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*Blockchain and Public Procurement: "I Have a Dream"**

Miguel Ángel Bernal Blay
(Professor of administrative Law at University of Zaragoza)

ABSTRACT Distributed ledger technology is not being adopted extensively in the public sector sphere. Nevertheless, public procurement outstands due to its pioneering role in the use of said technology for the registry and traceability of offers, automatization of decisions and digital identity management of tenderers and contractors. This paper presents the main initiatives developed, up to date, in Spain and offers a prospective view of other situations in which this technology could be implemented.

> *"I have a dream that one day, distributed ledger technologies will be used to full develop a public procurement proceeding. I have a dream today."*

1. *The development of distributed ledger technology in the domain of the public sector in Spain*

Distributed ledger technology, eleven years after its official birth, with the Bitcoin as a first case of successful use, has not yet spread in the public sector. We can observe a certain delay in its adoption, especially, in comparison to the experiences that the private sector has already developed.

The public sector is not very permeable to disruptive technological innovations (to innovation, generally speaking). Additionally, there is a generalized ignorance about this technology – distributed ledger technology – and its possibilities, caused by its legal loopholes – with one exception[1] – and increased by the lack of training activities in order to disseminate it within training centres, in public administrations. If we add the shared erroneous belief – due to the lack of knowledge – that distributed ledger technology (all) isn't environmentally sustainable, we can explain some of the difficulties that its development, in the public sector, might face.

The legal framework has not helped either, has it? The prohibition of the use of distributed ledger technology, for people identification, within administrative procedures, in accordance with the amendment of Law 39/2015, on Common Administrative Procedure, by Royal Decree-Law 14/2019, has only spread confusion[2]. The prohibition of the use of identification systems and signature, based on distributed ledger technologies, in the relations with the administration, ("under no circumstances will be admissible and, therefore, will not be authorized", as set out in part 1 of the sixth additional disposition of Law 39/2015), was misunderstood as an absolute prohibition regarding the use of distributed ledger technology within the domain of the public administration[3].

The reference, in the state regulations, to a temporary prohibition that will remain in place "… as long as distributed ledger technologies are not specifically regulated by the state within the EU legal framework" has not provoked a loss of hope in some autonomous regulations which have the expectation of a possible future authorization regarding identification and

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The analogy with 1963 Luther King's speech is only used, as a stylistic resource, to call the attention of the readership and, under no circumstances should it be understood with the intention to place, at the same level, public procurement digitalization problems and the unfairness of people discrimination, on the grounds of race.

[1] We cannot avoid referring to the boldness of the Aragonese legislator when including, in article 52.3 of the Aragonese Law 1/2021, of 11 February, on administrative simplification, a definition for distributed ledger technology systems that should be understood as "those which enable the storage of information, or its digital representation by means of a hash, in a permanent, simultaneous and successive way in a distributed database. Guaranteeing the immutability of the information and allowing an integrity audit".

[2] We should bear in mind, that two appeals, on the grounds of unconstitutionality, have been filed, against this regulation, by the Basque and Catalonian Generalitat governments, still pending a resolution. As well as the commitment of their repeal, in the pact of investiture signed by the Spanish Socialist Party (PSOE) and the Basque Nationalist Party (PNV), in order to facilitate the investiture of President Pedro Sánchez, after the 2019 elections.

[3] The prohibition only affects the use of distributed ledger technology to verify people's identification in public administration. Nevertheless, it is not applicable if distributed ledger technology is used for the identification of a person – physical or legal – in a private entity.

signature systems, based on distribution ledger technologies for its use in Public Administration and, that is, the reason for its current use "… in compliance with the state regulations on administrative procedure" (It should be noted that this final tagline introduces, skilfully, an escape clause, in the event of an unconstitutionality appeal, by the state, against the aforementioned regulations)[4].

Among these pioneering autonomous regulations we should highlight the determined step forward given, by the Aragonese regulation, on the identification systems in Public Administration, limiting the prohibition foreseen in the common administrative procedure regulations, with reference to the cases of use of "identification", in the strict sense of the word, that is to say, name and surnames and ID number – in the case of physical persons – or registered name and tax identification number – in the case of legal persons. Allowing the use of distributed ledger technology when confirming in the administration identity attributes as opposed to "identification attributes". Likewise, according to paragraph 5 of article 51 of the Aragonese Law 1/2021, of 11 February, on Administrative Simplification, confirmation, by the person concerned, of identity attributes different from their name and surnames or their registered name, as appropriate, will be carried out by any of the identification and signature systems foreseen in this law or in the basic state regulations.

