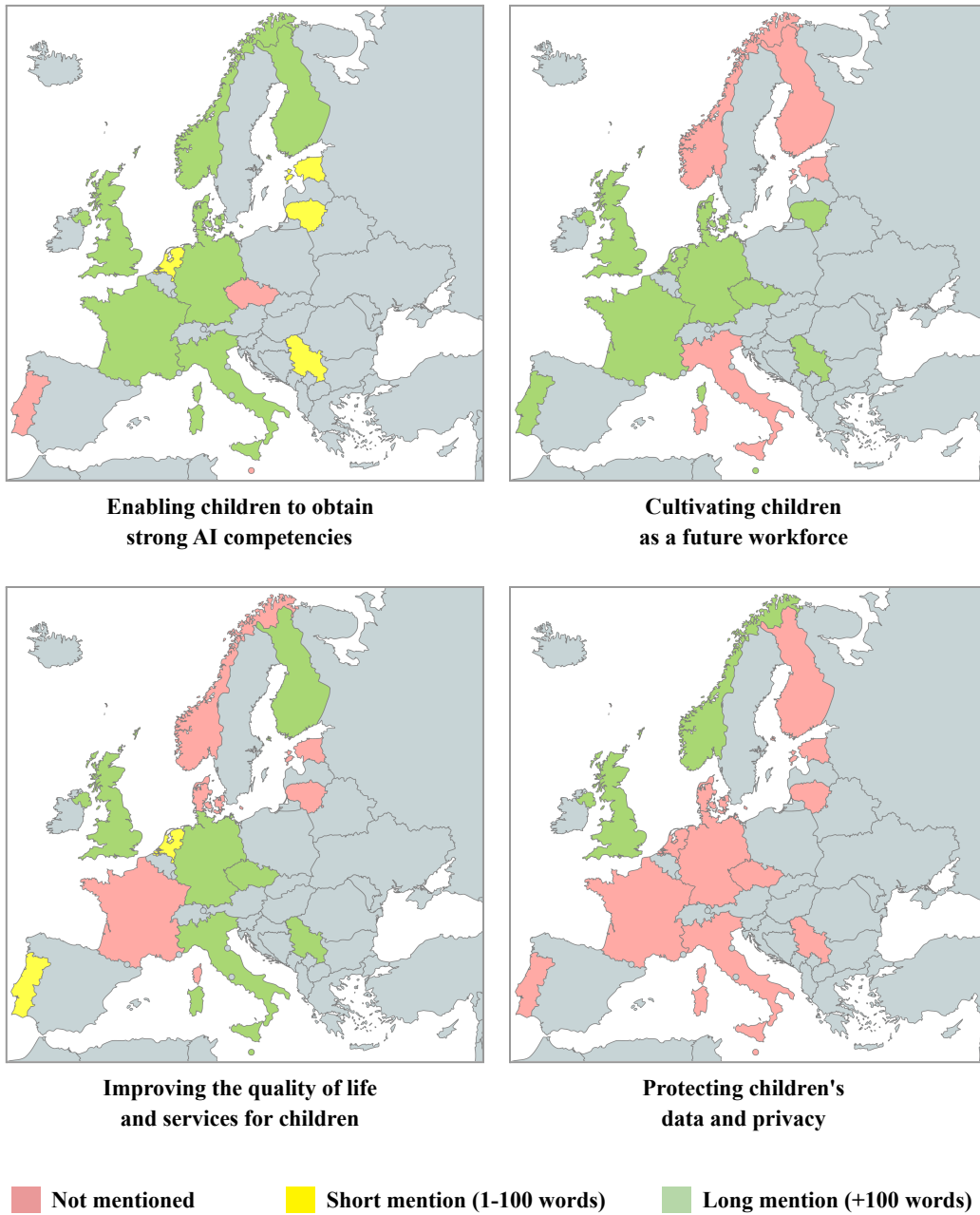


Figure 4: Various aspects of how children are taken into account in the national AI strategies. The full-size versions are available in Appendix D.

To start with the first aspect (enabling children to obtain strong AI competencies), most of the national strategies consider children's AI competencies to some level, and only the Czech and Portuguese strategies ignore the topic completely.⁸¹ In the Eastern European countries (Estonia, Lithuania, and Serbia), the focus on AI competencies is relatively narrow, but in contrast, Danish, German, and Italian strategies have a strong emphasis on AI competencies and education.⁸² This is seen, for example, in the Danish educational trial program, which aims to enhance students' understanding of technology by introducing compulsory classes at primary and lower-secondary schools.⁸³

The benefits of obtaining strong AI competencies in primary and lower-secondary education can be seen both on the individual level and the societal level, especially when it comes to addressing problems such as digital illiteracy and the gender gap in STEM skills.⁸⁴ These aspects are also connected with the CRC, as according to Article 28(1) and Article 28(3), every child has a right to education and governments are responsible for facilitating access to scientific and technical knowledge.⁸⁵ This means that governments are not only responsible for providing children with an education, but children must have access to relevant technical knowledge, which can benefit them in their lives.

The benefits of education are also linked with the next aspect of the national strategies, which is cultivating children as a future workforce. This means that the Member States should provide children with relevant AI skills that can be later applied in the work-life. Within the Member States, this aspect is relatively well

⁸¹ Czech national strategy for AI.

Portuguese national strategy for AI.

⁸² Estonian national strategy for AI.

Lithuanian national strategy for AI.

Serbian national strategy for AI.

Danish national strategy for AI.

German national strategy for AI.

Italian national strategy for AI.

⁸³ Danish national strategy for AI, pp. 19 and 45.

⁸⁴ Nascimbeni, F. and Vosloo, S., 2019. *Digital literacy for children: exploring definitions and frameworks*. UNICEF Office of Global Insight and Policy, pp. 5-38.

