

Philosophy and Intelligent Technologies: Logic and Ethics as the Engine of Legal Change.
An essay in general theory of law and legal informatics.

Filosofia e tecnologie intelligenti: logica ed etica come motore del cambiamento giuridico.
Un saggio di teoria generale del diritto e di informatica giuridica.

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Abstract

This essay argues that intelligent technologies transform the law not as mere instruments, but as bearers of a twofold philosophical demand — logic and ethics — which operates as the true engine of legal change. Tracing the path from the Leibnizian calculemus and jurimetrics to the founding season of Italian legal informatics (Frosini, Losano, Borruso), it examines how computational logic has tested the formalisability of law — from deontic logic and expert systems to legimatics — and how ethics, from Jonas's imperative of responsibility to Floridi's ethics of AI, has been progressively positivised in the GDPR, the AI Act and Italian Law No. 132 of 2025. Through the phenomenon of techno-regulation, the debate on electronic personhood and the safeguards surrounding predictive justice, the essay shows that logic opens the space of legal possibilities, ethics selects within it, and positive law consecrates the selection: legal change, rightly understood, is their joint work.



Keywords: philosophy of law; legal informatics; artificial intelligence; ethics; predictive justice; AI Act.

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1. Introduction: the law before the intelligent machine

The subject that this essay sets out to investigate may be stated in the form of a thesis: intelligent technologies do not transform the law merely as instruments, but as bearers of a twofold philosophical demand — logic and ethics — which operates as the true engine of legal change. Logic interrogates the law as to its form: whether, and to what extent, legal norms are computable, formalisable, translatable into machine language. Ethics interrogates it as to its end: which values ought to govern technical systems capable of affecting, with growing autonomy, individual legal positions. When these two demands converge, the legal order does not merely adapt: it changes its structure, its sources, its institutions.

The story is not new. Every major technical innovation — writing, printing, the telegraph — has produced new law. But artificial intelligence displays a specificity that justifies the attention of the legal philosopher: it does not simply extend the operational capacities of human beings; it replicates, in computational form, precisely those operations — classifying, inferring, deciding — which constitute the core of legal activity. For the first time, technology is not merely the object of regulation, but a potential competitor of the regulating subject. Hence the question that runs through this entire study: is philosophy, in its two articulations of logic and ethics, capable of governing this competition and of converting it into progress for the legal order?

This question is no longer confined to the courtroom or to the legislator's desk. It now enters the ordinary life of undertakings and public administrations, where digital transformation is increasingly imposed not only by economic efficiency but by the new European regulatory environment. The GDPR, the Digital Services Act, the Data Governance Act, the Data Act, the NIS2 Directive and, above all, the AI Act form a dense normative ecosystem in which innovation, compliance and fundamental rights are no longer separable dimensions of action. For companies and administrations alike, the adoption of intelligent systems therefore requires more than technical expertise and legal

compliance understood in a narrow sense: it requires the capacity to interpret the normative meaning of digital architectures, to recognise the values embedded in organisational procedures and to translate abstract principles — transparency, accountability, proportionality, non-discrimination, human oversight — into concrete practices of governance.

It is here that the philosopher — and, more specifically, the philosopher of law — may recover a practical and institutional role. In the corporate sphere, as in public administration, the philosopher is not called upon to provide ornamental ethical discourse after technological choices have already been made, but to participate in the design of those choices: to clarify concepts, expose hidden assumptions, distinguish innovation from mere acceleration, and prevent efficiency from becoming the sole criterion of legitimacy. The European model of digital regulation, precisely because it converts ethical requirements into organisational duties, calls for figures capable of mediating between technical design, legal obligation and moral justification.

This mediation is especially necessary where algorithmic systems affect access to services, employment, welfare, credit, education, policing or justice: domains in which digital conduct is never merely operational, but always also normative, because it distributes opportunities, burdens, visibility and vulnerability.

The topicality of the matter is therefore also theoretical. Digital conduct — the way in which individuals, administrations and enterprises act through data, platforms, automated procedures and artificial agents — obliges legal philosophy to rethink some of its basic categories: action, responsibility, imputability, consent, publicity, trust, obedience and contestation. The new European rules do not merely add compliance duties to existing organisations; they reveal that contemporary legality is increasingly produced in hybrid spaces, where norm, code, organisational routine and behavioural prediction interact.

To think this transformation in terms of philosophy of law means asking not only whether digital systems are lawful, but what kind of legal subject, what kind of public power and what kind of civic conduct they presuppose and produce.

For this reason the philosophy of digital transformation is not an external commentary on innovation: it is one of the conditions for governing innovation without surrendering the juridical meaning of human agency.

