EUROPE | APRIL 2023

Artificial Intelligence Act:

A Policy Prototyping Experiment

Revisiting the Taxonomy of AI Actors

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About Open Loop

Open Loop is a global program that connects policymakers and technology companies to help develop effective and evidence-based policies around AI and other emerging technologies.

The program, supported by Meta (previously Facebook), builds on the collaboration and contributions of a consortium composed of regulators, governments, tech businesses, academics and civil society representatives. Through experimental governance methods, Open Loop members co-create policy prototypes and test new and different approaches to laws and regulations before they are enacted, improving the quality of rulemaking processes in the field of tech policy.

This report presents the findings and recommendations of the third part of the Open Loop's policy prototyping program on the European Artificial Intelligence Act (AIA), which was rolled out in Europe from June 2022 to December 2022, and in partnership with Estonia's Ministries of Economic Affairs and Communications and Justice, and Malta's Digital Innovation Authority (MDIA).

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Cite this report

Andrade, Norberto Nuno de, Galindo, Laura, and Antonella Zarra. "Artificial Intelligence Act: A Policy Prototyping Experiment: Revisiting the Taxonomy of AI Actors" (2023), at https://openloop.org/reports/2023/04/Artificial_Intelligence_Act_A_Policy_Prototyping_Experiment_Taxonomy_AI_Actors.pdf

Acknowledgements

This policy prototyping program was co-designed and facilitated by **Meta** in collaboration with our partners from the **Government of Estonia** and the **Malta Digital Innovation Authority (MDIA)**.

We want to thank in particular Henrik Trasberg, Legal Advisor on AI and New Technologies, Estonian Ministry of Justice; Ott Velsberg, Government Chief Data Officer, Estonian Ministry of Economic Affairs and Communications; Kenneth Brincat, CEO, MDIA and Ian Gauci and Gordon Pace, Advisors, MDIA.

A special thanks to the experts consulted as part of the interviews for their contribution to the report: Noelle Cicila, Kees Stuurman, Tjerk Niman, and Johann Laux.

We would like to thank the following companies for their participation. Without their commitment and active involvement this project would not have been possible:

2021.ai Denmark
ASC27 Italy
Armilla AI Canada
Ask Mona France
AUNOA Spain
Bluetensor Srl Italy
Credo AI United States
Deeploy Netherlands
DLabs.AI Poland
Elara Tech Georgia
Enzai Technologies Limited Ireland
Evo Italy/United Kingdom
Flawless United Kingdom
Flytxt BV Netherlands
Future Intelligence Greece
Gossik AG Switzerland
indigo.ai Italy
Invrsion Italy
iov42 United Kingdom/Austria
Irida Labs Greece
Keepler Data Tech Spain
Keyless United Kingdom/Italy/Singapore
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Qubit Ventures Germany
super.AI Germany
SynerScope bv Netherlands
TAWNY Germany
Telesoftas Lithuania
Tgs Baltic Lithuania/Estonia/Latvia
The Newsroom Portugal
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Translated Italy
Travers Smith United Kingdom
Vedrai SPA Italy
Virtuleap Portugal/United States/ United Kingdom/Spain
Visor.ai Portugal
Vixtape Portugal
Voxist France
Vytautas Magnus University Lithuania
Watermelon Netherlands
Wayve United Kingdom
WingDriver United States
yData Labs Inc Portugal
Zupervise United Kingdom/India

Thank you in particular to the individual experts that represented the participating companies throughout the program:

Rasmus Hauch, Björn Preuss, Colum Donnelly, Nicola Grandis, Marion Carré, Fernando Perez, Jonni Malacarne, Ehrik Aldana, Susannah Shattuck, Evi Fuelle, Bastiaan van de Rakt, Maciej Karpicz, Shemmy Majewski, Negar Vahid, Ryan Donnelly, Kaitlin Goodrich, Stuart Lawrence, Prateek Kapadia, Anargyros Sideris, Benno Staub, Gianluca Maruzzella, Fabrizio Dini, Alexis de Vienne, Thomas Charisis, Christos Theocharatos, Ezequiel Paura, Pierluigi Failla, Claus Lang, Maury Shenk, Florian Neumeier, Simone Gabriellini, Alessandro Nuara, Francesco Trovò, Tommaso Demattè, Davide Fanale, Nicola Caporaso, Elisa Czerski, Ramin Karbalaie, Rui Dias Ferreira, Philip Meier, Alessandro Lazzeri, Federico Cesari, Hakki Ercosman, Sina Youn, Jan-Kees Buenen, Marco Maier, Bart Kappel, Mindaugas Civilka, Jenny Romano, Lorenzo Mora, Pedro Henriques, James Black, Sébastien Bratières, Shawn Curran, Hossein (Kian) Sarpanah, Amir Bozorgzadeh, Victòria Brugada-Ramentol, Bebiana Moura, Gonçalo Consiglieri, Michael Fiorentino, Karel Bourgois, Tomas Krilavičius, Darius Amilevičius, Alexander Wijninga, Sarah Gates, Daniel Quirke, André Azevedo, Fabiana Clemente, Janhvi Pradhan Deshmukh, Philip Dawson

We would also like to thank the Open Loop's partners and observers from business, academia, civil society, international institutions, and governmental authorities:

Members of European Parliament

- **Eva Maydell**
  ITRE Rapporteur of the AI Act (BG, EPP)
- **Ivan Štefanec**
  President of SME Europe (SK, EPP)

International Institutions / Governmental Authorities

- **Alessandro Fusacchia**
  Former Member of the Italian Parliament, Coordinator of Parliamentary Intergroup on AI
- **Andras Hlacs**
  AI Policy Analyst, OECD.AI, Organisation for Economic Co-operation and Development (OECD)
- **Işıl Selen Denemeç, LL.M**
  Head of Legal Department, Digital Transformation Office of the Presidency of the Republic of Türkiye
- **Karine Perset**
  Head of AI Unit and OECD.AI, Organisation for Economic Co-operation and Development (OECD)
- **Luca Carabetta**
  Former Member of the Italian Parliament
- **Richard Nevinson**
  Head of Digital Economy, Information Commissioner's Office (ICO)
- **Dr. Zümrüt Müftüoğlu**
  Expert, Digital Transformation Office of the Presidency of the Republic of Türkiye

Academia / Think Tanks

- **Andrea Bertolini**
  EURA Centre, Scuola Superiore Sant'Anna Pisa
- **David Osimo**
  Lisbon Council
- **Eduard Fosch**
  Leiden University
- **Evert Stamhuis**
  DIGOV Centre Rotterdam University
- **Fabiana di Porto**
  University of Salento and LUISS University
- **Giovanni Sartor**
  University of Bologna and European University Institute
- **Johann Laux**
  Oxford Internet Institute
- **Joshua Ellul**
  University of Malta and Former chairman, Malta Digital Innovation Authority
- **Klaus Heine**
  Professor, DIGOV Centre Rotterdam University
- **Nicolaos Voros**
  University of the Peloponnese
- **Risto Uuk**
  The Future of Life Institute
- **Virginia Dignum**
  Umeå University

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THE FUTURE SOCIETY

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Executive summary

In this report, we explore the efficacy of the taxonomy of AI actors in the EU Artificial Intelligence Act (AIA) (e.g., provider, user, and importer), proposing an alternative for the taxonomy of AI actors currently included in the proposal.[1] This research is part of the Open Loop Program of the EU AIA.

The question we pose is whether *the taxonomy of AI actors in the AIA is effective and, if not, what an alternative taxonomy would look like. Our hypothesis is that* ***the current taxonomy of AI actors in the AIA does not accurately reflect the AI market, and this may lead to issues in assigning responsibilities for market actors and apportioning liability.***

To test our hypothesis and address our research questions, we surveyed AI companies in our Open Loop Forum (OLF), conducted expert interviews, and performed desk research.

Based on the information gathered, we conclude that the existing taxonomy does not accurately reflect the actors in the AI ecosystem. In particular, roles such as the subject, third-party service providers, and data providers seem to be missing from the AIA's text.

In our alternative taxonomy, we propose the following actors:

- ***AI Developer:*** The natural or legal person that builds generic or specific AI systems at the behest of third parties but who do not place this product on the EU market.
- ***AI Provider:*** The natural or legal person that places a generic or specific AI system on the EU market.
- ***AI Service Provider:*** The natural or legal person that provides AI support tools and/or services on demand.
- ***Data Provider:*** The natural or legal person that provides data for training, testing and/or validating generic or specific AI systems.
- ***User:*** The natural or legal person using a specific or generic AI system to perform a particular task.
- ***End user:*** The natural person operating the AI system and/or using AI system outputs to inform their actions.
- ***Subject:*** A natural or legal person that is directly influenced by the outcomes of an AI system.
- ***Importer:*** The natural or legal person established in the EU importing a generic or specific AI system from outside the EU and placing it on the EU market.
- ***Distributor:*** The natural or legal person established in the EU importing a generic or specific AI system from outside the EU and making it available to a provider that places it on the EU market.