UNICEF, 2021. *Regional Mapping: STEM and Digital Skills for Girls*. UNICEF Europe and Central Asia Regional Office (ECARO), pp. 2-26.

UNICEF, 2021. *Gender Equality Strategy in Europe and Central Asia 2021-2025*. UNICEF Europe and Central Asia Regional Office (ECARO), pp. 2-33.

⁸⁵ Article 28. Convention on the Rights of the Child.

taken into account and is present in all national strategies except in the Estonian, Finnish, and Italian strategies.⁸⁶ It can also be seen especially important as cultivating children as the future workforce addresses other problems such as the gender gap and racial inequalities.⁸⁷ A big reason why women and people of colour are often underrepresented (and underpaid) in the technology industry comes from the inequalities in education, and due to the degree gap women and people of colour are also underrepresented in the technology companies, especially in the management positions.⁸⁸ Thus, the importance of introducing diverse groups of people to computer science at an early age has a significant impact on diversifying the workplaces and making technology companies more inclusive.

In addition to enabling children to have strong AI competencies and cultivating them as a future workforce, the third aspect in the national strategies considers improving the quality of life and services for children. This aspect is mentioned in most of the national strategies, and the Danish, Estonian, French, and Lithuanian strategies are the only ones within the EU to ignore it.⁸⁹ In the strategies, which do include quality of life and services for children, the contents vary from the Italian

⁸⁶ Estonian national strategy for AI.

Finnish national strategy for AI.

Italian national strategy for AI.

⁸⁷ Madgavkar, A., Manyika, J., Krishnan, M., Ellingrud, K., Yee, L., Woetzel, J., Chui, M., Hunt, V., and Balakrishnan, S., 2019. *The future of women at work: Transitions in the age of automation*. [online] McKinsey Global Institute. Available at: <<https://www.mckinsey.com/featured-insights/gender-equality/the-future-of-women-at-work-transitions-in-the-age-of-automation>> [Accessed 17 May 2022].

Autor, D. and Wasserman, M., 2013. *Wayward Sons: The Emerging Gender Gap in Labor Markets and Education*. Third Way, pp. 7-53.

OECD, 2020. *Advancing Gender Balance in the Workforce: A Collective Responsibility*. Gender Balance Network, Forum on Tax Administration, OECD, Paris, pp. 7-49.

Greenberg, E., Rosenboom, V., and Adams, G., 2019. *Preparing the Future Workforce: Early Care and Education Participation among Children of Immigrants*. Urban Institute, pp. 2-32.

⁸⁸ White, S., 2021. *Women in tech statistics: The hard truths of an uphill battle*. [online] CIO. Available at:

<<https://www.cio.com/article/201905/women-in-tech-statistics-the-hard-truths-of-an-uphill-battle.html>> [Accessed 5 May 2022].

Grant, N., 2021. *Google Is Hiring More Black People But Struggling to Retain Them*. [online] Bloomberg. Available at:

<<https://www.bloomberg.com/news/articles/2021-07-01/google-is-hiring-more-black-people-but-struggling-to-retain-them>> [Accessed 5 May 2022].

⁸⁹ Danish national strategy for AI.

Estonian national strategy for AI.

French national strategy for AI.

Lithuanian national strategy for AI.

plan to use intelligent technologies for public administration to the Finnish initiative to improve children's healthcare.⁹⁰ A practical example of AI in children's healthcare can be seen at Helsinki University Central Hospital where researchers have developed new tools for predicting blood glucose levels in order to help diabetic children.⁹¹ This also demonstrates how national strategies can introduce practical solutions that support the principles from the legislation. In this case, the basis for providing help to diabetic children can be found from the EU Charter of Fundamental Rights (Article 2(1), "the right to live"), the Finnish national law (Article 3, 17.8.1992/785, "rights of patients"), and the CRC Article 6(2), which requires that the states shall ensure to "the maximum extent possible the survival and development of the child".⁹²

For the fourth and final aspect in the national strategies, children's data and privacy is considered. Notably, none of the Member States mention children's data and privacy in their national strategies, and only the Norwegian and British national strategies address the issue.⁹³ The reason for this can be arguably seen in the GDPR, which has connected data and privacy issues strongly with the EU legislation, leaving fewer incentives for national regulation. Still, the lack of children's protection on the national level can be seen as an oversight that should be addressed. For example, in the British strategy, children's data protection is approached from the educational perspective, which aims to improve children's understanding of the online environment and their personal data.⁹⁴ Arguably, a similar approach could be implemented in other national strategies, and it could supplement the GDPR. In this case, it's important to highlight that children can't be responsible for their own data protection, and the educational programs should be used only to reduce the misuse of children's data (protecting children from the

⁹⁰ Italian national strategy for AI.

Finnish national strategy for AI.

⁹¹ Ibid. pp. 58

⁹² Article 3. Finnish National Law. *Act on the Status and Rights of Patients*. 17.8.1992/785.

European Union. *Charter of Fundamental Rights of the European Union*. 26 October 2012, 2012/C 326/02. Available at: <<https://www.refworld.org/docid/3ae6b3b70.html>> [accessed 8 May 2022]

Article 6. Convention on the Rights of the Child.

⁹³ AI for Children.

Norwegian national strategy for AI.

British national strategy for AI.

⁹⁴ Ibid.

practices that are illegal).

In conclusion from the four aspects, most of the national strategies within the EU consider children's rights to obtain AI competencies and cultivating children as a future workforce. AI is also considered to improve children's quality of life and services, especially in the forms of healthcare and education. In contrast, the data protection and privacy aspects receive little attention and the national strategies largely ignore the subject. An example of better implementation can be found in the British national strategy, which demonstrates the educational programs' potential to prepare children for threats that concern their personal data.⁹⁵ Although the GDPR provides a strong basis for children's data protection, the added benefits from national strategies could come from children's improved skills in understanding their data.

