BLOCKCHAIN ESTATE REGISTRY

OPINION

PREPARED BY
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SUBMITTED TO
THE AUSTRALIAN SENATE

WHAT IS PROPOSED

THE FIRST BLOCKCHAIN ESTATE REGISTRY IN THE WORLD

Dear Senators,

This is a submission to the inquiry of the Select Committee on Financial and Regulatory Technology of The Australian Senate.

The opinion explains the use of the blockchain in land registration and various public [property] registries of different purposes (cars, boats, aircraft, companies, mineral resources, water registry, etc.)

The opinion pertains to the following topics raised in the Second Issues Paper:

- Data standards and blockchain, i.e., Blockchain applications
- Rules as code

Yours faithfully,
Oleksii Konashevych (PhD)

December 10, 2020

Summary

- A new generation of public property registries on the blockchain can ensure an unprecedented level of transparency to address fraud, corruption, ensure auditable property transactions, etc., and the immutability of records (data protection).
- At the same time, it opens the door to innovations in the PropTech industry and enables free flow of investments from all over the world into the national economy.
- The proposed concept is developed as academic research presented in peer-reviewed papers in ranked academic journals. The author lives in Australia and seeks trials and implementation in the public sector.
- Blockchain estate registry combines P2P transactions with smart contracts and registration.
- Automation eliminates intermediaries and bureaucratic procedures (up to 90%), reducing transaction costs and public administration expenses.
- A properly designed system addresses law enforcement issues on the blockchain (inheritance, dispute resolution, etc.), and issues with mistakes and inaccurate data and privacy issues.
- An initial pilot can run embedded in the current legislative and organizational system of land registration (as per law, "the Registrar may keep the Register of land in any form or combination of forms; and on any medium or combination of mediums; and in any manner.").
- It is proposed that citizens and businesses will be able to choose to opt into the blockchain (and back to the traditional registry if needed). Australia has an experience of running two systems in parallel for 150 years. Which are the traditional land deeds and the Torrens system.
- The full potential of blockchains and smart contracts can be achieved through legislative changes.
- Interoperability and technological neutrality is the main design principle. It is proposed to use existing public blockchains in a bundle through a specifically designed cross-blockchain protocol to enable a free market competition of technologies.
- The existing land authorities are unlikely to initiate changes as their statutes do not imply goals for the reduction of their functions and responsibilities through automation.
- A high-level public policy for longer terms must be developed, and it should address the problem of redundancy of registrars and other intermediaries.
- The proposed blockchain public registry, in fact, can be applied for various legal relationships with immovable and moveable property (registry of cars, boats, and aircraft), corporate rights and company registration, water registry, mineral resources, and various other procedures with permits.

Contents

I. Blockchain perspectives

1.1. About this reference

This author's reference is a brief introduction to an academic work accomplished as a Ph.D. thesis by a publication that consists of five peer-reviewed papers published in internationally ranked journals. I conducted this research in the international program funded by the EU and coordinated by the University of Bologna (LAST-JD.EU), half of the research (2 of 4 years) was done at RMIT University (as a per a collaboration agreement with the program), under supervision of the Australian academicians, see sections 3.1 "About the author" and 3.2 "Letters of reference."

The research goal was to introduce a viable concept of blockchain use in the public sector, specifically to improve public [property] registries and increase the efficiency of governance through LegalTech. The land registry was chosen as a use case, though the concept's applicability is much broader.

This is interdisciplinary research consists of (1) legal aspects, (2) public policy, and (3) technological components. Various parts of the technical protocols were tested (PoC), though the further goal is the practical implementation.

The result of the research is meant to give a holistic picture of how the blockchain technology can be applied, determine the limits of the technologies, the technologies that must accompany blockchain, how to introduce a new generation of public property registries, and what changes must happen in legislation and public sector to accommodate a new paradigm.

This reference is not meant to give detailed answers to all questions. For further reference, see a two-hundred-page thesis of five papers, an introduction and conclusions, see section 3.3 "Bibliography."

