

The European map of artificial intelligence development policies: a comparative analysis

Karolina Woszczyzna*[†] , Karolina Mania** 

*Jagiellonian University, Faculty of Management and Social Communication, Institute of Economics, Finance and Management, Cracow, Poland. E-mail: karolina886.woszczyzna@student.uj.edu.pl

**Jagiellonian University, Faculty of Management and Social Communication, Institute of Economics, Finance and Management, Cracow, Poland. E-mail: karolina.mania@uj.edu.pl

Abstract **Objective:** The aim of this paper is to discuss the management aspect of artificial intelligence development policy by the national regulators of the 27 European Union (EU) member states. The solutions formulated by three of them—Germany, France (as a pioneers), and Poland—are analyzed in depth.

Conclusions: The obtained results allow us to conclude that out of 27 EU countries, only one has not yet prepared its strategic project on artificial intelligence (AI) development, while among the existing policies one can find significant differences in the approach to the matter of strategic management.

Methodology: The research methods used are content analysis and comparative analysis of selected source documents. In the course of the deliberations presented, key legal acts concerning the areas of AI and modern technologies are cited.

Practical applications: The presented work formulates a starting point for further research and directions of changes in the management of AI development policy. The attention of subsequent researchers should focus on the possibility of a detailed analysis of other documents published by EU member states, a comparison of policies of other countries across the world, and even an attempt to examine the global dimension of AI strategies.

Originality: The article addresses the problem of creating law only following, rather than preceding, the emergence of technological changes, the lack of systemic regulation of AI tools and mechanisms, as well as the absence of integrated forms of international cooperation with a strategic and long-term dimension.

Keywords artificial intelligence (AI); European Union; strategic policy; national policy; development policy

Artificial intelligence (AI) is one of the most dynamically developing areas directly affecting humans (Aghionet al., 2019). Modern technologies are omnipresent and although we are not always aware of it, and even more often unable to predict the consequences of these changes, we should already be preparing for their inevitable impact (Harari, 2018).

The term “artificial intelligence” (“AI” for short) was formulated in 1956 by the American computer scientist John McCarthy (McCarthy, 2007). Over the last few decades, many definitions of this phenomenon have been developed. AI was described by Robert J. Schalkoff as a field of science that tries to explain and emulate intelligent behavior using computational methods (Schalkoff, 1990). Aleksandra Przegalińska, on the other hand, defined AI as a “multidisciplinary engineering field” encompassing many other subfields (Przegalińska & Oksanowicz 2020).

Currently, AI can be divided into three main fields, or paradigms. These are, in historical order, symbolic AI (AI that can be built by creating a specific set of rules that it should follow in the process of problem solving, statistical AI (which assumes that a computer “fed” large data sets will learn to catch trends on its own through constant repetition, experimentation and feedback), and subsymbolic AI (machine learning, deep learning) (Marr, 2016).

The revolution we are witnessing, experiencing, and creating is crucial for our future and represents a massive challenge (Atkinsonet al., 2020). AI is implemented by highly specialized research units—those working for global research centers, but also those created for huge and capital-rich transnational companies or corporations with monopolistic inclinations (Bench-Capon et al., 2012). In the case of the former, we can feel somewhat safer; their work is intended to serve the whole society. Corporations have entirely different goals; for them, the appropriate use of AI is a mechanism to better reach their target groups, reduce costs, reduce the level of human employment, and finally generate profits more and more efficiently (Bruner, 2020).

[†]Corresponding author

Hence, ethics and law related to the development of smart technologies should be one of the priorities of contemporary research, shaping the future picture of the relationship between humans, society, and technology (Dwivedi et al., 2021). In view of the changes seen today, we should anticipate their effects as far into the future as possible, prudently creating the necessary legal and social framework (Harari, 2018). It is worth looking at a certain duality of the impulse for legal changes related to AI (Hathaway, 2000). Already, AI imposes the need to adapt laws to the dynamically changing digital reality. On the other hand, its widespread use is changing the face of the economy, the labor market, and individual industries, which requires a strategy introduced at the level of national regulations. Thus, we can assume that the law only follows the changes related to AI. First comes a revolutionary discovery that changes our perception of technology and only much later are attempts made to establish a legal order (Carrillo, 2020).

On the other hand, states are increasingly beginning to notice the impact of the development of robotization and AI on their important sectors and therefore, regardless of their attitude towards AI, they must begin to create appropriate development policies (Hacker, 2018). Additionally, due to entities such as the European Union (EU), for example, many countries are increasingly obligated to undertake strategic collaborations in modeling the technological future of their societies (Cath et al., 2018).

One of the most important elements influencing the global development of AI is the actors involved in its development, creation, use, and regulation. We can identify distinct groups of influence, namely, consumers, entrepreneurs, producers, and regulators (Kawecki, 2021). Each of these groups has a slightly different influence on the development of AI, as well as a different perspective on it and its distinct needs. Their high-tech knowledge, motivations, and expectations can often lead to conflicts of interest. Irrespective of this, all the groups mentioned above strongly influence one another, are interrelated, and in many cases could not function without each other (Sroka, 2019).