This alternative taxonomy more accurately reflects the actors in the AI ecosystem and their interactions. As such, it should allow for a more fine-grained and focused approach when it comes to assigning responsibilities and identifying liability. Conversely, a potential drawback of a richer taxonomy is that it becomes too complex for organizations to understand the law and their role within that law. Therefore, we encourage further study and actual testing of the existing taxonomy and our alternative taxonomy in practice.

1

Introduction

In this report, we explore the efficacy of the taxonomy of AI actors (e.g., provider, user, and importer) in the proposed EU Artificial Intelligence Act (AIA) and propose an alternative for the taxonomy of AI actors currently included in the proposal.[2] This research is part of the Open Loop Program of the EU AIA.[3]

Problem statement

Our hypothesis is that the current taxonomy of AI actors in the EU AIA does not accurately reflect the complex market for AI in Europe. This, in turn, may have an effect on the ability to apply the AIA provisions effectively, for instance, because it is unclear where certain actors in the AI ecosystem sit in terms of the AIA obligations.

The taxonomy of AI actors from the AIA has its roots in the physical product safety paradigm, whereby there are strict requirements on, for example, safety and security for products that are to be placed on the EU market. The question, however, is whether AI systems[4] are developed, placed on the market, and used in much the same way as "traditional" products. In particular, we need to explore whether the paradigm of physical products with a clear distinction between producers and consumers also fits AI systems.

Therefore, the problem statement for this research is as follows:

Is the taxonomy of AI actors in the AIA effective, and if not, what would an alternative taxonomy of AI actors look like?

To solve this problem statement, we explore the following research questions (RQs):

1. **RQ1: What is the current taxonomy of AI actors?**
2. **RQ2: Does this taxonomy cover all (potential) actors in the AI ecosystem?**
3. **RQ3: What are the potential issues with the existing taxonomy of AI actors?**
4. **RQ4: What are the guiding principles for developing an alternative taxonomy of AI actors in the AIA?**
5. **RQ5: What would an alternative taxonomy look like?**

Methodology

To test our hypothesis and address our problem statement, we adopted a mixed methods approach, combining desk research with quantitative results from surveyed AI companies in our Open Loop Forum (OLF) and qualitative insights collected via semi structured interviews with experts.

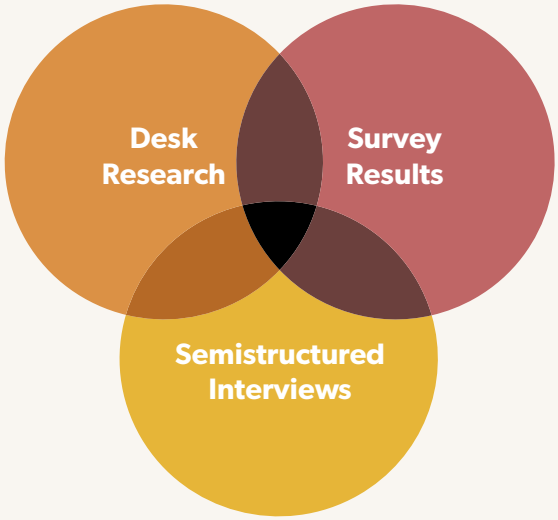


Figure 1. Mixed methods methodology

i. The Open Loop Forum (OLF)

In the first phase of the Open Loop policy prototyping[5] program that focused on the AI Act[6] (AIA), we asked participating companies to share their views of the AI ecosystem and the proposed taxonomy of the AI actors. To gather feedback, we set up the OLF, a closed online platform where invited participants took part in various research-related tasks. The participants were mostly AI startups and scale-ups that could be categorized as "providers" under the AIA. We asked these participants whether the definitions from the AIA were clear and whether they could identify themselves under the AIA taxonomy. We also provided them with different scenarios in which they had to assign roles to different actors and assess their liability.[7]

ii. Interviews

We conducted four interviews to obtain insights from experts in the fields of AI, policy, governance, and law. The goal of these interviews was to get feedback from experts on the existing taxonomy of AI actors and our alternative taxonomy. Interviewed experts include: Noelle Cicila, Cofounder at Brush AI; Prof. Dr. Kees Stuurman, Emeritus professor of IT law at Tilburg University; Dr. Tjerk Niman, Senior scientist at TNO; Dr. Johann Laux, Research fellow at the Oxford Internet Institute.

iii. Desk research

In the desk research, we assessed regulatory frameworks from other jurisdictions (e.g., Japan), international organizations (e.g., United Nations Commission on International Trade Law, UNCITRAL; OECD), and amendments to the AIA suggested by the European Parliament (EP) and the Council of the European Union (Council). Furthermore, we used the literature on AI and the AI ecosystem.

Limitations of the research

One of the limitations of this research lies in the fact that neither the existing taxonomy of AI actors in the AIA, nor our alternative taxonomy, was tested in a real-world environment. Despite this, the evidence collected reports feedback from real-world actors in the existing AI ecosystem. Thus, with the proposed alternative taxonomy and conclusions drawn from the present research, we intend to stimulate discussion and inspire further research in this area.

Regarding the data collection process in the OLF, it is essential to note that the participants were primarily AI providers. However, the study also incorporated views from other key stakeholders, such as academics and policymakers, through a thorough literature review and interview process, which enabled a more comprehensive understanding of the subject matter.

Reading guide

Following this introduction, in Chapter 2, we discuss the AIA and existing taxonomy of AI actors, answering **RQ1: "What is the current taxonomy of AI actors?"**

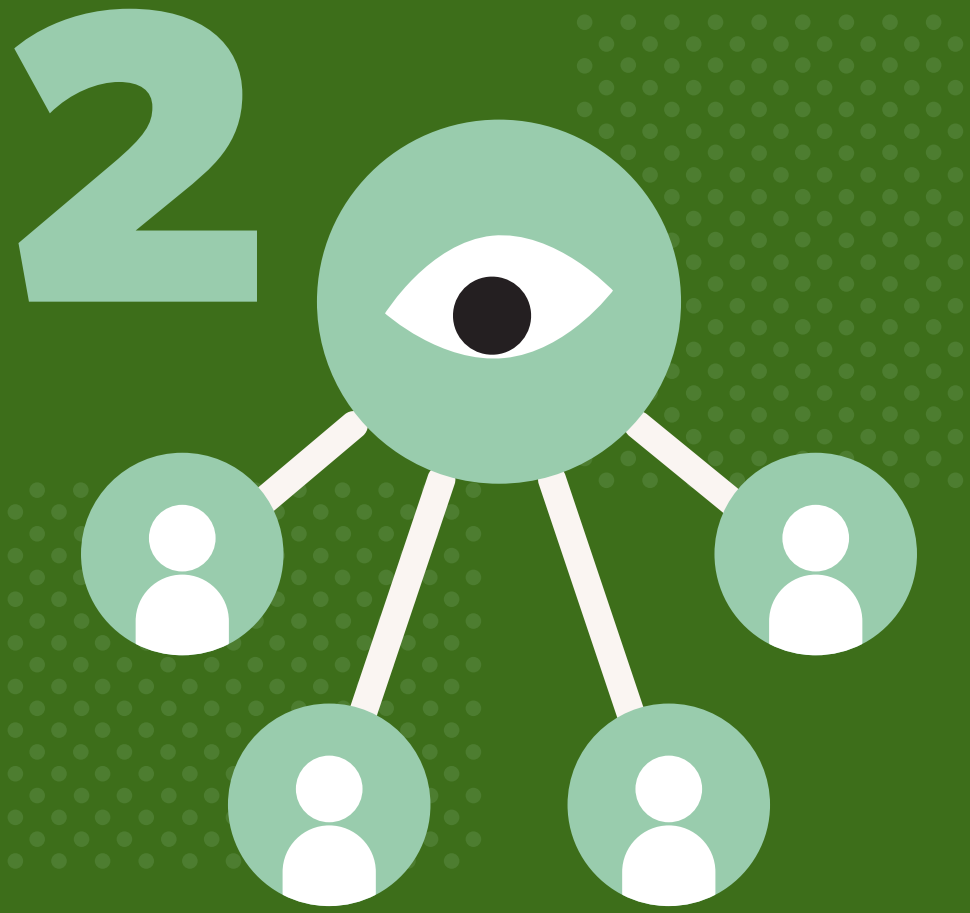
In Chapter 3, we examine the AI ecosystem. The concept of an **AI ecosystem** is relatively new, so the roles of the different parties involved are not firmly established. As technology evolves, new actors emerge. Rather than attempting to define the AI ecosystem, we have chosen to present different perspectives, such as a product perspective and an MLops perspective; in doing so, we have aimed to demonstrate that there are numerous actors involved, along with various types of relationships between actors. We accept that this depiction may not be all-encompassing, but it is helpful in answering this chapter's key question: **RQ2: "Does this taxonomy offer sufficient coverage of the different actors in the AI ecosystem?"**

In Chapter 4, we explore potential issues with the existing taxonomy of AI actors by using insights from our desk research, OLF, and the interviewees. This will answer **RQ3: "What are potential issues with the existing taxonomy of AI actors?"**

In Chapter 5, we set out several guiding principles for an alternative taxonomy. This will answer **RQ4: "What are the guiding principles for developing an alternative taxonomy of AI actors in the AIA?"**

In Chapter 6, we use the results of Chapter 4 and the guiding principles from Chapter 5 to propose an alternative taxonomy. This will answer **RQ5: "What would an alternative taxonomy look like?"** We explain our rationale for this taxonomy in Chapter 7.

