

Blockchains at the service of public authorities

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In J.P. Dardayrol, editor of the special issue *Blockchains and smart contracts: The technology of trust?* of *Réalités industrielles*, 2017

Abstract:

Thanks to blockchains, decentralized ledgers can be designed; and trust in their validity, shared among concerned parties. Inherent in this technology is a decentralization of the databases underlying blockchains. For public authorities, this decentralization marks a shift of paradigm away from the usual organization whereby tightly supervised operators store public data. Two fields are presented where the application of blockchain technology is under study: a new chain of more fluid, easier-to-control financial securities; and the possibility of keeping easement records so as to better inform buyers in the real estate market.

At its origin, blockchain technology, via the community of users on the Bitcoin network, developed in line with a "libertarian" conception of socioeconomic relations, in opposition to the standard, centralized model of government interventions. Its promises have led governments in OECD lands, including France, to take close notice of its potential applications. A few characteristics of blockchains are described herein that justify the interest public administrations have shown in this technology. Two examples will be discussed in detail, the one having made news recently in the legislative sphere, the other more exploratory. The purpose is to focus attention on a few applications in public administrations of the sort to be expected from this technology.¹

Why are blockchains of interest to public authorities?

Distributed ledger technology (DLT) is mainly a method for keeping a ledger that, distributed among various nodes in a network, is protected from having its recorded data modified, even by the parties who run the blockchain. To simplify, there are two types of operators in a blockchain. First of all, the users who want to store information there and consult the information already stored. Secondly, the "miners", *i.e.*, users who place at the network's disposal (often in return for benefits set under the protocol) the computing power of their machines in a proof-of-work system for the purposes of data validation and a decentralized management of the ledger.

¹ This article has been translated from French by Noal Mellott (Omaha Beach, France). The translation into English has, with the editor's approval, completed a few bibliographical references.

Beyond the techniques designed for making blockchains, let us examine the fundamental properties of a blockchain that could be of interest to public authorities:

- This technology “distributes” the work of keeping the ledger (register or registry) among a large number of users, including public administrations, local authorities, etc.
- By construction, blockchains are resilient in the face of an attack. In practice, the data are stored there in stone, definitively. Once validated, they cannot be altered, not even by the keepers of the ledger. This holds for as long as technological progress does not enable someone to decipher in a realistic time span the combinations used to protect data under the proof-of-work system.
- By design, blockchains allow for building a consensus about the validity and chronology of the recorded data.
- Any node in the network can easily check whether or not a given information is in the data base.

The decentralization of the blockchain’s data base is the very grounds of this technology. For public administrations, this decentralization might mean overhauling the usual organization of public records, which have, till now, been stored under close supervision by public authorities. This decentralization is paired with a verification of the data on the blockchain by any node (*i.e.*, any user) in the network. We can imagine that this technology, if used in line with public policy decisions, could offer citizens a high degree of transparency while also enabling them to play an active part in the system. Questions about the openness of data (*e.g.*, on a land registry)² inevitably crop up. And what about environmental data under the UN Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters of 25 June 1998? Should such data, for the sake of transparency, be open to all citizens?

When a public administration uses a blockchain, the question of miners is crucial for shoring up the system’s resilience. The unalterability of the data stored on a blockchain stems from the protocol for validating blocks and, in particular, from the strength of the consensus procedure. Once again, this technology could, we imagine, grant citizens a power of verification and thus reinforce confidence in a blockchain’s data.

Given its principal characteristics, a blockchain is a means for eventually overhauling procedures so as to grant citizens (or groups) a power now in the hands of public officials. The promises of a more consensual, horizontal technology could prove of interest whenever people are wary of the institutions that exercise oversight. Down to earth, we can imagine that such a system, if set up by public authorities, could sometimes be more efficient than current systems that are sources of economic rent and technological inefficiency. Let us illustrate this remark.

Two examples in public administrations

From electronic currency to the securities trade

As pointed out, blockchain technology can be used to keep a decentralized ledger that withstands attacks, definitively records data for sharing, and involves a users’ consensus about its contents. Several professions require unalterable public registers that are consensual and public. Prior to the upsurge in digital technology, such registers could not be made without a centralized authority who certified that the records had not been altered and whose guarantee amounted to a

² The INSPIRE directive (2007/2/CE 14 March 2007) provides for setting up a “spatial data Infrastructure” for geographical Information in the European Union. Texts of European Union law are available via <http://eur-lex.europa.eu/legal-content/FR/TXT/?uri=CELEX%3A02006R1907-20140410>

“consensus”. Registers were usually entrusted to government authorities or else big private organizations usually under the oversight of public authorities.

