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Blockchain and Public Administration: A Digital Love Story[*]

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ABSTRACT The article reviews the evolution of the relationship between Blockchain and the public administration. It outlines an initial fascination, followed by legislative actions in 2019 that framed the technology's use, and subsequent caution advised by legal experts. A significant update is the incorporation of distributed-ledger technologies into the Public-Contracts Code, raising new challenges, such as implementing the Human-in-the-loop principle. While predicting the immediate future of such disruptive technologies is difficult, reviewing their development so far could help anticipate the next advancements in the Fourth Industrial Revolution, where Blockchain plays a crucial role.

1. *Charting the blockchain journey in public administration*

As technology relentlessly reshapes our world, the intricate dance between Blockchain and public administrations unfolds a journey marked by initial excitement, regulatory milestones, and cautious optimism.[1] Delving into the integration of distributed-ledger technologies into the Public-Contracts Code reveals a landscape ripe with innovation and challenge. It's not possible to make predictions about the near future because the evolution of disruptive technologies always holds surprises. However, retracing the steps followed so far might be useful in catching the "coming wave" in the IV Industrial Revolution,[2] of which Blockchain is one of the engines.

2. *Attraction always has its reasons*

Theoretically, Blockchain is the perfect digital partner to realize the principles of Transparency,[3] legal certainty, and reliability of administrative action in all crucial sectors of the lives of citizens and businesses.[4] The "God Protocol"[5] still resonant with the mystery surrounding its inventor (Natoshi Sakamoto[6]), is considered as revolutionary as

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[1] The paper is the revised version of the presentation "*Blockchain e Pubblica Amministrazione*", held at the University LUM Giuseppe Degennaro, *La digitalizzazione nel ciclo di vita dei contratti*, 23-24 February 2024.

[2] K. Schab, *The Fourth Industrial Revolution*, Crown, 2017. Klaus Schwab, founder and executive chairman of the World Economic Forum, explores the profound impact of the Fourth Industrial Revolution on various aspects of our existence. From communication to work, from our economies to our understanding of what it means to be human, this revolution is reshaping our world. Schwab discusses the emergence of new opportunities and significant challenges in an era driven by data and technology. He proposes ways to navigate this transformation and manage its effects, emphasizing collaboration across geographical and disciplinary boundaries. The fourth industrial revolution represents a convergence of physical, digital, and biological technologies, and it has the potential to revolutionize every discipline and economic sector. While it offers great opportunities, it also poses risks related to organizational adaptation, technology adoption, security, inequality, and societal fragmentation.

[3] The literature on Transparency in the Italian legal system is too vast to mention here. However, it is necessary to cite it, also for the extensive bibliographical references, E. Carloni, *Il paradigma trasparenza. Amministrazioni, informazione, democrazia*, Bologna, Il Mulino, 2022; A.G. Orofino, *La trasparenza oltre la crisi. Accesso, informatizzazione e controllo civico*, Bari, Cacucci Editore, 2020; A. Corrado, *Conoscere per partecipare: la strada tracciata dalla trasparenza amministrativa*, Naples, Edizioni Scientifiche Italiane, 2019.

[4] G. Gallone, *Blockchain, procedimenti amministrativi e prevenzione della corruzione*, in *Diritto dell'economia*, 3, 2019, 187 ff.; S. Caldarelli, *L'uso della tecnologia blockchain nel settore delle pubbliche amministrazioni: tra "mito" e realtà giuridica*, in *Il diritto dell'informazione e dell'informatica*, 4, 2020, 857. G. D'Acquisto, *Blockchain e GDPR: verso un approccio basato sul rischio*, in *Federalismi.it*, 2, 2021, 53 ff.; M. Farina, *Blockchain e tutela della salute: verso la riorganizzazione dei sistemi sanitari?*, in *Federalismi.it*, 21, 2020, 170; M. Verzaro, *La blockchain e il fabbisogno di personale nella pubblica amministrazione*, in *Federalismi.it*, 2, 2021, 195 ff.; F. Faini, *Il diritto nella tecnica: tecnologie emergenti e nuove forme di regolazione*, in *Federalismi.it*, 16, 2020, 79; G. Gallone, *La pubblica amministrazione alla prova dell'automazione contrattuale. Note in tema di Smart Contracts*, in *Federalismi.it*, 20, 142-220; M. Macchia, *Blockchain e pubblica amministrazione*, in *Federalismi.it*, 2; P. Rubechini, *Blockchain e pubblica amministrazione italiana: i primi passi di un cammino ancora lungo*, in *Giornale di diritto amministrativo*, 3, 2021, 298 ff.; M. Marchesi, *Blockchain pubbliche e permissioned: una questione di fiducia*, in *Federalismi.it*, 2, 2021, 140 ff.