A possible solution to facilitate the introduction of distributed ledger technology in Public Administration was mentioned in another place: "setting up a sandbox for its testing, with real data, regulating the effects derived from the said tests, some of which, could be considered equivalent to the tests carried out within the framework of ordinary procedures"[5].

We could use the precedent known as financial sandbox (Law 7/2020, of 13 November, for the digital transformation of the financial sector) for the creation of a controlled and limited testing environment in order to carry out, one or several, technologically-based innovation tests in an administrative proceeding or in administrative procedures. From our point of view, this measure will contribute to the knowledge of the technology and the potential benefits of its use within the domain of the administrative proceedings, especially, with reference to the automated administrative proceedings, in accordance with article 41 of Law 40/2015, of 1 October, on the Legal Regime of the Public Sector.

2. *First use cases of distributed ledger technology in the Administration: the case of public procurement*

In 2008 the Bitcoin was born. Ten years after this first experience, in Spain, two use cases, of this same technology, saw the light, within the scope of public procurement. Both cases were regional initiatives developed by the Basque government, firstly, and the Aragonese government, after

2.1. *Distributed ledger of tenderers*

At the beginning of 2018, the IT Society of the Basque government tendered a contract aiming at carrying out the analysis, development and implementation of a blockchain solution in order to cover scenarios linked to the tenderer register of the Basque government. In essence, what this project aimed at was the use of distributed ledger technology as an identity solution (not as an identification solution) of the registered tenderers in the Basque Register. The identity attribute managed, in this case, was the registration of a business in the tenderers register (due to the effects deduced[6]).

Likewise, and thanks to the security that distributed ledger technology offers, the

[4] As an example, we may quote, article 55.3 of Decree Law 76/2020, of 4 August, on Digital Administration and article 51.1, of the Aragonese Law 1/2021, of 11 February, on Administrative Simplification.

[5] *Blockchain, Administration and Public Procurement*, published in www.obcp.es, 12 July 2018.

[6] Bear in mind, that the registration in the Tenderer's Official Register and Classified Public Sector Businesses shall prove to all Contracting Authorities, within the public sector, according to what appears in the tender Official Register and, unless proven otherwise, the conditions of aptitude of the businessperson, with reference to his personality and capacity to act, representation, professional or business capacity, economic and financial solvency and technical or professional classification and other registered circumstances, as well as the concurrence or non-concurrence of the contracting prohibitions which should appear in the said Register. Registration in the Tenderer's Official Register of an Autonomous Community, shall prove identical circumstances to contract with the said Autonomous Community, the local entities, included within its territorial sphere and, with the remaining entities, organisms or public sector bodies, depending on one or another, (article 96 of the Public Procurement Law (LCSP). Likewise, in order to take part in the simplified open procedures it is compulsory to be registered in the Tenderer's Official Register (article 159.4.a of the Public Procurement Law (LCSP).

contracting authorities that used the said Register, would have a safer way to confirm the registration of a tenderer, in the said register and, allowing the appropriate legal effects.

2.2. *Distributed ledger of offers and their automated evaluation*[7]

The system of distributed ledger of offers and its further automated evaluation using, in both cases, distributed register technology is one of the first use cases of this technology, within the scope of public administration. In addition, it is an example of innovation public procurement, of an innovative solution from a technological point of view and, why not mention it, also from a legal point of view. Even though it has been articulated according to the traditional formula of service tendering.

It is true that electronic tendering platforms already existed, in the market, which offer more functionalities and can be used by the contracting authorities. The project developed by the Aragonese Government, used this use case, to satisfy a need (offering tenderers an electronic system to submit their tenders), and to promote innovation in public procurement. And in this sense, it can be demonstrated that distributed ledger technology adds value in this case. Of course, economic value, due to the fact that the cost of the use of this system means a less costly tender than when other platforms are used and, even with the cost of the offer registration using the traditional system in the administrative registers (the tender documents established a unitary payment system for each piece of registered information – an offer, a summary of the submitted offers, the contract award proposal, etc. – in the distributed ledger network).

It can be claimed, in this case, that distributed ledger technology yielded much more non- economic content value, but not less important.

