

European Key Features and Initial Insights in Public Contracting Digitalization*

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ABSTRACT The paper addresses the main characteristics of digital tools in the field of public procurement, outlining its peculiarities in relation to the general reform of administrative action. The author examines digitalization by deconstructing and reconstructing the procurement cycle to better align it with the goals of digital procurement.

1. *Aligning digitalization and AI with the specific traits of public procurement*

The digitalization of public administration's activities constitutes a vital component of a strategy aimed at modernizing the relationships between individuals, services, and administrative functions.¹ Its overarching goal is the pursuit of efficiency to enhance the precision, timeliness, and responsiveness of administrative action. Moreover, it serves as a catalyst for the collection of organized and aggregated knowledge, which becomes the collective asset of organizations.

As a response to digital transformation, public-management processes and office structures change, thereby engendering novel critical considerations, such as the governance of decision-making, the imperative to guarantee the protection of property rights, and the validation of the reliability and appropriateness of information disseminated by automated systems.

Hence, the inquiry arises: is it possible to apply the discourse on the digitalization of public administration to the domain of public contracts, or is it better to specify its features?

To eliminate or at least reduce the inefficiencies affecting the public-contract

market, it is imperative to stimulate innovation and investment in activities leveraging new technologies and digital methodologies. It is essential to facilitate knowledge acquisition, data gathering, and information dissemination, while also integrating public authorities into the forefront of their economic and social backdrop. By doing so, the phenomenon of public knowledge can become more comprehensive for governmental entities. A more precise and extensive collection of information, coupled with its accurate interpretation and processing, would enhance the efficacy and rationality (in terms of consistency between acquired data and consequent administrative decisions) of the administrative response to the community's needs, overcoming a scarcity that often causes weak points, even in contractual relationships.

In my view, within the realm of public contracts, besides the generic need for synergy between digital tools and the proper functioning of administrative functions, the digital wave has the same degree of specialty as procurement towards general administrative action.²

On the one hand, the digitalization process undeniably enhances compliance with the general principles of administrative action —

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¹ On the subject, see, without claims of exhaustiveness: L. Torchia, *Lo stato digitale. Una introduzione*, Bologna, Il Mulino, 2023; V. Visone, *Contributo allo studio della dimensione algoritmica della funzione amministrativa*, Naples, Editoriale Scientifica, 2023; B. Marchetti, *Amministrazione digitale*, in *Enciclopedia del diritto, Funzioni Amministrative*, Milan, Giuffrè, 2022, 75 ff.; G. Gallone, *Digitalizzazione, amministrazione e persona: per una «riserva di umanità» tra spunti codicistici di teoria giuridica dell'automazione*, in *PA Persona e Amministrazione*, 2023, 1, 329 ff.

² The accompanying report to Legislative Decree No. 36/2023 immediately emphasizes this aspect: it states that the risk of corrupt practices is mitigated by a broader reliance on digitization, transparency, and qualifications' documents related to the procurement cycle. It also articulates the principle of "once only": "the comprehensive digitization of procedures and interoperability of platforms, according to the principle entailing the uniqueness of data, documents, and information submission to contracting authorities.

such as transparency, impartiality, efficiency, and effectiveness. On the other hand, the specificities found in the intersection between public procurement and digitalization create new issues or shift the focus to singular aspects. In essence, what holds true in general in the debate on digitalization for public administration may not necessarily apply equally to the certainly peculiar realm of the public-contract market.

It is thus fruitful to study the features that characterize the public-contract market, questioning which of these reverberate onto the utilization of digital methods.³

First and foremost, public procurement consists of a series of decisions and actions wherein the administration primarily does not exercise authoritative functions but is engaged in providing a response to a publicly relevant need, for which it is necessary to resort to the market and articulate a “public demand” for supplies, services, or works (or a mix thereof).

This feature strengthens the potentially virtuous link between digital tools and public contracting, the former being understood as means to streamline a managerial function of “performance”. The effectiveness of the contracting action, in fact, also depends on the availability of data, the level of knowledge of the public procurer, the rational use of collected information, and the use of technologies to expedite the achievement of expected results and enhance their correspondence with expected outcomes.