1.2. How to use Blockchain

The research made it clear that the blockchain is a unique technology, though it cannot be directly applied in e-governance. Researched pilots in the world showed a gap between declared goals with proclaimed benefits and reality.

The implementations showed that some directions of blockchain implementation have no perspectives. For example, hashing records from the centralized registry has a very limited effect. Use cases of the land registry in the Republic of Georgia, and some experimentation in Cook County, Illinois, US. These conclusions are presented in papers 3 and 5 of the thesis (see section 3.3).

Also, I concluded the questionable nature of the so-called "permissioned" (private, federated, enterprise) blockchains. Suppose the goals are decentralization and an immutable ledger for peer-to-peer transactions. In that case, non-public DLTs are not addressing these goals, as they are just other types of centralized technologies. They are immutable and irrevocable only at the discretion of those who control them. Governments across countries run centralized systems for decades; why would anyone want to reintroduce it again? This question remains open to those who advocate for centralized DLTs.

1.3. Issues with public blockchains

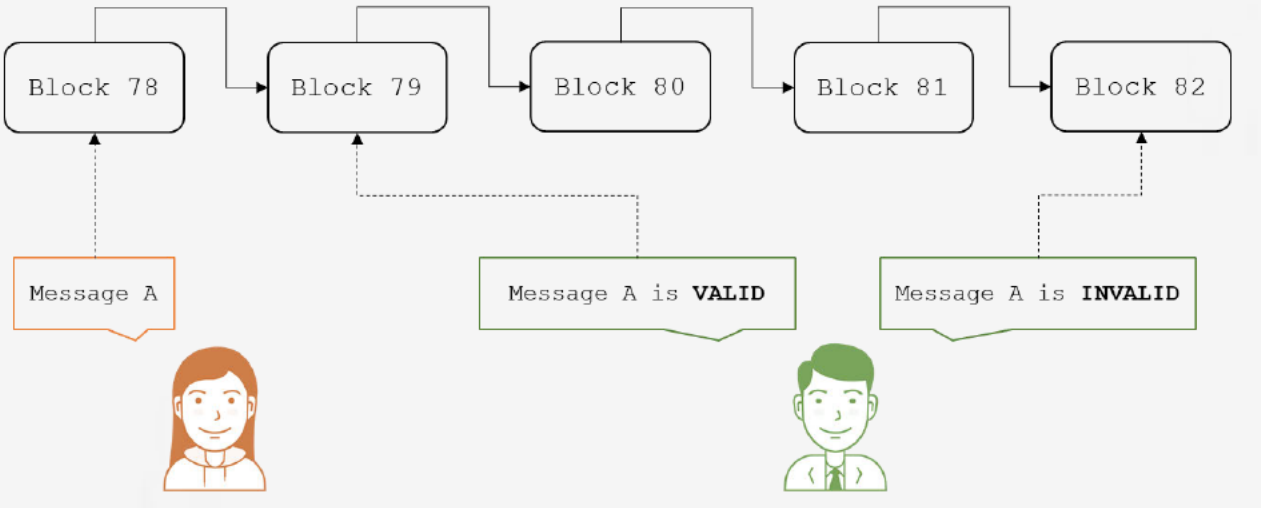
Across multiple suggestions of blockchain use in the public sector, there was no grounded theory that would systematically address known issues using public blockchains. Here are the major ones.

How to use blockchain for legal purposes in an irrevocable and immutable ledger, i.e., addressing legal disputes, performing inheritance transfers, and enforcing smart contracts, etc. How to correct mistakes and inaccurate data. How to scale blockchains, how to handle price volatility of cryptocurrency, how to address problems with privacy, and how to manage digital identity.

1.4. Design concept

The research concludes that the open and decentralized nature of public blockchains should not be challenged or somehow undermined as this is the guarantee of its immutability. Therefore, "permissioned" blockchains are not applicable, and they may have a limited auxiliary application.