In the first place, because it increased transparency. The decentralization of the tender registers allows the administration to be more transparent regarding the submission of tenders. Anybody can check when the tenders were submitted, by means of a transaction Front Page, which guarantees their traceability and control. Hence, tampering with the submission time of a tender (changing date or time) is impossible.

In the second place, because there is an absolute guarantee of the integrity of the offers with the use of the hash, circumstance that renders impossible tampering, afterwards, with the documents that contain the hash. Tender tampering (changing their value) would produce a different hash to the one registered previously in the distributed ledger network, before the deadline for the submission of offers. And this lack of coincidence would result in the exclusion of the offer from the tendering process.

And, in the third place, because the automatization of the offer evaluation tasks results in an increase of the efficacy and efficiency in administrative procedures. The advisory boards may be released from some of their functions and devote those resources to much more productive tasks.

We are, therefore, facing a system with great potential, that in the framework of this *mise-en-scène*, was used for the tendering of simplified open procedures, in summary proceedings, and minor contracts. An evolution, of the abovementioned system, started at the end of 2021, foreseeing an increase of its functionalities.

The initial project received some acknowledgements. Likewise, in the framework of the X Innovation and Public Services Nacional Conference, held in Madrid, in March 2020, this initiative was awarded the "Best project with innovation technologies: solutions in the cloud, artificial intelligence, Blockchain, 5g, Bigdata, Business Intelligence", which means an important acknowledgement of the work carried out by the staff of the Office of Public Procedure and the Centralized Contractor Service of the Government of Aragón that participated in it, along almost a year.

On the other hand, the project has been presented by the General Secretariat of Digital Administration of the Ministry of Economic Affairs and Digital Transformation, for its implementation in the European Blockchain Services Infrastructure (EBSI) which is being developed by the European Commission and in which all the Member States take part, within

[7] The functioning of this use case has been previously explained in M. A. Bernal Blay, *Electronic Tendering and Distributed Ledger Technologies*, in J.M. Gimeno Feliú (ed.) *Observatorio de Contratos Públicos 2018*, Cizur Menor, Aranzadi, 2019. This use case has also been echoed in the paper of J. Tejedor Bielsa, *Transformacion digital, "blockchain" e inteligencia artificial en la administración pública*, in *Revista Española de Derecho Administrativo*, n. 209, 2020, and in the paper of M. Pereiro Cárceles, *La utilización del blockchain en los procedimientos de concurrencia competitiva*, in *Revista General de Derecho Administrativo*, n. 50, 2019.

the framework of the European Blockchain Partnership (EBP). Currently, four cases of use are being developed, based on that European Blockchain, but the European Commission wants to open it to others and the distributed ledger of offers for public procurement is a good candidate due to the fact that they are already functioning and their feasibility has been proved.

Additionally, it can also be mentioned that the Aragonese project was used as a base for the development aiming at the fight against corruption in food supply to the school dinning-rooms, in Colombia, financed by The World Economic Forum[8]. And more recently the World Bank has included the analysis of this case in their analysis document, Disruptive Technologies in Public Procurement, concluding that a project like this can be implemented successfully provided there is political support and the ecosystem of specialized businesses in blockchain does not disappear[9].

2.2.1. *Some specifications in the project tender process*

In order to articulate the use case, developed by the Aragonese Government, the supply, as a service, of an electronic system of automated tender submission and evaluation was opted for. Using distributed ledger technology (DLT as a service).

Due to the innovative nature of the service, in need of a previous stage of scientific, technological and legal research, for its articulation and development; a "previous tender announcement" was launched (six months before the compulsory tender announcement), by the Government of Aragón in order to disseminate, well in advance, the intention of tendering the development of this project. This "anticipation" explains the high numbers of businesses participation, as a response to the tender call, launched in the month of September 2018.

It should be highlighted that, due to the objective of the project, it was a solution with important intrinsic innovation features, with reference to the award criteria. The price criterion, within the contract, was not considered as a determining element. In fact, the said criterion, was only assigned a 20 percent of the points. The acquisition of low-cost innovation was inconceivable.

On the other hand, the description of the technical specifications of the project was, scrupulously respectful with the principle of technological neutrality. These technical specifications did not predetermine the technical solution that should be used. It was the responsibility of the businesses to offer the technical solution, according to their own judgement, which best fulfilled the needs of the Administration. In fact, apart from the winning solution (Hyperledger Fabric), other technical solutions such as, Ethereum and Quorum (Alastria network), were also offered.

