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# The Legal Challenges of AI Literacy Between Enforcement and Compliance\*

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## 1. Introduction

The normative challenges of Artificial Intelligence (AI), in particular, of what EU lawmakers call “general purpose” AI (GPAI), are increasingly drawing the attention of scholars and institutions<sup>1</sup>. This paper reflects on that part of the legal challenges that concern AI literacy. The notion refers to the ability of individuals and institutions to understand, assess, and interact with AI and GPAI technologies. AI literacy entails multiple cognitive competences of institutions and individuals, taking into account different social roles, such as those of developers and lawmakers, retailers and end-users of the technology. From a normative perspective, AI literacy spans from tracing duties of humans dealing with a meaningful control of AI models and systems to the interpretative skills and capabilities of people interacting with the latest version of Chat GPT. The challenges may concern different problems such as the explainability and transparency of AI, further issues of equity and inclusion, bias and fairness, public education and awareness, people’s privacy and data protection, international cooperation and development of standards.

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<sup>1</sup> J. Bertomeu – Y. Lin – Y. Liu – Z. Ni, *Capital market consequences of generative ai: Early evidence from the ban of ChatGPT in Italy*, in SSRN, 2023, 1 ss.; U. Pagallo, *LLMs meet the law: Who is the sorcerer’s apprentice?*, in *Cambridge forum on AI: Law and governance*, 2025, 1 ss.

A robust amount of work has stressed the novelty of the challenges posed in particular by GPAI: an entire chapter of the EU AI Act<sup>2</sup>, i.e. Chapter V of Reg. (EU) 2024/1689 aims to tackle such challenges. Further efforts regard China's interim measures for Generative AI in 2023<sup>3</sup>, and the sectorial provisions of the White House's Executive Order from October of that year<sup>4</sup>, although overruled in January 2025<sup>5</sup>. This normative activism is not by chance. The uniqueness of GPAI entails several legal challenges in addition to issues of bias and fairness, explainability and transparency, cooperation and standards. The use of GPAI models and systems can trigger for example misinformation hazards that affect trust, or that lead to less well-informed users, or to human-computer interaction harms that depend on users overvaluing the capabilities of GPAI, thus using the technology in unsafe ways<sup>6</sup>. In addition, the attention should be drawn to the environmental harms that hinge on the energy power that is necessary to train and operate the technology<sup>7</sup>. GPAI models and systems can also exacerbate traditional normative problems, such as information hazards that impinge on people's privacy by leaking personal information and inferring sensitive data; or discrimination issues that perpetuate social stereotypes and biases, triggering representational and allocational harms; down to GPAI-generated fake news, which are more credible to human raters than human-written disinformation: texts, images, audios, and videos generated by GPAI can be impossible to distinguish from human creation<sup>8</sup>.

Against this set of normative challenges, the paper intends to restrict the focus of the lawmakers' response to the challenges of AI literacy. An increasing amount of work deals with the challenges of AI literacy<sup>9</sup>; and yet,

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<sup>2</sup> Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence and amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139 and (EU) 2019/2144 and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828 (Artificial Intelligence Act), OJ L, 2024/1689, 12.7.2024.

<sup>3</sup> M. Zou – L. Zhang, *Navigating China's regulatory approach to generative artificial intelligence and large language models*, in *Cambridge forum on AI: Law and governance*, 1, 2025, 1 ss.

<sup>4</sup> EO (2023) Executive Order on the Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence, The White House, October 30, 2023, Washington D.C., USA.

<sup>5</sup> The White House, *Initial rescissions of harmful executive orders and actions*, January 20, 2025, Washington D.C., USA.

<sup>6</sup> L. Weidinger et al., *Ethical and social risks of harm from language models*, in *2021 ACM Conference on fairness, accountability, and transparency*, 2021, 214 ss.; K. Lekadir – G. Quaglio – A. Tselioudis Garmendia – C. Gallin, *Artificial intelligence in healthcare. Applications, risks, and ethical and social impacts*, in *European parliamentary research service*, PE 729.512, 2022.

<sup>7</sup> U. Pagallo – J. Ciani Sciolla – M. Durante, *The environmental challenges of AI in EU law: Lessons learned from the Artificial Intelligence Act (AIA) with its drawbacks*, in *Transforming government: People, process and policy*, 16(3), 2022, 359 ss.

<sup>8</sup> S. J. Nightingale – H. Farid, *AI-synthesized faces are indistinguishable from real faces and more trustworthy*, in *Proceedings of the national academy of sciences*, 119(8), e2120481119, 2022, 1 ss.

<sup>9</sup> There is a wide variety of studies on this point, involving several fields of research, from computer science to the social sciences, such as education and philosophy.

there is still limited research on how current legal systems intend to tackle such challenges with some crucial issues of legal theory<sup>10</sup>. This paper aims to fill this gap, highlighting the challenges of AI literacy by comparing the different US and EU approaches with the analysis of the US Executive Order on AI from 2023, how Trump's White House overruled it in January 2025, down to EU law with the exam of the AI Act, or Reg. (EU) 2024/1689 from July 2024. This perspective sheds light on how the notion of AI literacy is intended in the legal domain to dissect its relevance for practical purposes in both the private and public sectors.

The overall assumption of the paper is that four issues of law enforcement and compliance with legal regulations follow as a result of this inquiry. To substantiate the claim, the paper is divided into three parts that regard: (i) The lawmakers' response to the challenges of AI literacy (Section 2); (ii) The assessment of such a response (Section 3); and, (iii) The open problems of the field with the corresponding issues of legal theory (Section 4). Against the plethora of definitions and issues of AI literacy from an ethical, technological, or political viewpoints, the first step of the analysis is to elucidate the ways in which lawmakers have intended to address the problems of AI literacy, in particular, those posed by uses of GPAI.