2. The philosophical roots: from the Leibnizian *calculus* to *jurimetrics*

The idea that law may be reduced to calculation belongs to the history of philosophy before it belongs to the history of technology. Gottfried Wilhelm Leibniz — a jurist by training, doctor *in utroque iure* at the age of twenty — conceived in the *Dissertatio de arte combinatoria* of 1666 the project of a *characteristica universalis*: a perfect symbolic language in which every dispute, including legal disputes, could be resolved with the invitation *calculus*, «let

us calculate»¹. Even earlier, Thomas Hobbes had reduced reason itself to computation: reason «is nothing but reckoning»². These two seventeenth-century formulas already contain, in embryo, the programme of symbolic artificial intelligence: if to think is to compute, and if law is a work of thought, then law is — at least in principle — computable.

Three centuries were needed for the programme to find adequate instruments. In 1949 Lee Loebinger coined the term *jurimetrics* to designate the scientific and quantitative investigation of legal problems, urging that empirical method replace speculation in the prediction of judicial decisions³. The year before, Norbert Wiener had founded cybernetics as the general science of control and communication in the animal and the machine, warning however — with a lucidity that today appears prophetic — that the human use of human beings demanded moral vigilance over the delegation of decisions to machines⁴. Logic and ethics, then, are already intertwined in the founding discourse: the technical possibility of legal calculation and the moral limit of that calculation were formulated together, by the same authors, in the same years.

In Italy the ground had been prepared by the analytical turn. Norberto Bobbio's essay on legal science and the analysis of language, published in 1950, proposed that jurisprudence be regarded as the rigorous analysis of the legislator's language: a law conceived as language is a law that can, at least in part, be formalised⁵. Without this methodological premise — law as discourse, the norm as proposition — the encounter between the legal order and the computer would have remained an external juxtaposition; with it, it became a research programme.

3. The founding Italian season: Frosini, Losano, Borruso

The years 1968 and 1969 mark, for Italian legal culture, a founding moment. In 1968 Vittorio Frosini published *Cibernetica, diritto e società*, the first Italian monograph — and among the first in Europe — devoted to the relationship between cybernetics and law, from which a new academic discipline would take its start: legal informatics⁶. The book, initially received with an astonishment tinged with scepticism in a community of jurists still unfamiliar with «electronic

¹GW Leibniz, *Dissertatio de arte combinatoria* (Lipsiae 1666). On the Leibnizian dream of a *characteristica universalis* and of a *calculus ratiocinator* applicable to legal disputes as well, see MG Losano, *Giuscibernetica. Macchine e modelli cibernetici nel diritto* (Einaudi 1969) ch I.

²T Hobbes, *Leviathan* (London 1651) pt I, ch V ('For REASON [...] is nothing but Reckoning'). The reduction of reasoning to computation is the direct philosophical antecedent of symbolic artificial intelligence.

³L Loebinger, 'Jurimetrics: The Next Step Forward' (1949) 33 Minn L Rev 455–93.

⁴N Wiener, *Cybernetics: or Control and Communication in the Animal and the Machine* (The MIT Press 1948); N Wiener, *The Human Use of Human Beings* (Houghton Mifflin 1950).

⁵N Bobbio, 'Scienza del diritto e analisi del linguaggio' ['Legal Science and the Analysis of Language'] (1950) 4 Riv trim dir proc civ 342 ff, the manifesto of the Italian analytical school which, together with U Scarpelli, prepared the conceptual ground for the formalisation of normative language.

⁶V Frosini, *Cibernetica, diritto e società* [Cybernetics, Law and Society] (Edizioni di Comunità 1968), published in the series *Diritto e cultura moderna*, edited by R Treves and U Scarpelli, with a 2nd enlarged edn in 1973 and a 5th edn in 1983; the first Italian monograph on the relationship between cybernetics and law, from which the discipline of legal informatics took its start. The work was later recast as V Frosini, *Informatica, diritto e società* (Giuffrè 1988; 2nd edn 1992). See also V Frosini, *La struttura del diritto* (Giuffrè 1962).

brains», is distinguished by an interpretative criterion which the author himself described as an appraisal that is critical without being sceptical, confident without being enthusiastic: a formula which remains, almost sixty years later, the best definition of the correct philosophical attitude before intelligent technologies. For Frosini — who conceived of law as the «morphology of praxis» — the machine does not threaten the jurist, but obliges him to a supplement of humanism: this is the thesis of «technological humanism», later developed in *Informatica, diritto e società* and throughout his subsequent work.

In 1969 Mario G. Losano coined the term «juscibernetics», rigorously distinguishing the planes of analysis that the debate tended to conflate: the use of the computer as an instrument for the documentation and management of the law; the logical formalisation of legal norms; and the consideration of law itself as a cybernetic system of social control⁷. This tripartition retains its ordering value intact: even today, to discuss artificial intelligence and law is to move on these three planes — instrumental, logical, systemic — and a large part of current misunderstandings arises from their improper superimposition.