Finally, Chapter 8 provides a series of policy recommendations and conclusions.



The AIA taxonomy of AI actors

The AIA can be viewed as a product safety regulation. In general, product safety regulations set specific requirements for producers who want to place their products in the EU market. The requirements are as follows:

- only place products on the EU market that are safe;
- inform users how to use the product and of any associated risks; and
- ensure that any dangerous products present on the market can be traced so that they can be removed/repaired to avoid any risks.[8]

The AIA approaches the regulation of AI systems in the same way as any other product categories (e.g., consumer products, medical devices) by setting rules for those actors placing AI systems on the EU market ("providers") and those using those systems ("users").

Box 1

Taxonomy of AI actors (Art. 3, AIA)

The AIA presents the following taxonomy of AI actors in article 3:

1. *"(..) 'provider' means a natural or legal person, public authority, agency or other body that develops an AI system or that has an AI system developed with a view to placing it on the market or putting it into service under its own name or trademark, whether for payment or free of charge;*
2. *'small-scale provider' means a provider that is a micro or small enterprise within the meaning of Commission Recommendation 2003/361/EC61;*
3. *'user' means any natural or legal person, public authority, agency or other body using an AI system under its authority, except where the AI system is used in the course of a personal non-professional activity;*

4 *'authorised representative' means any natural or legal person established in the Union who has received a written mandate from a provider of an AI system to, respectively, perform and carry out on its behalf the obligations and procedures established by this Regulation;*

5 *'importer' means any natural or legal person established in the Union that places on the market or puts into service an AI system that bears the name or trademark of a natural or legal person established outside the Union;*

6 *'distributor' means any natural or legal person in the supply chain, other than the provider or the importer, that makes an AI system available on the Union market without affecting its properties;*

7 *'operator' means the provider, the user, the authorised representative, the importer and the distributor;"*

Within this taxonomy, the two main actors are 'the provider' (i.e., the producer of an AI system placing it on the market) and the 'user' (i.e., the entity using the provided AI system). For instance, when an AI startup develops a chatbot and sells this to an e-commerce company, the AI startup is the provider, and the e-commerce company is the user.

The provider and user are the main actors in the AIA because most scenarios will involve an entity developing and placing an AI system on the market and one or more entities using this AI system. However, although this is a common scenario, more entities may be involved in both developing and using AI systems.

The other roles (authorized representative, importer, distributor) mainly serve to operationalize the territorial application of the AIA. AI systems may be developed outside of the EU and imported and distributed in the EU, or they may be made directly available to EU users from outside of the EU. The roles of representative, importer, and distributor have been introduced to avoid those systems falling outside of the scope of the AIA. This creates a structure whereby the AIA will still apply, regardless of whether the system is developed within the EU, developed outside of the EU, imported in the EU, or developed and operated outside of the EU but made available in the EU.

3

The AI ecosystem

A prerequisite for an effective taxonomy of AI actors in the AIA is that it should be able to cover the different relations in the AI market (the AI ecosystem). When actors are missing or their definition is too broad or too narrow, it will be impossible to map real-world relations to the requirements in the law, leading to legal uncertainty. At the same time, creating a taxonomy that is (overly) complex also creates problems because it will make the AIA more difficult to understand and could also create a higher burden for individuals and small businesses that have to comply with the AIA.

The AI market consists of a multitude of organizations on the supply and demand side, providing a host of different products and services. These actors and their (potential) relationships need to be captured effectively by the AIA (and/or related legislation) to ensure that the law can govern these different relations.

To obtain an overview of the different actors involved and their relationships, we can look at the AI ecosystem from different angles:

A first way of looking at the AI ecosystem is to distinguish between AI providers that offer the following:

- ***Generic AI systems/models*** that can be used by a client (user) for a number of purposes. An example of this would be a generic speech recognition model that might be used in a customer care center but also in a court of law. These models can be proprietary or open source.[9]
- ***Purpose-specific AI systems/models*** that are aimed at performing a particular function or servicing a particular market. An example of this would be a model for assessing the credit risks of customers buying products in a webshop.[10]

A second way of looking at the market is to distinguish between AI systems that are the following:

- "off the shelf" or "as a service,"
- AI systems that are custom built based on specifications of the client/user, and
- offered as open-source products.

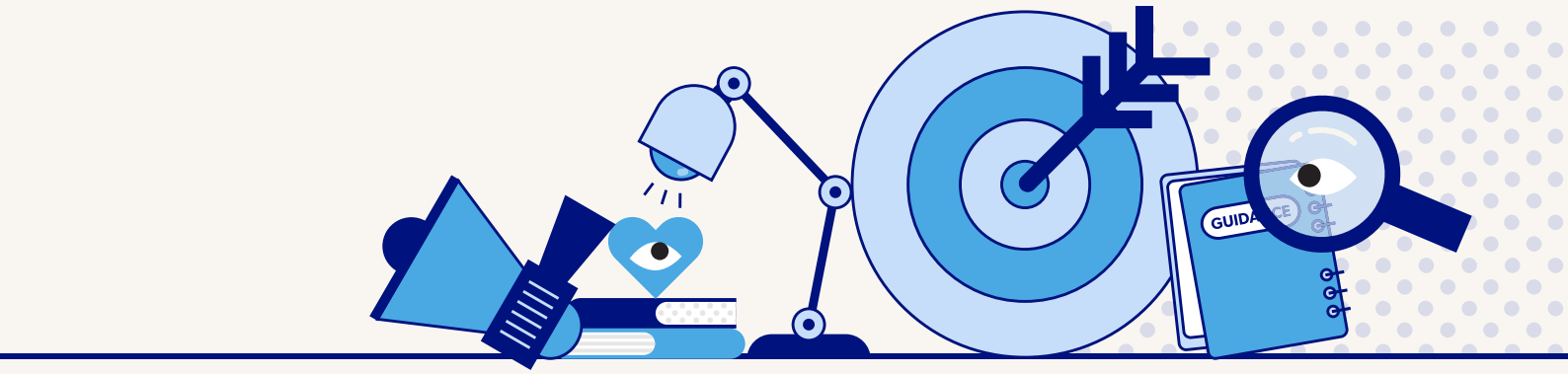
A provider can build an AI system and sell it as a product or service. In this constellation, the user (the client) has no influence over the development of the system. Within the second category the client/user may have significant influence over the building process, for example, by providing subject matter expertise, providing relevant training data and setting the overall requirements/specifications for the AI system. Finally, a provider may offer their model as an open-source resource to be used by third parties.

A third way of looking at the AI ecosystem is by looking at the model-building process ('MLops' for machine learning). Here, we can roughly distinguish among the 1) design, 2) model development, and 3) production/deployment/maintenance phases. [11] Within these phases, there are different roles/tasks where specialized companies may offer services in each area. More broadly, AI development platforms such as TensorFlow, PyTorch, and Vertex AI provide platforms for training, testing, validating, and deploying AI models, each bringing a custom set of tools to support the MLops process.

A fourth way of looking at the AI ecosystem is distinguishing between AI systems that are stand-alone products for "end-users" (e.g., an image recognition model for a hospital or a marketing system determining "next best

actions" for an e-commerce company) and AI systems that are component parts of other AI systems. For example, a provider can create a specific speech recognition AI system that uses a generic language model as a basis for developing a more specific model.

A fifth and final way to look at the AI ecosystem is the interaction between different AI systems and their interdependence. For instance, a model may provide an output that can be used as training data as the input for a different model. For instance, a weather forecasting model may use information from other forecasting models to predict weather more accurately. These models may have been developed by the same provider, but they may also have been developed by different providers. Furthermore, both models may be operated by a single user, but it could also be that these users are different entities. In our weather forecasting example, for instance, a weather forecasting channel may operate the weather forecasting AI, which sources input from a model operated by, for example, a commercial company.



Efficacy of the taxonomy of AI actors

Insights from the Open Loop Forum[12]

Regarding the taxonomy of AI actors from the AIA, we established that the definitions of provider and user were sufficiently clear for the participants, at least "on paper."

Although the definitions of user and provider were clear, most participants argued that, in practice, these roles are not mutually exclusive. A provider is often also a user (because they may use other AI systems as part of the AI system that they provide); furthermore, the user may significantly influence the work of the provider, for instance, by setting requirements for the AI system and/or providing training data. This means that, in practice, it is much more difficult to assign distinct roles to each of the parties involved in the creation and use of an AI system.

We also observed that the interdependence of different actors in the AI ecosystem raises questions regarding liability. The participants were very much split on who should be held responsible because actors depend on one another for correct training and input data, models, and other technologies.