## 2. The il/literate lawmaker

Forms of AI, such as Generative AI, Foundation Models, and Large Language Models (LLMs), broke the news by the end of 2022 and throughout 2023. Benefits and threats of technology ignited people's imagination and drew the regulatory attention of lawmakers and institutions, including the Group of Seven (G7) countries under the Japanese Presidency in May 2023. In addition to the declarations of the G7, the "AI Principles" of the G20, and the initiatives of the Council of Europe<sup>11</sup>, national and regional lawmakers soon followed suit, in particular, with the White House's 2023 Executive Order on AI, and the 2024 EU AI Act. A comparative law perspective is fruitful to stress commonalities and divergences of the US and the EU approaches. Both jurisdictions aim to govern the challenges of technology vis-à-vis issues of AI literacy; and however, the Executive Order and the AI Act mirror traditional differences between US and EU law. Although recently overruled, the US 2023 EO is still particularly instructive to grasp crucial differences with the EU approach. The fact

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Among the many see J.E. Aoun, *ROBOT-PROOF: Higher education in the age of artificial intelligence*, Cambridge, MA, 2017; D. Long – B. Magerko, *What is AI literacy? Competencies and design considerations*, in *Proceedings of the 2020 CHI conference on human factors in computing systems*, 2020, 1 ss.; Y. Yi, *Establishing the concept of AI literacy*, in *Jahr-European Journal of Bioethics*, 12(2), 2021, 353 ss.; L. Wilton et al., *Where is the AI? AI literacy for educators*, in *International conference on artificial intelligence in education*, Cham, 2022, 180 ss.

<sup>10</sup> K.T. Kotsis, *The scientific literacy enables policymakers to legislate on artificial intelligence*, in *European Journal of Political Science Studies*, 7(1), 2024, 69 ss.

<sup>11</sup> Council of Europe, *Human rights by design future. Proofing human rights protection in the era of AI*, 2023; H. Habuka, *Japan's approach to AI regulation and its impact on the 2023 G7 Presidency*, in *Center for Strategic & International Studies*, 2023, 1 ss.

that the US 2023 EO was rejected since the first week of the new Trump administration makes such differences more crystal clear.

## 2.1 From Biden to Trump

The differences between EU and US law start with different definitions of technology. The US 2023 EO, for example, defines generative AI (Gen AI) as follows:

«The class of AI models that emulate the structure and the characteristics of input data in order to generate derived synthetic content» (US 2023 EO's Section 3).

After a three year-long institutional debate, on the other hand, it is worth mentioning that art. 3(1) of the AI Act intends AI as a «machine-based system» that can operate with «varying levels of autonomy» and eventually adapt itself after deployment. Drawing on this basis, the EU definition of GPAI is general enough to include the notion of Gen AI. It goes as follows:

«An AI model, including where such an AI model is trained with a large amount of data using self-supervision at scale, that displays significant generality and is capable of competently performing a wide range of distinct tasks regardless of the way the model is placed on the market and that can be integrated into a variety of downstream systems or applications, except AI models that are used for research, development or prototyping activities before they are placed on the market» (art. 3(1)(63) of the AI Act).

Against this framework of technological definitions, we can appreciate the differences of legal approaches. In particular, Biden's 2023 Executive Order unpacked a number of vertical regulations on biosecurity risks and child sexual abuse, patent law and development of standards, consumer law and American civil rights. The AI Act, on the contrary, is a horizontal regulation in the jargon of EU lawyers: the AI Act is in fact an all-encompassing legislation that aims to govern the life cycle of the technology from the first phase of design to the last updates in the market. Whilst Biden's Executive Order mostly regarded public authorities and only indirectly private companies — lest doing business with the federal government — the AI Act affects public and private sectors with a few exceptions for military uses of technology and public order, among others. Although dealing with the same problems of AI literacy and the use of next generation GPAI models, crucial differences between Biden's EO and the AI Act should be emphasized.

In the US, the provisions of Biden's Executive Order that had to do with AI literacy can be divided into three sets. They are related to:

- Human capabilities to assess risks;
- The aim to attain informed oversight; and,

- Recruitment of talent.

Concerning the requirements of AI literacy to assess risks, they can be illustrated with the 2023 EO's Section 2 on policy and principles: letter (d) referred to the AI Risk Management Framework, «in seeking to ensure that AI complies with all Federal laws and to promote robust technical evaluations, careful oversight, engagement with affected communities, and rigorous regulation... Only then can Americans trust AI to advance civil rights, civil liberties, equity, and justice for all».

As regards informed oversight of public actors deploying AI, the EO set up measures to «advance the responsible and secure use of generative AI in the Federal Government» (10.1(d) and (f)). In particular, «agencies are discouraged from imposing broad general bans or blocks on agency use of generative AI». Instead, agencies should have adopted guidelines and limitations on the proper use of GPAI — Generative AI, in the EO jargon — so that they personnel could have had access to secure and reliable GPAI capabilities, «at least for the purposes of experimentation and routine tasks that carry a low risk of impacting Americans' rights» (lett. (f)(i)). The third set of provisions related to AI literacy in the 2023 EO concerned «increasing AI talent in Government» (Section 10.2). We should not forget that the US government is by far the largest single buyer of AI technologies in the US economy with over \$750 billion in annual spend. According to lett. (d) of Section 10.2, the intent was «to meet the critical hiring need for qualified personnel to execute the initiatives in this order, and to improve Federal hiring practices for AI talent». To attain this goal, on the one hand, it was established the review of the «existing Executive Core Qualifications (ECQs) for Senior Executive Service (SES) positions informed by data and AI literacy competencies» (vii of “d”); on the other hand, a «review of competencies» of civil engineers and related occupations was set up (viii of “d”).