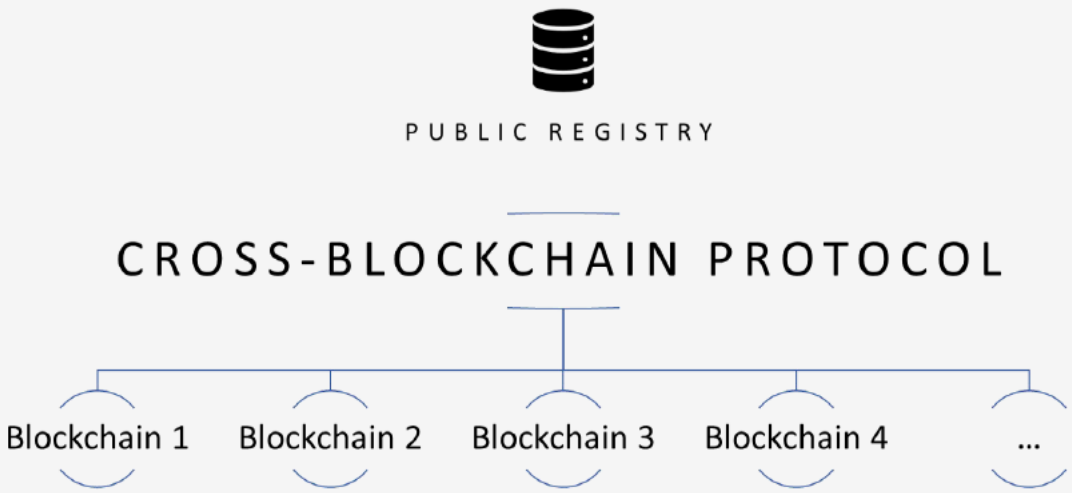
Cryptocurrency is the blood of blockchain. It is not only a reward for nodes that share their computing resources to form a public infrastructure but an internal payment (fee) mechanism for publishing data, performing transactions, deploying and running smart contracts, and decentralized applications.



Invalid transactions are a matter of a proper design of the system

Incorrect (invalid) transactions, inaccurately published data, or transitions that violate laws are not a problem, and it is just a matter of a proper design of the system.
Public blockchains must be used as they are without interfering with their consensus mechanism. Though a few overlaid technologies must accompany the system for government use of blockchains.

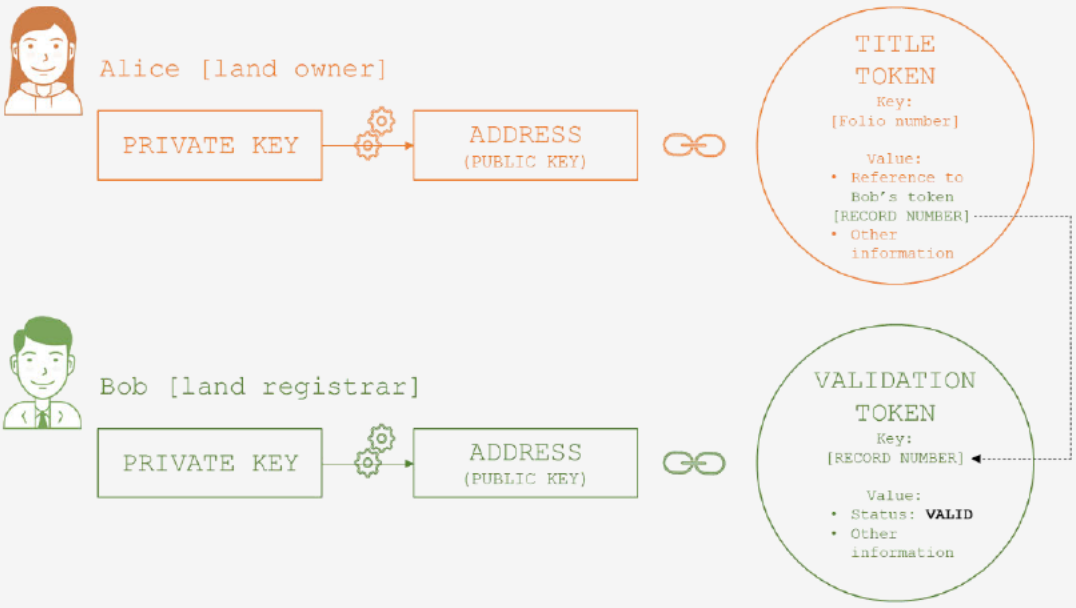
It consists of a cross-blockchain protocol that enables the use of multiple blockchains in one bundle. Users can opt into their preferred blockchain. For example, one user wishes to use Bitcoin (Colored coins on Bitcoin) to ensure the highest protection to the asset. Another user will choose Ethereum as it provides the full potential of smart contracts. It is not a matter of a public servant (government, land authority, registrar, etc.) to decide the technology that must be used.