[5] M.J. Casey and P. Vigna, *The Truth Machine: The Blockchain and the Future of Everything*, St. Martin's Press, 2018.

[6] S. Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash*

the Internet or Artificial Intelligence. But it contains promises that touch the foundations of a Rule-Of-Law state such as the certainty of information, upon which legal traffic is based, accessibility, transparency, data sharing, and their protection. Since its global emergence in 2008 to today, many public sectors have been candidates to benefit from this disruptive technology: public contracts, authorization processes, digital-health records, digital identity, tracking of production and food-supply chains, real-estate transactions, voting processes, degree certification, and public-funding disbursements.

The perfect synergy between Blockchain technology and administrative action has profound roots. One of the oldest functions of the Rule-Of-Law is to ensure certainty regarding subjects, status, properties, legal relationships; functions that "are deemed necessary or useful for the conduct of various activities that take place within the community".[7] From the land registry, to real-estate registers, to the vehicle registry, to the registry of resident citizens, all public registers share some common elements: they are kept by a public authority, are accessible to the public, can issue copies or extracts, or, in some cases, also certifications; their purpose is to create public certainty. In the digital world, public registers are sometimes called "digital files" (the digital file of the economic operator; digital-construction file, under discussion in the reform of the TUE). To public records, open to the public and freely accessible, is entrusted the new era of digitalized transparency if the information and data pertain to the public sector. And they are flourishing everywhere. For instance, the Ai Act[8] requires additional registration obligations if AI systems are used by a public authority. Indeed, for systems classified as 'high-risk' (Annex III), the administration, even if it is not the 'provider', has the obligation to register in the public database (see Recital 131 "In order to facilitate the work of the Commission and the Member States in the AI field as well as to increase the transparency towards the public, providers of high-risk AI systems other than those related to products falling within the scope of relevant existing Union harmonisation legislation, as well as providers who consider that an AI system listed in the high-risk use cases in an annex to this Regulation is not high-risk on the basis of a derogation, should be required to register themselves and information about their AI system in an EU database, to be established and managed by the Commission. Before using an AI system listed in the high-risk use cases in an annex to this Regulation, deployers of high-risk AI systems that are public authorities, agencies or bodies, should register themselves in such database and select the system that they envisage to use"). For private deployers, registration is instead on a voluntary basis. Moreover, if there were not a proliferation of public registers, it would not be so difficult to implement in practice the *once-only* principle, a milestone of the strategy for the digitalization of administrative activity, now also of the public-contracts cycle.

3. *Why this resonance between blockchain and public registers?*

Because Blockchain is a "ledger", indeed the most widespread type of technology based on "distributed ledgers" (as indicated by the Italian legislator), that is *a data structure*. Only the ledger is digital and fully replicated at every node (block) of the network, so each node contains a copy of the entire register and this creates the biggest difference compared to traditional public registers: the management of the register is decentralized. Owing to the asymmetric cryptography underlying the protocol, the incorporation of each new block into the chain necessitates a consensus mechanism among the network's computers. And with each addition, each node updates its copy, without the possibility that anyone have exclusive control of the data. Like traditional public registers, Blockchain thus fulfils the same need for certainty, but it is not kept and managed by an institutionalized entity embedded in the Public Authority.