Finally, the contract was awarded to the tender submitted by Iasoft Aragón S.L. (Grupo Oesía), in collaboration with Open Canarias, who proposed as a technical solution based on Hyperledger Fabric. Linux Foundation took the leading role of the initiative which was subsequently supported by some registers in the public network Ethereum.

2.2.2. *The problem yet to be solved: electronic tender submission in public procurement processes*

After the enforcement of the Spanish Public Procurement Law (LCSP), offers submission must be carried out electronically. The need of an electronic tender system, for the Government of Aragón, justified the tender of the said system. It is certainly true that there were already, in the market, solutions that enabled electronic public tendering. Nevertheless, the objective of the project was checking whether the use of information distributed ledger technologies could contribute to adding value in comparison with what was offered, by the solutions in the market. The previous analysis concluded that the use of distributed ledger technology could contribute to adding value, with reference to procedure transparency (transparency which would cover the tender submission stage), as well as efficiency, due to the automatization in the offer evaluation process.

2.2.3. *Scope of the system*

In order to test the offer distributed ledger technology system, the determined

[8] World Economic Forum, *Exploring Blockchain Technology for Government Transparency: A Blockchain-Based Public Procurement System*, accessible from www3.weforum.org/docs/WEF_Blockchain_Government_Transparency_Report.pdf.

[9] World Bank, *Disruptive Technologies in Public Procurement*, accessible from https://documents1.worldbank.org/curated/en/522181612428427520/pdf/Disruptive-Technologies-in-Public-Procurement.pdf.

implementation area was the appropriate, according to this type of procedure, according to article 159.6 of the Public Procurement Law (LCSP), that is, the simplified open procedure, in "summary" proceedings, characterized by the following specific requirements:

a) The offer will be submitted in a single envelope or electronic file and will be evaluated according to quantifiable award criteria, by means of the application of standard formulas stated in the procurement documents.

b) The evaluation of offers will be done automatically, by means of IT devices or, with the collaboration of a technical unit, in order to help the contracting authorities.

c) The opening of proposals will not be carried out until the submission deadline ends. This will be guaranteed by electronic means, therefore, no public opening ceremony of the offers will be performed.

In spite of this scope limitation, the functionalities of the system may be, equally, spread to other procedures as long as there is a coincidence with the highlighted characteristics. In this sense, the system was also used, for example, for the tenders in minor contracts. The distributed ledger service for offers could be used, within the framework of such procedures, to enable tenderers to submit their tenders. And, additionally, the function of automated tender evaluation could be used, when using quantifiable award criteria by, simply, applying formulae in the procedures.

2.2.4. *Development of the system*

In essence, the tender stage of the public procurement award process is composed by the submission of envelopes or electronic files which contain the tenders submitted by the tenderers, the opening of those envelopes by the technical units or IT devices, or if appropriate by the "advisory boards", in a public opening ceremony and the subsequent tender evaluation process and tender classification, in order to propose the contracting authorities the official contract award of the successful tender.

The "basic" idea around which to articulate the distributed ledger service for offers is the following: within the framework of a simplified open procedure according to article 159.6 of the Spanish Public Procurement Law (LCSP), in "summary" proceedings, tenderers are requested to submit their tender in electronic format following a standardized model.

The tenderers identify themselves in the system that will calculate the (hash) of the tenderer's tender, the tenderer introduces it, into the system, before the deadline for the submission of tenders and, sends it for registration in a distributed ledger network. The digital signature for tendering is understood as the data set that guarantees the undeniable link between the contents of the tender and that enables the detection of any possible tampering with its content, guaranteeing its integrity[10].

The digital signature is kept permanently, simultaneously and successively in a distributed ledger systemin several nodes, and allows: a) guaranteeing the immutability and integrity of the information, b) guaranteeing the non-rejection of the person who submits the offer using their electronic signature included within the information of which the hash is carried out and c) certifying the moment at which the electronic signature was submitted by means of a time stamp.

Once the official tender submission deadline arrives, tenderers must send their tender, in electronic format, by means of the front-end of the system. The system calculates the hash of the submitted tender and confirms its coincidence with the one, previously registered, in the distributed ledger system.

Provided that the coincidence takes place, the offer is admitted to the tender process and its evaluation process starts. The non-coincidence of the hash is a sign of tampering with the content of the offer.