What we concluded from this exercise is that the binary product-based approach of the AIA (provider/user) does not fully match the reality of the AI ecosystem. We had the impression from the participants' reactions that AI is much less of an "off-the-shelf" product. This is relevant to note because the product liability framework on which the AIA is based takes off-the-shelf products as the point of departure.

Insights from other jurisdictions and international frameworks

The issue of AI regulation is an area of focus in many jurisdictions throughout the world. It is helpful to look at initiatives in other jurisdictions or within international organizations because they can help inform our own taxonomy.[13]

i. Japan

In Japan, the first taxonomy of AI actors was developed by the Conference toward AI Network Society in the **AI Utilization Guidelines.**[14] The document describes the following roles for different actors:

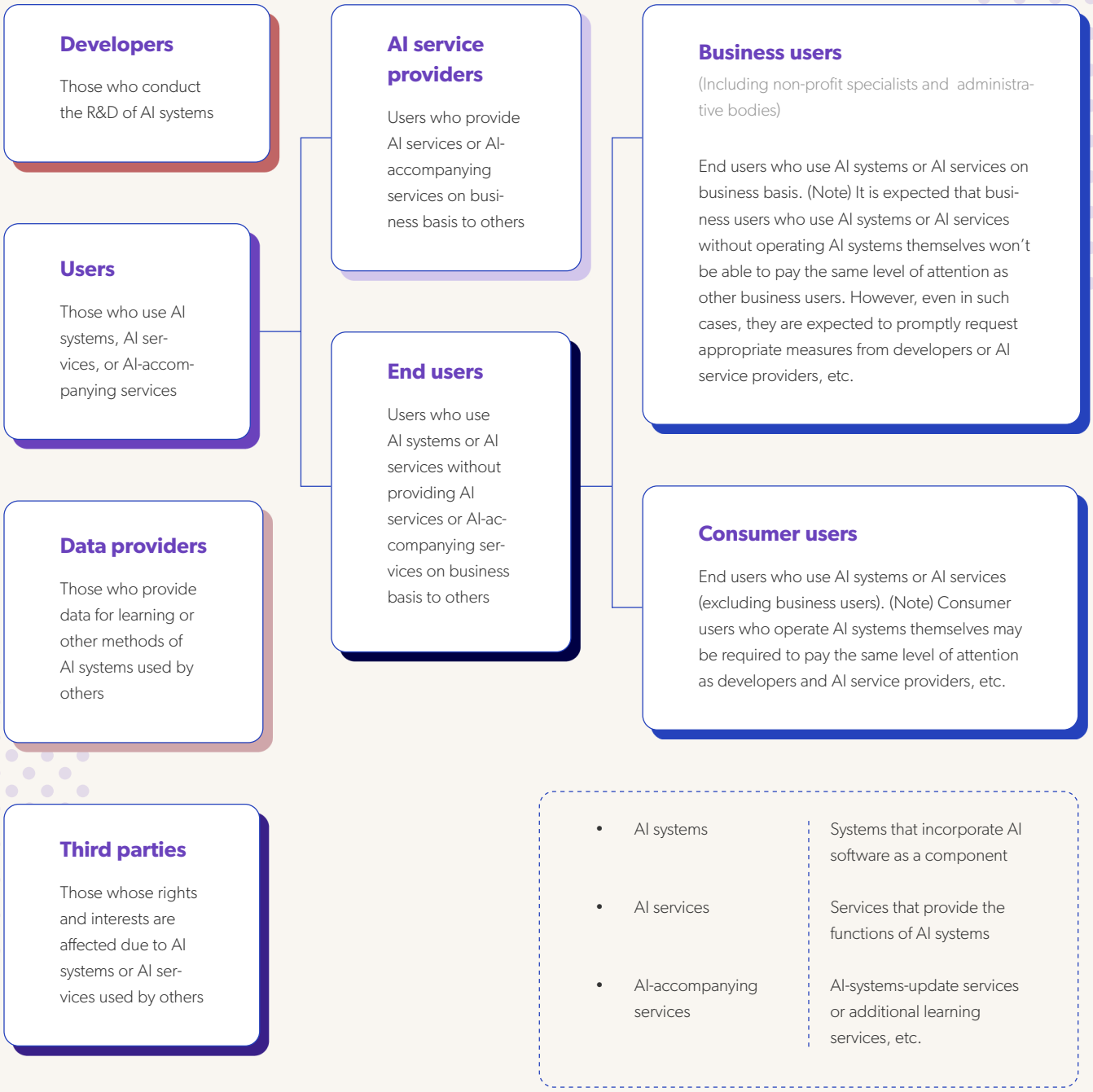


Figure 2. Classification of AI actors. Source: Adapted from Japan AI Utilization Guidelines (2019). Retrieved from https://www.soumu.go.jp/main_content/000658284.pdf

In the AIA, the concept of a *Developer* is comparable to that of a *Provider*. A developer can be an organization that specifically aims at placing AI systems on the market (i.e., selling AI systems) but can also be a business user developing an AI system in house.

In the AI Utilization Guidelines, it is specifically mentioned that a *User* can also be a *Developer* when they develop an AI system in house. An actor that is recognized in the guidelines, but not in the EU AIA, is the *Data Provider.*

The **Japanese Ministry of Economy, Trade, and Industry (METI)** has adopted a similar taxonomy in its Governance Guidelines for Implementation of AI Principles.[15]

Box 2

Japan's METI Governance Guidelines (2022)

The Governance Guidelines use the following definitions:

AI system developer:

An entity that develops an AI system for its own use or to provide it to others as a business (including an entity that conducts retraining, e.g., to maintain the performance of an AI system).

AI system operator:

An entity that operates an AI system for its own use or for the use of others as a business (e.g., it includes an entity that does not engage in AI system development, but simply procures and operates an AI system) and, to a certain extent, is responsible for the operation of the AI system and/or maintenance of its performance. Although such an entity is not necessarily the legal right holder of the AI system, it is generally believed that, in many cases, they are the same entity.

AI system user:

An entity that simply uses an AI system developed by an AI system developer or an AI system provided by an AI system operator and that is not responsible for the operation of the AI system and/or maintenance of its performance. Note that AI system users include those who use AI systems for business purposes and consumers who use AI systems for nonbusiness purposes. METI argues that it is preferable to understand users in a more flexible manner based on their literacy levels rather than explicitly dividing the users into the two groups.[16]

Data provider:

An entity that, as a business, provides others with data collected from a number of unspecified sources, data collected from specific people, data prepared by the data provider itself, a combination of these, or data created by processing the above-mentioned data for the purpose of AI system training.

According to METI's guidelines, a single AI company may be classified into multiple roles at the same time. For example, if the development and operation of an AI system are performed by the same company, the company is an AI system developer and AI system operator.

What stands out from METI's guidelines is that there is a distinction between the AI operator and AI system user, whereas in the AIA, there is a singular actor: the user. Furthermore, METI's guidelines introduce the concept of a data provider, which is not present in the AIA.

ii. OECD

The OECD AI 2019 Recommendation defines AI actors as those who play an active role in the "AI system lifecycle." This life cycle consists of four phases: (i) design, data, and models; (ii) verification and validation; (iii) deployment; and (iv) operation and monitoring. The OECD Recommendation also refers to "stakeholders," as those other persons involved in or affected by an AI system, which includes AI actors.

In 2021, the OECD offered a nonexhaustive landscape of the different AI actors across an AI system value chain in its OECD Business and Finance Outlook 2021: AI in Business and Finance report, as shown in Figure 3.