To answer the research question, there are four major ways in which national strategies can protect children from the misuse of AI. Firstly, most of the strategies strive to develop children's AI competencies to help them better understand AI systems and thus decrease the risk of AI misuse. Secondly, cultivating children as the future workforce is included in most of the national strategies, and is especially important in terms of equality and diversity in the fields of technology. Thirdly, improving the quality of life and services with AI is also widely included and gives an example of how national strategies can be used to create equal opportunities and avoid positive discrimination. Lastly, protecting children's data and privacy is of high importance but is currently left outside of many national strategies and could be better implemented on the national level. Although the GDPR provides strong legal protection for data and privacy, the added protection for improving children's knowledge of data and privacy on the national level could decrease the risks for misuse of their personal data.

2.2.4 Expert Interviews

In addition to the EU's proposal for the Artificial Intelligence Act, and national strategies, a number of expert interviews were conducted for this study. The interviews were carried out by using an online survey tool Typeform and additional discussions were conducted via email and phone calls. As the contents

⁹⁵ Ibid.

of the EU's proposal and national strategies were covered in the previous sections, this section aims to expand the understanding by discussing the aspects that could be included in AI regulation in the future. Although the research question considers in what ways the EU's proposal and national strategies currently protect children from the misuse of AI, it is important to also understand in which direction the legislation could go in the future.

For this paper, six expert interviews were carried out, and included an AI policy researcher, a research scientist, a finance growth analyst, a digital expert, a postdoctoral researcher, and a tech policy advisor. The respondents worked for Future of Life Institute, VTT (Technical Research Centre of Finland), SEB Group, UNICEF, and Credo AI, and were chosen to represent both technological, juridical, and economical aspects of AI and children's rights. Each of the respondents was granted anonymity and for all of the survey questions, a free-text field was included to provide the respondents with the possibility to give in-depth answers. The survey questions and examples of the answering format can be found in Appendix A and B.

In the first question (Table 1, Question 1), the experts provided a deeper insight into the current situation and addressed the opportunities and threats that AI has for children's rights. In line with the previous sections, the largest threats were considered to be privacy issues and data rights, including inequality in privacy issues, children's exposure to inappropriate materials, and facial recognition. In contrast, the main opportunities included better possibilities for education, especially through AI applications that would enable personalized learning and assist children with disabilities. This is in line with the national strategies' focus on educational aspects, but the experts recommended a more personalized approach where the needs of individual children would be better taken into account. To prevent discrimination, it would be also important to ensure that educational opportunities are equally available to all children.

In the second question (Table 1, Question 2) concerning the children's current protection from AI, the expert answers indicated that the GRPR and the upcoming risk-based assessment models (Figure 3, pp. 21) provide a starting point, but more needs to be done to prevent companies from using the loopholes in the regulation

(for example, in terms of the user age verification). Companies should also be more strongly responsible for the harm that they cause to children and practical actions, such as algorithmic explainability mandates, would be needed to increase AI transparency. An example of this can be found in the Canadian algorithmic accountability directive, which, although partly criticized, provides a concrete regulation for automated decision-making.⁹⁶ Similar legislative actions are also expected from the EU, as non-binding guidelines often have a limited impact on reducing the risks. Therefore, in most of the expert answers, the need for the national and EU legislation to protect children was seen as a priority over other forms of regulation (Table 1, Question 4).

The aspects that have currently been least considered at the EU level include the fairness and non-discrimination of children, protecting children from manipulation and exploitation, and enabling children to obtain strong AI competencies (Table 1, Question 3). Also, the aspects, such as personal data and privacy, which are considered in the GDPR, often lack adequate attention to children's rights, leading one of the respondents to comment that the EU "has not succeeded well in any of the presented areas" (Table 1, Question 3). This illustrates the general challenges of the proposed AI regulation not considering children's rights holistically and leaving key areas unaddressed.

To improve the children's protection from the misuse of AI, the respondents expected to see tighter restrictions for algorithms, as well as concrete actions to protect children from harmful content (Table 1, Question 5). This includes protecting children from both mature content (for example, sexual themes, strong language, and excessive violence), and malicious practices such as hooking children to games, using microtransactions, and targeting online ads toward children. The tighter control and screening are especially important on platforms developed for children, such as YouTube Kids, which should be required to verify the age of their users, and have (to a larger extent) content screening measures via human moderation.

⁹⁶ Canadian National Law. *Directive on Automated Decision-Making*. Ottawa: Treasury Board Secretariat, 2019.

Scassa, T., 2021. *Administrative Law and the Governance of Automated Decision-Making: A Critical Look at Canada's Directive on Automated Decision-Making*. Forthcoming, 54:1 University of British Columbia Law Review, pp. 1-29.