The first group comprises consumers, i.e., simply average members of society, including employees of all (except technological) industries (Sroka, 2019). Although in their daily lives most consumers use many AI solutions, more often than not they do so unconsciously. Interestingly, despite their lack of proficiency in the field, they are at the same time one of the main creators of demand for AI. However, due to this lack of familiarity combined with high exposure to high-tech, their behaviors and decisions can be unjustified, irrational, and dictated by emotions, e.g., fear and anxiety. In order to minimize such behaviors, it is necessary to provide members of this group with a sense of security in the world of technology, to enable their professional self-fulfilment and to guarantee all their basic rights. To this end, global educational activities are needed, as well as the creation of appropriate regulations, e.g., legal ones.

The second group consists of members of the business world, i.e., mainly small, large, and medium-sized entrepreneurs (Kawecki, 2021). Like consumers, they are also creators of technological solutions, and the technological knowledge they possess varies (Kuck, 2013) and depends mainly on the industry and the specifics of their business. The use of state-of-the-art solutions, including AI, ensures that this group builds and maintains market competitiveness, enabling its members to conduct and develop their business in a turbulent and changing environment (Gregor & Kaczorowska-Spychalska, 2022). The awareness of the influence of AI solutions on the competitiveness of enterprises is perfectly illustrated by the results of research conducted by the International Data Corporation. According to them, spending on robotics and related services by individual companies worldwide will almost quadruple, reaching the level of USD 110 trillion by the end of 2024.

The third group includes manufacturers or suppliers of high-tech solutions (Kawecki, 2021; Niedbalska, 1999). They have the greatest and most advanced knowledge of all groups and are able to classify and anticipate upcoming new trends and technological changes most effectively (Sroka, 2019). Through their activities, they are the main suppliers to both consumers and businesses. The manner and breadth of their operation is sanctioned by regulators. In the absence of the creation of appropriate regulatory pathways, their activities may take two opposite forms: stagnation in a given area (in the case of regulations prohibiting a selected activity) or unbridled proliferation (in the absence of regulations concerning a given aspect) (in accordance with the common legal maxim *Nullum crimen sine lege*) (Blaski, 2008).

The last group consists of regulators. As regards their power scope, they can be divided into domestic (national legislators) and supranational (e.g., the European Parliament) (Duina & Raunio, 2007). Additionally, through the control function performed, judges (domestic and foreign) will also belong to this group. The regulators' knowledge of, for example, AI is characterized by a reactive response to technology; in the vast majority of cases, the change comes first, and only then come the regulations governing it. There are many reasons for this reverse order, ranging from competence gaps in the relevant bodies of regulators (Pretkiel et al., 2020) (low level of skills diversification), through only sporadic involvement in consultation with specialists in the regulated areas, to the absence of specially designated bodies.

The foregoing introduction provides background on the issue of AI in contemporary conditions: markets, societies, and business. Subsequently, the methodology, research questions, and the rationale behind the chosen area of inquiry are presented. The

body of the article contains an overview of policies developed by EU member states and an in-depth analysis of policies developed by France, Germany, and Poland. The final summary is dedicated to the noted differences and similarities in the approaches represented by the three indicated regulators.

Method

The development of AI has necessitated the need to adapt the law to the reality around us (Koulu, 2020). As AI has become a widely used technology in more industries, states have noticed the need to outline a legal framework indicating further directions for its development. This is how AI development strategies began to emerge, along with subsequent policies at both the EU and national level (Ulnicane, 2022).

The main purpose of the article is to analyze national policies for AI development in the 27 EU countries as a complete overview of all EU countries active in the field of AI development policy. The analysis of the content of documents created by the member states allows us to obtain an answer to the first research question about the differences in the adopted strategies for AI development. Additionally, the authors decided to conduct an in-depth analysis of the content of three selected policies of three different countries. Two leading countries, France and Germany, are leaders in AI development policies in the EU and first published policy documents (Katzenbach & Bareis, 2021). Additionally, to show different approaches to the studied subject, Poland was added as a country that is not a leader, but represents a different approach which helps answer the second research question about the specificity of the differences in policies among France, Germany, and Poland (Galindo et al., 2021; Jobin et al., 2021).

Special attention is paid to the management of the development of AI in terms of building long-term strategies for the future. The attention of the authors is also drawn to the proposals signaled by French, German, and Polish regulators for the implementation of new tools and organs focused on coordinating AI. For the purpose of better demonstrating the diversity in approaches to creating national AI policies, selected solutions presented in the aforementioned three documents have been juxtaposed.

Content analysis is used to explore all qualitative data (materials). It enables correct inference from the content of various origins, providing new information and allowing for understanding the differences between analyzed policies (Downe-Wamboldt, 1992). The comparative method allows for a comparison between the analyzed documents (Roig-Tierno et al., 2017). Legal comparative studies as a method aim at learning and understanding the legal provisions and differences between countries (Gutteridge, 1971).