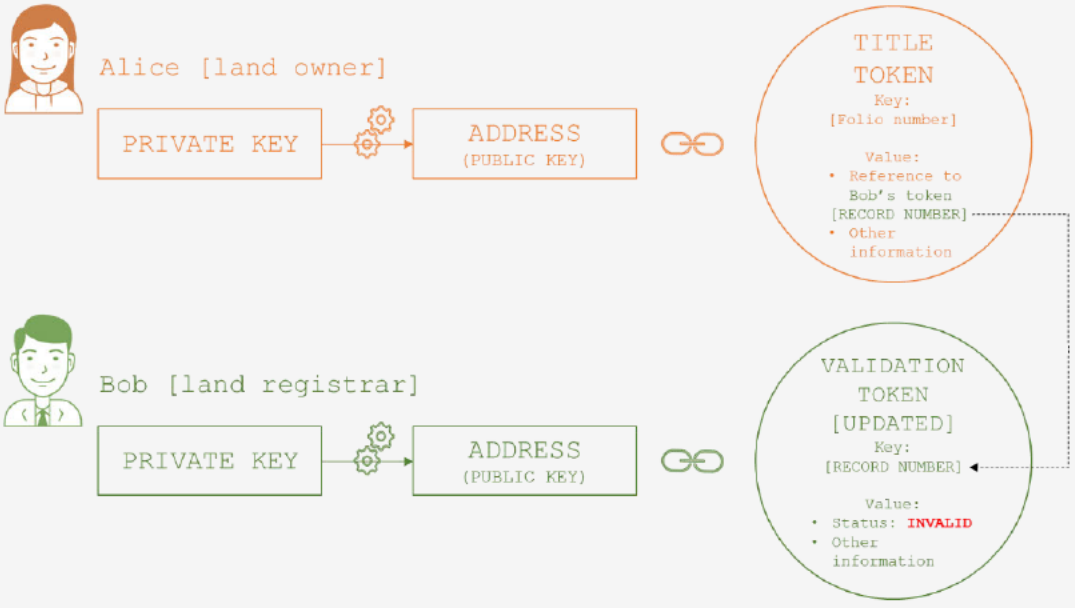


The government's role is to establish a minimum standard requirement of blockchain credibility to be admitted to the bundle of the public [title] registry, i.e., blockchain hash rate, number of nodes, etc.

The core element of the property registry is the title token. It is not an asset-backed or a security token, as these are kinds of legal promises or records of debts but not title rights. The title token is the record that represents a property right. It is a record of ownership with the same value and meaning as a record in the land registry. It is, actually, a part of what is called the land registry, because as per the law, the registry can be kept in different forms and consists a variety of mediums: paper records, microfilms, electronic databases, etc. See, for example, TRANSFER OF LAND ACT 1958 VIC - SECT 27 Register of land.

Their proprietors own title records. Contrary to the existing land registry, where the owner is detached from his or her record and can accomplish a real estate transaction only through the Registrar's mediation. On the blockchain, the user owns the title record and can directly perform a transaction with it through the native blockchain mechanism of public/private keys.





The registrar validates the token. In other words, the registrar notifies the world that this token truly represents the title. But once it is validated, subsequent transactions do not require registration in any other traditional registry because the blockchain is the registry itself. The overlaid technology allows to update of the legal status. The registrar also has the authority to declare it invalid (void, etc.), for example, if the proprietor loses access to his or her record.

Only legally compliant and valid transitions are possible. It is ensured through an overlaid mechanism of smart laws and digital authorities.