Answers from the expert interviews	
1. The main opportunities and threats that children currently face in relation to artificial intelligence	
<p>Opportunities:</p> <ul style="list-style-type: none"> ● Personalised learning and education. Encourage technology interest for children. ● Opportunities for education and hobbies through interactive applications (especially for disadvantaged children). ● Opportunities for medical applications (for example, using AI techniques in predicting pregnancy disorders). ● Decreased capital and transaction costs in data analysis. ● AI projects/applications that are available open-source, or for low cost, and can help low-income countries. ● Best practices in AI regulation can become international standards (compare to GDPR). <p>Threats:</p> <ul style="list-style-type: none"> ● Privacy issues, data rights, and exposure to inappropriate material via social media (example: social media users being data objects for third parties, which can use AI systems, such as face recognition, without the users' knowledge). ● Decreased learning skills (and critical thinking) by increased reliance on AI. ● Grey areas in the legislation and challenges of regulating global AI development in the local jurisdictions. Limited understanding and fast development of AI makes regulation difficult. ● Development of novel biases and risk of manipulation (example: creating a perception that females need to comply with an individual's orders and commands by using female voices in voice assistants). 	
2. Examples of protecting children from misuse of artificial intelligence	
<ul style="list-style-type: none"> ● The upcoming risk-based assessment models on AI and the GDPR. ● Earlier laws and international agreements that are interpreted in the AI context. ● Brazil, Canada, and the EU have introduced limitations for AI but children's protection is only partially taken into account. ● Protection via soft law, at least 85 mentions of children in global AI programs. ● Algorithmic explainability mandates, such as the algorithmic accountability framework in Canada. 	
<i>The general notion from the respondents was that current protection is not sufficient.</i>	
3. The EU's attention to sub-areas in protecting children in AI related questions *	
<ol style="list-style-type: none"> 1. Protect children's data and privacy 2. Ensure safety and well-being for children 3. Prioritize fairness and non-discrimination for children 4. Protect children from manipulation and exploitation 5. Enable children to obtain strong AI competencies 	<p><i>(best taken into account)</i></p> <p><i>(least taken into account)</i></p>
<p>Additional comments:</p> <p><i>The EU has not succeeded well in any of the presented areas; Children are incredibly susceptible to being manipulated on the platforms, facing data and privacy issues.</i></p> <p><i>There is a need for obligations for companies that are using the data, in contrast to kids protecting their own safety.</i></p>	

Table 1: Key results from the expert interviews.

4. The effectiveness of written documents in protecting children **	
1. National legislation and strategies	<i>(most effective in protecting children)</i>
2. EU-level legislation (e.g. Artificial Intelligence Act)	
3. Guidelines created by institutions and businesses	
4. International agreements (e.g. UN conventions)	
5. Statements made by civic activist groups	<i>(least effective in protecting children)</i>
Additional comments:	
<i>Given how horribly the EU has failed in protecting children's rights online or from most of the threats of AI, it's hard to say any of these have done well.</i>	
<i>Legislative mandates specifically targeted at the use of children's data are most important in addressing bad actors.</i>	
<i>International agreements can have an important role but the interpretation of the agreements varies and they are often not part of primary legislation.</i>	
5. Expected future actions regarding AI and children's rights	
Comments:	
<ul style="list-style-type: none"> • <i>Creating the EU-wide standards and legislation should be a priority.</i> • <i>There needs to be strongly enshrined and robust protections for children's data and privacy online.</i> • <i>Platforms and applications should verify the age of their users and platforms developed for children, like Youtube Kids, should have much tighter content screening via human moderation to ensure no harmful material is allowed to be made for the use of children.</i> • <i>Advertising and targeted online ads toward children, as well as malicious and addictive practices such as loot boxes or microtransactions, should have stronger oversight and controls on them to prevent harm to children.</i> • <i>The EU should regulate the digital world so that e.g. hooking children to games and applications is not tolerated and the oversharing of personal and digital data is more difficult for underage children.</i> • <i>Gender and racial inequalities should be addressed and made sure that children have equal access to AI applications.</i> • <i>Global and EU-level supervisory authority needs to be established. It's important that AI development does transfer to countries with the least restrictions.</i> • <i>Cooperation between the Member States should be encouraged both for supervision and coordinating AI strategies. Good incentives already exist but they remain isolated and are not implemented.</i> • <i>The EU should enforce a prohibition against manipulation in algorithms.</i> 	

Table 1: Key results from the expert interviews.

* In the priority order. Number one (1) has received the most attention and number five (5) has received the least attention. The aim is to evaluate, which sub-areas of children's protection from AI are taken best into consideration within the EU, and which are least considered. The results show average rankings from six respondents.

** In the priority order. Number one (1) is estimated to be the most effective and number five (5) is estimated to be the least effective. The aim is to evaluate which written documents (including legislation, guidelines, and statements) have the largest impact on children's protection, and which have the least impact. The results show average rankings from six respondents.

2.2.5 Conclusion

In Section 2.2.2 the EU's proposal for the Artificial Intelligence Act was analyzed and four distinct aspects were distinguished in terms of children's rights. These aspects included protecting children's rights in accordance with the CRC (Article 24), protecting children from high-risk AI systems, protecting children from AI systems that can distort human behaviour, and using AI systems to help victims of crime. In the light of earlier research (Annex C), the proposal covers principles of AI that are connected to safety, security, and transparency, but neglects other principles such as the right to be notified when interacting with AI, the right to opt-out of automated decisions, and requirements for non-discrimination and prevention of bias for children. Additionally, the privacy aspects are largely left to the GRPR, and direct references to children's data and privacy are missing from the proposal.

In Section 2.2.3 the national AI strategies were analyzed from twelve different EU countries, and four themes were identified. These were enabling children to obtain strong AI competencies, cultivating children as a future workforce, protecting children's data and privacy, and improving the quality of life and services for children. Similar to the proposed EU regulation, the aspects concerning children's data and privacy were missing in most of the national strategies and were only taken into account in the British and Norwegian strategies. With regard to earlier research (Annex C), also the principles concerning transparency, accountability, and control of technology, were largely absent from the national strategies. This illustrates how many themes concerning children's protection are still not included in the national strategies, and there is a need for more holistic approaches.

In connection to the analysis of the EU's proposal and national strategies, the expert interviews also pointed out a number of shortcomings that could be addressed in future strategies and subsequent legislation. Although there are increasing amounts of initiatives to protect children from the misuse of AI on the EU and national levels, the extensive scope of AI applications leaves key issues to be addressed. Some examples from the expert interviews include children's protection with algorithmic explainability mandates, facial recognition restrictions, and content screening measurements via human moderation. As

children are an especially vulnerable group to manipulative practices and misuse of AI, there is a special need to take children's rights into account in legislation and provide added protection to them. In the expert interviews, the common concern was that although the proposed EU regulation and national strategies mention children and provide them with certain protection, there is still a long way ahead in terms of taking children's rights holistically into consideration.