Taking into account the specificity of the research conducted by the authors, i.e., the compilation of all policies on AI development strategies and the comparison of the content of the three selected documents, a qualitative method, content analysis, is adopted as the main research method (Stemler, 2015). Given the nature and thematic scope of the studied documents, methodology carries both qualitative and critical dimensions.

Legal Framework of Competencies of Creating AI Development Policy in the EU

At the EU level, the framework for the development of AI results from both EU regulations and primary law: the Treaty on the Functioning of the European Union (TFEU), the Treaty on European Union (TEU), and the Charter of Fundamental Rights of the European Union, as well as the general principles of law.

When analyzing the legal basis for creating policies in this area, it is necessary to refer to the EU primary law. Competencies in the field of creating AI policies can be found in Art. 3 par. 3 of the TEU. The legal basis of the competencies of the EU in the field of creating AI policy results from the competencies in the field of promotion of research and technological development policies. This provision defines the general objectives of the EU, which are identical to its areas of interest. The provision includes “scientific and technological advance,” which can be linked with research and technological development policy. Moreover, the regulations of AI are essential for economic turnover, which translates into the building and development of the digital single market, and thus the functioning of the internal market.

An unambiguous (explicit) competency norm (having the character of shared competencies of the EU) is indicated in Art. 4 par. 3 and Art. 179–190 of the TFEU. In addition, the sources of EU competencies in the field of AI development policies can also be referred to as Art. 352 of the TFEU, which is a supplementary competency clause. Art. 4, Sec. 3 of the TFEU indicates the EU’s competency to issue binding legal acts subject to harmonization with the simultaneous law-making competence of the state in the same matter, which is the subject of this article.

Overview of AI Development Policies in EU Member States

Before embarking on a detailed comparison of the three selected AI development policies, it is first necessary to look at the bigger picture by collating key information on the AI strategies being formed by the 27 EU member states. The basic criteria for the study are the existence of relevant legislation in the country, the time of its publication, the language of the document, and in some cases, additional comments. The key criteria listed above helped determine which countries have recognized early on the crucial importance of preparing their AI management policies, and whether a language barrier is emerging to prevent analysis due to the language of the publications. The sources discussed below have appeared over the last four years; the oldest is dated 2018 (*For a Meaningful Artificial Intelligence: Towards a French and European Strategy*), while the most recent was only produced in 2021 (*AI: Here for Good: National Artificial Intelligence Strategy for Ireland*). Some of the cited documents were published in English (e.g., those of Germany, Sweden, and Belgium), while some others also have their equivalents in national languages apart from the English version (e.g., Luxembourg). There are also those available in local languages only. The order of presentation of the source documents follows the chronology of their publication by national regulators.

The first national policy on the development of AI was the one created by France on 8 March 2018 titled *For a Meaningful Artificial Intelligence: Towards a French and European Strategy*. The document is available in English and its main author is Cédric Villani, a mathematician and member of the French Parliament (Villani et al., 2018).

Shortly after, in November 2018, Germany prepared its proposal in this area. This act is in English and is titled *Artificial Intelligence Strategy of the German Federal Government*. It should be mentioned that it was updated as *Artificial Intelligence Strategy of the German Federal Government* in 2020 due to new aspects of AI noted by the regulator.

The year 2018 can be considered exceptionally abundant when it comes to the implementation of long-term strategies for the development of AI, as during this time as many as eleven EU member states decided to publish their proposals. At the very beginning of the year, on February 18, Sweden introduced its *National Approach to Artificial Intelligence*, available in English. A month later, on March 14, Denmark and Belgium also joined the group of countries with such policies. Both the Danish *National Strategy for Artificial Intelligence* and the Belgian *AI 4 BELGIUM* are available in English.

The next country was the Czech Republic, with the English-language *National Artificial Intelligence Strategy of the Czech Republic*, released on May 6, 2019. A month later, on 12 June, there came an English language draft prepared by Finland, *Leading the Way into the Age of Artificial Intelligence. Final Report of Finland's Artificial Intelligence Programme 2019*. Estonia decided to follow in Finland's footsteps and in July 2019, it proposed an English version of its policy under the title *Estonia's National Artificial Intelligence Strategy 2019–2021*.

In October 2019, Malta joined the group of countries implementing English-language regulations on AI titled *Malta: The Ultimate AI Launchpad. A Strategy and Vision for Artificial Intelligence in Malta 2030*, as well as the Netherlands with *Strategic Action Plan for Artificial Intelligence*. Croatia also prepared its vision on October 2, 2019 under the title *National Plan for the Development of Artificial Intelligence*. In this case, it should be mentioned that the authors of this article did not manage to review this source—the only information available was the title and date of publication of the Croatian document.