But it is in relation to the open access of data contained in the "chain" that Blockchain has exercised its maximum seductive power

System, 2008). Available at SSRN: https://ssrn.com/abstract=3440802 or http://dx.doi.org/10.2139/ssrn.3440802

[7] G. S. Giannini, *Diritto pubblico dell'economia*, Bologna, Il Mulino, 1995, 53.

[8] *Artificial Intelligence Act, 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, P9_TA(2024)0138 (COM(2021)0206 – C9-0146/2021 – 2021/0106(COD)), available at: https://artificialintelligenceact.eu/the-act/.

towards public administrations, capturing the attention of the legal field. Among the emerging technologies of the digital revolution, it is the one that most intercepts the paradigm of administrative transparency, a guiding principle of the relationship between individuals and the public power of a constitutionally advanced Rule-Of-Law. Indeed, in this regard, Blockchain constitutes a tool for the realization of the most orthodox core of transparency, that of the absolute publicity of information. With a metaphor echoing that of Filippo Turati's "The Glass House", the long chain of data blocks can be seen as a series of sealed-glass boxes. Everyone can see the content, but it is not possible to alter it, simply, what is entered is visible to all and cannot be changed without the consensus of the entire network.

Its revolutionary idea is that, at least in the original model engineered for this purpose, it eliminates the need for trust in a single central authority, replacing it with a combination of algorithms, computational power, consensus mechanisms, cryptography, and especially with an intelligent "rewarding" system or remuneration for the computational effort performed by the transaction validators (also known as "miners").[9]

The overcoming of the necessary presence of a "third party" for the verification of information exchange between two or more subjects entails, moreover, at least two other benefits. Firstly, Blockchain allows the programming of a series of actions without human intervention, through so-called *smart contracts*,[10] which can be drafted to transfer information or goods when certain predefined conditions are met ("if, then"), such as the execution of guarantees in case of non-compliance, or royalties automatically granted to various contractual parties depending on their contribution to a specific project.

Secondly, digital registers with Blockchain technology can be designed to be inclusive, enabling the end-user, and even those left on the margins of traditional markets, particularly banking and financial ones, to conduct digital transactions without paying the cost of intermediation (commonly known as the *trust tax*), thus extending financial services to areas of the world that are not covered.

Regardless of its relationship with public administrations, Blockchain is certainly an innovative technology and all innovative technologies have a lifecycle regarding their impact on the economy and organizations, and Blockchain is no exception. Indeed, the "love story" between the public administration and Blockchain seems to closely mirror what is known as Gartner's Hype Cycle. According to this model, there are five key phases of a technology's life cycle.

1. Innovation Trigger: a potential technology breakthrough kicks things off; early proof-of-concept stories and media interest trigger significant publicity; often no usable products exist and commercial viability is unproven;
2. Peak of Inflated Expectations: early publicity produces a number of success stories — often accompanied by scores of failures; some companies take action; many do not;
3. Trough of Disillusionment: interest wanes as experiments and implementations fail to deliver; investments continue only if the surviving providers improve their products to the satisfaction of early adopters;
4. Slope of Enlightenment: more instances of how the technology can benefit the enterprise start to crystallize and become more widely understood. Second- and third-generation products appear from technology providers; more enterprises fund pilots; conservative companies remain cautious;
5. Plateau of Productivity: mainstream adoption starts to take off; the technology's broad market applicability and relevance are clearly paying off.

It is certain that the disillusionment phase has been largely overcome in the relationship between public administrations (PA) and Blockchain; now the point is to understand whether the inclusion of Blockchain in the new Public-Contracts Code marks the beginning of a new phase of maturity, or if it instead heralds the end of this controversial and passionate relationship.

Let's look at the details of the evolution of this journey.

4. *Enchantment period: the international enthusiasm involves the Italian legislator*

Based on these elective affinities, focused on certainty and transparency, the Blockchain

[9] M. De La Roche and A. Dahlborn, *Navigating the Blockchain Landscape, Efforts to Demystify Distributed Ledger Technologies*, available at: www.eublockchainforum.eu/news/paper-navigating-blockchain-landscape-efforts-demystify-distributedledger-technologies.