Smart laws ensure "filters" through which transactions are passed, and invalid ones are ignored. Digital authorities introduce smart laws, perform transactions that validate title tokens and smart contracts, and address all possible law enforcement problems (change of legal status of records, correct mistakes, etc.). The resulting public database of all valid title records represents the current state of affairs across blockchains. In other words, records are never retrospectively changed (it is impossible in the blockchain), but due to blockchain transactions' chronological order, changes are performed through updates. The latest transaction reflects the current status of the property right and represents other valid legal facts.

Private information is not published in blockchain, and it is always off-chain but linked to transactions through cryptographic algorithms. In recent years IT industry developed new methods to manage digital identity and electronic signatures that should be applied: Decentralized Identifiers (DID, v.1.00) and Self-Sovereign Identity, e.g., Selective Disclosure Protocol.

The system has root records, which can publish on blockchain "patches," i.e., new filters and algorithms. They are also published on blockchains, and they deliver new rules that must be applied to the records in the overlaid system.

Suppose the owner loses access to his or her record or dies, or so and the land authority loses the key as well. In that case, the dead-end situation will be resolved through a transaction of the root address that announces these tokens invalid (so then the user or heirs and the Registrar can reissue new ones). Therefore, records are not altered in blockchain but interpreted on the layer above.

Root addresses can have different roles. A more sophisticated system will represent branches of power (legislative, executive, and judicial) having any depth of hierarchy of addresses with different authorization. Root addresses can be managed through collective decisions (collegial bodies, etc.) through mechanisms of multi-signatures on blockchain and possibly in the future through e-voting.

The difference of such a system is that public bodies can retain the traditional amount of power, but all public and individual acts towards crypto assets are published through the blockchain. On the contrary, in the land registry, which is a closed, centralized database, many changes are available and are known only through the Registrar's mediation. With blockchain, citizens get direct access to manage their records by performing peer-to-peer transactions with other users. Smart contracts and various automation can be applied which opens the door to innovations that are up in the air in the PropTech industry.

II. Trials and Implementation

2.1. Regulatory sandbox

A new proposed system does not solve problems all at once; it does not introduce complete automation in one click but provides a basic public infrastructure to make it happen step by step with the speed which the government and the society can digest.

At the initial stage, the pilot can completely mimic the existing system, standard procedures, and bureaucracy. Still, gradually, various aspects of G2C and G2B interactions can be automated, eliminating registrars and other public servants. The general principle here is that whatever can be formally and algorithmically described can and must be automated. There is no reason to keep an army of clerks if their work can be digitized.

There are a few basic approaches to piloting the project. First we must define stakeholders of the future project. The initial stage can imply no changes with the existing laws, but only the subordinate legislation is changed to adapt to the project requirements. The results of piloting are introduced as a new body of statute law.

There are many known forms of piloting state-level projects with special legislation in the world, e.g., special economic zones, industrial parks, regulatory sandboxes, etc.

A regulatory sandbox may require a new law by a legislator but may not affect the existing legislation and conventional governance forms. But it gives necessary freedom within the project. Therefore, the possible project can start with specific statute law.
Contrary to the existing laws with detailed norms for land registration, the new law delegates more discrete executive power to introduce alternative regulations towards the piloted project (under parliament supervision, for instance).
This approach gives more flexibility and freedom for innovations in the sandbox while not jeopardizing the existing system.

The blockchain's shift would be a voluntary choice for anyone who wants to use new possibilities with smart contracts, new forms of crowdfunding (ICOs, etc.), and other PropTech innovations. Limited in time (and possibly in the territory), new regulations, and subsequent legal relationships than might be reintroduced after evaluation as new parliament acts or changes to existing ones.

2.2. Financing

Core parts of the system, e.g., a cross-blockchain protocol for the public registry, smart laws, digital authorities, selective disclosure protocol for DID/SSI, are those kinds of technologies that can be considered public infrastructure. Like building a bridge, it requires some public funds to become a part of an open economy. Of course, it can be developed through private investments, but in this case, the business will seek their rent for "crossing the bridge."