Among the countries that have prepared their projects in 2019 are also Portugal with the English language *AI Portugal 2030 Initiative on Digital Skills*, Luxembourg with the English- and French-language *Artificial Intelligence: A Strategic Vision for Luxembourg*, Lithuania with a document prepared entirely in Lithuanian titled *Lithuania's Artificial Intelligence Strategy: A Vision of the Future* and Romania with *Romania's National AI Strategy*. It should be mentioned that, as in the case of Croatia, the original document prepared by Romania was not available. However, the authors of the article managed to reach another Romanian English-language document, being a sample draft, published in June 2019, of the strategy titled *Romania in the Era of Artificial Intelligence*. 2020 turned out to be the second most ground-breaking year in terms of the number of actions taken by EU member states to build a long-term AI strategy. The first country to introduce its document then was Cyprus, with its *National Artificial Intelligence (AI) Strategy: Key Action for Promoting the Integration and Development of AI in Cyprus*. Unfortunately, this document was only prepared in Greek, which makes it very difficult to compare with other sources. In addition, access to it is very difficult; eventually the source was found in Greek on a subpage of one of the Cypriot government's websites.

Shortly after Cyprus's action, in February Latvia launched its document titled *Latvia's National AI Strategy*. As in the case of Cyprus, Latvian regulators decided to create the document only in the national language and to upload it as a Microsoft Word file, which can be difficult to download and open properly. In Greece, on the other hand, a document published in April of the same year titled *Democratizing AI: A National Strategy for Greece* was already available in English, as was *Hungary's Artificial Intelligence Strategy 2020–2030* from May of that year.

In July 2020, the Italian proposal *Proposte per una strategia italiana per l'intelligenza artificiale* appeared, published entirely in Italian. The last countries to decide to publish their acts in 2020 were: Spain with its Spanish-language *Estrategia Nacional de*

Inteligencia Artificial, published on December 2; Bulgaria with its English-language *Concept for the Development of Artificial Intelligence in Bulgaria until 2030*, published on December 16; and Poland with its Polish-language *Policy for the Development of Artificial Intelligence in Poland from 2020*, published on December 28.

The very last EU countries to join the group of countries with their own acts on AI development were Slovenia, Ireland, and Austria. The proposal of the first of the mentioned countries is dated May 27 and titled *Slovenia's National Programme on AI*, written in Slovenian. The second is an Irish English-language document from July 8 titled *AI - Here for Good: National Programme on AI*, updated on September 15 later that year. In turn, the Austrian *Strategie der Bundesregierung für Künstliche Intelligenz. Artificial Intelligence Mission Austria 2030* was published entirely in German.

The only EU country that has not yet decided to introduce a national strategic document on modeling the future of AI is Slovakia. It should be noted that this country has a separate document focused on digital transformation, but the regulators decided to devote only five pages to AI in the form of a mini-chapter entitled "We will support development of artificial intelligence."

AI Development Policies: The Example of Poland, Germany, and France

After a general discussion of the AI strategies formed by the 27 member states of the EU, we can focus on a more detailed comparison of the three selected policies. The following section presents and compares documents prepared by Poland, Germany, and France. The choice of these countries was not accidental. The first one, Poland, is the country of origin of both authors of this study, so the solutions proposed by the Polish regulator are particularly important for them. On the other hand, Germany and France are countries that have been very active in the modern technology market for many years, extensively financing numerous programmes, consortia, research units, and individual scientists researching AI and its impact on the world around us.

Poland: Policy for the Development of AI in Poland from 2020

The above legal act was published on December 28, 2020. Apart from the elements of introduction and summary, it has been divided into six main thematic chapters: AI and society; AI and innovative companies; AI and science; AI and education; AI and international cooperation; AI and the public sector. In addition, each of these chapters is described under the following four subsections: strategic partners for achieving the goals in a given area; short-term goals (until 2023); medium-term goals (until 2027); long-term goals (unspecified time frame).

The actions and objectives proposed in it are characterized by a high degree of detail, while also presenting a holistic view of the problem. Apart from pointing out the advantages and potential opportunities of AI, we can also find problems or possibly obstacles related to it, such as the issue of technological unemployment, the lack of consumer confidence in such technology, the need to create an ethical framework for AI, to build strong technological education at all levels of schooling, or to invest in research and development.

The solutions suggested by the Polish regulators take into account different time perspectives for achieving the intended goals (short-term, medium-term, long-term) and clearly indicate the governmental entities necessary for the implementation of the goals, such as the Ministry of Education and Science; the Committee of the Council of Ministers for Digitalization; the Ministry of Finance, as well as local government organizational units, such as offices of regional governors (*voivodes*) and heads of regional assemblies (marshals), or independent entities such as universities, institutes, and other scientific units conducting research in the field of AI. When reading the *Policy for the Development of Artificial Intelligence in Poland from 2020* one notices that the attention of its authors is clearly focused on modeling activities aimed at building a strong position for Poland in the international arena of modern technologies. This goal is to be achieved by "investing in human capital; acquiring appropriate hardware and software, including those used to digitize production and business processes; investing in research and development; transferring research results to production environments; investing in strategic infrastructure projects; creating and sharing data and software under open licenses, as well as making products freely available for AI development in Poland; retaining Polish AI talent in the Polish AI ecosystem." The Polish regulators also assume the need to both create new and sustain existing programs such as the Ministry of Education and Science's Implementation PhD II (AI program); organizing competitions linking the most innovative private sector companies with public sector companies as part of GovTech Poland, or following the form of supporting the second-level education of top AI/machine-learning specialists as part of programs such as the Academy for Innovative Applications of Digital Technologies (AI Tech).