³ *Ex multis*, M. Barberio, *L'art. 30 del D.L.vo 36/2023 alla prova dell'A.I. Act dell'Unione Europea*, in www.giustizia-amministrativa.it, 2023; Id., *L'utilizzo degli algoritmi e l'intelligenza artificiale tra futuro prossimo e incertezza applicativa*, in www.giustizia-amministrativa.it, 19 giugno 2023; G. Carlotti, *I principi nel Codice dei contratti pubblici: la digitalizzazione*, in www.giustizia-amministrativa.it, 26 aprile 2023; P. Forte and N. Pica, *Principi per la digitalizzazione e l'automazione nel ciclo di vita dei contratti pubblici*, in M. Calabrò, G. Clemente Di San Luca, A. Contieri, A. De Siano, P. Forte, M. Interlandi, F. Liguori, S. Perongini, A. Rallo, R. Spagnuolo Vigorita, M.R. Spasiano and M. Tiberii, *Studi sui principi del Codice dei contratti pubblici*, Naples, Editoriale Scientifica, 2023; D.U. Galetta, *Digitalizzazione, Intelligenza artificiale e Pubbliche Amministrazioni: il nuovo Codice dei contratti pubblici e le sfide che ci attendono*, in federalismi.it, 2023, 12, ff.; F. Tallaro, *La digitalizzazione del ciclo dei contratti pubblici*, in www.giustizia-amministrativa.it, 15 giugno 2023; R. Cavallo Perin, M. Lipari and G.M. Racca (eds), *Contratti pubblici e innovazioni per l'attuazione della legge delega*, Naples, Jovene, 2022; M. Pignatti, *La digitalizzazione e le tecnologie informatiche per l'efficienza e l'innovazione nei contratti pubblici*, in federalismi.it, 2022, 12, 133 ff.

From this perspective, technology certainly adds value by working in favor of the public client, overcoming the veil of mistrust and alleged incapacity that for years has surrounded bidding procedures and contracts, as expressed both by operators and scholarship.⁴

In other words, reflecting on the digitalization of procurement implies, in my view, a preliminary step, which consists of consolidating the *set theory*, meaning decomposing and recomposing the procedural, logical, and formal steps that constitute the various and interconnected articulations of the procurement cycle. This operation immediately allows us to highlight that digitizing public contracts does not merely entail dealing with bidding procedures, digital files, facilitated access to documents, or “once-only” approaches, but it means reevaluating the framing of the entire process, starting with the identification of the public interest that the public authority intends to fulfill and pursue with the execution of the contract.

Thinking of the entire procurement cycle, i.e., starting from the *set theory*, it is immediately clear that the need to collect and analyze a series of data, in a non-analogical manner, only partially covers the requirements related to the procurement cycle and contracts. Indeed, upon closer examination, the use of data, artificial intelligence tools and digitalization of public contracts go well beyond mere informational archiving (whose relevance is not being questioned here) and opens up interesting and sophisticated questions.

Furthermore, scholars of public-organizational management and digital-process engineering have noted that rethinking a certain process in a technological context often gives rise to innovations that directly influence the process itself. For example, such forms of innovation can shed light on networks and connections that may otherwise rest implicit, while at the same time driving attention to inefficiencies.

Thus, in the realm of public contracts in particular, there arises a need to not only prioritize digitalization itself but also to embrace reforms of the process, as generally

⁴ S. Valaguzza, *Government by contract procuring for value. Creating value through public contracts*, Naples, Editoriale Scientifica, 2021.

conceived. These reforms can be prompted by a closer observation of organizational dynamics and the use of data (which ones are collected and used, which ones are disregarded, and why).

2. The digitalization of public contracts and the set theory

Planning is the first area to examine as it is potentially subject to a new configuration due to digital change.

Without delving into the specifics of different member-states legislation, we can safely say that planning in public contracts is usually limited to requirements for public administrations to plan procurement initiatives, identifying adequate financial coverage, establishing indicative timelines for the call to market, and indicating the type of contract they intend to enter into.