All these provisions simply disappeared on 23 January 2025 with the new White House's Executive Order. Its title speaks volumes: *Removing Barriers to American Leadership in Artificial Intelligence*. Section 5 implements the revocation of the previous EO no. 14110 in accordance with the policy of the AI Act. In the phrasing of its Section 2, «the policy of the United States [is] to sustain and enhance America's global AI dominance in order to promote human flourishing, economic competitiveness, and national security». It will come as no surprise that the US 2025 EO on AI dominance does not refer any longer to risk assessment issues, informed oversight, recruitment of talent, and last but not least, AI literacy. The Assistant to the President for Science and Technology (APST), the Special Advisor for AI and Crypto, and the Assistant to the President for National Security Affairs (APNSA), will determine all actions under Biden's 2023 EO «that are or may be inconsistent with, or present obstacles to, the policy set forth in section 2 of this order» (Section 5 of Trump's 2025 EO on AI).

## 2.2 The EU approach

The EU AI Act law tackles issues of AI literacy according to four “horizontal” sets of legal provisions. They regard:

- Legal duties of providers and deployers;
- Compliance and enforcement of the Regulation;
- General awareness; and,
- Education.

Art. 3(56) on definitions of the AI Act intends AI literacy as «skills, knowledge and understanding that allow providers, deployers and affected persons... to make an informed deployment of AI systems, as well as to gain awareness about the opportunities and risks of AI». Art. 4 of the AI Act establishes the measures that providers and deployers of AI systems shall take to «ensure to their best extent a sufficient level of AI literacy» of both their staff and individuals. Providers and deployers should use their AI systems in accordance with such parameters as sound technical knowledge, experience and training, and taking into account the context in which the technology is employed.

As regards compliance and correct enforcement of the AI Act, recital 20 establishes that «AI literacy should equip providers, deployers and affected persons with the necessary notions to make informed decisions regarding AI systems» and moreover, that «AI literacy should provide all relevant actors in the AI value chain with the insights required to ensure the appropriate compliance and its correct enforcement». Informed decisions refer to proper understanding of the technology and interpretation of its outputs as well as the measures to be applied during the use of the technology and, in case of affected persons, the understanding of how AI decisions may impact them.

Further provisions of soft law in the AI Act complement the aim of the EU lawmakers to tackle the challenges of AI literacy. Concerning general awareness in the use of AI, recital 20 of the Regulation refers to «the wide implementation of AI literacy measures and the introduction of appropriate follow-up actions», in particular, the initiatives of the European AI Board under art. 66 of the AI Act. In addition, the Codes of conduct set up in art. 95 should play a key role in promoting AI literacy, «in particular that of persons dealing with the development, operation and use of AI» (art. 95(2)(c)). Recital 165 encourages providers and even deployers of AI systems, in particular of GPAI, to apply additional requirements on literacy «on a voluntary basis».

Specific provisions are finally devoted to the deployment of AI systems in education. In the wording of recital 56, it is «important to promote high-quality digital education and training and to allow all learners and teachers to acquire and share the necessary digital skills and competences, including media literacy, and critical thinking, to take an active part in the economy, society, and in democratic processes».

Divergences between US and EU law shed light on the multiple ways in which the law can tackle the challenges of AI literacy. From the viewpoint of legal theory, the approach may regard either the soft tools or the hard means of the law, together with different forms of legal governance. Hard

law refers to the rules that aim to directly govern social and individual behaviour hinging on the threat of physical or pecuniary sanctions. Soft law regards guidelines, opinions, and recommendations that, although not legally binding, provide authoritative instructions as to how to interpret or implement the law. Governance concerns the establishment and implementation of policies, procedures, and standards for the proper development, use, and management of AI systems. Variables of legal governance include forms of self-regulation, co-regulation, and strict top-down enforcement of the provisions of hard law<sup>12</sup>. How jurisdictions intend to strike a balance between soft law and hard law with legal variables of technological governance help to further understand differences between legal systems in comparison and competition. The aim of the next section is to explore such differences.

### 3. Soft and hard legal literacy

We noted above in the previous section that several provisions of the AI Act intend to tackle the challenges of AI literacy through the means of hard law. The attention should be drawn, first of all, to art. 4 of the AI Act on the measures that providers and deployers of AI systems shall take for the AI literacy of their staff and potential parties to a lawsuit. On the one hand, as regards their own staff or team, AI providers should ensure they are capable to perform their tasks and fulfil their obligations; on the other hand, dealing with end-users, or deployers of the technology, the standard is set by that which is necessary to make informed decisions concerning AI and, in particular, the «systemic risk» of GPAI under art. 3(65) of the AI Act. Such informational duties add to what the General Data Protection Regulation, or GDPR (EU) 2016/679<sup>13</sup>, establishes for cases of personal data processing. Both provisions converge and may reinforce each other. EU law clarifies that the duty of AI providers, deployers, and data controllers, is to abide by the sets of principles in data protection, such as fairness and transparency under the “accountability principle” of art. 5(1) of the GDPR<sup>14</sup>. Whereas recital 85 of the GDPR refers to accountability

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<sup>12</sup> U. Pagallo – P. Casanovas – R. Madelin, *The middle-out approach: Assessing models of legal governance in data protection, artificial intelligence, and the web of data*, in *The theory and practice of legislation*, 7, 2019, 1 ss.

<sup>13</sup> Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), OJ L 119, 4.5.2016.