The document itself proposes the establishment of a very large number of projects or even separate entities dedicated to the coordination and creation of activities focusing on AI. It is impossible to mention them all here, but it is worth mentioning at

least a few such initiatives. The main proposal is the idea of establishing an AI Policy Task Force, operating at the Committee of the Council of Ministers for Digitalization. According to the information contained in the act, it will be chaired by the Prime Minister's Appointee for GovTech. The task of the task force will be to monitor and operationally coordinate the activities of public institutions in the field of AI policy implementation, in cooperation with other units, including:

- AI contact point, established by the minister in charge of informatization at the unit of the Centre for the Digital Poland Operational Programme in order to support and coordinate stakeholders of financial assistance programs from the central budget of the EU, such as Digital Europe or Horizon Europe;
- AI Observatory for the Labour Market, established by the minister in charge of informatization in order to monitor and research the impact of AI on the labor market, in cooperation with the minister in charge of labor;
- Observatory for International Artificial Intelligence and Digital Transformation Policy, appointed by the minister in charge of informatization to monitor AI policies and regulations of other countries, formulate recommendations for international initiatives in the field of AI, and monitor global trends in AI development, in cooperation with the Ministry of Foreign Affairs.

The main areas addressed in the policy are: Society; Innovative Companies; Science; Education; International Cooperation; Public Sector; Private Sector; Economy; and Health. Discussed from a broad socioeconomic angle, the set of these areas forms a coherent and strategic vision for the development of AI in various branches and industries of the Polish economy.

Germany: AI Strategy of the German Federal Government

In November 2018, Germany prepared its strategic document on AI. This act consists of four elements: two short chapters titled "Progress to Date" and "Situation in 2020," and with two broad chapters divided into further subsections: AI Strategy Priorities: Minds; Research; Transfer and Application; Regulatory Framework; Society and Next Steps in the Implementation of the AI Strategy: Minds; Research; Transfer and Application; Regulatory Framework; Society. Although the division of contents is systematized, the document seems to be less clear than its Polish counterpart due to the way it is presented. In terms of its form, the linking mechanism is worth praising: when an initiative/programme/entity is not discussed in the document in detail, a direct link to it is included in the text. This approach makes it much easier to truly understand the motivation of the regulators, providing a convenient way to reach other related sources (Justo-Hanani, 2022).

It is worth noting that this source was additionally updated in 2020. It was updated due to changes in response to the COVID-19 pandemic and sustainability issues, in particular, environmental and climate protection and European and international networks (Rassolov & Chubukova, 2022).

This source has very good coverage of the past, present, and future, reporting on actions taken, initiatives relevant to the present, and long-term plans and objectives. The reader can easily see the strategic formulation of goals, including the actors needed to achieve them. A frequently cited argument by the German regulators is the need to maintain Germany's position in the development of AI. For this reason, great emphasis is placed on supporting national talent, both in terms of individual researchers and, for example, consortia. The attention of the developers is also focused on the SME sector (Small and Medium-sized Enterprises sector).

In contrast to the Polish AI development policy, the German federal government, in the act it created, stressed the need to create various types of indicators, e.g., those designed to monitor AI in the area of work and society, or indicators examining the interaction between humans and AI in order to increase a sense of security among citizens. According to the German regulators' plan, they are also to include metrics on the use of AI in the economy, higher education and teaching, as well as on reporting on the number of German publications on AI compared to those created internationally. These indicators are to be continuously developed and supplemented with additional indicators from other areas. The main sectors/areas covered by the *Artificial Intelligence Strategy of the German Federal Government* are: Competition; Employment; Industry and Entrepreneurship; Innovation; Investment; Science and Technology; and Research. The analyzed contents testify to the broad and holistic view of the authors on AI.

As in the case of the Polish document, the German proposal concentrates many concrete solutions in a single place (pp. 26–30). In order to give some idea of the direction of action, it is worth quoting a few specific ideas here, such as launching further initiatives to promote young scientists: the Academic Exchange Service (DAAD); accelerating the expansion of the Gauss Supercomputing Centre; implementing a targeted funding program for AI-based start-ups as part of the international German accelerator program; developing application centers (including virtual ones) that actively link Mittelstand 4.0 Centres of Excellence with AI research Centers and involve SMEs in early-stage research.

France: For a Meaningful AI: Towards a French and European Strategy

The final AI development management strategy analyzed here and also the first one created in EU member states is the one

prepared by France on March 8, 2018. Its main author is Cédric Villani, a mathematician and member of the French Parliament. Of all three strategies discussed, this is certainly the most comprehensive document, running to 154 pages. It consists of seven main parts: Part 1, An Economic Policy Based on Data; Part 2, Towards Agile and Enabling Research; Part 3, Anticipating and Controlling the Impacts on Jobs and Employment; Part 4, Using Artificial Intelligence to Help Create a More Ecological Economy; Part 5, What are the Ethics of AI?; and Part 6, For Inclusive and Diverse Artificial Intelligence. Each of these chapters is further divided into subsections of varying size. For example, Part 1 has six subsections, Part 2 has four and Part 6 two. In contrast to the previously discussed documents, in the French proposal the way in which the issues raised are presented may be a stumbling block for the potential audience. In methodological terms, the layout of this document is illegible and relatively difficult to interpret (Villaniet al., 2018).