The third protagonist of the founding season is Renato Borruso, a judge of the Court of Cassation and theorist of documentary legal informatics. His major work, *Computer e diritto* of 1988, in two volumes devoted respectively to the legal analysis of the computer and to the legal problems of informatics, systematises the experience of the Electronic Documentation Centre of the Court of Cassation, operational since 1971 and among the first legal databases ever realised worldwide⁸. With Borruso, the encounter between law and computer ceases to be speculation and becomes an institution: the Italgire system demonstrates that the knowability of the law — a presupposition of every state governed by the rule of law, threatened by normative inflation — can be restored to the jurist only by means of technology. It is a lesson of philosophical import: here technology is not the enemy of legal certainty, but the condition of its survival.

The Italian season thus bequeaths to the contemporary debate three permanent acquisitions: the need for a critical equilibrium between confidence and scepticism (Frosini); the distinction of the planes of analysis (Losano); and the function of technology as a safeguard, not a threat, of the knowability of the law (Borruso). Upon these foundations rests today's reflection on the logic and ethics of artificial intelligence.

⁷ MG Losano, *Giuscibernetica. Macchine e modelli cibernetici nel diritto* [*Juscibernetics. Machines and Cybernetic Models in the Law*] (Einaudi 1969). Losano programmatically distinguished the use of the computer 'within' the law (legal informatics) from the cybernetic governance 'of' the law as a system of social control.

⁸ R Borruso, *Computer e diritto* [*Computer and Law*] (Giuffrè 1988) 2 vols: vol I, *Analisi giuridica del computer*, vol II, *Problemi giuridici dell'informatica*. The Electronic Documentation Centre (CED) of the Italian Supreme Court of Cassation, of which Borruso was among the founders, has been operational since 1971 and is one of the earliest experiences of automated legal documentation worldwide (the Italgire system).

4. Logic as an engine: the formalisation of law and its limits

The first philosophical engine of legal change is logic. The birth of modern deontic logic, with Georg Henrik von Wright's celebrated article of 1951, supplied for the first time a formal calculus of the normative operators — obligatory, forbidden, permitted — making it conceivable to translate legal norms into structures manipulable by a machine⁹. Kelsen's Pure Theory of Law, with its reduction of the legal order to a hierarchical system of norms purified of every sociological and evaluative element, had after all already offered — however unintentionally — the model of a law representable as a formal structure¹⁰. It is no accident that the first legal expert systems, developed between the 1970s and the 1980s, adopted a distinctly Kelsenian architecture: a normative knowledge base, an inference engine, a deductive chain from the general norm to the concrete case.

Logic, however, is an engine of legal change also — and perhaps above all — through its own limits. Herbert Hart showed that normative language exhibits an irreducible «open texture»: every rule has a core of certainty and a penumbra of doubt, within which the decision is not deducible but requires choice¹¹. The rediscovery of legal topics by Viehweg, and Perelman's new rhetoric, added that the jurist's reasoning does not proceed *more geometrico*, but by problems, argumentative loci and the adherence of the audience: it is reasonableness, not mere calculation¹². These acquisitions, which matured well before the current technological wave, prove today extraordinarily topical: they trace the boundary of principle between that part of legal activity which is automatable — subsumption within the clear core of the rule, documentary research, consistency checking — and that which is not: judgment in the penumbra, the balancing of principles, the equity of the concrete case.

The paradox is instructive: it was precisely the attempt to formalise law in its entirety that demonstrated, by experimental means, the soundness of the anti-formalist theses. When Alan Turing, in 1950, proposed his celebrated test, he shifted the question from the essence of thought to its observable behaviour¹³; analogously, legal informatics shifted the question of the nature of legal reasoning from the speculative to the operational plane, compelling legal theory to specify what, exactly, the jurist does when he interprets. In this sense computational logic has already changed the law: not by replacing the jurist, but by obliging legal science to an unprecedented self-reflective rigour. Modern generative artificial intelligence systems, founded on statistical models of language rather than on rules, reproduce the same dialectic in inverted form: no longer deduction without understanding, but plausibility

⁹GH von Wright, 'Deontic Logic' (1951) 60(237) *Mind* 1–15.

¹⁰H Kelsen, *Reine Rechtslehre* [Pure Theory of Law] (Deuticke 1934; 2nd edn 1960; English trans, University of California Press 1967).

¹¹HLA Hart, *The Concept of Law* (Clarendon Press 1961), esp ch VII, on the 'open texture' of legal language.

