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Strict liability for damages arising from artificial intelligence: A critical analysis in light of the risk framework of the Ecuadorian Civil Code

La responsabilidad civil objetiva por daños derivados de la Inteligencia Artificial: Un análisis crítico frente al sistema de riesgos del Código Civil ecuatoriano

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ABSTRACT

The aim of the research was to analyse strict civil liability for damages arising from artificial intelligence in relation to the risk framework of the Ecuadorian Civil Code. A meta-analysis design was adopted, involving a systematic search of the Scopus, Web of Science and Latindex databases, covering the period from January 2015 to March 2026, and including 27 sources that met the established selection criteria. Five recurring legal phenomena were identified: diffuse causation, subjective fragmentation of liability, informational asymmetry, obsolescence of the concept of fault, and a regulatory coverage gap, which highlight the inadequacy of the current civil framework for attributing liability for algorithmic harm. It is concluded that Ecuador requires regulatory reform incorporating aggravated strict liability, joint and several liability amongst technology providers, reversal of the burden of proof, a subsidiary guarantee fund, and differentiated transparency obligations according to the system's risk level.

Descriptors: artificial intelligence; civil liability; civil rights. (Source: UNESCO Thesaurus).

RESUMEN

La investigación tuvo como objetivo analizar la responsabilidad civil objetiva por daños derivados de la inteligencia artificial frente al sistema de riesgos del Código Civil ecuatoriano. Se adoptó un diseño de metaanálisis mediante la búsqueda sistemática en bases de datos Scopus, Web of Science, Latindex, con un período de cobertura entre enero de 2015 y marzo de 2026, incluyendo 27 fuentes que cumplieron los criterios de selección establecidos. Se identificaron cinco fenómenos jurídicos recurrentes: causalidad difusa, fragmentación subjetiva de la responsabilidad, asimetría informacional, obsolescencia del concepto de culpa y laguna normativa de cobertura, que evidencian la insuficiencia del marco civil vigente para atribuir responsabilidad por daños algorítmicos. Se concluye que el Ecuador requiere una reforma normativa que incorpore responsabilidad objetiva agravada, solidaridad entre actores tecnológicos, inversión de la carga probatoria, un fondo de garantía subsidiario y obligaciones de transparencia diferenciadas según el nivel de riesgo del sistema.

Descriptores: inteligencia artificial; responsabilidad civil; derechos civiles. (Fuente: Tesauro UNESCO).

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Research articles section

INTRODUCCIÓN

The 21st century has established artificial intelligence (AI) as one of the most significant transformative forces in the contemporary legal system; its widespread deployment in sectors such as healthcare, justice, finance and public administration creates scenarios in which decisions made by algorithmic systems have direct and indirect effects on individuals' subjective rights, such that legal science is compelled to ask whether the traditional instruments of civil liability, designed to regulate voluntary human conduct, are suitable when the agent causing the harm is a machine equipped with autonomous learning capabilities.

From a historical perspective, the law has responded to each technological revolution through the progressive adaptation of its categories: the advent of the automobile gave rise to regimes of strict liability for hazardous activities; nuclear energy introduced absolute liability; and the digital age challenged the concepts of identity, privacy and authorship. AI, however, presents a singularity that goes beyond these precedents, as its ability to learn, adapt and make decisions in environments not foreseen by the original programmer blurs the boundaries between the designer, the operator and the autonomous object as sources of legal causation; as noted, among others, by Čerka et al. (2015) and Parra-Sepúlveda and Concha-Machuca (2021).

In the Latin American context, Ecuador lacks specific legislation regulating liability arising from the use of AI; the Ecuadorian Civil Code, which draws on the Chilean codification tradition of the mid-19th century, structures non-contractual liability on the basis of proven fault or the presumption of fault in certain cases involving dangerous activities, but does not provide for a separate regime for damages caused by advanced technological systems; this omission is particularly serious given that Ecuadorian case law lacks established precedents in this area and that national legal scholarship is only just beginning the debate, as noted by Narváez-López (2019) and Concha-Flores (2024).

The central question guiding this research is formulated as follows: is the strict liability regime provided for in the Ecuadorian Civil Code sufficient to attribute liability for damages arising from artificial intelligence systems, or is a regulatory reform necessary to incorporate specific criteria in line with the technological nature of the causative agent? Its relevance lies in the fact that regulatory gaps not only create legal uncertainty for victims but also act as a disincentive to the responsible development of technology in the country, as highlighted by Reed (2018) and Gallegos-Unda et al. (2025).