However, the differences between this act and the Polish and German sources do not end there. Its character is much closer to an advanced scientific work or a specialist recommendation than to a strategic action plan. It should certainly be emphasized that the analyzed source has a substantive, almost educational content: it guides the reader through the areas of AI, explaining their importance and essence. In line with this concept, the document contains a wide range of knowledge and data, and its authors take an extremely broad view of AI. Unfortunately, it is also characterized by a relatively small number of proposals for concrete changes; one can clearly see the goals and directions, but there is a lack of their translation into, for example, concrete actions, implemented tools, or creation of new entities.

Looking for similarities with the previous proposals, it is worth noting that the French source treats AI as an extremely important phenomenon, although neither as strictly positive nor directly negative. It considers data, ecology, ethics, and the social dimension to be the most important areas of AI's impact. Slightly more specific areas are: competition; corporate governance; digital economy; economy; education; finance and insurance; health; industry and entrepreneurship; innovation; investment; public governance; science and technology; and societal and social issues and transport.

An interesting differentiator is that the document assumes AI's support in creating gender balance, boosting diversity, and working toward equality in society. Additionally, it cites both international and national initiatives and regulations.

It is worth mentioning that France's role in the creation of AI regulations will increase due to its presidency of the EU Council in 2022. Already at the beginning of this term, one can see that France is taking active measures, including changes to some elements of AI regulation. The most recent changes to this document focus on high-risk AI systems. Among the changes introduced are a decision to "relax the extreme requirement that training, validation and test data sets be 'error-free and complete,'" information about "dropping the requirement for high-risk AI systems to have a system to manage all known or foreseeable risks and limit it to risks that are highly likely to occur in relation to health, safety and fundamental rights;" and to "clarify that screening of data sets for bias is to be carried out taking into account the impact on human health and safety or leading to discrimination prohibited by EU law."

Conclusions

The above three subsections have focused on the contents of and main ideas expressed in each of the three AI development policies discussed in detail. Although we can assume that each of them had one common goal—to create a strategic document outlining the directions, areas and goals related to the development and impact of AI in a given country—it is worth noting that there were also numerous differences among them.

First of all, each of them was characterized by a completely different volume; the shortest act, with 31 pages, was the one prepared by Germany, while the longest was the one prepared by France, with 154 pages. In between was Poland, with a policy written down in 86 pages. As far as the form of the sources in question is concerned, it is interesting to note that despite the smallest number of pages, from the reader's perspective, the German document was much more understandable and pertinent compared to the French one, while the Polish act in terms of methodology in a way referred to the one prepared by the German regulators.

It was not only the volume and form that differed among the three sources. The Polish and German documents contained many more specific objectives, guidelines, and proposals, e.g., for the implementation of the necessary entities/units/programs/initiatives compared to the act prepared by France. Therefore, the *Policy for the Development of Artificial Intelligence in Poland from 2020* and the *Artificial Intelligence Strategy of the German Federal Government* were definitely more defined and strategic in nature, which in the opinion of the authors translates into greater universality and usefulness of such documents. In its *For a Meaningful Artificial Intelligence: Towards a French and European Strategy*, France focused on a broad and holistic depiction of the entire AI phenomenon, somehow omitting the need to prepare detailed, measurable, and time-bound solutions. However,

this does not mean that the French document is useless or wrong. Above all, it shows a completely different approach of French regulators to the way and form of building France's strategy.

Another aspect is the approach to the position of a given country in the international arena. For Poland, the main objective was to build and strengthen its position, while for France and Germany it was to maintain the existing position and penetrate more deeply into the market. The French were even keen to cite international documents and sources on AI. The Germans, on the other hand, often used a mechanism of references to other acts, initiatives, or programs they had already produced.

It should be noted that one of the key elements recurring in each of the three policies was the general understanding of AI. Each country saw it as a neutral field, neither positively nor negatively determined. Poland, Germany, and France all saw the huge potential and the range of benefits of AI, while not underestimating the accompanying risks. This approach to AI is best reflected in the word "challenge." It is because of it that each of the regulators has tried to define the main goals of action, the entities necessary to achieve them, and the methods of acquiring knowledge as well as funds.

A noticeable difference among the three policies indicated is the different emphasis placed on the establishment of new teams and bodies focused on managing the development of AI. The Polish regulators, according to its document, point to the need to institute a number of new authorities, including the AI Council responsible for, among other things, supporting the identification of challenges to research and flagship projects, or setting standards for the adoption of AI in Poland, as well as the AI Legislative Team dedicated to addressing legal and ethical issues in support of AI policy implementation, whereas the German document is much more inclined to cite already established and existing, national programs and bodies, e.g., Government's Observatory for Artificial Intelligence in Work and Society (AI Observatory); The Platform Lernende Systeme; and the DAAD program (German Academic Exchange Service). France equally often cited proposals to establish new organs, such as an observatory for the nonproliferation of autonomous weapons, as well as pointing to the expansion of the activities of those already in place, e.g., the "Femmes du Numérique" (Women of Digital Technology) program.