¹²T Viehweg, *Topik und Jurisprudenz* (Beck 1953); C Perelman and L Olbrechts-Tyteca, *Traité de l'argumentation. La nouvelle rhétorique* [The New Rhetoric] (PUF 1958; English trans, University of Notre Dame Press 1969).

¹³AM Turing, 'Computing Machinery and Intelligence' (1950) 59(236) *Mind* 433–60.

without justification — and hence, once again, the irreplaceability of the reasoned decision as a safeguard.

5. From expert systems to legimatics: logic in the service of lawmaking

The story of legal expert systems deserves specific consideration, because it constitutes the most rigorous experiment ever conducted on the computability of law — and because its outcome, apparently a failure on the commercial plane, proved in fact exceedingly fruitful on the theoretical and institutional plane. The first great project in the field was TAXMAN, presented by L. Thorne McCarty in 1977: a conceptual modelling of a dogmatically well-structured area of United States corporate tax law, which demonstrated that delimited portions of the legal order could be represented in computational structures capable of sustaining an elementary form of legal reasoning¹⁴. A decade later, Robert Kowalski's group at Imperial College London took the next step, translating an entire statute — the British Nationality Act 1981 — into an executable logic program¹⁵. The experiment succeeded technically, but its most precious teaching was of the opposite sign: the translation of the statute into logic required, at every step, interpretative choices which the text did not dictate; formalisation does not eliminate interpretation, it anticipates it and — if undeclared — conceals it. Whoever formalises a statute, one might say, legislates a second time: whence the requirement, today inescapable, that every computational representation of legal norms be transparent, documented and contestable.

The theoretical balance-sheet of that season was drawn, in Italian scholarship, by Giovanni Sartor, who showed how expert systems, though they never produced the promised «mechanical lawyer», compelled legal science to clarify notions which legal dogmatics had handled intuitively: the conditional structure of the legal rule, the relationship between rule and exception, the defeasible nature of legal reasoning — which proceeds by conclusions revisable in the light of new premises — and the dynamics of argumentation between opposing parties¹⁶. Symbolic artificial intelligence was, in this sense, the experimental laboratory of the theory of legal argumentation: many acquisitions now current in legal theory were refined precisely in the attempt to teach them to a machine.

Alongside the applied dimension of adjudication, logic invested the dimension of legislative production. This is the field which the Florentine school of the Institute for Legal Documentation of the National Research Council christened, at the beginning of the 1990s, «legimatics»: informatics in the service of legislating¹⁷. Building upon the rules of legislative drafting

¹⁴LT McCarty, 'Reflections on TAXMAN: An Experiment in Artificial Intelligence and Legal Reasoning' (1977) 90(5) Harv L Rev 837–93.

¹⁵MJ Sergot and others, 'The British Nationality Act as a Logic Program' (1986) 29(5) Commun ACM 370–86.

¹⁶G Sartor, *Intelligenza artificiale e diritto. Un'introduzione* [Artificial Intelligence and Law: An Introduction] (Giuffrè 1996).

¹⁷C Biagioli, P Mercatali and G Sartor, *Elementi di legimatica* [Elements of Legimatics] (CEDAM 1993); C Biagioli, P Mercatali and G Sartor (eds), *Legimatica: informatica per legiferare* [Legimatics: Informatics for

consolidated in the 1986 joint circulars of the Chamber of Deputies, the Senate and the Presidency of the Council of Ministers, legimatics developed instruments for the automatic quality control of normative texts — partitions, numbering, references, cross-references — and models for the feasibility analysis of legislation. From that intuition descend, in a direct line, the mark-up standards for legislative texts and the public databases of legislation in force which today guarantee citizens free access to the law of the State. The philosophical significance of the phenomenon should not be missed: here logic changes the law not by presuming to decide cases, but by disciplining the form of the statute. Clarity, consistency, univocity of cross-references are not drafting ornaments: they are preconditions of legal certainty and, therefore, of the rule of law itself — in perfect continuity with Borruso's lesson on knowability. And the most recent prospect, the use of generative artificial intelligence in support of legislative drafting and preparatory analysis, restates in this field the same golden rule that governs adjudication: the machine may instruct and propose; responsibility for the normative act remains with the political organ that enacts it.

6. Ethics as an engine: from the infosphere to the imperative of responsibility

The second engine is ethics. Luciano Floridi has described the digital revolution as the «fourth revolution»: after Copernicus, Darwin and Freud, human beings discover that they are not even at the centre of the infosphere, the informational environment in which human and artificial agents interact. In his ethics of artificial intelligence, Floridi warns that AI systems accomplish an unprecedented divorce between agency and intelligence: they act effectively without understanding, and precisely for this reason they demand an external ethical guidance, embedded in design and in governance¹⁸. From this follows a change of paradigm for the law: if artificial agency is blind to values, values must be inscribed *ex ante* into systems, and not merely invoked *ex post* before a court.