Subsequently, the administrative proceedings of the offer evaluation process (due to the fact that in the procedure foreseen in article 159.6 of the Spanish Public Procurement Law (LCSP), only quantifiable award criteria are used, by the simple application of formulae), and the proposal of the official contract award to the contracting authorities, is carried out in an automated fashion (using smart contracts software). The evaluation of quantifiable award criteria, by means of the simple application of formulae, is the easiest to automatize.

But this does not mean that blockchain cannot be used in the event of foreseen award criteria based on a value judgement evaluation.

In these cases, we will have to resort to "oracles", that is, external agents that provide information located out of the blockchain. Once supplied the information, related to the award criteria, the evaluation which depends on a value judgement; could be used by the system,

[10] Sixteenth Additional Provision of the Spanish Public Procurement Law (LCSP).

again, adding that evaluation resulting from the evaluation of quantifiable criteria using mathematical formulae.

This "automatization" of the tender evaluation process increases the efficiency of the procedure in two different ways, clearly differentiated and complementary: one, in the time decrease in the stages of the procedure from submission, of the initial hash of the tenderer, to the contract award communication (recital 80 of the Directive 2014/24/EU); and another, is the reduction of the processing costs of the procedure because the meeting, of up to five civil servants, for a certain time and space, with the subsequent savings of means, is unnecessary (let's think about the cost civil servant/time corresponding to each of the members of the advisory board, in the absence of the use of a physical space and in the elimination of the commuting costs). At the same time, as it has been previously mentioned, the automatic process produces a result, in a few minutes, with a reasonable safety degree.

It can be proved that the use of distributed ledger technology, within the stage of tender submission, as well as, in the evaluation stage of the submitted offers, is considered. These proceedings would be implemented on-chain, while other proceedings, of the procedure, will be implemented off-chain.

2.2.5. *Stages of the system*

The distributed ledger service and automated evaluation have been developed in several stages. The first stage focused on the development and validation of the associated functionalities to the electronic submission of the hash of the offers by the tenderers in a distributed registry (submission of the hash as well as its subsequent offer and access to the said "events"), as well as the functionality that allows public managers to check that the submitted hash, in the system, match the ones in the offers submitted by the tenderers. Since May 2019, 23 public tenders have programmed offer submissions in this way.

The second stage, concerning automated offer evaluation includes, among others, the functionality based on smart contracts set out in the tender documents in order to identify, automatically, the most economically advantageous offers and propose them for the contract award. These functionalities were validated during the months of March and April 2020, and in May they were implemented with real tenders.

The third stage, that was developed since May 2020, consists on the combined use of both, previously described, functionalities: the distributed ledger of offers as well as the offer automated validation; and will be extended until the contract award ends, together with its deadline extension**.**

As we said earlier, in December 2021, a new project has been launched, within the framework of a new contract, aiming at enlarging the functionalities, previously described. Specifically, regarding the procedures in which, apart from quantifiable criteria based on formulae; contracting authorities, should take into consideration criteria based on a value judgement. The tender evaluation based on quantifiable criteria, by means of simple formulae application, will be always carried out after having, previously, implemented the evaluation of the criteria quantified on a value judgement criterion**.** In these cases, the smart contract used for offer evaluation should enable the addition of the corresponding evaluation of those award criteria, depending on a value judgement, previously to the opening of the part of the offer containing the corresponding values with the automatic evaluation criteria; kept secret until the moment of their opening.

3. *Other cases, of use of distributed ledger technology, which could be subject to exploration within the scope of public procurement.*

Together with the use case already exposed, and successfully "tested", in the real world, it is possible to "dream" with the implementation of other cases that enable the completion of the proceedings in an award procedure using, entirely, blockchain technology.

3.1. *New digital identity credentials for tenderers and award tenderers, verifiable with blockchain technology.*

The identity credentials of tenderers and contractors is one of the cases with the biggest development potential using distributed ledger technology. The self-declaration statements, included in the European Single Procurement Document (ESPD), are "computer data subject to insurance", using distributed ledger technology. The ESPD will develop turning into a European Public Procurement Passport[11]. For

[11] That was, by the way, the denomination received by such tool, in the Proposal for a Directive submitted in

the implementation of the European Public Procurement Passport a European Digital Identity Wallet could be used as mentioned in the recent Proposal for a Regulation of the European Parliament and of the Council, amending Regulation (EU) n. 910/2014, as regards establishing a framework for a European Digital Identity (COM/2021//281 final). This tool is defined as "a product and service that allows the user to store identity data, credentials and attributes linked to his/her identity, to provide them to relying parties on request and to use them for authentication, online and offline", what turns it into a suitable tool to handle tenderer's attributes related to their financial and technical reliability, professional qualification, experience or good (bad) execution certificates, valid for the contracting authorities, within the framework of contract award procedures, for services.