Polish and German regulators, within the policies they have created, have made a very clear reference towards the need to undertake coordinated, synergy-based actions from an international perspective. The Polish policy echoed this through objectives defined as "supporting active cooperation in the European field in the creation of trustworthy artificial intelligence," as well as "supporting open interoperability standards, including mutual recognition of certificates and compliance protocols." Germany, on the other hand, proposed the creation of AI ecosystems with international reach, based on superior research and transfer structures, to encourage the use of research results in business, practice, especially in the SME or Mittelstand sector, and to increase the dynamism of start-ups. Unlike the countries mentioned above, the French regulators, among their specific goals, have focused most of their attention on plans for developing "aggressive data policies" to improve access to big data, and targeting four strategic sectors: health care, environment, transport, and national defense. Nevertheless, most importantly from the point of view of global security of AI development, Poland, Germany, and France communicated in their documents the necessity for organized, multidimensional international cooperation. None of these countries manifested in their plans the intention to act completely without collaborators or in total isolation.

References

- Aghion, P., Jones, B. F., & Jones, C. I. (2019). Artificial intelligence and economic growth. In A. Agrawal, J. Gans, & A. Goldfarb (Eds.) *The Economics of artificial intelligence: An agenda*. (pp. 237–282). University of Chicago Press.
- Atkinson, K., Bench-Capon, T., & Bollegala, D. (2020). *Explanation in AI and law: Past, present and future*. *Artificial Intelligence*, 289, 103387.
- Bench-Capon, T., Araszkievicz, M., Ashley, K., Atkinson, K., Bex, F., Borges, F., ... & Wyner, A. Z. (2012). A history of AI and law in 50 papers: 25 years of the International Conference on AI and Law. *Artificial Intelligence and Law*, 20(3), 215–319.
- Blaski, E., (2008). *Prawo karne: Repetytorium*. Wolters Kluwer.
- Bruner, C. M. (2020). Distributed ledgers, artificial intelligence and the purpose of the corporation. *The Cambridge Law Journal*, 79(3), 431–458.
- Carrillo, M. R. (2020). Artificial intelligence: From ethics to law. *Telecommunications Policy*, 44(6), 101937.
- Cath, C., Wachter, S., Mittelstadt, B., Taddeo, M., & Floridi, L. (2018). Artificial intelligence and the "Good society:" The US, EU, and UK approach. *Science and Ethics*, 24(2), 505–528.
- Downe-Wamboldt, B. (1992). Content analysis: Method, applications, and issues. *Health Care for Women International*, 13(3), 313–321.
- Duina, F., & Raunio, T. (2007). The open method of co-ordination and national parliaments: Further marginalization or new opportunities? *Journal of European Public Policy*, 14(4), 489–506.