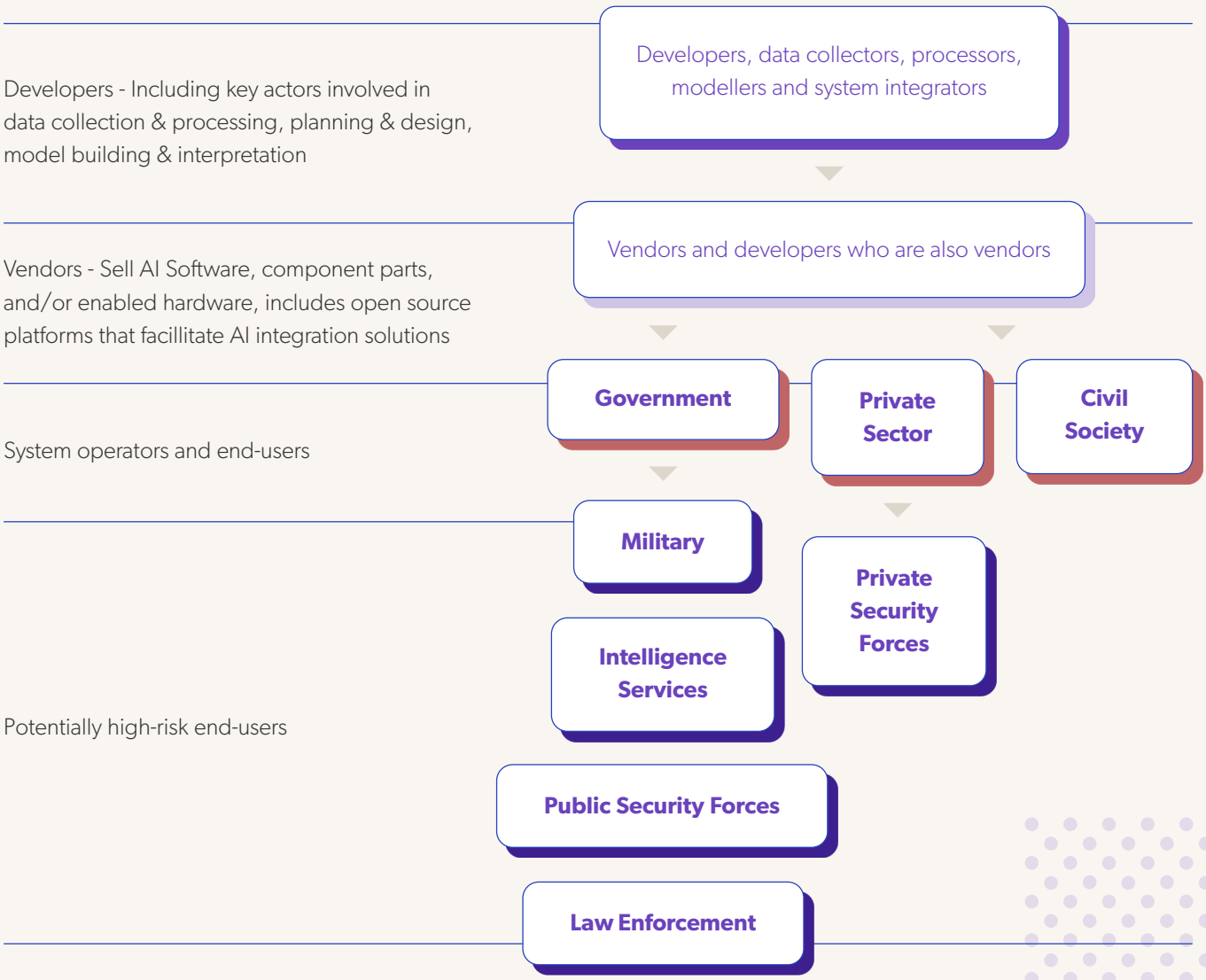


Figure 3. OECD's mapping of the AI supplly chain. Adapted from OECD. (2021). Business and Finance Outlook 2021: AI in Business and Finance report. Chapter 3: "Human rights due diligence through responsible AI". OECD Publishing. https://doi.org/10.1787/ba682899-en

What stand out in this taxonomy is the distinction between *Developers* and *Vendors* and the division between *End-users* and *Potentially high-risk end-users.*

Further, in its latest OECD 2023 report "Advancing Accountability in AI," the OECD suggests carrying out an analysis of the actors that should be involved in the risk management process across the AI life cycle. This more holistic taxonomy stems from the premise that actors should manage risks based on the roles they play in the ecosystem.

Figure 4. Actors in an AI accountability ecosystem.[17] Adapted from OECD (2023), "Advancing accountability in AI: Governing and managing risks throughout the lifecycle for trustworthy AI", OECD Digital Economy Papers, No. 349, OECD Publishing, Paris, https://doi.org/10.1787/2448f04b-en

iii. UNCITRAL

Within the United Nations Commission on International Trade Law (UNCITRAL), a taxonomy of AI actors was proposed based on the OECD Recommendation on AI, as shown in Box 3.[18]

Box 3

UNCITRAL's AI actors taxonomy (2020)

(a) *developer:*

The person who is responsible for the AI system's theoretical high-level design, programming, training and verification, and interfacing and integration with external hardware, applications and data sources before deployment;

(b) *data provider:*

The person who provides – or is responsible for providing – data to the system (i.e., the data needed to support training, deployment or operation);

(c) *deployer:*

The person who deploys the system by integrating it into its operations (e.g., the goods and services that it supplies), including by setting up, managing, maintaining and supporting the supply of data and infrastructure necessary for the operation and monitoring of the AI system and its interaction with the supplied data once deployed;

(d) *operator:*

The person who operates the system:

- in many cases, the operator will be the person who deploys the system;
- in some cases, the operator may be the end user of AI-enabled goods or services (e.g., if the end user has some control over the operation of the goods or services);

(e) *affected person:*

Any other person affected by the operation of an AI system, including by interacting with the system (e.g., by providing data to the system) or being the end user of AI-enabled goods or services."

What stands out from UNCITRAL's AI (UNCITRAL's AI taxonomy) is that it introduces the concept of the *Operator* and *Affected person.*[19] These roles refer to (natural) persons either operating the AI system or being affected by it. Although the AIA also has the concept of the operator, the concept of an operator is not very clear because the operator can be the provider, the user, the authorized representative, the importer, or the distributor. What also stands out is that, just like in the Japanese taxonomy, the data provider is a role in itself.

iv. Council of Europe

In its proposed Framework Convention on Artificial Intelligence, Human Rights, Democracy, and the Rule of Law,[20] the Council of Europe takes a similar approach to the AIA by introducing the notion of an artificial intelligence provider and an artificial intelligence user. An AI provider means *"any natural or legal person, public authority or other body that develops an artificial intelligence system with a view to putting it into service/commissioning it."*[21] While an AI user is defined as follows: *"Any natural or legal person, public authority or other body using an artificial intelligence system in their own name or under their authority."*[22]

The Council of Europe also adds the concept of an artificial intelligence subject. An AI subject is as follows:

> *"Any natural or legal person whose human rights and fundamental freedoms or connected legal rights guaranteed under applicable domestic law or international law are impacted through the application of an artificial intelligence system, including by decisions made or substantially informed by the application of such system."*

Thus, the definition is comparable to that of the "affected person" mentioned by UNCITRAL.

Amendments made in the AIA legislative process

The taxonomy of AI actors has also been subject to discussion in the EP and the Council.

i. European Parliament[23]

The EP has made several substantial changes to the taxonomy of AI actors. First, the EP has introduced the concept of an "end user," which is comparable to that of an "AI system user" in the METI taxonomy or an "operator" in the UNCITRAL taxonomy:

> *"'End user' means any natural person who, in the context of employment or contractual agreement with the user, uses or deploys the AI system under the authority of the user."*[24]

Along with this idea, the concept of an "AI subject" was also introduced, which is comparable to that of "the affected person"[25] in the UNCITRAL taxonomy:

> *"'AI subject' means any natural or legal person that is subject to a decision based on or assisted by an AI system, or subject to interaction with an AI system or treatment of data relating to them by an AI system, or otherwise subjected to analysis by an AI or otherwise impacted or affected by an AI system."*[26]

Furthermore, there are several amendments from the EP that clarify the liability for AI systems in the AI value chain. To assign liability, the EP introduced the concepts of an "original provider" and that of a "new provider" (new article 23a AIA).[27] The new article proposed in this amendment clarifies that, when an AI system that is placed on the market is, for example, changed or adapted by a new provider, the original provider is no longer liable for this new version/use.

ii. Council of the European Union (Council): Czech presidency compromise text[28]

The Council has not made any substantial changes to the taxonomy provided by the European Commission. However, to address the complexity of the AI value chain, the Council introduced the concept of a general purpose AI system:

> *"'General purpose AI system' means an AI system that—irrespective of how the modality in which it is placed on the market or put into service, including as open-source software—is intended by the provider to perform generally applicable functions such as image and speech recognition, audio and video generation, pattern detection, question answering, translation and others; a general purpose AI system may be used in a plurality of contexts and be integrated in a plurality of other AI systems."*

This new definition creates the possibility of differentiating between the application of rules to systems that are purposefully built for high-risk applications and those that serve a general purpose but may be used in the context of a high-risk activity.

In sum, as shown in the comparative table below, these various emerging frameworks provide different taxonomies of AI actors, each

with its own unique focus and nuances. METI's Governance Guidelines introduce the concept of a data provider, while UNCITRAL and the OECD both include the roles of operator and affected person, which can be seen as comparable to the AI subject introduced by the Council of Europe and the EP. The OECD's evolving taxonomy includes a broader set of actors involved in the AI system life cycle, such as auditors, certifiers, and supervisory authorities. These taxonomies show the complexity of the AI ecosystem and the need for a clear understanding of the various roles and responsibilities of its actors.