[10] For a helicopter view, see: www.finanzadigitale.com/fintech/smart-contract/.

phenomenon in administrative activity experienced its Hype during the biennium 2018-2020. In 2018, the European Union established the *EU Blockchain Observatory & Forum;* then the *European Blockchain Partnership (EBP)* was initiated, following a cooperative model among the EU countries and Norway, and on this basis, the development of the *European Blockchain Services Infrastructure* (EBSI) began, a network in which the members of the partnership manage at least one node, identifying various application areas such as notarization, diplomas, European digital identity, and reliable data sharing. The project seemed to have subsided, but in February 2023 it was relaunched with the initiation of a "Regulatory Sandbox".

The echo of European enthusiasm reached Italy. In the summer of 2018, the Ministry of Economic Development appointed a group of experts and initiated a public consultation to develop an Italian Blockchain Strategy, although the strategy was not adopted later (always better than when it is adopted but not applied). The consultation document offers several interesting insights, also with specific regard to possible application fields. Notably, and it has finally been addressed in recent days, the part that calls for potential applications of Blockchain in the construction sector, in interaction with Building Information Modeling (BIM) to achieve a higher level of transparency, verifiability, and effectiveness of the BIM model.[11] In this conducive setting, some projects defined as '*experimental*' also arose, although, as it often happens when the term "experimentation" is overused, the subsequent evaluation phase was not made public to identify any critical issues, in order to make the experiences scalable. Among the projects, those initiated by some Italian universities (University of Cagliari, University of Milan Bicocca, and University of Padua) deserve a note for their application of Blockchain for the authentication and recognition of academic degrees.[12]

Those activities are still based on paper documentation, subject to a complex bureaucratic process to retrieve the original act, and thus associated risks of forgery and falsification (also due to the global spread of the criminal phenomenon of so-called Diploma Mills, i.e., institutions that sell degree certificates).

The outcome of the infatuation phase is the definition, now recalled by the Public-Contracts Code, of distributed-ledger technologies. With Law No. 12 of 11 February 2019, introduced during the conversion of Decree Law No. 135 of 14 December 2018, Article 8-*ter* was introduced, applicable to both private individuals and public administrations. Regarding the multi-level articulation of sources, it was anticipated that the effectiveness of the provision would be conditioned on the adoption of technical standards that AGID was supposed to issue within ninety days from the law's entry into force, which were never issued. Immediately, the definition, indeed a bit premature relative to the in-depth knowledge of the risks and benefits of the technology, attracted some critical observations. Among these, I note that while it refers to distributed -ledger technologies, it lists requirements that belong only to Blockchain, namely immutability and unchangeability, thus overlapping genre and species. But also that "immutability or unchangeability"[13] would not be so secure given the current state of evolution of various known protocols because the data could be modifiable and alterable. This naturally depends on the Blockchain used and the cyber risks connected to potential issues.

Considering the evolutionary stage of Blockchain at the time of its adoption, the regulatory definition appears at least premature. Much has been written about the difficulty of identifying the right timing and methods to regulate –and thus define– the rapidly evolving digital-era technologies that present in various forms. However, there are signs of renewed awareness among regulators in seeking new approaches, including the use of regulatory sandboxes. The pacing problem is now pressing, and it is well known that it is extremely difficult to adopt rules that aim for stability and certainty while chasing

[11] www.mimit.gov.it/it/consultazione-blockchain.

[12] See: R. Trainito, M. Monaco and G. Galasso, *Blockchain e mutuo riconoscimento dei titoli di studio nell'UE,* in *Federalismi.it*, 2021, 2; P. Cherubini and D. Mapelli, *Digitalizzazione del titolo di studio, come la blockchain ridefinirà il concetto di laurea*, 27 August 2019, available at: www.agendadigitale.eu/documenti/digitalizzazione-del-titolo-di-studio-come-la-blockchain-ridefinirail-concetto-di-laurea.