It is immediately evident how, regarding this series of activities, technologies and digital tools could interact with the basic structure just described. In the planning phase, the digitalization of data, the presence of interoperable databases, and the ease of access to information by economic operators and individuals are added values in themselves, but the contribution of digital tools could go much farther. Even from this example, it is clear that digitalization can serve the planning activity in different ways, not just for reasons of financial-coverage certainty, but for example to push private economic operators to become technologically equipped so that they are ready to comply with contracting authorities' requirements. Planning, in other words, could promote competition more effectively than it currently does, reducing (if not avoiding) tenders with only one participant. Planning could thus be studied to be not only competitive from the economic point of view, but also consistent with the industrial, environmental, and social-policy directions pursued by administrations. To achieve this, it is probably necessary that data sharing encompass a greater and more strategic amount of information, be more integrated with companies' databases and be easy to handle (not only by the offices in charge of the budget, but also by other administrative bodies).

Without any pretention to be exhaustive, we can briefly sketch other examples of how the digitalization of public contracts could multiply its effects in public-contract

planning. Artificial intelligence could be used to develop formulas to streamline investment planning, hypothesizing, for example, when to open a certain tender procedure so that it suits the needs of the particular market segment it is directed to. Alternatively, artificial intelligence could be employed to decide on the type of legal structure of the tender (for example, whether to use a procurement instrument or a partnership) most suitable for the purpose.

Moreover, a very useful application of digital tools — perhaps even in more advanced forms of artificial intelligence — could cover the systematization and analysis of economic and social costs and benefits, costs to the community, and any other criteria useful to assess the alternative between outsourcing public services and in-house provision. The risks of analysis errors, incompleteness or partiality in information collection could be thus greatly reduced through the use of technological means.

Finally, the acquisition of data and their technical and economic processing could allow public offices to be more aware of the different options available, granting them the confidence necessary to approach all types of tenders without limiting themselves to the most commonly known. More informed organizations could encourage, among other things, the appreciation of models of tenders with broader scopes, such as framework agreements, which are efficient, however, only if the analysis of the context to which they apply allows the adoption of contracts with deferred execution orders and within a predetermined time.

In addition, a careful collection and sharing of data on public needs from the programming phase, periodically updated and supplemented by computational indicators, could promote public-private partnership initiatives, leading to a reduction in public spending, especially in areas such as housing, health, sustainable mobility, and tourism.

Furthermore, the possibility for contracting authorities to resort to automatism in the selection of offers, thanks to digital systems and artificial intelligence, is linked to resource savings, transparency, and anticorruption and represents, for all the different levels of public procurement, an important field for experiments.

On this specific aspect, scholarship

reflections are already abundant.⁵

In the execution phase, artificial intelligence could be used to extract data concerning the performance (positive or negative) of different types of contracts (comparing, for example, a contract with a construction and management concession). AI could also assess the level of conflict, ambiguity, or flexibility that certain contractual clauses entail, favoring or damaging the execution of the relationship between the parties. Once the relevant contractual clauses (producing positive or negative impacts) are isolated, AI tools could rewrite them and create a collaborative and unambiguous legal environment.

Digital tools have already permeated even the sphere of contracts. Although the discussion regarding smart contracts is still somewhat ambiguous, it remains intriguing. These contracts are built upon blockchain technology, thus being established on a blockchain that contains and permanently stores data. These data intertwine, creating a ledger of events within a specific legal relationship, and translate the actions associated with contract performance into automated processes facilitated by digital technology.

Smart contracts entrust the implementation of the relationship between the parties to preset mechanisms triggered by specific events (for example, a payment) or upon the input of certain information into the smart contract's blockchain. Essentially, smart contracts operate based on predefined rules dictating the outcome X upon the occurrence of a given event Y, thereby minimizing the risk of human error or imprecision (which could instead occur during the setup phase of the systems that make the contract 'smart'). Currently, this topic is primarily approached from a technical and mathematical standpoint, but inevitably demands further examination from a legal perspective. It is important to remember, especially in the case of complex multilateral agreements, that contracts consist not only of rights and obligations directly and automatically derivable from the agreement, but also require human interpretation before

being translated into digital code.