Institution	Considered AI Actors	Key Features
EU Commission	Provider, small-scale provider, user, operator, distributor, importer, authorized representative (2021).	Small-scale provider and product manufacturer (2022).
Japan - METI	AI system developer, AI system operator, AI system user, data provider (2022).	Distinguishes between AI operator and system user, includes data provider.
OECD	AI actors, stakeholders (2019). Developers, vendors, system operators and end-users, and potentially high-risk end-users (2021). Suppliers of AI knowledge and resources, actors in the AI life cycle users of the AI system, and stakeholders (2023).	Encompasses a wide range of actors involved in the AI ecosystem. Over time, the taxonomy has evolved and become more holistic.
UNCITRAL	Developer, data provider, deployer, operator, affected person (2020).	Introduces operator and affected person roles, includes data provider (like Japan).
Council of Europe	AI provider, AI user, AI subject (2023).	Specific, includes concepts such as AI subject (similar to UNCITRAL's affected person and the EU's Parliament proposal).
EU Parliament (2022)	End-user, AI subject (2022).	Additions to the EU Commission proposal.
Council (Czech Republic, 2022)	Small-scale provider and product manufacturer (2022).	Added the concept of General Purpose AI.

Table 1. Nonexhaustive comparative table of AI actor's taxonomies in selected frameworks.
Note: The table is not exhaustive, and there may be other AI actors or nuances to each taxonomy that are not included.

Insights from the interviews

As part of our methodology, we interviewed experts in the field of AI and AI regulation and asked them about the current taxonomy of AI actors and our alternative taxonomy. A summary of the main insights is given below.

The experts emphasized the importance of a taxonomy in the AIA to clarify the responsibilities of different actors involved in the AI value chain. They agreed that including the roles of AI developers, third-party providers, and end-users is essential to ensure human oversight and protect citizens' rights. However, they cautioned against creating a taxonomy with too many new actors because this may lead to difficulties in assigning liability, especially for smaller organizations and individuals. They emphasized the need to align existing EU law definitions with those in the AIA and focus on protecting citizens while avoiding overly complex rules that may discourage market entry and compliance.

Mr. Timan, for instance, mentioned the difficulty of establishing when a user may become a provider. A government, for instance, may buy AI systems and/or components and use them, but they could also develop more sophisticated models based on the systems and components they bought/used. The question then becomes who is responsible for the requirements under the AIA. The same more or less applies to open-source AI systems and components. Although responsibility will generally lie with those using the open-source AI systems or components, there is something to be said for setting some minimum requirements for some open-source AI providers as well (e.g., forbidding military use).

Mr. Laux supported the inclusion of the notion of the AI developer. Although the AI developer and provider may be the same entity, this is definitely not always the case.

Ms. Cicila identified the following main actors in the AIA ecosystem: subjects (i.e., to whom the algorithm applies, such as a consumer in credit scoring), the company using the algorithm (e.g., a credit rating agency), the developer of the technology (either internal or external), third-party solutions (e.g., those providing prebuilt models), and the data provider.

Mr. Laux underlined the importance of giving the end user a place in the AI Act, particularly to enable the notion of human oversight. A big gap in the existing taxonomy in the AIA (and in our alternative taxonomy), according to Mr. Laux, is the link between the actors in the AIA and responsibility for human oversight. Human oversight is the responsibility of all actors involved in the AI value chain.

Ms. Cicila underlined the importance of accounting for the role of third-party providers in the taxonomy. It is common practice within the AI ecosystem to use existing algorithms and models provided by third parties. As such, their role in the ecosystem must be included in the taxonomy to gain a better understanding of their responsibilities.

When it comes to the limitations of the current taxonomy, Ms. Cicila remarked that the subject is missing from the taxonomy. Adding the subject could help assigning rights to the subject or include specific provisions to protect the subject. In the EU's General Data Protection Regulation (GDPR), for instance, the controller and processor have obligations vis-a-vis the data subject. In the AIA, this is much more abstract. For instance, when you go to a doctor, you can check the qualifications of the doctor and ask questions regarding their decision-making; this is not necessarily the case for AI. By giving the subject rights to ask this information or including provisions that requires users/providers to provide model explanations for the subject, the position of the subject may be strengthened.

At the same time, the interviewees cautioned against the creation of a taxonomy that

introduces too many new actors. Prof. Stuurman cautioned against a taxonomy that is too rich because it may lead to more discussions on assigning liability. Prof. Stuurman warned of the dynamic that more actors in a taxonomy may lead to more disputes when it comes to apportioning liability (e.g., when an AI system makes a wrong decision and a subject suffers damages, is the user to be blamed, or the AI, the provider, or perhaps the third-party tool provider?). This may be detrimental to small businesses and individuals because it will make it more difficult for them to identify the correct actor for redress in case of damages. In light of this, a rich taxonomy may even benefit larger providers to the detriment of individuals and small businesses because they generally have more resources to litigate and could use the richer taxonomy to "deflect" responsibility. When there is a singular actor that needs to take responsibility (e.g., the AI provider), it makes it easier for individuals and small businesses to address this entity when it comes to liability, whereas a rich taxonomy makes it more difficult to address the correct entity. Prof. Stuurman also pointed toward the interplay between different types of regulation and their interaction. The AIA is primarily aimed at facilitating market entry, not necessarily on apportioning liability; however, concepts and requirements from the AIA may influence liability.

Mr. Timan argued that a taxonomy with too many actors would make the law more difficult to understand, especially for smaller organizations and individuals. In this sense, the binary approach of the AIA could be seen as a strength.

Mr. Laux noted that having too many actors and definitions in the AIA might make the rules overly complex, leading to costly and possibly ineffective compliance. The focus should be on protecting citizens.

Ms. Cicila cautioned against making the roles too complex because it would make market entry and compliance more difficult, potentially "scaring" companies away.

Mr. Timan also noted the importance of aligning existing definitions in EU law with those of the AIA. For instance, the concept of a controller under the GDPR may overlap with that of a provider and user. Too many definitions, some of which may overlap or contradict one another, will make it more difficult for norm addressees to understand which rules apply to them.

Based on this, we can conclude that there is a distinction between the relevance of a detailed taxonomy of AI actors for assigning responsibility for compliance with market entry criteria and that for assigning liability. The AIA may benefit more from a richer taxonomy because it is focused on market entry and conformity, whereas from a liability perspective, it might be better to focus more on the product than actor. While outside of the scope of the present research, it is worthwhile to explore the interplay between the AIA, product liability legislation, and the new draft AI liability directive.

A final insight is that it is important to closely monitor the AIA once it has been implemented and to revisit concepts where necessary. Given that the market for AI is very dynamic and not very mature, it will be difficult to adequately capture it in legislation on first try.

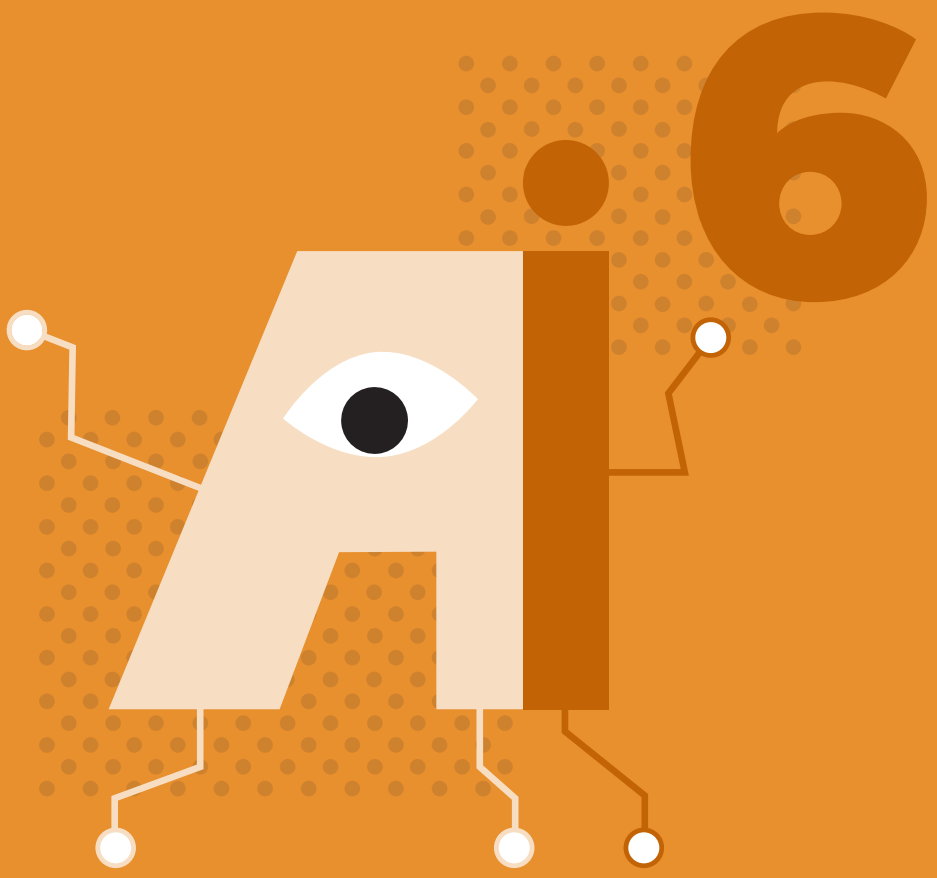
Toward an alternative taxonomy of AI actors: Guiding principles

Based on the OLF results, our literature study, and the interviews, we tentatively conclude that **there is room for improvement when it comes to the taxonomy of AI actors.**

The taxonomy of AI actors in the current proposal does not accurately capture all the relevant actors in the AI ecosystem and their respective roles. This assumption is supported not only by data gathered in the context of the OLF, but also by different taxonomies proposed by, for example, the OECD and UNICTRAL and amendments from the EP and Council. An incomplete or inaccurate reflection on the actors in the AI ecosystem may lead to issues when it comes to assigning responsibilities to the actors in the AI ecosystem. As such, it is worthwhile to propose and test alternative taxonomies of actors.