- Dwivedi, Y. K., Hughes, L., Ismagilova, E., Aarts, G., Coombs, C., Crick, T., ... & Williams, M. D. (2021). Artificial intelligence (AI): Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy. *International Journal of Information Management*, 57, 101994.
- Galindo, L., Perset, & Sheeka, F. (2021). *An overview of national AI strategies and policies*, OECD Publishing.
- Gregor, B., & Kaczorowska-Spychalska, D. (2022). *Technologie cyfrowe w biznesie: Przedsiębiorstwa 4.0 a sztuczna inteligencja*. PWN.
- Gutteridge, H. C. (1971). *Comparative law: An introduction to the comparative method of legal study and research*. CUP Archive.
- Hacker, P. (2018). Teaching fairness to artificial intelligence: Existing and novel strategies against algorithmic discrimination under EU law. *Common Market Law Review*, 55(4), 1143–1186.
- Harari, Y. N. (2018). *21 lekcji na XXI wiek*. Wydawnictwo Literackie.
- Hathaway, O. A. (2000). Path dependence in the law: The course and pattern of legal change in a common law system. *Iowa Law Review*, 86, 601.
- Jobin, A., Guettel, L., Liebig, L., & Katzenbach, C. (2021). *AI federalism: Shaping AI policy within states in Germany*. arXiv: 2111.04454.
- Justo-Hanani, R. (2022). The politics of artificial intelligence regulation and governance reform in the European Union. *Policy Sciences*, 55(1), 137–159.
- Katzenbach, C., & Bareis, J. (2021). Talking AI into being: The narratives and imaginaries of national AI strategies and their performative politics. *Science, Technology, and Human Values*, 47(5), 855–881.
- Kawecki, M. (2021). CD talks: *Etyczne dylematy rozwoju technologii*. YouTube. <https://www.youtube.com/watch?v=c3GjLGSyVak>
- Koulu, R. (2020). Human control over automation: EU policy and AI ethics. *European Journal of Legal Studies*, 12, 9.
- Kuck, J. (2013). Nowoczesne technologie oraz innowacyjność w procesach zarządzania, <https://depot.ceon.pl/bitstream/handle/123456789/8943/10.%20Nowoczesne%20technologie%20oraz%20innowacyjno%C5%9B%C4%87%20w%20procesach%20zarz%C4%85dzania%20%28XX%29.pdf>
- Marr, B. (2016, August 12). What is the difference between deep learning, machine learning and AI?, *Forbes*. <https://www.forbes.com/sites/bernardmarr/2016/12/08/what-is-the-difference-between-deep-learning-machine-learning-and-ai/?sh=5cb9a4c126cf>
- McCarthy, J. (2007). From here to human-level AI. *Artificial Intelligence*, 171(18), 1174–1182.
- Niedbalska, G., (1999). Pojęcie i klasyfikacja wyrobów wysokiej techniki. *Ekonomika i Organizacja Przedsiębiorstwa*, 10, 3–7.
- Przegalińska, A., & Oksanowicz, P. (2020). *Sztuczna inteligencja: Nieludzka, arcyłudzka.*, Znak.
- Roig-Tierno, N., Gonzalez-Cruz, T. F., & Llopis-Martinez, J. (2017). An overview of qualitative comparative analysis: A bibliometric analysis. *Journal of Innovation & Knowledge*, 2(1), 15–23.
- Ruiz, K., Śmiechowski, M., & Zalewski T. (2022, January 25). Alert prawny: Kolejne zmiany w projekcie rozporządzenia w sprawie sztucznej inteligencji. *Bird&Bird*. <https://www.twobirds.com/pl/insights/2022/poland/220126-alert-prawny-zmiany-w-rozporzadzeniu-ai>
- Schalkoff, R. J. (1990). *Artificial intelligence: An engineering approach*, McGraw-Hill College.
- Sroka, R. (2019). Modele i warunki rozwoju etyki sztucznej inteligencji w biznesie. *Prakseologia*, 161, 1–20.
- Stemler, S. E. (2015). Content analysis. In R. A. Scott, S. M. Kosslyn, & M. Buchmann (Eds.) *Emerging trends in the social and behavioral sciences: An interdisciplinary, searchable, and linkable resource*. (pp. 1–14). Wiley.
- Ulnicane, I. (2022). Artificial intelligence in the European Union: Policy, ethics and regulation. In T. C. Hoerber, G. Weber, & Ignazio Cabras (Eds.), *The Routledge Handbook of European Integrations*. (pp. 254–270). Taylor & Francis.
- Villani, C., Bonnet, Y., & Rondepierre, B. (2018). *For a meaningful artificial intelligence: Towards a French and European strategy*. Conseil national du numérique.

Member States' AI Policies

Austria

Strategie der Bundesregierung für künstliche Intelligenz: Artificial intelligence mission Austria 2030

Belgium

AI 4 Belgium

Bulgaria

Concept for the development of artificial intelligence in Bulgaria until 2030

Cyprus

National artificial intelligence (AI) strategy: Key action for promoting the integration and development of AI in Cyprus

Czech Republic

National artificial intelligence strategy of the Czech Republic

Denmark

National strategy for artificial intelligence

Estonia

Estonia's national artificial intelligence strategy 2019–2021

Finland

Leading the way into the age of artificial intelligence: Final report of Finland's artificial intelligence programme 2019

France

For a meaningful artificial intelligence: Towards a French and European strategy

Germany

Artificial intelligence strategy

Artificial intelligence strategy of the German federal government

Greece

Democratising AI: A national AI strategy for Greece

Hungary

Hungary's artificial intelligence strategy 2020–2030

Ireland

AI - here for good: A national artificial intelligence strategy for Ireland

Italy

Proposte per una strategia Italiana per l'intelligenza artificiale

Latvia

Latvia's national AI strategy

Lithuania

Lithuania's artificial intelligence strategy: A vision of the future

Luxembourg

Artificial intelligence: A strategic vision for Luxembourg

Malta

The ultimate AI launchpad: A strategy and vision for artificial intelligence in Malta 2030

The Netherlands

Strategic action plan for artificial intelligence

Poland

Policy for the development of artificial intelligence in Poland from 2020

Portugal

AI Portugal 2030 initiative on digital skills

Romania

Romania in the era of artificial intelligence

Slovakia

Action plan for the digital transformation of Slovakia for 2019–2022

Slovenia

Slovenia's national programme on AI

Spain

Estrategia nacional de inteligencia artificial

Sweden

National approach to artificial intelligence

Legal Acts of the European Union

Charter of Fundamental Rights of the European Union. (2007). C 303/01. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.C_.2007.303.01.0001.01.ENG&toc=OJ%3AC%3A2007%3A303%3ATOC

Consolidated Versions of the Treaty on European Union and the Treaty on the Functioning of the European Union. (2008). OJ C115/13. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.C_.2008.115.01.0001.01.ENG&toc=OJ%3AC%3A2008%3A115%3ATOC

Consolidated Versions of the Treaty on European Union and the Treaty on the Functioning of the European Union. (2016). OJ C202/1. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:C:2016:202:TOC>