Indeed, contracts sometimes allocate options or subjective conditional situations rather than acknowledging rights. In these instances, event Y does not always lead to result X, as one must consider the subjective intentions of the holder of the power or option. In other words, not every contractual provision can be translated into a straightforward sequence of actions and reactions. Therefore, the process of deducing numeric matrices and digitally documenting procedures, which can operate independently from human intervention—such as automating alert systems and mechanically determining actions stemming from obligations outlined in the contractual relationship (such as meeting deadlines with varying penalties)—requires thorough legal scrutiny.

With that said, given the paramount importance of preserving information in the realm of public contracts, particularly in construction, and considering the benefits of reducing human errors (thus minimizing opportunities for maliciously altering contract performance to one's advantage) and the necessity of expediting and overseeing actions, this type of contract appears highly appealing for the sector under consideration.

Digitalization and artificial intelligence could then be used to improve exchanges between administrations and facilitate the sharing of best practices. It would be very useful, for example, to digitally engineer standard bidding documents and contracts, making them easily accessible and updatable in light of new case law on the subject, common experiences, and consolidated practices, implementing new rules or guidelines. Proceeding in this direction would also enhance the principle of “re-usability”, according to which public administrations, faced with a specific problem, should benefit from the work of others by sharing experiences and solutions.

3. BIM and the need for a common legal environment

We begin to realize that, starting from the tender phase in the public-contracts market, digital modeling enables contracting authorities to depict more precisely the context and conditions within which they are tasked to complete a project or provide a service or supply. Moreover, the challenges encountered in the execution phase of public-

⁵ See G. M. Racca, *Trasformazioni e innovazioni digitali nella riforma dei contratti pubblici*, in *Diritto amministrativo*, 2023, 723 ff.; L. Siciliani, V. Taccardi, P. Basile; M. Di Ciano and P. Lops, *AI-based decision support system for public procurement*, *Information Systems*, Volume 119, October 2023, 102284.

works contracts can be more effectively addressed when contracting authorities utilize digital methods and tools to maintain control over timing and costs, thereby ensuring oversight over the various stages of contractors' performance.

In tender contracts for works or services involving digital-project modeling or actions among multiple parties within a shared data environment, the traditional binary contractual structures, typically client-contractor and adversarial, face immediate inefficiencies. Digital modeling makes it necessary to decode new contractual structures capable of recreating, within the agreement between the parties, the collaboration underlying the *common data environment*.

The new digital design (modeling) requires a shared data environment and a relational system between project professionals and those who hold relevant information and inputs for their digital evolution. This includes the client, tasked with translating public interests into quantifiable metrics, objectives, and design criteria.

Furthermore, it should be noted that the digitalization of the project requires specific legal analysis in terms of intellectual-property rights, collaborative contractual structures, professional responsibility, and control. These issues highlight a distinctive aspect of the digitalization problem if observed within the public-procurement sector, which is starting to be incorporated in administrative-law literature. These techniques should facilitate the integration of various project components into a unified digital model (commonly known as a federated model), delineate the responsibilities of involved parties, address intellectual-property rights, and provide mechanisms for conflict resolution.

Not by chance, the digital strategy of the construction sector in the United Kingdom has been fueled for years and has long been intertwined with the technique of collaborative agreements, further driven by the imperative to enhance workers' health and safety protections.

Thus, there is a need for both theoretical and practical reflection (at least in the world of construction and "digital" infrastructure) on developing collaborative contract models as industry standards.⁶ They should be designed

to integrate various stakeholders within a unified legal framework, fostering a synergistic alliance among designers, contractors, clients, suppliers, and consultants, and mitigating individual impulses that may diverge from common goals.

In the context of digitalization, in fact, data sharing makes it necessary to regulate a common legal environment, without completely replacing bilateral contracts but rather complementing them. These collaborative contracts, which public administrations can utilize within their contractual autonomy, are inherently linked to the principle of achieving results, given the characteristics of digital processes and contract execution. Therefore, they should form part of the contractual documentation, ensuring compliance with the principles of transparency and public scrutiny.