Four aspects of proposed EU regulation	
<p>Protecting children’s rights in accordance with the CRC (Article 24)</p> <p>Examples: promoting children’s rights to express their views freely and receive information</p>	<p>Protecting children from high-risk AI systems</p> <p>Examples: developing risk management systems, testing procedures, risk evaluations, and documentation</p>
<p>Protecting children from AI systems that can distort human behaviour</p> <p>Examples: protecting children from AI systems that can manipulate, exploit, or take advantage of social control practices</p>	<p>Using AI systems to help victims of crime</p> <p>Examples: using AI to help find missing children, while preventing the misuse in other settings, including general investigations</p>

Four aspects of national strategies	
<p>Enabling children to obtain strong AI competencies</p> <p>Examples: promoting ethics of technology and basic AI and digital literacy skills</p>	<p>Cultivating children as a future workforce</p> <p>Examples: improving STEM education and incorporating AI in curricula</p>
<p>Improving the quality of life and services for children</p> <p>Examples: building tools to improve children’s social services and education systems</p>	<p>Protecting children’s data and privacy</p> <p>Examples: safeguarding vulnerable populations from harms, discrimination and exploitation</p>

Table 2: Identified aspects of children’s protection from national strategies and the proposed EU regulation.

3. Final Remarks

The purpose of this paper was to answer in what ways do EU regulation and national strategies protect individuals under the age of majority from the misuse of artificial intelligence. The analysis of the EU's proposed AI regulation showed that currently there are four major ways in which the proposal protects children. These included protecting children's rights in accordance with the CRC (Article 24), protecting children from high-risk AI systems, protecting children from AI systems that can distort human behaviour, and using AI systems to help victims of crime.

In addition to the EU's proposed AI regulation, the analysis of national strategies revealed four distinct aspects that contribute to children's rights, which were enabling children to obtain strong AI competencies, cultivating children as a future workforce, improving the quality of life and services for children, and protecting children's data and privacy. Notably, the data and privacy aspects were only covered in the British and Norwegian strategies, exposing the need for better implementation in the Member States. This was also highlighted in the answers from the expert interviews as shown in Section 2.2.4.

When reflecting on the findings of this study with the earlier research (Section 2.1.2 and Annex C), the ways in which the EU aims to protect children from the misuse of AI only covers parts of the challenges associated with AI. Although this study focuses on exploring the contents that are currently included in the proposed AI regulation and national strategies, it is also important to acknowledge the missing aspects. In terms of children's rights, especially the age verification processes, content screening, algorithmic transparency, and data rights would require closer attention. At the same time, there is a need to use AI applications in a way that can provide benefits for children (for example, protecting children from crime, and enabling more personalised learning experiences), and make efforts to share the benefits equally between the children. Some risks of positive discrimination include neglecting children with disabilities or having a disproportionate amount of certain demographic groups (for example, girls or people of colour) left outside of AI development.

In the expert interviews, especially the need for coordinated responses to regulate AI was highlighted. Many risks, including addictive AI practices and manipulation (for example, in AI-based applications), are difficult to accurately address in legislation, which creates a need for holistic approaches. This means that the current proposal should be expanded to take different risks into account, and the national strategies should be coordinated among the Member States. In many areas, close cooperation is needed, as for example manipulation and addictive applications create multi-dimensional challenges. To protect the children from the risks, there is a need for both legislative actions (for example, algorithmic transparency mandates) and national programs and strategies (for example, educational programs to improve children's digital literacy skills). This is needed in addition to the current protection and would benefit from the approach, where national legislation and EU legislation are considered in a more holistic way to provide both general protection and account for the specific needs of different demographic groups and geographic areas.

In conclusion, the proposed AI regulation protects the children in several ways but should be expanded to provide more detailed action plans to meet the different needs of children. In future studies, and in the forthcoming legislation, especially the sub-categories of AI applications should be addressed, including non-discrimination aspects, transparency aspects, and responsibility questions. Due to the rapid changes in the field of AI, there is also an ongoing need to re-examine the national strategies and AI regulation. For example, in 2022, the EU is expected to finalize the Artificial Intelligence Act, and similarly, the Member States are updating their national AI strategies in upcoming years. Thus, the AI regulation can be expected to change in the future, and only by regularly revising national strategies and changing the legislation, it is possible to keep up with the changes.

Finally, it is worth noting that AI's effects on children are a complex subject that is difficult, if not impossible, to grasp in one study. While learning more about the EU's current proposal and national strategies helps to better understand the overall picture, there are a large number of factors that are yet to be included in the proposal and national strategies, and therefore the need for more comprehensive studies continues. As the technology is taking its next steps and the legislation

often follows the technical advancements, there are multiple ways how the regulation can evolve in the future. By better understanding the different needs of different demographic groups, such as children, it is also possible to develop AI approaches in a more holistic way for the next generation. This makes looking into the smallest sub-areas interesting and gives a reason to continue studying AI and its regulation at different forefronts.

Appendix A



LUND
UNIVERSITY

AI and children's rights

This survey consists of six questions with the aim to study children's protection from artificial intelligence in the European Union.

The survey is done as part of the master's thesis for Lund University.

Start press Enter



2+ Survey

e. Which of the following would you consider most influential in protecting children's rights in the EU Member States? *

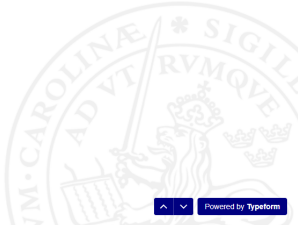
Rank the aspects that you would consider most influential at the top and the aspects that are least influential at the bottom.