This demand finds its deepest foundation in Hans Jonas's imperative of responsibility: technological civilisation, being capable of what no previous generation was capable of, must answer for effects remote in time and space, according to an imperative that commands us to act so that the consequences of our action are compatible with the permanence of genuine human life¹⁹. Transposed into the field of intelligent technologies, the Jonasian principle grounds the entire precautionary architecture of European AI law: prior risk

Legislating] (Edizioni Scientifiche Italiane 1995), proceedings of the Florence conference held on 25 November 1994. The neologism was coined within the Institute for Legal Documentation of the Italian National Research Council (IDG-CNR) in Florence, later ITTIG.

¹⁸L Floridi, *The Ethics of Artificial Intelligence. Principles, Challenges, and Opportunities* (OUP 2023); Italian edn, *Etica dell'intelligenza artificiale*, M Durante (ed) (Raffaello Cortina 2022). See also L Floridi, *The Fourth Revolution. How the Infosphere is Reshaping Human Reality* (OUP 2014).

¹⁹H Jonas, *Das Prinzip Verantwortung. Versuch einer Ethik für die technologische Zivilisation* (Insel 1979); English trans, *The Imperative of Responsibility. In Search of an Ethics for the Technological Age* (University of Chicago Press 1984).

assessment, documentation and continuous monitoring are not bureaucratic devices, but the juridification of an ethics of prospective responsibility.

The passage of ethics from the book to the legislative process took place, in the European Union, through a body established for the purpose: the High-Level Expert Group on Artificial Intelligence, whose Ethics Guidelines for Trustworthy AI, published in April 2019, defined the three pillars of trustworthiness — lawfulness, ethicality, technical robustness — and the seven operational requirements that flow from them: human agency and oversight; robustness and safety; privacy and data governance; transparency; diversity, non-discrimination and fairness; societal and environmental well-being; accountability²⁰. The document had no binding force, but its historical function is now evident: it operated as a transmission belt between philosophical reflection and legislation, supplying the future European regulation with its lexicon, its taxonomy of requirements and even the structure of many of its provisions. Whoever compares the seven requirements of 2019 with the obligations imposed on high-risk systems by the AI Act observes an almost literal derivation: rarely does the history of the sources of law offer so documentable an example of ethics becoming law by degrees — philosophical principle, soft law, binding norm.

In Italian scholarship, the voice that contributed most to translating the ethical demand into legal categories is that of Stefano Rodotà. From the 1990s onwards he showed that information technologies redefine the person — the electronic body alongside the physical body — and that the response of the legal order cannot be confined to compensatory protection, but must consist in the constitutionalisation of new rights: data protection, informational self-determination, the right to have rights in the digital dimension as well²¹. The itinerary leading from Article 8 of the Charter of Nice to the General Data Protection Regulation is, to a large extent, the history of the success of this approach: an ethics of informational dignity become positive law of primary rank.

7. Code is law: techno-regulation and protection by design

The point of convergence between logic and ethics is the discovery that computer code regulates behaviour just as — and at times more effectively than — the legal code. The formula «code is law», made famous by Lawrence Lessig, expresses the thesis that in the digital environment the technical architecture constitutes an autonomous modality of regulation, alongside the law, the market and social norms: what software renders impossible needs no prohibition; what it renders inevitable needs no command²². The consequence for the theory of the sources of law is disruptive: whoever writes the code

²⁰ High-Level Expert Group on Artificial Intelligence (AI HLEG), *Ethics Guidelines for Trustworthy AI* (European Commission 8 April 2019).

²¹ S Rodotà, *Tecnologie e diritti* [Technologies and Rights] (il Mulino 1995); S Rodotà, *Il diritto di avere diritti* [The Right to Have Rights] (Laterza 2012).

²² L Lessig, *Code and Other Laws of Cyberspace* (Basic Books 1999); L Lessig, *Code: Version 2.0* (Basic Books 2006).

exercises a de facto normative power, withdrawn from the circuits of democratic legitimation and from procedural safeguards.

Mireille Hildebrandt has carried the analysis to its extreme consequences, asking whether the «smart» technologies that anticipate and pre-shape behaviour do not mark the end of law as we know it: a law that addresses subjects capable of disobeying, and which grounds its very nature precisely in the possibility of disobedience — and of the subsequent adversarial contestation. Her proposal of «legal protection by design» reverses the relationship: if technology regulates, then legal safeguards — contestability, transparency, due process — must be embedded in the technical infrastructure itself²³. This is precisely the strategy which the European legislator would make its own: from data protection by design under Article 25 GDPR to the transparency and human oversight requirements of the AI Act.