[13] S. Caldarelli, *L'uso della tecnologia Blockchain nel settore delle pubbliche amministrazioni: tra "mito" e realtà giuridica*, in *Diritto dell'Informazione e dell'Informatica*, 4, 2020, 857.

phenomena with accelerated and unpredictable development curves, characterized by sudden breakthroughs. According to the most recent update of the EU's Better Regulation program, as detailed in the European Commission's Communication 'Better Regulation: Joining Forces to Make Better Laws' dated 29 April 2021, the digital era has brought about disruptive changes in the approaches and tools available to regulators.

Among the new emerging methods for crafting "*future-proof*" rules, the regulatory sandbox is highlighted as an excellent solution. The term refers to the protected sand space where children can play and learn safely, and the metaphor can indeed be considered successful. But the first concern of every regulator, even before experimenting with new rules, is to define the phenomenon, even when the phenomena to be regulated do not even have a certain definition in reality. In the case of Blockchain, the definition enshrined in a primary ranking norm in 2018 has since remained unchanged, probably because, after the hype phase, this technology, particularly in reference to public administrations and outside the financial sphere, has been met with a certain disenchantment. In the end, even after five years, it is to this definition that the Public-Contracts Code of 2023 referred, without even taking the precaution to verify its resilience.

5. *The disillusionment phase: too close, too far*

However, the definition of 2018 marked the peak of the idyllic phase of the relationship. Meanwhile, legal science began to question the practical rather than abstract compatibility of Blockchain with public administrations.[14]

The uncomfortable truth is that this call for more cautious reflection based on the genetic difference between the original "permissionless" paradigm of the Blockchain as envisioned by its inventor Sakoshi Nakamoto, ensuring its fluctuating adoption in the financial sector, and the organizational model of public administrations.

That idea of disintermediation, of so-called "computational trust", based on a magical cross between algorithms, asymmetric keys, and widespread consensus among nodes, which in turn presupposes economic "compensation" systems for those validating transactions, seemed dissonant, at times subversive, with the state structure. Blockchain in its original 'permissionless' paradigm (models freely accessible to anyone wishing to participate in the network through a consensus mechanism and devoid of a central authority; indeed, created with the purpose of eliminating the necessary presence of institutional actors within a network) is a technology "that lends itself to escaping state control, to evading the law, rather than promoting the effective implementation of the law".[15] Because, in the final analysis, it calls into question the trust "embodied" in the Institution, and therefore in the democratic circuit in which they are placed within the constitutional framework, replaced by computer protocols and mechanisms of distributed consensus ("*Don't trust, verify*") managed by algorithms.

The interest of scholarship[16] has therefore shifted to models of *permissioned Blockchain*, of a private or hybrid type, considered, first of all, the only ones compatible with the model of administrative action, being in such cases also implementable the fundamental canons of privacy by design and privacy by default established by Article 25 of the GDPR. As to the second point, only in such a model is it possible to identify upstream the node or nodes that hold or are responsible for the processing of personal data. The most legitimate concern for such types is obviously related to the security of the network, since the absence of certain mechanisms for validating consensus (Proof of Work, Proof of Stake, etc.) requires entrusting the system to administrators who could take control of the entire chain causing irreparable damage. The real issue, however, is how to incentivize access to the platforms, because their dissemination also depends on their reliability and usefulness.

[14] J. Clifton, M. Fernández-Gutiérrez and D. Cagigas, *Beyond the hype—the actual use of blockchain in government. Policy Design and Practice*, 6(4), 389–396. https://doi.org/10.1080/25741292.2023.2272377.

[15] M. Macchia, *Blockchain e pubblica amministrazione*, 119.

[16] G. Gallone, *Blockchain e big data nel settore pubblico*, 74.