A necessary case of use is related to the attribute of current bank account owner, in order to receive payments, until today, contained in bank certificates materialized, most of the times, in scanned pdf's (the so-called "third party information certificate" or "supplier registration form". Bank ownership is a very important identity attribute, in the sphere of public procurement, because it refers to the bank account number where payments, corresponding to the contract award, are made. The importance of ensuring this attribute is evident. And as an example, we may quote the important problems that, not so long ago, have taken place when some criminals, impersonating awarded tenderers, have sent notifications to different contracting authorities, requesting a change in the number of the bank account, into which the contract payment should be made. A credential related to the attribute of current bank account owner, managed by distributed leger technology, would detect promptly the attempt of identity theft.

3.2. *Electronic biddings*

In the sphere of public procurement, electronic auctions are defined as, "a repetitive electronic process, that takes place after a first full evaluation of tenders, for the submission of price improvement or new values, as regards specific tender elements, that improve them globally, based on an electronic device that allows their classification, using automated evaluation methods. Ensuring that the electronic device allows a non-discriminatory and, generally, available access. As well as the unalterable registration of all the participations in the auction process". (article 143 PPL – LCSP). Actually, this use is very similar to the one developed by the Government of Aragón concerning distributed ledger of offers and automated evaluation of the award criteria, the evaluation of which is carried out by the application of formulae.

It would suffice to replicate, as many times as bids are submitted by the tenderer, registering, subsequently, the bid**.** The re-evaluation of the values of the offer and, its reclassification after comparing this evaluation with the evaluation of the rest of the offers, until the closing of the bidding.

Distributed ledger technology is, especially, suitable to comply with the traceability requirement and unalterable register of all the participations in the auction process, as demanded in the quoted article 143 PPL (LCSP). Distributed ledger technology of evidence of participation of a tenderer would allow the accreditation of their bid record, as well as the bid value.

3.3. *Automated sub-procedures*

Apart from the already mentioned, the use of distributed ledger technology could improve the efficiency of the administrative proceedings, allowing technically what has, legally, been defined as "automated administrative proceedings" in section 41 Law 40/2015, 1 October, Legal Regime of the Public Sector, by means of the so-called "smart public contracts". As we have previously mentioned, with this technology, administrative decisions could be automated, they could be made without human intervention. This circumstance would strengthen the principles of objectivity and equal treatment of tenderers[12].

Apart from the exercise of automated functions, by the contracting authorities, we have already analyzed in the Aragonese use case, the existence of sub-processes within the tender procedure which could be subject to an automated process, using the same blockchain technology.

2011 that was finally approved as Directive 2014/24/EU of the European Parliament and Council, on 26 February 2014, on Public Procurement.

[12] M.Á. Bernal Blay, *Licitación electrónica y tecnología de registro distribuido*, in J. M. Gimeno Feliú (ed.) *Observatorio de Contratos Públicos 2018*, Cizur Menor, Aranzadi, 2019.

Among these automated sub-processes we could highlight, in the preparation stage of the tenders, sub-processes related to the economic management proceedings, which are carried out, in parallel, with the tender proceedings. And in this sense, checking issues such as, credit existence or the competence of the contracting authority depending on the amount of the tender, could be automated, without any doubt.

During the tender stage, I also consider automatable the identification of abnormally low offers according to the abnormality criteria set in the tender documents of special administrative provision. And once identified adopt them, in an automated fashion, according to article 149.4 (PPL – LCSP).

The resolution of occasional offer draws or, finally, the request to the tenderer, who submits the best offer, to justify his solvency in order to contract or, the proof that the tenderer is up to date concerning the payment of tax debts and social security duties, are other examples of proceedings that could be "activated" by the use of "smart" functions deployed in a blockchain.

When executing a contract, it is also possible to automate some functions such as: the issuance of certificates of final completion, previously mentioned, or the return of contractual guarantees aiming at the correct execution of contracts.

Likewise, the implementation of penalties and bonuses or, even, carrying out payments – which could reduce the Administration payment default – and improve instalment payments to suppliers, could be other possible cases in which to think about distributed ledger technologies application.