Techno-regulation thus marks the passage from law that regulates technology to technology that embeds the law. The change is philosophically decisive: the norm is no longer merely a prescriptive utterance addressed to the freedom of its addressee, but becomes an architectural constraint that shapes the very space of action. Logic presides over the translation of the rule into code; ethics decides which rules deserve to be translated and which margins of freedom, of exception, of equity must be preserved against the temptation of perfect enforcement. A law perfectly enforced by the machine, be it noted, would not be a perfect law: it would be a legal order without equity, without tolerance of error, without that margin of inefficiency in which, historically, liberties have drawn breath.

8. The subjectivity of the machine: from the «electronic person» to software agents

If techno-regulation affects the theory of the sources of law, the growing autonomy of artificial agents affects an even deeper category: that of the legal subject. The question was raised in institutional terms by the European Parliament resolution of 16 February 2017 on civil law rules on robotics, which invited the Commission to consider, for the most sophisticated autonomous robots, the creation of a specific legal status of «electronic person», liable for the damage it may cause²⁴. The proposal provoked a vast critical reaction in the scientific community: the decisive objection was that electronic personhood, far from filling a gap in protection, would function as a shield, allowing producers and users to unload onto the artefact a responsibility that must remain human. The Commission did not pursue the idea, and subsequent European legislation — the AI Act and the new directive on liability for defective products, which expressly includes software among products — has

²³ M. Hildebrandt, *Smart Technologies and the End(s) of Law. Novel Entanglements of Law and Technology* (Edward Elgar 2015).

²⁴ European Parliament resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103(INL)) para 59(f), which envisaged 'a specific legal status' of electronic person for the most sophisticated autonomous robots.

definitively opted for the allocation of duties and liabilities to human beings and organisations: providers, importers, distributors, professional deployers.

The theoretically most refined contribution to the debate remains that of Gunther Teubner, who proposed — on the foundation of social systems theory — to grant software agents not full legal personhood, but a partial and graduated legal subjectivity, calibrated to the functions they actually perform in legal transactions: capacity to declare on behalf of others, centres of imputation of specific risks²⁵. Teubner identifies with precision the three digital risks which the law of liability must confront: the autonomy risk, generated by the unpredictable decisions of the individual agent; the association risk, generated by hybrid human-machine action, in which the respective contributions can no longer be separated; and the interconnection risk, generated by systems acting in networks. To each risk there should correspond a dedicated dogmatic instrument, rather than a generic and totalising personification.

The question, in truth, is not ontological but normative — and the history of law proves it. Legal subjectivity has always been an artefact: the *persona* is, etymologically, the actor's mask; and over the centuries the legal order has personified collective entities, foundations, dedicated patrimonies, without ever asking whether they «think». Nothing prevents, on the conceptual plane, the personification of the machine: legal logic shows that the space of construction is open. But it is ethics that decides whether that space ought to be occupied, and the answer prevailing today — adopted by the European legislator — is negative, for a reason that leads straight back to Jonas: responsibility, in technological civilisation, cannot be transferred to the artefact without dissolving. The episode of the electronic person is thus the clearest illustration of the thesis of this essay: logic opens the space of constructive possibilities, ethics selects within it, positive law consecrates the selection. The engine of legal change has functioned, in this case, also as a brake — and braking, when the direction is wrong, is an eminent form of governing movement.

9. When ethics becomes law: the GDPR, the AI Act and Law No. 132 of 2025

Current positive law offers the most concrete proof of the thesis defended here: principles elaborated in philosophical quarters have become, within the span of two decades, binding legal norms. Regulation (EU) 2016/679 positivised informational self-determination and, in Article 22, the right not to be subject to decisions based solely on automated processing which produce legal effects: a provision which is, strictly speaking, a clause reserving decision-making to humans, the direct offspring of ethical reflection on the dignity of the person before calculation²⁶. Article 25, by mandating data protection by design and by

²⁵G Teubner, *Soggetti giuridici digitali? Sullo status privatistico degli agenti software autonomi* (Italian edn, P Femia (ed), Edizioni Scientifiche Italiane 2019); G Teubner, 'Digital Personhood? The Status of Autonomous Software Agents in Private Law' [2018] *Ancilla Iuris* 35–78.

²⁶Regulation (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 (General Data Protection Regulation) [2016] OJ L119/1, esp. arts 22 and 25.

default, transformed the intuition of techno-regulation into a legal obligation: compliance with the law must be a property of the artefact.

Regulation (EU) 2024/1689 — the Artificial Intelligence Act, the first organic body of legislation on artificial intelligence in the world — brings the design to completion. Its risk-based architecture is the normative application of the imperative of responsibility: practices prohibited as incompatible with dignity (subliminal manipulation, *social scoring*), high-risk systems subject to requirements of risk management, data quality, documentation, transparency and, under Article 14, effective human oversight²⁷. The ethics of AI elaborated by philosophy — the principles of beneficence, non-maleficence, autonomy, justice and explicability — has here become legislative technique: recitals and enacting terms translate into obligations, prohibitions and sanctions what in the documents of ethics committees was recommendation.