A big portion of development can and should be done through private investments, e.g., startups in PropTech and LegalTech, assuming that public infrastructure is in place, it is free and open.

Therefore, by combining public and private investments in 5-10 years, it is possible to reshape the market of real estate or other property rights, at least that part of it which is related to public administration and managing property rights and investments.

To add, this whole new technology is exportable to other countries. The typical vicious circle of government inertia can be broken. "A government does not introduce an innovation while other countries did not introduce it," it can become a competitive advantage: LegalTech and PropTech will enable free flow of investments from all over the world into the national economy, while this technology can become the major product of the GovTech export.

III. Misc

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3.1. About the author

I completed my Ph.D. in 2020, in Law, Science and Technology. The title of my Ph.D. thesis is "Tokenization of Real Estate on Blockchain." I was the winner of a prestigious scholarship provided by the EU within the international program of six universities coordinated by the University of Bologna (Italy) - "Erasmus Mundus Joint International Doctoral (Ph.D.) degree in Law, Science and Technology" (www.last-jd.eu). Only six people have won this scholarship annually, though applications were received from all over the world.

Within the research program, I visited and collaborated with five universities: University of Bologna (Italy), University of Turin (Italy), Autonomous University of Barcelona (Spain), University of Tilburg (Netherland), and the last two years I was enrolled at RMIT University.

I have degrees in Laws, recognized by World Education Services as an equivalent of the U.S. LLM, 2005, and in Economics (2010, postgraduate diploma).

While undertaking my research, I published 24 papers. Among them, 14 are academic publications in ranked international journals. I am an author of 11 articles on Cointelegraph, the global leading online magazine in blockchains and fintech. In the last four years, I have spoken at 15 conferences in 9 countries. I have an emerging Youtube channel "Blockchain State."

With my background in software engineering, I developed a cross-blockchain protocol concept to support the creation of public property registries on DLT. I presented technical protocols for smart laws and digital authorities that create grounds for developing a new generation e-government system on the blockchain.

With industry partners, I developed an online blockchain application - Emernotar. I am the co-founder and the managing partner of this project. The web and mobile applications provide notarizing services on blockchain, i.e., sign contracts, certify copyrights, and other legal facts on the distributed ledger. www.Emernotar.io is a global service that supports 11 languages. Before academia, I spent ten years practicing law, holding senior positions in large national companies in Ukraine. Between 2014 and 2016, I worked on Ukraine's public reforms as an e-Democracy group manager (an NGO). I became a co-author of the law on e-Petitions (see the reference letter from the Presidential Administration of Ukraine).

3.2. Bibliography

The list of published papers:

1. **General Concept of Real Estate Tokenization on Blockchain**. O. Konashevych. European Property Law Journal, De Gruyter, 9, 1–45, 2020. DOI 10.1515/eplj-2020-0003

2. **Cross-Blockchain Protocol for Public Registries**. O. Konashevych. International Journal of Web Information Systems, Emerald Pub., Vol. 16 No. 5, pp. 571-610. DOI 10.1108/IJWIS-07-2020-0045

3. **Constraints and Benefits of the Blockchain Use for Real Estate and Property Rights**. O. Konashevych. Journal of Property, Planning and Environmental Law, Emerald Pub., Vol 12, Issue 2. DOI 10.1108/JPPEL-12-2019-0061

4. **Data Insertion in Blockchain For Legal Purposes. How to Sign Contracts Using Blockchain**. O. Konashevych. Electronic modeling – international scientific-theoretical journal, Ukrinformnauka Co. Ltd., Vol 41, Issue 5, 103–120.DOI 10.15407/emodel.41.05.103

5. **Blockchain anchoring of public registries: Options and challenges**, Konashevych, O., Poblet, M. ICEGOV2019: Proceedings of the 12th International Conference on Theory and Practice of Electronic Governance in: ACM International Conference Proceeding Series. Association for Computing Machinery, pp. 317–323. DOI 10.1145/3326365.3326406

The thesis is available in public repositories of the Autonomous University of Barcelona and the University of Bologna. Alternatively, it can be downloaded from my personal repository on oleksii.konashevych.com