In the construction sector for public works, the content of the collaborative agreement should be attached to the tender or, in any case, be part of the framework of commitments. Indeed, explicit public-interest targets (both in relation to the strict subject matter of the contract and as collateral objectives), can impact the interaction between designers, consultants, and any other key professionals. This would not eliminate bilateral contracts, which would continue to regulate specific subjects such as the remuneration of contractors.

The collaborative agreement, structured as an open case with the possibility to integrate collaboration components over time, should also accompany the works tender (or integrated tender). It should serve as a benchmark for asset-management activities, maintenance, etc., alongside other bilateral agreements that delineate the specific relationship between the contracting authority

some of the contracts involved in the execution of the same work, surpassing the one-to-one logic and extending synergy through the creation of economies of scale in expanded interaction, to seize opportunities and reduce unforeseen events. They can also function as "first-level contracts", taking the form of framework agreements, to award multiple projects: in this case, the parties to the collaboration contract are multiple contractors, competing for the assignment of individual projects within the collaborative alliance. For further insights on the subject, see D. Mosey, *The FAC-1 Framework Alliance Contract: A Handbook*, London, London Publishing Partnership, 2023; S. Valaguzza, *Collaborare nell'interesse pubblico. Perché passare dai modelli antagonisti agli accordi collaborativi*, Naples, Editoriale Scientifica, 2019.

⁶ Collaborative contracts are "umbrella contracts" that bring together, under a single-network discipline, all or

and contractors.

In summary, the digital environment requires that all elements, actors, and contents of the process be managed in dynamic agreements, capable of adapting to evolving events and representing, in a new contractual context, the collaborative alliance that inevitably arises around data sharing and digital processing.

4. Insights for the future of digitalization in public contracts

To ensure that the integration of digital tools within the procurement cycle yields synergistic effects aligned with the fundamental objectives and outcomes inherent to the public market, it is imperative to adopt a new perspective rooted in the *set theory*. This entails not merely considering individual phases of the cycle but also embracing a holistic view that encompasses the entirety of the process, its significance, and the desired trajectory of contracting actions.

More specifically, the digitalization of public contracts must be perceived primarily as a challenge for reimagining the process itself, its internal and external structure relationships, and its connections with the general principles of the sector and its objectives.

In this context, digitalization transcends its conventional role as a supplementary tool for enhancing the efficiency, modernity, and transparency of public contracting authorities. Instead, it serves as the framework within which strategies and regulations of public procurement are comprehensively restructured within an integrated digital landscape. This necessitates embracing inevitable changes in procedures, regulations, and reference frameworks without reservation.

Central to this transformation is the creation of a new, collectively agreed-upon, precise, and consistently applicable language. This language defines the information network and essential connections crucial for the evolution of a fully digitalized public-procurement cycle. It must facilitate not only the growth of the process itself but also the database upon which it relies, in an ongoing, dynamic, and progressive way. The process of data collection and processing is continuous, never reaching a state of completion, requiring continuous adaptation and advancement.

Indeed, digitalization represents more than a mere achievement to be reached before

moving on to other objectives; it signifies a deliberate strategic choice with enduring repercussions on organizational structures and operational methodologies.

The perspective of digitalization is not only to make the process itself exact, appropriate, and precise but to make it available at any time, for any operator, essentially eliminating the need for data transfer. In this paradigm, knowledge is inherently embedded within the process.

The digitalization of procurement implies a continuous feeding of competencies of the public organization and its actors. This involves not only tangible, physical activities related to tendering and contract management but also the extraction and analysis of information gathered during monitoring and recording throughout the execution phase. This includes documenting and assessing any challenges, disputes, and the efficacy of contractual clauses.

Once the tender is finished and the contract execution is completed, the procurement cycle is not over. Even after the completion of tendering and contract execution, the procurement cycle persists. It transitions into a phase dedicated to analyzing the impact of those actions, generating further information, and serving as an ongoing source of valuable data.

The digital-procurement cycle, in this new dimension, is like a large open wardrobe, in which contracting authorities and economic operators have their own transparent drawers, which, in turn, fill other drawers, some generated by the system, others by people.