The Italian legal order completed the picture with Law No. 132 of 23 September 2025, which lays down principles on artificial intelligence in coordination with the European regulation: human-centred development, transparency, proportionality, and — a point of systematic importance — the reservation to the judge of every decision on the interpretation of the law, on the assessment of facts and evidence and on the adoption of judicial measures, with the use of AI in the judicial domain confined to instrumental and supporting functions²⁸. The statute, together with the delegations for the adaptation of domestic law, designs a national governance framework involving the sectoral authorities and entrusts legislative technique with the task of keeping the human being — the official, the physician, the judge, the professional — at the centre of the decision-making process. That so distinctly philosophical a principle as human-centredness should appear today as a provision of ordinary legislation is textual proof that ethics has operated as an engine of legal change.

10. The judge, the jurist and the machine: predictive justice and its safeguards

Adjudication is the ultimate testing ground of the entire question, because in it logic and ethics touch without mediation: judgment is at once inference and evaluation, calculation and prudence. So-called predictive justice — the use of systems that estimate the probable outcome of disputes on the basis of precedents — promises calculability, uniformity, deflation of litigation; but the case of *State v. Loomis*, decided by the Supreme Court of Wisconsin in 2016 with regard to the COMPAS recidivism risk-assessment algorithm, laid bare the dangers: the opacity of proprietary models, the risk of discrimination

²⁷Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence (Artificial Intelligence Act), OJ L, 2024/1689, 12 July 2024, esp. arts 1, 5, 6 ff, 13 and 14.

²⁸Legge 23 settembre 2025, n 132, 'Disposizioni e deleghe al Governo in materia di intelligenza artificiale' ['Provisions and Delegations to the Government concerning Artificial Intelligence'] (GU Serie Generale n 223, 25 September 2025), which sets out the national principles of human-centred AI development and sectoral rules concerning healthcare, labour, intellectual professions, public administration and judicial activity, in coordination with Regulation (EU) 2024/1689.

embedded in the data, the tendential de-responsibilisation of the human decision-maker²⁹. The CEPEJ European Ethical Charter of 2018 fixed in response the five principles — respect for fundamental rights, non-discrimination, quality and security, transparency, user control — which still constitute the ethical grammar of judicial AI³⁰.

The Italian legal order has, for that matter, already elaborated, in its administrative jurisprudence, a body of safeguards for algorithmic decision-making that anticipates many solutions later consecrated by the European legislator. Ruling on the celebrated litigation concerning the algorithm used for the mobility of school teachers, the Council of State first characterised the algorithm as an administrative technical rule, as such subject to the principles of publicity, transparency and full knowability, and therefore reviewable by the courts; it then articulated the three principles governing the use of automated instruments in administrative proceedings: the knowability of the algorithm and of the logic employed; the non-exclusivity of the algorithmic decision — which requires a human contribution capable of controlling, validating or overturning the automated outcome — and algorithmic non-discrimination³¹. It is remarkable that this construction was argued also in the light of Article 22 of the GDPR: the clause reserving decisions to humans, born as an ethical principle and positivised as a European norm, operates here as a standard of domestic judicial review. The circle of the thesis closes before the interpreter's eyes.

Classical reflection offers here its most enduring contribution. Aristotle had already seen that the law, being universal, cannot foresee the case that escapes its generality, and that equity is the corrective of legal justice precisely where the universal fails³². Now, a predictive system is, by construction, the power of the universal: it extracts regularities from the past and projects them onto the new case. It is therefore structurally blind precisely to what, for Aristotle, defines the highest moment of judgment — the deviation of the case from the series. A conclusion of principle follows, which positive law has by now received: prediction may serve judgment, not replace it; Article 101(2) of the Italian Constitution, in subjecting the judge only to the law, excludes that he may be subjected — in law or in fact — to the output of a statistical model³³.

For the legal professions the argument is specular. Richard Susskind foresaw the decomposition of legal work into standardisable activities, destined for automation, and irreducibly human activities — strategy, negotiation, ethical

²⁹Supreme Court of Wisconsin, *State v. Loomis*, 881 N.W.2d 749 (Wis. 2016), on the use of the COMPAS algorithm in sentencing: the Court allowed its use, but subject to significant cautionary requirements in the statement of reasons, given the proprietary and non-inspectable nature of the model.

³⁰European Commission for the Efficiency of Justice (CEPEJ), *European Ethical Charter on the Use of Artificial Intelligence in Judicial Systems and Their Environment* (Council of Europe 2018).