6. *Public-contracts Code 2023: rekindling of a romance?*

At this stage of legal reflection, far from the initial enthusiasm, technologies based on distributed ledgers have found their place in the new Public-Contracts Code. The new place is located in a limited segment of the contract cycle, namely the "management" of surety guarantees that the economic operator must provide in favor of the public client, both for participating in the tender and for the execution phase. Despite the limited scope, it is counterbalanced by the fact that Blockchain technology is not an oasis in the desert. It is part of a broader push for the digitalization of the entire procedural cycle that goes from planning to the results aimed at by public tenders (to carry out public works, provide a service, or acquire a good), which is the true driver of the overall reform and to which the challenge of its success is entrusted.[17]

Distributed ledgers are expressly referenced, in particular, in two provisions of the Public-Contracts Code. Article 30, dedicated to the use of automated procedures and aimed at affirming the principles of so-called algorithmic legality developed by scholars and embraced by the caselaw of the State Council; and Article 106, relating to surety guarantees, which must be digitally native and can be managed through the use of technologies based on distributed ledgers. Specifically, with regard to surety platforms based on distributed-ledger technology, the Code indeed provides an option. Article 106 establishes, in general, the obligation to issue and release surety guarantees "digitally", in line with the digital-first principle and the abandonment of the dual paper/digital track, with the consequent effect of avoiding inconsistencies and misalignments. The second sentence of paragraph 1 of Article 106, in particular, stipulates that the surety guarantee must be "telecommunications verifiable at the issuer or managed through platforms operating with technologies based on distributed ledgers according to Article 8-ter, paragraph 1 of the decree-law of December 14, 2018, No. 135, converted, with modifications, by law on February 11, 2019, No. 12, compliant with the characteristics established by AGID with the provision of Article 26, paragraph 1".

The conjunction 'or' ("telecommunications verifiable at the issuer *or* managed through platforms operating) is itself ambiguous, as authoritatively highlighted by the State Council, which cites a study by the Accademia della Crusca. It is one of the most widespread pitfalls of legal language (State Council, sec. III, 28.05.2020 n. 3374) because it can have a disjunctive (or) or explanatory (that is) meaning, in the latter case being aimed at clarifying, explaining the preceding concept. Essentially, there is no obligation on the part of operators and clients to use Blockchain even though the benefits expected from using such technology are multiple, such as: "the complete dematerialization of the guarantees, the reduction in requests for verification of authenticity by the guaranteed parties, and greater transparency within the market also through a reduction in the number of frauds related to the issuance of counterfeit".

Article 106 did not arise from nothing. It is the normative outcome of an experimentation conducted by CETIF - Center for Research on Technologies, Innovations, and Financial Services - in collaboration with various financial institutions and companies, Bank of Italy, IVASS, and the Financial Guard, with the goal of automating, with the guarantee of authenticity and security provided by blockchain technology, the life cycle of surety guarantees.

As already outlined in the mentioned Article 8-*ter*, even in relation to distributed-ledger technology for the platforms managing surety guarantees, the discipline is structured on several levels, but in this case, it seems already complete. Alongside the primary level, and precisely because of the risk of rapid obsolescence of norms, there is an implementational and technical level, which should ensure the necessary flexibility to

[17] G. Carlotti, *I principi nel Codice dei contratti pubblici: la digitalizzazione*, in www.giustizia-amministrativa.it., 2023, 6; L. Carbone, *La scommessa del Codice dei contratti pubblici e il suo futuro*, in www.giustizia-amminsitrativa.it., 2023, 9; P. Clarizia, *La digitalizzazione*, in *Giornale di Diritto Amministrativo*, 2023, 3, 302; G.R. Conforti, *Digitalizzazione nel nuovo codice dei contratti pubblici*, in *Diritto di Internet*, 2, 2023, 399; da ultimo, A. Corrado, *I nuovi contratti pubblici, intelligenza artificiale e blockchain*: *le sfide del prossimo futuro*, in *Federalismi.it*, 19, 2023, 128-154; F. Tallaro, *La digitalizzazione del ciclo dei contratti pubblici*, in www.giustizia-amministrativa.it, 2023.

realize a "future-proof " discipline reserved by Article 26, paragraph 1 of the same Code. AGID has adopted the determination of 1June 2023, No. 137 containing, in particular, the technical rules of the platforms of the digital ecosystem of public contracts that are subject to 'certification'. The last part of this implementing act (point 6) regards "platforms for managing surety guarantees, indicating the characteristics to which the distributed ledgers used within the platforms for managing surety guarantees must conform".