<sup>14</sup> This aspect is also underlined in EDPS, *Generative AI and the EUDPR. First EDPS Orientations for ensuring data protection compliance when using Generative AI systems*, 2024, 1 ss., spec. 20, according to which it «is essential that the datasets used to create and train models ensure an adequate and fair representation of the real world - without bias that can increase the potential harm for individuals or collectives not well represented in the training datasets - while also implementing accountability and oversight mechanisms that allow for continuous monitoring to prevent the occurrence of biases that have an effect on individuals, as well as to correct those behaviours». Similarly, see EDPB, *Opinion 28/2024 on certain data protection aspects related*

in connection with responsibility for data breaches and risks for the data subjects' rights and freedoms, art. 5(2) mentions the principle as the way in which data controllers shall be able to demonstrate compliance with the «principles relating to processing of personal data» under art. 5(1)<sup>15</sup>. Such co-regulatory approach fits like hand into glove with the duty of AI providers and deployers of the technology to guarantee appropriate compliance and enforcement of the AI Act through the means of AI literacy (recital 20 of the AI Act).

Mind, this hard approach of EU law does not mean that no US hard law exists for informational duties and tortious claims for AI damage that can be related to issues of literacy<sup>16</sup>. What we mean is that, contrary to the AI Act, even Biden's Executive Order mostly focused on the regulation of administrative agencies and vertical provisions that hinge on the soft tools of the law. Since AI literacy refers to multiple cognitive competences that entail the ability of individuals (and institutions) to understand, assess, and interact with GPAI technologies, this soft approach makes sense because lawmakers can hardly defeat any AI ignorance by decree. The soft law approach to the normative challenges of AI — that we also noted in certain provisions and recitals of the EU regulation, such as art. 66 or art. 95 of the AI Act — materialize through guidelines, opinions, recommendations, and even incentives in both the EU and the US.

However, strict top-down legal governance of AI and GPAI is supplemented through forms of self-regulation or co-regulation with a key difference: whilst a «market-driven approach» prevails or even triumphs in US law<sup>17</sup>; in EU law, the self-regulatory measures that may complement the provisions of hard law often concern forms of supervised (but not enforceable) self-regulation<sup>18</sup>. Consider the voluntary application of specific requirements of the AI Act under the codes of conduct of art. 95. Among the clear objectives and performance indicators that such codes must possess under the encouragement and facilitation of the AI Office and the EU Member States, the attention is drawn to the effectiveness and inclusiveness of the codes (recital 165); the 2019 guidelines of the High-Level Expert Group on the ethical principles of AI (recital 27); and AI literacy (recital 20). Against every form of pure self-regulation, it is up to the European AI Board to take care of the development, application and evaluation of the Codes of conduct (art. 66(e)(i)).

The distinction between soft law and hard law, between variables of self-regulation, co-regulation, or top-down legislation, does not entail any tight separation. Soft law and hard law can supplement each other as much

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*to the processing of personal data in the context of AI models*, 2024, par. 129.

<sup>15</sup> M. Kaminski, *Binary governance: Lessons from the GDPR's approach to algorithmic accountability*, in *Southern California Law Review*, 92, 2019, 1529 ss.; U. Pagallo – P. Casanovas – R. Madelin, *The middle-out approach*, cit., 1 ss., spec. 9-10.

<sup>16</sup> W. Barfield – U. Pagallo, *Advanced introduction to the law and artificial intelligence*, Cheltenham, 2020, 108-121.

<sup>17</sup> A. Bradford, *The Brussels effect: How the European Union rules the world*, Oxford, 2020; Federal Trade Commission, *Using artificial intelligence and algorithms*, 2020.

<sup>18</sup> C.T. Marsden, *Internet co-regulation and constitutionalism: Towards a more nuanced view*, in *SSRN*, 2020, 1 ss.

as occurs with the primary rules of the law that aim to directly govern individual and social behaviour on AI literacy, and the secondary rules of the law that provide for the organization and functioning of the legal system. This interplay between hard law and soft law, between primary and secondary rules of the law, holds for the notion of appropriate compliance and correct enforcement of top-down regulations, such as those of the AI Act. For example, according to art. 112(7) and recital 174 of the AI Act, the ultimate goal of the voluntary application of specific requirements for other than high-risk AI systems through the formation of the codes of conduct under art. 95 of AI Act is to expand the safeguards of certain high-risk uses of AI with the corresponding set of hard law regulations to the governance and regulation of all AI systems<sup>19</sup>. Despite crucial differences between EU and US law, a similar approach is at work, for example, with the powers and soft law of the Federal Drugs Administration (FDA) in releasing authorizations for the use of AI systems as medical tools in the health sector in US law<sup>20</sup>.

Regardless of differences between US and EU law, however, dealing with the challenges of AI literacy, it seems fair to admit that there are some problems open. They concern:

Issues of hard law, such as the enforcement of the top-down provisions of EU lawmakers on AI literacy;

Issues of soft law that regard the alternative of compliance or non-compliance with guidelines and recommendations of institutional authorities; and,

How the interplay between law enforcement and compliance with soft law provisions has to be grasped through governance mechanisms that shall properly tackle the pace of technological innovation.

Such legal drawbacks can be illustrated with the problems of today's institutional efforts to tackle those challenges of AI literacy, such as problems of general awareness, public education or, in the jargon of the overruled US Executive Order, issues of AI compliance «with all Federal laws» as a condition for Americans' trust on AI (the 2023 EO's letter (d) of Section 2). In our view, the problem does not only regard whether strict top-down regulations are effective; whether self-regulatory approaches are good enough; or whether the mix of hard law and soft law through different

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<sup>19</sup> This results to the extent that Article 112(7) AI Act specifically provides for the possibility for the European Commission to assess by 2 August 2028, «the impact and effectiveness of voluntary codes of conduct [...] for AI systems other than high-risk AI systems and possibly other additional requirements for AI systems other than high-risk AI systems, including as regards environmental sustainability». Accordingly, Recital 174 AI Act underlines that «by 2 August 2028 and every three years thereafter, the Commission should evaluate the impact and effectiveness of voluntary codes of conduct to foster the application of the requirements provided for high-risk AI systems in the case of AI systems other than high-risk AI systems and possibly other additional requirements for such AI systems». It seems fair to argue that Art. 112(7) and Recital 174 of the AI Act are an example of the European institutions' quest for a balance between various governance approaches.