³¹Consiglio di Stato, sez VI, 8 April 2019, n 2270; Consiglio di Stato, sez VI, 13 December 2019, n 8472, both delivered in the litigation concerning the algorithm used for the assignment of teaching posts. The latter articulates the principles of knowability, non-exclusivity of algorithmic decision-making and algorithmic non-discrimination, also in the light of art 22 of Regulation (EU) 2016/679.

³²Aristotle, *Nicomachean Ethics* V.10, 1137b, where *epieikeia* [equity] is defined as the corrective of the law 'insofar as it is universal'; the passage remains the classical foundation of every critique of the full computability of judgment.

³³On this point see Article 101(2) of the Italian Constitution («Judges are subject only to the law») and Article 111 of the Constitution on fair trial; and, in Union law, Article 47 of the Charter of Fundamental Rights of the EU.

judgment³⁴. The experience of generative systems both confirms and corrects the prediction: the machine drafts, summarises, researches with growing efficiency, but responsibility for the act — the signature, in the proper and in the figurative sense — necessarily remains human, as the rules of professional conduct and the aforementioned Law No. 132 of 2025 are careful to reaffirm for the intellectual professions. The legal change induced by technology is here not the replacement of the jurist, but the normative reorganisation of his responsibility.

11. Logic and ethics as the engine of legal change: a synthesis

It is now possible to resolve the initial question in the form of a synthesis. Logic and ethics operate as the engine of legal change in three distinct and complementary modes.

First, as *critique*. Computational logic, by putting the formalisability of law to the test — from expert systems to the translation of statutes into programs — has compelled legal science to distinguish with unprecedented precision the computable from the non-computable, subsumption from balancing, retrieval from interpretation. Ethics, for its part, has subjected the apparent neutrality of technology to critique, revealing that every architecture embeds value choices. In both cases philosophy has acted as an agency of clarification: the law that emerges knows itself better.

Second, as *design*. The convergence of logic and ethics has generated a new regulatory paradigm — protection *by design*, the risk-based approach, human oversight — in which the norm does not merely prescribe conduct, but shapes artefacts; and it has invested the very fabric of legislation, from legimatics to today's drafting-support tools. This is a change in legislative technique and, more profoundly, in the theory of the sources of law: alongside the statute there appear harmonised technical standards, common specifications, codes of conduct, in a normative continuum which legal scholarship is called upon to re-systematise.

Third, as *foundation* — and, when required, as *limit*. The new rights of the digital age — data protection, explanation of automated decisions, the reservation of decision-making to humans — are born neither of judicial practice nor of political will alone: they are born of philosophical arguments about dignity, autonomy and responsibility, subsequently positivised. And conversely, as the story of the «electronic person» shows, the same reflection has been able to halt constructions that were legally possible but ethically regressive. The chain that leads from Jonas and Rodotà to Article 22 GDPR, and from Floridi and the European ethical principles to the AI Act and to Law No. 132 of 2025, can be documented text in hand: rarely, in the history of law, has the passage from ethics to norm been so rapid and so traceable.

There remains the methodological warning bequeathed by the founding Italian season, which deserves to be adopted as a permanent criterion: critical appraisal without scepticism, confidence without enthusiasm. The

³⁴R Susskind, *Tomorrow's Lawyers. An Introduction to Your Future* (3rd edn, OUP 2023).

philosophical engine of legal change works only if logic and ethics remain in mutual tension — if the former does not presume to calculate the just and the latter does not presume to halt calculation, but both concur in a law that uses the machine while remaining a work of man.

12. Conclusions

Philosophy and intelligent technologies can be — and historically already have been — the engine of legal change, provided the phrase is correctly understood: not technology alone, which is blind force, nor philosophy alone, which is form without leverage, but their composition. Logic supplies the law with the instrument and the limit of computability; ethics supplies the end and the brake; positive law converts both into enforceable safeguards. The European AI Act and the Italian Law No. 132 of 2025 represent the current state of this conversion, not its completion: the delegation of cognitive functions to machines will continue to grow, and with it the need for legal science to keep open the conceptual worksite inaugurated by Leibniz, reopened by Wiener and, in Italy, by Frosini, Losano and Borruso.

If a single lesson can be drawn from the path travelled, it is the following: the law need not fear being conceived as calculation, provided it does not forget that it is, before calculation, judgment; and judgment — the act by which the universality of the norm bends to the unrepeatability of the case — remains the place where logic and ethics, machine and human being, meet without being able to replace one another.

To guard this place is, today, the proper task of the philosophy of law; to equip it with technical intelligence is the task of legal informatics; to secure it with norms is the task of the legislator. Legal change, rightly understood, is the joint work of all three.