The best-known blockchain application is the Bitcoin protocol with its ledger of transactions in a virtual currency. This ledger decentralizes confidence in the regularity of the transactions and in the validity of the bitcoins used in payment. In the case of fiat or commodity money, this role has been a monopoly of states or central banks, the ultimate “trusted third party”.

Among the many applications expected of blockchains, financial circles have shown interest in using them for the clearing and settlement of financial securities. Considerable funds have already been raised in France and, even more, in English-speaking lands for this purpose.

The legal texts applicable to financial securities (about operations and players: the central depository of securities, the parties that keep the books, etc.) have long received little notice — or even been overlooked. Restricted to debates among experts, *i.e.*, attorneys and specialists from financial establishments, clearing and settlement operations have been deemed less strategic than bidding on the trading floor or conducting capital operations.

Without a robust securities chain however, the transfer of the ownership of securities — the legal counterpart of a cash payment in an ordinary transaction — cannot be guaranteed. The lack undermines the very operation of financial markets. For reasons having as much to do with the operations as with oversight, participants in the securities chain have historically been centralized, or at least organized in a tree structure — each node occupied by an account holder (the broker who follows his clients’ accounts) and the highest node by the central depository. A transaction involving a transfer between two parties that are not clients of the same account holder has to be validated by both clients’ account holders. In turn, the latter have recourse to the central depository who is responsible for the integrity of all securities in circulation.

This procedure’s logic is fundamentally at odds with blockchain protocols. Transactions are not validated through a decentralized consensus between all players in the market but, instead, by a single intermediary, centralized and tightly regulated (considering the extraordinary powers vested in it). Incidentally, this setup can, it should be pointed out, soon cause problems from an economic viewpoint since the party in a *de facto* monopolistic position might be tempted to collect economic rent from users. Historically, the remedy found for this was to have the major financial players hold equity in the central depository (in France, SICOVAM, whose shares were originally held by French banks). This helped limit the risk of the depository behaving like a rentier.

In this context, what can blockchains contribute to the securities chain?

FIRST OF ALL, blockchains do not have a tree structure, where the integrity of the securities chain depends on a single link, the highest level in the tree, which must be tightly regulated. This structure induces the player at the top to act like a rentier to the detriment (excess costs, inefficiency, etc.) of the system as a whole.

SECONDLY, as regards unlisted shares, the adoption of a blockchain approach would be a big leap forward technologically, similar to the dematerialization of quoted securities in France in 1984. This would work in favor of a financial system without intermediaries while reinforcing the robust and verifiable nature of unlisted securities transactions.

FINALLY, information would be improved since all securities transactions would be recorded in a decentralized ledger. It would be possible to do better than draw a static image of shareholders at a given moment in time. Controllers (tax authorities, financial market regulatory authorities) could access this up-to-date information. Their role would be significantly reinforced since they could obtain, instantaneously, a view of portfolios and trace transactions.

In France, the previous government made two successive announcements in support of this new technology. Under an executive order of 28 April 2016, experiments may be conducted using blockchain technology for “mininotes” (*minibons*).³ Under the Sapin 2 Act of 9 December 2016, a regulatory framework is to be set up for a blockchain for unlisted securities.⁴

“Mininotes” materialize the acknowledgment of a debt by a firm without being debt securities or loan certificates. They update an old financial instrument, the corporate note, for crowdlending. The executive order, decided in application of the Macron Act, allowed for reforming the regulatory framework for the purpose of creating mininotes. As drafted, it allows for a decree on a procedure of a blockchain type for the clearing and settlement of these new financial instruments. Thanks to this arrangement, the definition of a blockchain came to figure — for the first time in French law (and to the best of our knowledge in European law) — in the Monetary and Financial Code: *“Article L. 223-12. [...] issuing mininotes and transferring ownership of them can also be done via a setup of shared electronic records for authenticating these operations subject to the conditions, in particular with respect to security, to be stipulated in a decree.”*

To its advantage, this solution is optional while making room for experiments with this new way of conducting back-office business when the circumstances allow. The executive order made this possible. Unlike for financial securities (especially listed ones), the law hardly had anything to say about these notes; nor did any EU legal text. There was, therefore, room for working on a new regulatory framework, which can be finalized after the decree is issued. All things considered, we can liken this situation to mobile telecommunications in developing countries: it is sometimes simpler to leapfrog to a more advanced state of technology.