<sup>20</sup> Federal Drug Administration, *Artificial Intelligence and Machine Learning (AI/ML)-enabled medical devices*, 2024; U. Pagallo et al., *The underuse of AI in the health sector: Opportunity costs, success stories, risks and recommendations*, in *Health and Technology*, 14, 2024, 1 ss.

forms of technological governance is up to the task. The claim of this paper is that the lawmakers' response to the challenges of AI literacy also entails problems of legal theory as regards, for example, the dichotomy between compliance and no compliance.

The aim of the next section is to elucidate this mix of practical and theoretical problems.

#### 4. Four kinds of legal problem

The paper has discussed so far two forms of regulation (hard law and soft law), and three types of legal governance — i.e. top-down, bottom-up, and co-regulation with their variables — to assess some provisions of EU law on AI literacy with the challenges of GPAI systems and models. Against this framework on legal forms of regulation and types of legal governance, we reckon that four issues are crucially open. They regard: (i) The development of new standards; (ii) Forms of accountability for AI literacy; (iii) The effectiveness of soft law policies; and, (iv) The anticipatory capabilities of the law in tackling the pace of technological innovation.

In addition, a new digital divide could follow as a result of these legal problems with the challenges of AI literacy. Such new forms of digital divide could on the other hand exacerbate the challenges of AI literacy for law enforcement and compliance with legal regulations.

Each of these legal problems is examined separately in the next subsections.

##### 4.1 The development of new standards

The development of new standards plays a crucial role in the AI Act (Section III, Chapter 5 of the Regulation)<sup>21</sup>. However, scholars have paid little attention to the development of new standards for AI literacy as regards the enforcement of the top-down rules of the law.

As thresholds of evaluation for the assessment of the design, functioning and use of technology<sup>22</sup>, standards for AI literacy should complement general provisions of the law against damage arising out of strict product and malfunction liability, negligence and breach of warranty, or conformity to a certain standard of conduct. While there is a well-established interpretation and application of the information duties<sup>23</sup>, incumbent on data controllers in the case of automated processing of personal data (meaningful information the logic involved must be provided on the basis of arts. 13(2)(f) and 14(2)(g) of the GDPR), it remains to be seen how the information duties imposed by EU law on developers and distributors of GPAI mod-

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<sup>21</sup> Likewise for the overruled Executive Order (Section 4 of the EO).

<sup>22</sup> M. Durante, *Computational power: The impact of ICT on law, society, and knowledge*, New York-London, 2021, 23-42.

<sup>23</sup> See EDPB, *Article 29 Working Party - Guidelines on transparency under Regulation 2016/679*, 2018.

els and systems will address AI literacy issues. The uncertainty depends on the role that standards for AI literacy may play in the establishment of new individual rights, and private and public duties related to the development of new technological standards<sup>24</sup>. In addition, such standards are particularly critical as regards either third parties, or end-users of GPAI models that allow to innovate without any gatekeeping<sup>25</sup>. In addition, it will be crucial to examine whether and to what extent the AI governance standards being developed by the international standardisation bodies will impact this scenario<sup>26</sup>. Further problems of standardization are discussed below in the next subsections in connection with the assessment of the soft law initiatives of lawmakers and the pace of technological innovation. Yet, the myriad legal standards related to issues of AI literacy should not lead to overlooking a common threat. Whereas the development of standards should be understood as instrumental to the ability of individuals to grasp, assess, and interact with AI technologies, the opaqueness of the standardization process and the lack of civil society expertise in standard-setting pose serious risks for the rule of law and democracy<sup>27</sup>.

### 4.2 Forms of accountability for AI literacy

A second issue with the lawmakers' response to the challenges of AI literacy has to do with the appropriate compliance and correct enforcement of top-down regulations. Whereas, in EU law, the AI Act has innovated the legal framework through new duties of information and compliance with the obligations that follow the high-risk status of certain uses of AI in Chapter III, and of GPAI in Chapter V of the AI Act, how AI literacy will determine such duties and obligations in addition to the definition of new standards remains an open issue.

In the public sector, the uncertainty depends on the kinds of duty and obligations, if any, that public agencies would have. In the field of contracts and tort law, it is unclear to what extent providers and deployers of AI systems may attempt to turn around some duties and obligations on risk management or data governance through contracts or terms of service, and how burdens of proof for negligence-based liability of private actors

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<sup>24</sup> U. Pagallo – J. Ciani Sciolla, *Anatomy of web data scraping: Ethics, standards, and the troubles of the law*, in *European Journal Data Privacy Law & Technology*, 2, 2023, 1 ss.

<sup>25</sup> B. Dickson, *How Open-source LLMs Are Challenging OpenAI, Google, and Microsoft*, 2023.

<sup>26</sup> Consider, for instance, the role of ISO (International Organization for Standardization), IEEE (Institute of Electrical and Electronics Engineers), and BSI (British Standards Institution). Efforts by these standardisation bodies, such as ISO/IEC 42001, the IEEE P7000 series and BSI's PAS, aim to provide best practices for the design, development, deployment and use of AI and could also play a role about AI literacy.