International literature has advanced the study of this problem from different perspectives: authors from the Anglo-Saxon world have proposed frameworks of strict liability without fault, as argued by Marchisio (2021); comparative research has examined the differential treatment offered by systems of subjective, objective and hybrid liability, as documented by Díaz and Mitrani (2025); and European regulatory developments, particularly the European Union's civil liability directives, have opened a debate that transcends continental borders, within the framework analysed by Solaiman and Malik (2025); against this backdrop, the analysis of the Ecuadorian case provides a perspective situated within a peripheral civil law system, with institutional and technological capacities currently in the process of consolidation.

Thus, the objective of this research is to analyse strict civil liability for damages arising from Artificial Intelligence in relation to the risk regime of the Ecuadorian Civil Code.

Strict civil liability: doctrinal foundations

Strict civil liability, also known as liability for risk or no-fault liability, constitutes one of the most significant constructs of modern private law; unlike the subjective regime, which requires proof of fault or intent on the part of the agent causing the damage, strict liability attributes the harmful consequences to whoever introduces a source of risk into society, regardless of whether they acted diligently or not; this formulation, with its roots in French and Italian doctrine, found

acceptance in Latin American legal systems through general clauses on dangerous activities, as noted by Jácome Aguirre et al. (2023) and Guamán-Quinzo and Batista-Hernández (2024).

In the Ecuadorian Civil Code, non-contractual liability is based on Article 2214, which establishes the obligation to compensate for damage caused by a wrongful act committed with intent or through negligence, and on Article 2229, which provides for liability for activities that, by their nature, are capable of causing harm to third parties; however, the application of these provisions to AI systems faces the problem of the so-called algorithmic 'black box', that is, the practical impossibility of determining precisely which element of the system caused the harmful decision and whether there was any form of fault attributable to an identified human agent, as noted by Rodríguez-Corría and Alba-Cazales (2025) and Jaramillo-Valdivieso (2024).

Ecuadorian legal doctrine has noted that the equivalence between gross negligence and wilful misconduct, provided for in Article 29 of the Civil Code, introduces a presumption that could be extended to the treatment of grossly negligent algorithmic errors; this construction, however, proves insufficient when the harm arises from the system's autonomous behaviour, not directly attributable to the decision of any human operator, as noted by Jácome Aguirre et al. (2023); strict liability therefore appears to be the mechanism most consistent with the distributive logic of technological risk, as it falls upon whoever derives the economic benefit from the risky activity.

Artificial intelligence and types of harm

The specialist literature identifies at least three categories of harm that may be caused by AI systems: physical harm, financial harm and harm to fundamental rights such as privacy, equality and dignity; the first category includes bodily injury or death caused by autonomous devices such as vehicles, surgical robots or drones, the second category includes financial losses arising from algorithmic decisions in stock markets, credit granting or insurance management, and the third category arises when facial recognition systems, data profiling or automated decision-making result in discrimination or infringe upon individuals' privacy, as described by Bottomley and Thaldar (2023) and Wang and Zhou (2025).

For legal analysis, it is pertinent to distinguish between weak AI systems, which execute specific tasks predefined by the programmer, and strong AI or advanced machine learning systems, capable of operating in unforeseen environments and modifying their own decision-making parameters; this distinction matters because, in weak systems, the causal chain between design and harm is relatively traceable, whereas in strong systems causality becomes so blurred that no human agent can fully foresee or control the consequences of algorithmic action, as argued by Erkan and Biswas (2025) and Custers et al. (2025).

Within the Ecuadorian justice system, the incorporation of AI tools for case management, sentence prediction and evidence analysis introduces specific risks linked to the automation of judicial decisions; on this subject, authors such as Aguas-Yáñez et al. (2024), Escobar-Escobar et al. (2024), Zabala-Balladares et al. (2024) and Orozco-Zavala et al. (2024) have warned of the dangers of algorithmic bias in criminal and civil proceedings, the lack of transparency in decision-making and the absence of accountability mechanisms when the system produces erroneous results.