Before we draft a new taxonomy of AI actors, we must first establish some guiding principles for our taxonomy. Considering the goals of the AIA and input from our desk research, we have come to the following guiding principles:

- *The taxonomy must be able to cover different actors and their relations in the AI ecosystem.*
- *The taxonomy should enable a clear division of responsibility and accountability in the AI ecosystem.*
- *The taxonomy must not be overly complex.*
- *The taxonomy must provide the necessary flexibility to accommodate changes to the AI ecosystem and future business models (i.e., it needs to be technology neutral/independent).*
- *The taxonomy must be clear enough for actors in the AI ecosystem to recognize themselves in the definitions (i.e., not be too vague/technology neutral/independent).*
- *The taxonomy must fit within the existing structure of the AIA to the largest extent possible.*



Alternative taxonomy of AI actors

Based on the above observations of the AI ecosystem and taking our guiding principles into account, we have come to the following alternative taxonomy of AI actors:

i. Open Loop alternative taxonomy

- ***AI Developer:*** The natural or legal person that builds generic or specific AI systems at the behest of third parties, without themselves placing this product on the EU market.
- ***AI Provider:*** The natural or legal person that places a generic or specific AI system on the EU market.
- ***AI Service Provider:*** The natural or legal person that provides AI support tools and/or services on demand.
- ***Data Provider:*** The natural or legal person that provides data for training, testing and/or validating generic or specific AI systems.
- ***User:*** The natural or legal person using a specific or generic AI system to perform a particular task.
- ***End user:*** The natural person operating the AI system and/or using AI system outputs to inform their actions.
- ***Subject:*** A natural or legal person that is directly influenced by the outcomes of an AI system.
- ***Importer:*** The natural or legal person established in the EU importing a generic or specific AI system from outside the EU and placing it on the EU market.
- ***Distributor:*** The natural or legal person established in the EU importing a generic or specific AI system from outside the EU and making it available to a provider that places it on the EU market.

ii. Supporting concepts

- ***Generally applicable AI system:*** An AI system that can be used for multiple purposes and is not aimed at a particular use case or market segment.[29]
- ***Specific AI system:*** An AI system that is purpose built for a particular use case or market segment or is aimed at or marketed to a particular use case or market segment.
- ***High-risk AI system:*** A specific AI system that operates in one of the market segments mentioned in article 6 of the AIA.
- ***AI support tools and services:*** Services other than (prebuilt) models or AI systems that AI developers and AI providers can use in building and deploying AI systems. These may include, but are not limited to, APIs, pipelines, libraries, and algorithms.
- ***Placing on the market:*** Making a generic AI system or specific AI system available on the market or putting a generic or specific AI system into use in the EU.
- ***Open-source model:*** (Prebuilt) models offered under a European Union Public License (EUPL) or similar open-source license.

iii. Relationships and assumptions

An *AI Developer* cannot be a *Provider* or *User*.

A *User* can also be a *Data Provider*. For instance, a hospital provides training data to a provider to create an AI system.

A User can also be a Provider of a generally applicable or specific AI system if they place their AI system on the EU market. This is, for instance, the case when they develop an AI system in house and expose it to end-users, subjects, and/or society. Depending on the level of involvement, the *AI Developer* hired to (co-)develop the AI system may also be considered the (co-)provider.

A *Provider* of an AI system and/or an *AI Developer* may use tools and services from an *AI Service Provider* (e.g., a platform like TensorFlow or PyTorch). For instance, an AI provider can use TensorFlow or PyTorch to build its AI systems.

When an AI service platform makes AI systems available via its platform, it will be considered a *Provider* for those AI systems. For instance, an AI service platform publishes pretrained AI systems for use by developers or AI providers.

A *Provider* of an AI system can also use the model of another *Provider* in their AI system. For instance, an AI provider operating a chatbot uses a language model developed by a different AI provider.

Third parties that can hire an *AI Developer* and/or *AI Service Providers* may be *Users* or *AI Providers*. For instance, a hospital hires Accenture to build an AI system that can detect tumors.

Explanation and rationale

The above taxonomy should, in theory, be better suited to deal with the issues raised by participants in the OLF and in response to the draft AIA:

- Participants in the OLF pointed out that it was challenging for users to predict how generic AI systems would be utilized in various contexts. To differentiate between generic and specific AI systems, rules can be tailored to specific AI systems or generic AI systems specifically aimed at or marketed in high-risk sectors. This approach could alleviate the compliance burden for providers of generic AI systems. In the case of generic systems proposed by users in a high-risk environment, additional rules could be established, such as compliance with Chapter 2. This is consistent with the proposals of the EP and Council, where the original provider is relieved of the requirements and the new provider must comply.

- According to our participants, AI systems differ significantly from traditional products and cannot always be categorized under the binary split between providers and users. There are instances where the development of an AI system is a collaborative effort between an AI provider/developer and the user. In light of this, expanding the existing taxonomy to include an AI Developer category would allow for situations of co-creation to be accommodated. This, in turn, would enable the creation of rules that clearly outline joint responsibility and liability in such scenarios.

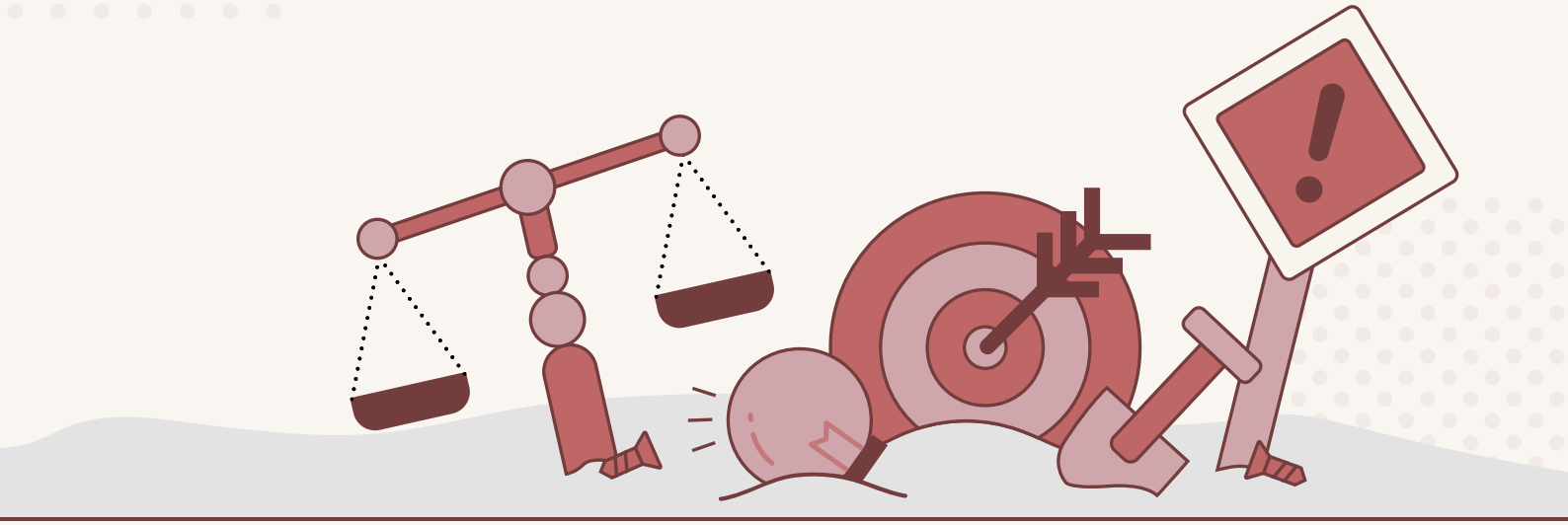
- The participants highlighted that they may utilize tools, services, and models provided by third-party providers, such as frameworks like PyTorch. At present, these service providers would either fall under the category of providers or remain outside the purview of the AIA altogether. To address this issue, we can introduce the concept of AI support tools and services, allowing for specific rules to be developed for this category of services. It should be noted that actual AI systems and models are not classified as support tools and services, and neither is data, as they have their own distinct requirements and responsible actors (i.e., the provider and data provider, respectively).

- The role of platforms, such as Vertex AI and Pytorch, is currently unclear in the AIA. Because they provide such a key service in the AI market, we introduced the concept of an AI service platform. When these platforms also offer (prebuilt) AI systems and/or models, they are qualified as providers.