Drag and drop to rank options

- EU-level legislation (e.g. Artificial Intelligence Act)
- Guidelines created by institutions and businesses
- International agreements (e.g. UN conventions)
- National legislation and strategies
- Statements made by civic activists

Clear all

OK ✓



Powered by **Typeform**

2+ Survey

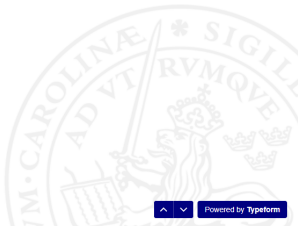
f. Comment your choices from the previous question

Here you can provide additional information to your answer

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Shift + Enter to create a line break

OK ✓ press Enter



Powered by **Typeform**

Appendix A: Illustration of the survey and free text fields.

Appendix B

Background information

Write your job title and the name of your organization

Survey

1. What do you think are the main opportunities and threats that children currently face with regard to artificial intelligence?

2. How are children protected from the misuse of artificial intelligence and what else should be done? Are there any countries that you would consider to be good examples for others?

3. Which of the following are best taken into account in the EU and its Member States? Which ones have received the least attention?

- Enable children to obtain strong AI competencies
- Ensure safety and well-being for children
- Prioritize fairness and non-discrimination for children
- Protect children from manipulation and exploitation
- Protect children's data and privacy

Comment on your choices from the previous question

4. Which of the following would you consider the most influential in protecting children's rights in the EU Member States?

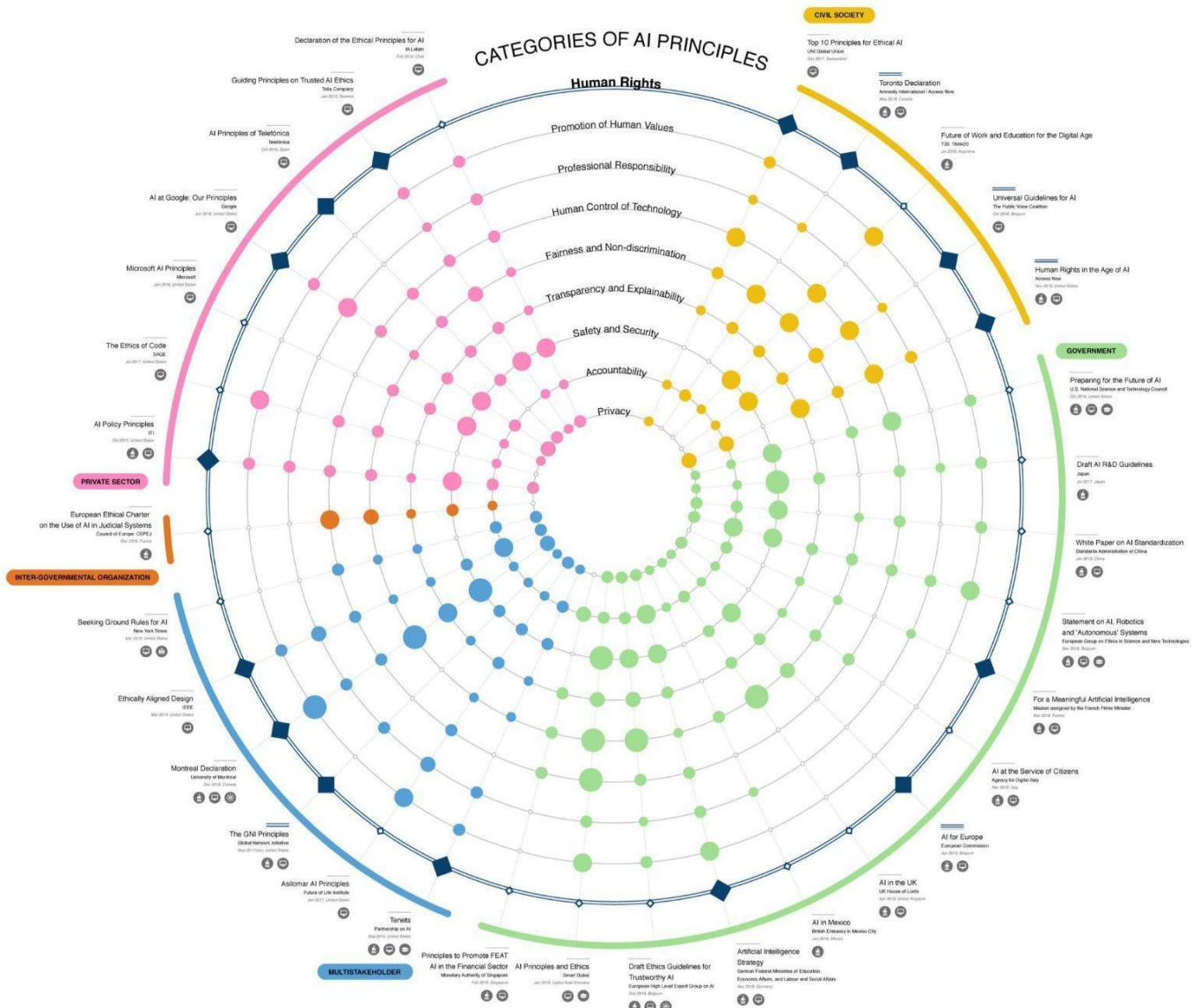
- EU-level legislation (e.g. Artificial Intelligence Act)
- Guidelines created by institutions and businesses
- International agreements (e.g. UN conventions)
- National legislation and strategies
- Statements made by civic activist groups

Comment on your choices from the previous question

5. What are the future actions that you would expect the EU and its Member States to take in terms of AI and children's rights?

Appendix B: The contents of the survey.