7. *The Human-in-the-loop wall: what lies beyond?*

The new Public-Contracts Code thus opens a new path for Blockchain in administrative activities. However, this path is not an easy one. The race towards the future could be hindered by the legal context in which the new road unfolds, indeed, by the fundamental principle of administration based on algorithms: the human-in-the-loop.

The topic to be explored concerns the actual ways in which Blockchain technology must conform to the now-codified principle of Human-In-The-Loop,[18] to which no exceptions are currently foreseen. In its negative connotation, the principle prohibits authoritative decisions that affect the legal spheres of the recipients from being removed from control and the possibility of human intervention and, in this respect, the normative references so far invoked by administrative caselaw such as Article 22 of the GDPR show their limitations. In its positive connotation, it is implemented through the recognition of the power by humans to monitor, intervene, and even potentially 'refute' the solution proposed by the automated system. Philosophically, it can be seen as meta-autonomy. It is always necessary for human beings, even when they have delegated part of the power to the machine to be able to revoke the delegation and decide to decide again.

As already noted, the reference to technologies based on distributed ledgers is also expressly contained in Article 30 of the Public-Contracts Code, which raises to positive law, capable of affecting the pathology of administrative decisions, alongside the canon of non-discrimination and transparency, the principle of "*non-exclusivity of algorithmic decision-making*". This provision, as highlighted by authoritative scholarship, is the first primary normative basis of the so-called "Human Reserve"[19] and is thus destined to have implications also in sectors other than public contracts, as an analogous parameter of reference in the case of automated procedures lacking specific discipline. In this case – and unlike the meaning that the same conjunction assumes in Article 106 paragraph 1 second period – it has been acutely observed that 'or' ("*check, validate or deny*") cannot be understood in a disjunctive sense, but rather explicative. Does the algorithm on the authenticity of the guarantee compliant with human oversight, and human ability to "deny" in a specific case the validation? This opens a series of questions: to whom is the power referred to in Article 30 paragraph 3 letter b) of the Code attributed, to the manager/issuer who authorizes the writing, or to the administrative public servant of the contracting station who benefits from the guarantee? And in any case, how does this power interfere with the algorithmic protocol outlined by the platform and the reliability guarantee associated with the Blockchain? How is the verification and oversight system implemented in the model, which is used to validate or 'deny' the result in the case of managing surety guarantees? Are the standards explicitly referenced in the AGID resolution of the ISO technical standardization on DLTs (technical standardization, which should always be remembered, is only accessible for a fee) aligned with the Human-In-The-Loop principle? Even more fundamentally, will compliance with the principle of positive law of "*non-exclusive algorithmic*" actually condition the choice towards technology on distributed ledgers, compared to other less advanced digital solutions, effectively hindering the spread of Blockchain platforms for guarantees?

[18] P. Benanti, *Human in the loop. Decisioni umane e intelligenze artificiali*, Milan, Mondadori, 2023; C. Accoto, *Il mondo ex machina. Cinque brevi lezioni di filosofia della automazione*, Alba, Egea, 2019; D.U. Galetta, *Human-stupidity-in-the-loop? Riflessioni (di un giurista) sulle potenzialità e i rischi dell'Intelligenza Artificiale*, in *www.federalismi.it*, 5, 2023, iv-xii.

[19] G. Gallone, *Riserva di umanità e funzioni amministrative*, Padua, Cedam, 2023.

It's not the first time that regulators, instead of solving problems and providing certainty to citizens and businesses, have contributed to creating them. Perhaps the ground in which the Blockchain seed was planted is not the most fertile. It is certain that for now, Blockchain seems to have been put in a corner. For example, it is not mentioned at all in the Three-Year Plan for Informatics for Public Administration.[20] Only the future can tell if this resurgence is meant to last.

[20] www.agid.gov.it/it/agenzia/piano-triennale.