<sup>27</sup> M. Cantero Gamito – C.T. Marsden, *Artificial intelligence co-regulation? The role of standards in the EU AI Act*, in *International Journal of Law and Information Technology*, 32.1, eaac011, 2024, 1 ss.

would work in case of AI illiteracy<sup>28</sup>. Such issues add to tortious liability claims among 27 legal systems in the EU and, except the state of Louisiana, 49 unified tortious legal regimes in the US<sup>29</sup>. Moreover, it remains to be seen whether individuals may claim a right to AI literacy against either private companies or the public administration. Should such a right be protected only indirectly through contracts, terms of service, or tortious liability claims in case of damage, the result could be a vicious circle. We would be bounced back to the issues of contractual responsibility, tortious liability claims, or public agencies' accountability<sup>30</sup> mentioned in this subsection.

### 4.3 The effectiveness of soft law policies

A third concern with AI literacy regards the notion of compliance. The notion has traditionally been understood as a sort of zero-sum game in the legal domain<sup>31</sup>. Yet, rather than 0s or 1s, either yes or no, focus should be on more subtle assessments that distinguish between ideal, sub-ideal and non-compliant statuses of legal agents<sup>32</sup>; or, between “good”, “ok”, or “bad” compliance<sup>33</sup>; down to more fine-grained views that distinguish average compliance, reasonably high compliance, very high compliance, and full compliance<sup>34</sup>. The binary alternative of compliance or non-compliance does not provide critical information for the assessment and improvement of those institutional initiatives, such as the codes of conduct of art. 95 in the AI Act, which add to similar provisions and policies of

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<sup>28</sup> A thorough analysis of the coordination between the AI Act and the newly adopted Product Liability Directive, i.e. Directive (EU) 2024/2853 of the European Parliament and of the Council of 23 October 2024 on liability for defective products and repealing Council Directive 85/374/EEC, in P. Hacker, *The European AI liability directives. Critique of a half-hearted approach and lessons for the future*, in *Computer Law & Security Review* 51, 2023, 1 ss.; and T. Rodríguez de las Heras Ballell, *The revision of the product liability directive: a key piece in the artificial intelligence liability puzzle*, in *ERA Forum*, 24, 2023, 247 ss.

<sup>29</sup> W. Barfield – U. Pagallo, *Advanced introduction to the law and artificial intelligence*, cit., 108-121.

<sup>30</sup> See the recent European Commission, *AI Literacy - Questions & Answers*, 2025. Significantly, one of the frequent questions taken up by the European institutions is specifically related to the assessment of the level of AI literacy as a means of ensuring the accountability of actors. For instance, one of the questions refers to the «minimum content to consider for an AI literacy programme complying with article 4 of the AI Act».

<sup>31</sup> R.V. Stover – D.W. Brown, *Understanding compliance and noncompliance with law: The contributions of utility theory*, in *Social Science Quarterly*, 1975, 363 ss.

<sup>32</sup> R. Lu – S. Sadiq – G. Governatori, *Measurement of compliance distance in business processes*, in *Information Systems Management*, 25(4), 2008, 344 ss.

<sup>33</sup> E. Morrison – A. Ghose – G. Koliadis, *Dealing with imprecise compliance requirements*, in *Proceedings of the 2nd International Workshop on Dynamic and Declarative Business Processes (DDBP 2009)*, Los Alamitos, 2019, 6 ss.

<sup>34</sup> M. Hashmi – P. Casanovas – L. de Koker, *Legal compliance through design: Preliminary results of a literature survey*, in *TERECOM2018@ JURIX, Technologies for Regulatory Compliance*, 2018, 59 ss.

EU law<sup>35</sup>, such as legal experimentation by open access in Chapter III of the Digital Governance Act (DGA), i.e. Regulation (EU) 2022/868<sup>36</sup>.

We noted that illiteracy remains a problem that does not simply revolve around the top-down enforcement of the tools of hard law, but also, on the success of the promotional side of the law and the aim to foster AI for good<sup>37</sup>. Therefore, the “popularity” of the registration mechanisms for data altruism of the DGA, or the “efficacy” of current policies against the underuse of AI through methods of cooperation — for example, through the sandboxes of art. 57 of the AI Act — should be finetuned between 0 and 1, to determine how much these norms of soft law have been effective in tackling the opportunity costs of technology<sup>38</sup>. Since we stressed that many challenges of AI literacy cannot be tackled through the means of hard law, this lack of more subtle assessments on the effectiveness of soft law policies is critical to improve any legal policy on the drivers of AI illiteracy.

#### 4.4 The pace of technological innovation

A fourth problem with the legal challenges of AI literacy concerns how effective current initiatives of lawmakers will be in coping with the pace of technological innovation. The problem is not only to find forms of accountability for AI literacy, or thresholds for legal enforcement and compliance with new standards. Also, what is at stake concerns how the law intends to intercept the trajectory of technological progress. The paper mentioned activism of US public agencies (although under the Biden administration), as well as future work of such new EU authorities, as the European AI Board, or the AI Office<sup>39</sup>.

However, it remains to be seen how effective the soft side of the law can be in promoting AI literacy while catching up with the race of technological progress. We do not have to buy into any argument of those scholars who claim that the race of technology is so determined and powerful

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<sup>35</sup> U. Pagallo, *The politics of data in EU Law: Will it succeed?*, in *Digital Society*, 1, 2022, 1 ss.

<sup>36</sup> Regulation (EU) 2022/868 of the European Parliament and of the Council of 30 May 2022 on European data governance and amending Regulation (EU) 2018/1724 (Data Governance Act), OJ L 152, 3.6.2022. See L. Paseri, *Scienza aperta: Politiche europee per un nuovo paradigma della ricerca*, Milano-Udine, 2024, 166-170.

<sup>37</sup> M. Taddeo – L. Floridi, *How AI can be a force for good*, in *Science*, 361.6404, 2018, 751 ss.

<sup>38</sup> U. Pagallo – M. Durante, *The good, the bad, and the invisible with its opportunity costs: Introduction to the J' Special Issue on “the Impact of Artificial Intelligence on Law”*, in *J*, 5(1), 2022, 139 ss.