The Sapin 2 Act⁴ allows for an executive order to set up a regulatory framework for an eventual application of blockchains to unlisted securities. Public hearings are being held to flesh out the regulations to be adopted. France will thus be one of the first countries in Europe to have this sort of regulatory framework, which could eventually be extended to the EU level, in particular for listed securities.⁵

In both these cases, the approach taken by France (starting from the advantages and limitations of currently applicable legal requirements) to implement blockchain technology in the securities chain is both gradual and mixed. Gradual in that it launches experiments in new uses (mininotes) and makes up for the current, unsatisfactory state of regulations (unlisted securities). Mixed in that it does not intend to move all clearing and settlement procedures onto a blockchain but, on the contrary, backs, with the legal force of these procedures, the development of blockchain technology for recording transactions. Blockchains might thus become a new, more decentralized way to manage a centralized securities account, a way that would still carry legal authority about the ownership of securities.

A blockchain as a land registry

Another sovereign function of the state is to keep a land registry (*i.e.*, a public register of lots of land by administrative subunit), and a registry of landed property (for certifying ownership of the lots). This function, which dates back to ancient times, has more than one purpose. For one thing, it provides information on landed property for establishing a tax base. Public notice about the tax base and the unalterability of the land registry were democratic safeguards set up during the French Revolution. Another purpose is to provide a public warranty for deeds of real estate property.

³ Ordonnance n° 2016-520 of du 28 avril 2016 relative aux bons de caisse (NOR: FCPT1608300R). French legal instruments law are available via <https://www.legifrance.gouv.fr/Droit-francais>

⁴ The “Sapin 2 Act” n° 2016-1691 of 9 December 2016 on “*transparency, the modernization of the economy and the fight against corruption*”.

⁵ http://www.tresor.economie.gouv.fr/16101_consultation-publique-ordonnance-blockchain-applicable-a-certains-titres-financiers

From a technical viewpoint, it is fully possible to imagine digitizing these two sorts of documents for a blockchain registry that would, because of how it is set up, fulfill the requirements of public notification, unalterability and consensus. In concrete terms, the public authorities (in particular, notaries) who control this registry and ensure the validation and certification of changes in property would be the “miners” in a blockchain that makes available to everyone data about the ownership of real estate. This decentralized registry, given its malleability, could incorporate other sorts of data about the lots, in particular, information on urban planning and zoning — in fact, any information pertaining to the lots.

We can thus imagine building a decentralized system of records of property changes where accredited professionals (such as notaries) would enter real estate transactions. The public administration would thus have an inventory of lots for tax purposes. This blockchain would, in other words, fulfill the purposes for which land registries are currently used.

Besides the aforementioned information, the decentralized blockchain registry could also record as “special transactions” the restrictions attached to lots (in application of regulations of various sorts) as well as any relevant environmental data (on flooding risks, etc.). The service in charge of town and country planning would, we suppose, be empowered to attach to a lot the requirements imposed by zoning or risk-reduction programs as well as the applicable easements of public utility. The service in charge of monitoring soil pollution could also enter information on the lots.⁶ Such information would be easy to consult and available “all at once” to eventual buyers.

By automatically making available the environmental and zoning information attached to a lot, a blockchain would allow for major gains in efficiency by abolishing the systematic recourse, in cases of conveyance, to the services now in charge of these questions. It would thus fluidify real estate transactions and facilitate the identification of areas that are problematic or well suited for urban development projects. Filing a request prior to purchase would take no more time than a click to find the relevant information on the lot in question, whereas the buyer now receives a stack of papers to be initialed and signed before a notary.

The role of public authorities would switch from certifying a centralized registry of data to guaranteeing the integrity of the protocol and ciphering procedures used. This calls for a significant shift in our point of view on the state’s sovereign functions.

A digitized, decentralized land registry based on a blockchain could be set up in developing countries that lack a centralized land registry but realize that guaranteeing land titles is a major condition for economic development. The Bitland project is experimenting with introducing such an arrangement in Ghana.⁷ Once again, as for mininotes, it is sometimes simpler to leapfrog to the forefront of technology.

Conclusion

Blockchain technology can be an opportunity for restoring a horizontality between users on a network by turning them simultaneously into both providers and users of services, both real and digital, via a peer-to-peer approach. Public authorities have everything to gain by seizing this possibility of DLT in fields as distinct as easements or financial securities in order to exercise oversight. This trend will make exchanges more fluid and make it easier to control operations, thus making markets more efficient. It supposes, however, a substantial change in the controlled/controller relationship since the parties controlled will be able to partly control the correction of entries in the blockchain.

⁶ As under article 173 of the Alur Act n° 2014-366 of 24 March 2014 on access to housing and a renovated urbanism.

⁷ <http://bitlandglobal.com/>