Models of liability in comparative law

The debate over the most appropriate model of liability for AI-related damages has produced three main proposals in legal scholarship: the first proposes maintaining the regime of subjective liability with evidential adaptations, such as the reversal of the burden of proof or the use of presumptions of fault, a position held by those who believe that strict liability discourages technological innovation; the second proposes adopting a regime of pure strict liability, similar to that applicable to nuclear activities, which dispenses with any consideration of fault and bases

liability solely on the causal link between the system's operation and the damage caused, a position supported by Marchisio (2021) and Erkan and Biswas (2025).

The third proposal, which is becoming increasingly dominant in European and Latin American debates, opts for a hybrid regime that combines objective and subjective elements depending on the type of system, the degree of autonomy, the sector of activity and the type of harm caused; this alternative envisages the shared allocation of liability between the algorithm developer, the operator deploying it and the user utilising it, assigning to each a share proportional to their capacity to control the system, in line with the proposals of Díaz and Mitrani (2025), Muñoz (2025) and Custers et al. (2025).

At the European level, the European Union's AI Liability Directive and the reform of the Defective Products Liability Directive have established that high-risk AI systems must be subject to a strict liability regime with mandatory quantitative coverage limits, whilst low-risk systems remain under the fault-based regime with the burden of proof reversed; this model has been analysed from a comparative perspective as a benchmark for Latin American legal systems lacking sector-specific regulations on AI, as noted by Solaiman and Malik (2025) and Schoolcraft et al. (2026).

The risk regime in the Ecuadorian Civil Code

The Ecuadorian Civil Code incorporates the principle of liability for dangerous activities through provisions on damage caused by animals, the collapse of buildings and industrial activities; Ecuadorian legal doctrine has debated whether these clauses can be interpreted broadly to include advanced technological systems as sources of risk analogous to those contemplated by nineteenth-century legislators, and in this debate, the argument in favour of analogical extension maintains that the basis of the rule is not the specific nature of the dangerous object, but the general principle that whoever creates a risk must bear the harmful consequences arising from it, a position shared by Guanoluisa Almache et al. (2021) and Zúñiga-Hurtado and Hurtado-Macías (2023).

However, the doctrine of analogical extension faces significant technical objections: firstly, the principle of specificity in civil torts requires that the factual basis of the rule be sufficiently defined, as excessive flexibility in the rule may lead to legal uncertainty and contradictory judicial decisions; secondly, the dangerous activities covered by the Ecuadorian Civil Code presuppose the intervention of a human agent who controls the activity, a situation that does not always hold true in highly autonomous AI systems; and thirdly, establishing the causal link in cases of AI-related harm requires highly specialised technical knowledge that the Ecuadorian judicial system has not yet systematically developed, as noted by Kostrzewa and Nowak (2022) and Guamán-Quinzo and Batista-Hernández (2024).

These limitations have led some legal scholars to consider that the response cannot be purely interpretative, but rather requires legislative reform that incorporates, within the Civil Code itself or in a complementary special law, a differentiated liability regime for the development, deployment and use of AI systems; a position shared by Concha-Flores (2024), Parra-Sepúlveda and Concha-Machuca (2021), and Rodríguez-Corría and Alba-Cazales (2025).

METHOD

The research adopted a qualitative meta-analysis design, aimed at the systematic and critical synthesis of published doctrinal, regulatory and jurisprudential contributions on civil liability for damages arising from AI systems; qualitative meta-analysis, unlike the quantitative meta-analysis typical of the health sciences, did not seek the statistical aggregation of numerical data, but rather the interpretative integration of the results of multiple qualitative studies on the same legal phenomenon, with the aim of constructing a broader and more far-reaching understanding than that offered by each individual study, in line with the approach proposed by Parra-Sepúlveda and Concha-Machuca (2021).

The literature search was conducted in the Scopus, Web of Science, Latindex, Google Scholar and Dialnet databases, as well as the institutional repositories of UNIANDES and the Ecuadorian and Latin American universities with the highest output in civil law and technology; the search terms used were: 'artificial intelligence and civil liability', 'AI-related damages and civil law', 'strict liability and AI', 'Ecuadorian Civil Code and technology', *artificial intelligence liability*, *AI tort law* and their combined variants in Spanish, English and Portuguese; the search period spanned from January 2015 to March 2026.