<sup>39</sup> World Economic Forum, *Data Equity: Foundational Concepts for Generative AI: Briefing Paper*, 2023; World Economic Forum, *The Presidio Recommendations on Responsible Generative AI*, 2023; European Commission, *Successful and timely uptake of Artificial Intelligence in science in the EU*, Publication office of the EU, Luxembourg, 2024, 1 ss.; Council of Europe, *Human rights by design future. Proofing human rights protection in the era of AI*, cit.

that it cannot be deterred by legal means<sup>40</sup>, to admit that it is a troubling question whether lawmakers and their normative acts will be good enough in this kind of “cat-and-mouse” game. The development of standards with the alignment of metrics and indexes, for example, does not occur overnight<sup>41</sup>. Today’s problems of the law with new forms of accountability for AI literacy and with thresholds of evaluation for compliance with new standards can only make the anticipatory capabilities of every lawmakers’ response worse. It is worth mentioning that only two years after the release of the first draft of the AI Act in 2021, the Brussels lawmakers discovered a new world of AI models to be disciplined in addition to the original material scope of the regulation, namely, the set of GPAI models and systems under the lens of this paper.

#### 4.5 A vicious circle

A new digital divide, even harsher than the first wave in the early 2000s<sup>42</sup>, could follow as a result of multiple cognitive competences of institutions and individuals affected, in the jargon of EU law, by the «systemic risk» of certain GPAI models and systems. A full array of cases shows users overvaluing the capabilities of GPAI, or using such technology in unsafe ways, or even with malicious purposes or criminal intent<sup>43</sup>. The impact is systemic and spans from developers to lawmakers, consumers and citizens, retailers and end-users. AI illiteracy may depend on previous drivers of social inequality and digital division, such as educational, generational, attitudinal, geographical, or socio-economic factors that add to problems of individuals with physical disabilities, lack of digital training, or infrastructure. However, the uniqueness of AI — and moreover, of GPAI technologies — can bring forth new problems of access, usage, and outcomes, such as data inequalities, algorithmic awareness, misinformation hazards which affect trust, or perpetuation of biases and stereotypes that trigger discrimination and thus, representational and allocational harms. Lawmakers should be attentive to such new forms of digital divide<sup>44</sup>, and how they may exacerbate today’s challenges of AI literacy. The multiple cognitive competences involved in how to grasp, assess, and interact with AI technologies regard different epistemic and normative aspects of AI

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<sup>40</sup> H. Moravec, *Robot: Mere machine to transcendent mind*, Oxford, 1999; R. Kurzweil, *The singularity is near*, New York, 2005; K. Kelly – J.J. Myers, *What technology wants*, New York, 2010.

<sup>41</sup> U. Pagallo – M. Durante, *The good, the bad, and the invisible with its opportunity costs*, cit.

<sup>42</sup> R. Cullen, *Addressing the digital divide*, in *Online information review*, 25(5), 2001, 311 ss.; J.A.G.M. Van Dijk, *Digital divide research, achievements and shortcomings*, in *Poetics*, 34(4-5), 2006, 221 ss.

<sup>43</sup> See A.M. Barrett et al., *AI risk-management standards profile for general-purpose AI (GPAI) and foundation models*, Centre for Long-Term Cybersecurity, UC Berkeley, 2025, 1 ss.

<sup>44</sup> S. Lythreathis – S. K. Singh – A.N. El-Kassar, *The digital divide: A review and future research agenda*, in *Technological Forecasting and Social Change*, 175, 121359, 2022, 1 ss.

literacy<sup>45</sup>. The epistemic challenges concern the delegation of cognitive tasks and decision-making processes to AI systems that may end up with unjustified actions, opacity, or biases that fall within the loopholes of the law, such as cognitive biases; institutional biases; learning biases; or use biases<sup>46</sup>. The normative challenges of AI literacy have to do with unfair outcomes that pose threats to both human autonomy and social cohesion<sup>47</sup>. We noted that GPAI-generated fake news is often more credible to human raters than human-written disinformation, and that videos generated by GPAI can be impossible to distinguish from human creation<sup>48</sup>. As a result, the problem is not only given by the hallucination of GPAI systems, i.e. the false information they provide about the states of the world. Also, the problem regards individuals who are not capable of understanding they are facing just hallucinations.

New forms of digital divide can only aggravate the four issues of law enforcement and compliance with legal regulation under scrutiny in this paper with the development of new standards; new forms of accountability for AI literacy; the effectiveness of soft law policies; and the anticipatory capabilities of the law in tackling the pace of technological innovation. A vicious circle may follow as a result. In fact, the more AI systems and GPAI models trigger issues of access, usage, and outcomes with a new digital divide<sup>49</sup>, the less the law appears effective in addressing literacy problems; and yet, the more the law struggles to address issues of law enforcement and compliance with legal regulations — as suggested in this paper — the more a new digital divide is fated to increase. Although some scholars claim that AI systems can be understood as both the reason and solution of this new digital divide<sup>50</sup>, the assumption cannot be reasonably extended to the governance and regulatory problems under scrutiny in this context. After all, it is up to lawmakers the responsibility of how to cope with the pressing problems of the present, and moreover, how to anticipate the challenges of the future.

One of the most relevant challenges of AI literacy has indeed to do with “meta-cognition”, i.e. the ways in which the law may aim to anticipate the challenges of an uncertain future through the anticipation capabilities

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<sup>45</sup> M. Durante – L. Paseri, *Examining epistemological challenges of Large Language Models in law*, in *Cambridge Forum on AI: Law and Governance*, 1, 2025, 1 ss.

<sup>46</sup> E. Loza de Siles, *AI, on the law of the elephant: Toward understanding artificial intelligence*, in *Buffalo Law Review*, 69, 2021, 1389 ss.