Appendix C



How to Read

Nature of Actors

- Civil Society
- Government
- Multistakeholder
- Inter-governmental Organization
- Private Sector

Framework

- Ethical Principles
- International Human Rights
- Ethical Principles + International Human Rights

Target audience for recommendations

- Government
- Industry
- Academics
- Civil Society
- General Public

Coverage of Themes:

Higher (Large Blue Circle) | Lower (Small Blue Circle) | Not referenced (White Circle)

The eight themes of principles are Privacy, Accountability, Safety and Security, Transparency and Explainability, Fairness and Non-discrimination, Human Control of Technology, Professional Responsibility, and Promotion of Human Values. In total, 47 principles were articulated in the documents across the eight themes. Some themes have more principles than others. For example, there are 11 principles in the Accountability theme, but only three in Safety and Security. Therefore, it's informative to compare one topic within a theme, but not across themes.

Some documents in our dataset were short lists of principles, others included a longer narrative. In the latter case, we only coded the principles themselves. This means that some documents may contain a discussion of issues beyond what is represented here.

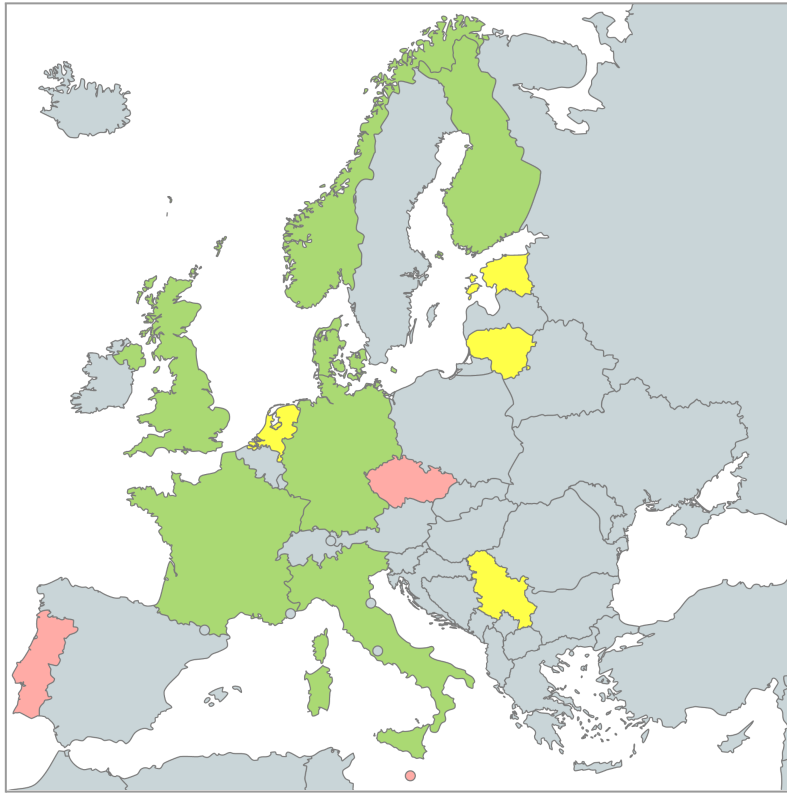
The 47 principles, by theme, are:

- Promotion of Human Values:** Promotes Access to Technology, Promotes Human Values and Human Flourishing, Leveraged to Benefit Society
- Professional Responsibility:** Accurate, Responsible Design, Considers Long-Term Effects, Multistakeholder Collaboration, Scientific Integrity
- Human Control of Technology:** Right to Human Review of Automated Decisions, Right to Opt out of Automated Decision
- Fairness and Non-discrimination:** Non-discrimination and the Prevention of Bias, Representative and High Quality Data, Fairness, Equality, Inclusiveness in Impact, Inclusiveness in Design
- Transparency and Explainability:** Transparency, Open Source Data and Algorithms, Open Procurement, Right to Information, Satisfaction when Interacting with an AI, Notification when AI Makes a Decision about an Individual, Explainable, Regular Reporting Requirement
- Safety and Security:** Security by Design
- Accountability:** Accountability, Recommends Adoption of New Regulations, Provable, Verifiable and Repeatable, Recommends Impact Assessment, Evaluation and Auditing Requirement, Environmental Responsibility, Recommends Monitoring Body, Right to Access, Right to Remedy of Automated Decision, Liability and Legal Responsibility
- Privacy:** Privacy, Consent, Privacy by Design, Control over Use of Data, Right to Restricted Processing, Right to Erasure, Right to Rectification, Recommends Data Protection Laws

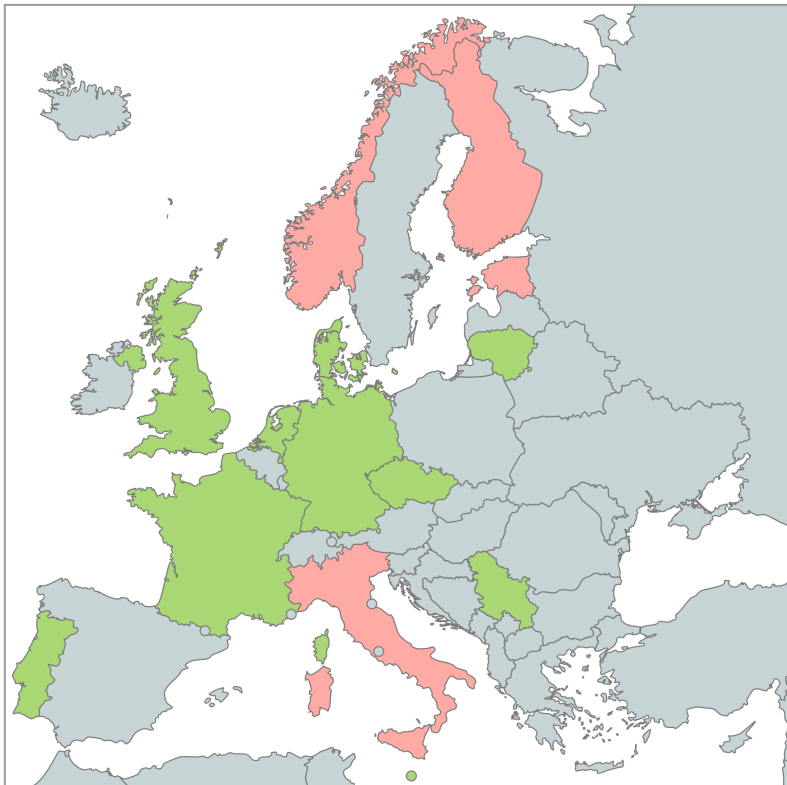
Title: Principled Artificial Intelligence: A Map of Ethical and Rights-Based Approaches
Authors: Jessica Fjeld, Hannah Hillgoss, Nele Achten, Maia Levy Daniel, Joshua Feldman, and Sally Kagay
Available at: <https://walton.uark.edu/business-integrity/images/PrincipledAIHarvard2020.pdf>