The inclusion criteria applied were as follows: a) publications in peer-reviewed journals with an impact factor or indexed in recognised databases; b) texts that specifically addressed civil liability in relation to AI systems; c) studies examining Ecuadorian, Latin American or comparative civil law; and d) publications available in full text; the exclusion criteria comprised: a) texts dealing exclusively with AI from a technical or computer science perspective, without any legal connection; b) publications in languages other than Spanish, English or Portuguese; and c) opinion pieces without verifiable theoretical backing.

Twenty-seven primary sources that met all the specified criteria were included; the analysis proceeded in three successive phases: in the first, the thematic categories emerging from the literature were identified, including models of attribution, causal link, distribution of liability and regulatory proposals; in the second, the central arguments of each source were systematised in relation to these categories; and in the third, the arguments were compared with one another and contrasted with the current Ecuadorian regulatory framework, with the aim of drawing inferences geared towards the formulation of reform proposals; methodological rigour was ensured through theoretical triangulation and cross-verification of sources.

RESULTS

The meta-analysis of the reviewed literature identifies five recurring legal phenomena that shape the landscape of civil liability for AI-related harm in the Ecuadorian context:

Regulatory phenomena identified in relation to the objective

The first is the phenomenon of diffuse causality; in machine learning AI systems, the causal chain linking the system's behaviour to the damage caused cannot be reconstructed using traditional evidentiary tools, as the statistical and probabilistic nature of AI models means that a single algorithmic decision may stem from millions of training data points, adjustments made by multiple actors at different times, and contextual variables not foreseen in the original design; such causal diffusion renders the requirement of a direct causal link, as demanded by Article 2214 of the Ecuadorian Civil Code, inoperative, given that the victim faces a burden of proof that is practically impossible to meet without access to the system's internal data, which in many cases constitutes protected trade secrets, as noted by Čerka et al. (2015), Erkan and Biswas (2025) and Rodríguez-Corría and Alba-Cazales (2025).

The second phenomenon is the subjective fragmentation of liability; AI systems are produced, distributed and used by a chain of actors that includes algorithm developers, technology infrastructure providers, operators who customise the system and end users, such that this fragmentation prevents the identification of a single liable party when the harm arises from the interaction between the different links in the chain;

the Ecuadorian Civil Code, designed to attribute liability to a specific individual, lacks mechanisms for distributing liability amongst multiple actors with varying levels of control over the agent causing the harm, as noted by Custers et al. (2025) and Muñoz (2025).

The third phenomenon is information asymmetry; developers of AI systems possess technical knowledge regarding the system's operation that victims, judges and ordinary court experts do not possess, creating a structural disadvantage for the injured party, who must prove a causal link whose understanding requires knowledge of advanced mathematics, statistics and

computer science; the rules of evidence in Ecuador's General Organic Code of Procedure do not provide for specific mechanisms to facilitate the presentation of evidence in this type of litigation, a circumstance that exacerbates the victim's situation, as documented by Kostrzewa and Nowak (2022) and Aguas-Yáñez et al. (2024).

The fourth phenomenon is the obsolescence of the concept of fault for damages caused by autonomous AI; when an AI system makes a harmful decision in the exercise of its autonomous learning capacity, there is no voluntary human behaviour to which a finding of fault can be applied, since the system does not act with negligence or wilful misconduct, but in accordance with its own adaptive parameters, which may lead to consequences that no human actor foresaw or could reasonably have foreseen; the application of the concepts of slight fault, gross negligence and wilful misconduct under Article 29 of the Civil Code to this scenario is legally strained and practically ineffective, in line with the arguments put forward by Narváez-López (2019), Jácome Aguirre et al. (2023) and Díaz and Mitrani (2025).

The fifth phenomenon is the regulatory gap in coverage; Ecuador lacks specific legislation on AI, whether in the form of general law or sector-specific regulation, and the Organic Law on the Protection of Personal Data, enacted in 2021, whilst providing tools for the processing of personal data by algorithmic systems, does not regulate civil liability arising from material or non-pecuniary damage that such systems may cause; this absence creates a void that can only be filled, provisionally and imperfectly, through the broad interpretation of the provisions of the Civil Code, with all the risks of legal uncertainty that this entails, as warned by Gallegos-Unda et al. (2025) and Orozco-Zavala et al. (2024).