<sup>47</sup> M. Durante – L. Floridi, *A legal principles-based framework for AI liability regulation*, in J. Mökander – M. Ziosi (eds.), *The 2021 Yearbook of the Digital Ethics Lab. Digital Ethics Lab Yearbook*, Cham, 2022, 93 ss; U. Pagallo, *Algo-rhythms and the beat of the legal drum*, in *Philosophy and Technology*, 31, 2018, 507 ss.

<sup>48</sup> S. J. Nightingale – H. Farid, *AI-synthesized Faces Are Indistinguishable from Real Faces and More Trustworthy*, cit.

<sup>49</sup> J. Bertomeu – Y. Lin – Y. Liu – Z. Ni, *Capital market consequences of generative AI*, cit.; I. Celik, *Exploring the determinants of artificial intelligence (AI) literacy: Digital divide, computational thinking, cognitive absorption*, in *Telematics and Informatics*, 83, 102026, 2023, 1 ss.

<sup>50</sup> V. Božić, *Artificial intelligence as the reason and the solution of digital divide*, in *Language Education and Technology*, 3.2, 2023, 96 ss.

of AI literacy<sup>51</sup>. This meta-cognitive approach was at work with certain provisions of the overruled US Executive Order, for example, regarding «purposes of experimentation» with Generative AI in Section 10.1 (f)(i). The same holds for the AI Act with «the necessary digital skills and competences, including media literacy, and critical thinking» in recital 56. How to attain these meta-cognitive goals of legislation, however, remains itself an open issue, which brings us back to the dilemmas of hard law, soft law, and governance dissected in this section.

## 5. Conclusions

An increasing amount of work has been devoted to the analysis of the challenges of AI literacy over the past years. However, there is still few research on the lawmakers' response to these challenges. The paper aimed to fill this gap by examining the ways in which the 2024 EU AI Act has intended to strengthen the ability of individuals and institutions to understand, assess, and interact with GPAI technologies. Focus was on the tools of soft law and hard law with different kinds of legal governance related to both public and private actors. The attention was drawn to the aims to be attained, such as individual autonomy, awareness, or proper understanding of the use of technology, as well as AI literacy as a means of regulation. Lack of AI literacy appears often crucial because it jeopardizes the development of all those sectors — from the digitalization of public administrations to the competitiveness of private companies — which need new skills, abilities, and expertise to deal with the pressing problems of the present and the uncertain challenges of the future.

Four open issues related to law enforcement and compliance with legal rules were under scrutiny. Such problems are related to the development of new standards, the enforcement of hard law rules on AI literacy, the effectiveness of soft law policies, and how to cope with the pace of technological innovation. We stressed that a new digital divide should be expected in case the law is not up to this task. Since legislations are still in their infancy — for example, the AI Act will be at full speed only on 2 August 2026 — it is unclear how provisions on the accountability of both public actors and private companies will be implemented. And yet, on the other hand, such legislations are also affected by conceptual problems, as occurs with traditional notions of legal compliance that do not provide useful information for the assessment of most soft law initiatives on AI literacy.

Issues of AI literacy will thus be increasingly relevant in the legal domain for four reasons:

The speed of technological innovation, in particular, with new GPAI models that may exacerbate the problems with such a time-consuming operation, such as the development of legal standards, their interaction

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<sup>51</sup> S.R. Yussen, *The role of metacognition in contemporary theories of cognitive development*, in D. Forrest-Pressley – G. Waller (eds.), *Contemporary Research in Cognition and Metacognition*, Orlando, FL, 1985; R. Miller, *Futures Literacy: transforming the future*, in R. Miller (ed.), *Transforming the future. Anticipation in the 21st century*, London-New York, 2018, 1 ss.

with technical standards, and the overall ability of the law to address the novelties of technology;

The implementation of hard and soft law provisions on AI literacy that in EU law are open to divergent but legitimate interpretations;

The effects of such implementation of hard law and soft law on further regulatory systems in society, such as the AI industry and the market, which add to competitive issues among jurisdictions; and,

Threats of a new digital divide and its interplay with the challenges of AI literacy, which may trigger a vicious circle.

Admittedly, the focus of our analysis could and shall be expanded, for example, by considering further jurisdictions in addition to the response of lawmakers to the challenges of AI literacy in EU law<sup>52</sup>. The aim of this paper, however, was not to be exhaustive, but rather, to explore a *terra incognita* due to the lack of research in the field. We piled up the problems that are open in the legal domain, and suggested why such open problems will increasingly draw the attention of scholars and institutions. By insisting on the pace of AI innovation and the shortcomings of legislative efforts with new risks of digital divide, it seems fair to conclude the bell has rung for everyone.

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<sup>52</sup> Council of Europe, *Human rights by design future*, cit.; UNESCO, *Recommendation on the Ethics of Artificial Intelligence*, 2021; World Economic Forum, *Data Equity: Foundational Concepts for Generative AI*, cit.

## **Abstract**

An increasing amount of work is devoted to the challenges of AI literacy. However, there is still limited research on how the law intends to tackle such challenges. The paper aims to fill this gap with the analysis of the AI Act of EU law vis-à-vis the US Executive Orders on AI from 2023 and 2025. Four issues of law enforcement and compliance with legal regulations follow as a result of the analysis. Such issues regard the development of new standards, forms of accountability for AI literacy, the effectiveness of soft law policies, and the anticipatory capabilities of the law in tackling the pace of technological innovation. A new digital divide, even harsher than the first wave of the early 2000s, should be expected if the lawmakers' response to the challenges of AI literacy is not up to the task.

## **Keywords**

AI Act – digital divide – Executive Order on AI – general purpose AI – law enforcement