Appendix D

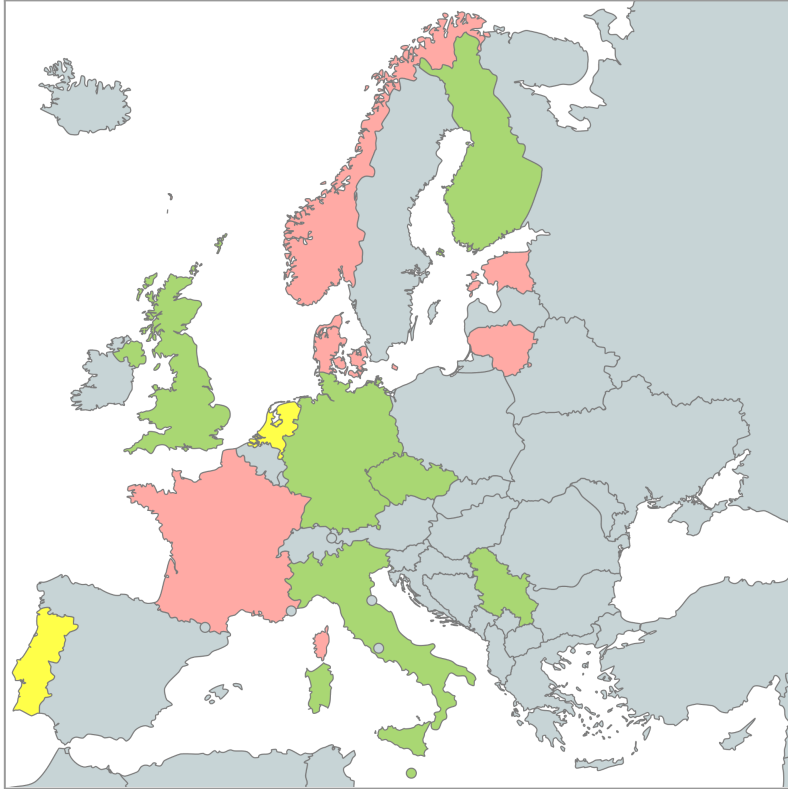
Enabling children to obtain strong AI competencies



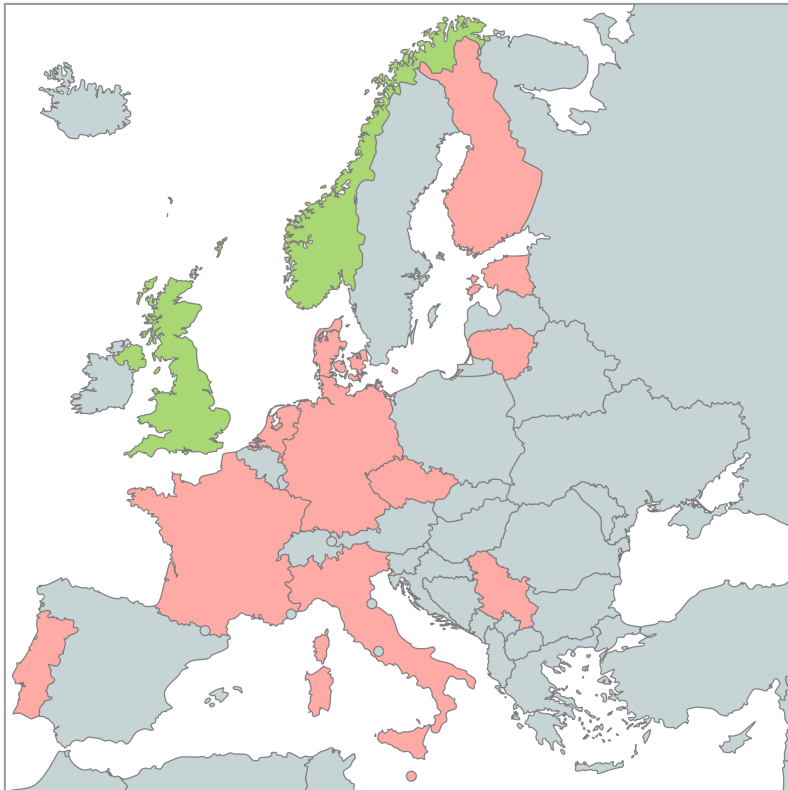
Cultivating children as a future workforce



Improving the quality of life and services for children



Protecting children's data and privacy



Appendix D: Full-size versions of maps presented in Figure 4.

Appendix E

3 Question 1 Additional Comments

3 out of 3 people answered this question

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Appendix E: An illustration of the data analysis process with graphics based on earlier work of using Typeform. For the analysis process, the parts that were irrelevant were first removed (red colour) and the remaining parts were colour-coded to find interrelations. This illustration describes the data analysis process for the expert interviews (in Typeform), but a similar process was done for the proposed Artificial Intelligence Act and national strategies (for limited parts). In the colour-coding, each colour describes a specific topic such as children's data and privacy, and children's AI competencies. The colour coding is removed from the final version (to achieve better readability), but the identified aspects are presented in tables and figures in Chapter 2.

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