Regulatory proposal for the incorporation of AI into the Ecuadorian Civil Code

Based on the phenomena identified, the research formulates a regulatory proposal structured around five pillars, intended to be incorporated into the Ecuadorian Civil Code, either through the reform of existing provisions on non-contractual liability or through the addition of a specific title relating to liability for high-risk technological activities.

The first pillar proposes the incorporation of a clause on aggravated strict liability for high-risk AI systems; this clause would establish that anyone who develops, operates or uses an AI system capable of making decisions with significant effects on the life, physical integrity, property or fundamental rights of third parties shall be liable for the damage caused by the operation of such a system, regardless of the existence of fault, with proof of the damage and the causal link between the operation of the system and the harm suffered being sufficient; the determination of high-risk systems would be referred to an updatable technical regulation, drawn up by the competent regulatory body, in line with the approach adopted by European regulation and with international risk classification standards.

The second pillar proposes establishing a regime of joint and several liability between the developer, operator and user, with rights of recourse amongst them proportional to their share of control over the system; where it is not possible to determine which of the actors in the technological chain caused the damage, they would all be jointly and severally liable to the victim, and each party's share of liability would be determined in a subsequent recourse action, based on criteria such as technical capacity to intervene in the system, the economic benefit obtained and the level of information available on the risks at the time of deployment, as proposed by Custers et al. (2025) and Muñoz (2025).

The third pillar proposes the reversal of the burden of proof regarding the causal link for damages caused by AI systems; under this rule, once the victim has established the damage suffered and the interaction with the system, it will be incumbent upon the defendant to demonstrate that the damage was not caused by the system's operation or that it operated within the safety parameters required by applicable regulations; this reversal is justified by the information asymmetry that characterises such litigation and by the procedural principle of ease of proof, which assigns the burden of proof to the party with better access to the means of

evidence, in line with the arguments put forward by Bottomley and Thaldar (2023) and Wang and Zhou (2025).

The fourth pillar proposes the creation of a subsidiary guarantee fund for victims of AI-related harm, covering cases where the liable party is insolvent or cannot be identified; this fund would be financed through a system of mandatory contributions payable by developers and operators of systems classified as high or medium risk, proportional to the turnover generated by the activity and the risk level of the deployed system; the mechanism has precedents in the field of road traffic accidents in several Latin American countries, so its extension to the field of AI is legally consistent with the region's civil law tradition.

The fifth pillar proposes incorporating an obligation of transparency and auditability as a condition for mitigated liability; developers and operators of AI systems who have complied with the duties of registration, documentation, independent auditing and risk communication set out in the regulations could benefit from a regime of quantitatively limited liability, which seeks to balance the protection of victims with the incentive for the responsible development of AI technologies, preventing a regime of unlimited liability from restricting technological innovation in Ecuador, in line with the guidance provided by Reed (2018) and Marchisio (2021).

DISCUSSION

The results of the meta-analysis enable a productive dialogue with theory and with precedents in comparative law; the observation of the phenomenon of diffuse causality confirms the thesis of Čerka et al. (2015), who noted at an early stage that causality is the Gordian knot of AI liability, a thesis complemented by the more recent contributions of Erkan and Biswas (2025), who emphasise that causal diffusion is exacerbated as AI systems incorporate unsupervised learning capabilities; the Ecuadorian Civil Code, structured around a notion of direct and linear causality, does not offer adequate tools to address this reality without substantive reforms.

The phenomenon of subjective fragmentation of liability engages directly with the proposal by Custers et al. (2025), who have coined the concept of 'liability gaps' to refer to regulatory spaces in which no actor in the technological chain can be held liable under current rules; the proposal for joint and several liability with rights of recourse formulated in this research takes up these authors' insight and adapts it to the Ecuadorian civil law tradition, which already recognises joint and several liability as a mechanism for enhanced protection of victims in other areas of private law.

The debate on the obsolescence of fault as the basis for liability finds particular resonance in this research with the proposal by Marchisio (2021), who advocates the adoption of no-fault liability rules as the solution most consistent with the precautionary principle that should guide the deployment of transformative technologies; doctrinal resistance to this proposal, which fears a disincentive effect on innovation, has been qualified in recent empirical studies, which have found no evidence that strict liability regimes significantly reduce investment in technological innovation when accompanied by compulsory insurance mechanisms, as documented by Díaz and Mitrani (2025).