- Data plays a pivotal role in the development of reliable and trustworthy AI systems. However, while the AIA specifies data quality requirements, these are solely directed towards providers of high-risk AI systems. To address this issue, we propose introducing a new category, the data provider, which would allow for the creation of additional rules on data quality, representativeness, and other relevant aspects pertaining to data providers who supply data for high-risk AI systems. Furthermore, these requirements could be extended to users who provide data to train a model developed by a provider or developer.

- The concept of the *open-source model* was introduced to enable specific rules on the responsibilities of publishers of open-source models. In the AI ecosystem, AI models (and AI systems as a whole) can be published by academia, companies, governments, and individuals free of charge. If those publishing open-source models fall under the strict rules of the AIA, this might dissuade them from publishing their models or systems, hurting innovation and the public interest. At the same time, publishing and/or operating an open-source model that can be qualified as a high-risk AI system without any requirements is dangerous. By introducing the concept of an open-source model, we can set specific rules without having to add new actors or change the definition of 'placing on the market.'

- The concepts of importer and distributor have been made a bit more accessible by explaining the activities of importers and distributors in a clearer language.



Summary and conclusions

The AIA applies the EU regime for regulated products (e.g., medical devices, aviation equipment, elevators) to high-risk AI systems. This means that the development and deployment of AI is subject to strict requirements, ensuring that, when an AI system is placed on the EU market, it is considered "safe."

Regulated products are generally placed on the market by a manufacturer and subsequently bought by a user (e.g., a company or consumer). The AIA takes a similar approach to AI, whereby the high-risk AI system is the product placed on the market by a "provider" and then used by a "user." It is questionable whether this approach accurately reflects the way in which AI is developed and used. As such, the taxonomy of AI actors in the AIA may be too limited.

In the present paper, we have argued that the market for AI (the AI ecosystem) is complex and that there are many actors with different potential relationships. As such, the "binary" approach of the AIA, with the "provider" and the "user" as the main norm addressees, might not accurately reflect the AI ecosystem. This could lead to legal uncertainty because it is not clear for actors what their respective roles and responsibilities under the AIA are when they do not neatly fit within the description of either a provider or user.

We have proposed an alternative taxonomy that is more granular, considering in particular the following:

- The distinction between general purpose AI and AI specifically developed for a high-risk purpose.
- Situations whereby providers and users may co-create or where a developer develops AI at the behest of a user.
- The role of the data provider.
- The role of AI platforms offering pretrained models and other services.

Our alternative taxonomy should allow for a more granular approach when it comes to assigning responsibilities to actors involved in the development, deployment, and use of high-risk AI systems. Furthermore, this taxonomy will allow for increased legal certainty, identifying and covering actors and their roles in the AI ecosystem that are currently not accurately or sufficiently captured. By having more clarity regarding the rules of the game, this taxonomy can help ensure the trustworthiness and innovation of the EU market.

Note that our taxonomy does not consider other legal regimes, most notably general product safety regulations, AI liability, and the GDPR. It is focused on helping to more accurately assign responsibility for the safe and trustworthy development, deployment, and use of AI. Although this should also help in determining liability in the case of fault, this taxonomy is not aimed at improving or streamlining the AI liability regime or the legitimate processing of personal data.

Endnotes

1 Proposal for a Regulation of the European Parliament and of the Council laying down harmonized rules on artificial intelligence (Artificial Intelligence Act) and amending certain Union legislative acts, COM/2021/206 final.

2 Ibid.

3 For more information about the program, see: https://openloop.org/programs/open-loop-eu-ai-act-program/

4 A machine learning model is a program (a set of patterns and rules derived from a training data set) that can make decisions or predictions based on previously unseen data. An AI system uses a machine learning model(s) to perform tasks such as image recognition, speech recognition, and natural language processing. When we refer to an AI system, we mean the implementation of a model in a system.

5 Policy prototyping is a methodology for assessing the efficacy of a policy by testing it in a controlled environment first. Policy prototyping applies a design thinking approach, which is common in product and service design, to the development of law and policy.

6 For more information about the program, see: https://openloop.org/programs/open-loop-eu-ai-act-program/

7 Andrade, Norberto Nuno Gomes de, and Antonella Zarra. (2022). "Artificial Intelligence Act: A Policy Prototyping Experiment: Operationalizing the Requirements for AI Systems – Part I." Available at: https://openloop.org/reports/2022/11/Artificial_Intelligence_Act_A_Policy_Prototyping_Experiment_Operationalizing_Reqs_Part1.pdf

8 See: e.g., https://ec.europa.eu/info/business-economy-euro/product-safety-and-requirements/product-safety/consumer-product-safety_en

9 The notion of a generic AI system is comparable to what the Council has added as a definition in its general approach in article 3(1)b AIA: "'general purpose AI system' means an AI system that - irrespective of how it is placed on the market or put into service, including as open source software - is intended by the provider to perform generally applicable functions such as image and speech recognition, audio and video generation, pattern detection, question answering, translation and others; […]." In other words, generic AI systems can be used for multiple purposes and are not aimed at a particular use case or market segment. See: e.g., Gutierrez, C. I., Aguirre, A., Uuk, R., Boine, C., & Franklin. (2022). A Proposal for a Definition of General Purpose Artificial Intelligence Systems.

10 See: Hacker, P., Engel, A., & Marco, M. (2023). Regulating ChatGPT and other Large Generative AI Models. Working paper (version February 13th 2023). For an overview of possibilities to regulate generic systems/general purpose AI systems.

11 See: https://towardsdatascience.com/the-ai-ecosystem-is-a-mess-c46bdfbf43e4

12 For more insights on the OLF, see: "Activity 1: Taxonomy of AI Actors" in Andrade, Norberto Nuno Gomes de, and Antonella Zarra. (2022). "Artificial Intelligence Act: A Policy Prototyping Experiment: Operationalizing the Requirements for AI Systems – Part I." Available at: https:// openloop.org/reports/2022/11/Artificial_Intelligence_Act_A_Policy_Prototyping_Experiment_ Operationalizing_Reqs_Part1.pdf

13 It must be noted that, although many countries are currently setting up AI regulations, actors are not always clearly defined. For instance, in the United States, the NIST draft risk management framework for AI, Executive Order 13960 and the AI Bill of Rights do not set out a clear taxonomy of AI actors.

14 The Conference toward AI Network Society. (2019). "AI Utilization Guidelines." Available at: https://www.soumu.go.jp/main_content/000658284.pdf

15 METI. (2022). "Governance Guidelines for Implementation of AI Principles, January 28 2022, version 1.1." Available at: https://www.meti.go.jp/shingikai/mono_info_service/ai_shakai_jisso/pdf/20220128_2.pdf

16 Ibid, p. 6.

17 See: OECD (2023). "Advancing accountability in AI: Governing and Managing Risks Throughout the Lifecycle for Trustworthy AI." OECD Digital Economy Papers, No. 349. Paris: OECD Publishing. Available at: https://doi.org/10.1787/2448f04b-en.

18 See UN General Assembly. (2021). Strengthening and promoting the international treaty framework: Report of the Secretary-General (A/CN.9/1012/Add.1). Retrieved from https://undocs.org/Home/Mobile?FinalSymbol=A%2FCN.9%2F1012%2FAdd.1&Language=E&DeviceType=Desktop&LangRequested=False

19 Note that the AIA also has the concept of an operator, but this is mainly a "catch all" definition encompassing the provider, user, authorized representative, importer, and/or distributor and does not refer to a natural person operating the AI system.

20 Council of Europe Revised Zero Draft (Framework) Convention on Artificial Intelligence, Human rights, Democracy and the Rule of Law, Strasbourg January 3rd 2023, CAI (2023)1, article 2.

21 Ibid.

22 Ibid.

23 Committee on the Internal Market and Consumer Protection, Committee on Civil Liberties, Justice and Home Affairs. (2022). "DRAFT REPORT on the proposal for a regulation of the European Parliament and of the Council on harmonized rules on Artificial Intelligence (Artificial Intelligence Act) and amending certain Union Legislative Acts (COM2021/0206 – C9-0146/2021 – 2021/0106(COD)), 20-4-2022." Available at: https://www.europarl.europa.eu/doceo/document/CJ40-PR-731563_EN.pdf

24 Amendment 949, Andrea Caroppo, Salvatore De Meo, Article 3 – paragraph 1 – point 4 a (new).

25 Comparable amendments (e.g., amendment 951) actually use the same terminology (affected person).

26 Amendment 948, Kim Van Sparrentak, Sergey Lagodinsky on behalf of the Verts/ALE Group Alexandra Geese, Alviina Alametsä, Article 3 – paragraph 1 – point 4 a (new).

27 Amendment 1976, Axel Voss, Deirdre Clune, Eva Maydell, article 23a (new).

28 Fourth presidency compromise text, Interinstitutional File: 2021/0106(COD), Brussels, 19 October 2022 (OR.en), Brussels, 19 October 2022 (OR. en), 13102/22.

29 See: e.g., Gutierrez, C. I., Aguirre, A., Uuk, R., Boine, C., & Franklin. (2022). A Proposal for a Definition of General Purpose Artificial Intelligence Systems.