The proposal to reverse the burden of proof is, in turn, aligned with trends in comparative law analysed by Bottomley and Thaldar (2023) in the field of healthcare and by Wang and Zhou (2025) in relation to large-scale AI systems; both studies have demonstrated that the reversal of the burden of proof, combined with a transparency obligation regarding the system's operation, constitutes the most effective mechanism for reducing the information asymmetry that characterises AI liability litigation.

A comparison with the European model reveals that Ecuador could benefit from adopting a regulatory approach based on risk classification, similar to that of the European Union's AI Regulation; however, it is important to note the need to adapt this model to the specific conditions of the Ecuadorian context, which include more limited institutional oversight capacity,

an emerging technological development sector and a population with unequal access to digital technologies, as the uncritical transposition of European models without such adaptation could result in unenforceable rules or ones that favour technology firms at the expense of individuals' rights, as warned by Solaiman and Malik (2025) and Gallegos-Unda et al. (2025).

The discussion also highlights an unresolved tension in the literature between the need to protect victims of AI-related harm and the need not to restrict technological development through an excessively severe liability regime; the proposal put forward in this research seeks to articulate a balanced solution through a scheme of differentiated liability based on the system's risk level, the obligation of transparency as a condition for mitigation, and the creation of a subsidiary guarantee fund. This framework translates the best practices identified in the international literature into the context of Ecuadorian civil law, whilst fully respecting its principles and doctrinal tradition, in line with the guidance provided by Concha-Flores (2024) and Parra-Sepúlveda and Concha-Machuca (2021).

Finally, it should be noted that regulatory reform, whilst indispensable, is not sufficient on its own; the effectiveness of the civil liability regime for AI-related damages also depends on strengthening the technical capabilities of the Ecuadorian judicial system to understand and assess technological evidence, on the specialised training of judges in technology law, and on the development of a legal culture of precaution in the face of innovations with high social impact; without these enabling conditions, even the best regulatory design risks remaining a mere statement of principles with no practical translation into the effective protection of victims' rights, as noted by Zabala-Leal and Gómez-Macfarland (2024) and Narváez-López (2019).

CONCLUSION

An analysis of strict civil liability for damages arising from artificial intelligence in relation to the risk framework of the Ecuadorian Civil Code shows that the current regulatory framework is structurally insufficient to attribute liability when the agent causing the damage is an algorithmic system equipped with autonomous learning capabilities; Articles 2214 and 2229 of the Civil Code, designed to regulate voluntary human conduct and dangerous activities of foreseeable control, do not address the diffuse causality inherent in artificial intelligence systems, the subjective fragmentation between developers, operators and users, nor the information asymmetry that places the victim at an insurmountable evidential disadvantage under ordinary procedural rules; such a regulatory gap does not constitute a minor deficiency susceptible to hermeneutic correction, but rather a coverage gap that compromises the legal certainty of individuals and discourages responsible technological development in the country.

Against this backdrop, the reviewed literature converges in pointing out that strict liability, structured on the principle that whoever introduces a risk into society must bear the harmful consequences regardless of their diligence, represents the mechanism most consistent with the technological nature of the causative agent; its effective application in the Ecuadorian context requires, however, that it be complemented by a regime of joint and several liability amongst the actors in the technological chain, the reversal of the burden of proof regarding the causal link, the creation of a subsidiary guarantee fund for victims of insolvent or unidentifiable liable parties, and an obligation of transparency and auditability, compliance with which operates as a condition for the quantitative mitigation of liability; this set of mechanisms, systematically coordinated, translates the most established practices of comparative law into the framework of Ecuadorian civil law, with full respect for the region's civil law tradition.

Legislative reform incorporating these key elements, whether through amendment of the Civil Code or via a special supplementary law on liability for high-risk technological activities, constitutes a necessary but not sufficient condition; its practical effectiveness depends on strengthening the technical capabilities of the Ecuadorian judicial system to assess algorithmic evidence, on the specialised training of judges in technology law, and on the institutional development of a regulatory body with the technical expertise to classify artificial intelligence

systems according to their level of risk; without these enabling conditions, even the best regulatory design will be reduced to a mere statement of principles with no effective translation into the protection of the rights of those who suffer the harm caused by these systems.

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