

Title: **Blockchain Technology: The safest way for better land governance?**

Everyday technology platforms are adding value for better land governance worldwide. Since Honduras announced its experimentation building a land title registry using bitcoin technology and results of it ¹ to Dubai's announcement of its intention to turn itself into the first blockchain-powered government in the world by 2020², governments are increasingly looking for robust and secure ways to ensure their data is unbreakable, reliable, sharable and available at any time. Georgia ³ and Sweden⁴ are countries investing on this technology as well and the outcome will be seen sooner. More recently, on January this year, *"... an international real-estate marketplace (Propy Inc. @ Palo Alto, California, USA) announced, that they had launched a pilot project to develop a global real estate conveyance management system and global real estate data model as a blockchain. The blockchain-based solution would revolutionize global real estate purchasing and registration processes worldwide, according to the company."*⁵

Most land agencies worldwide are also looking to lower implementation and operational costs while providing the highest level of data integrity, security and transparency, all of which goes directly to work solving the land administration problems.

What is Blockchain?

Blockchain offers innovative infrastructure possibilities to private sector and government entities alike, providing end-users the opportunity to collaborate using a common digital ledger that securely shows transaction history and real-time records status.

System users are subject to strict protocols and automatic reconciliations that ultimately yield a permanent, immutable, shared transaction history. This permanence is further cemented as each end-user maintains an identical copy of the chain of information in their network node. Hacking single nodes will not allow the overall chain to be compromised, and hacking every node would be impossible.

¹ <https://www.coindesk.com/debate-factom-land-title-honduras/>

² <http://www.dubaifuture.gov.ae/our-initiatives/global-blockchain-council/>

³ <http://agenda.ge/news/56891/eng>

⁴ <https://bitcoinmagazine.com/articles/sweden-conducts-trials-of-a-blockchain-smart-contracts-technology-for-land-registry-1466703935/>

⁵ <https://bitcoinist.com/propy-launches-first-pilot-us-blockchain-land-registry/>

Blockchain's Land Management Potential

Many land agencies have begun to look for cost-effective, secure technology for land registries. However, critical concerns about efficiency, transparency and productivity need also be addressed. This search has led many land management thought leaders worldwide to blockchain, driven by several key benefits:

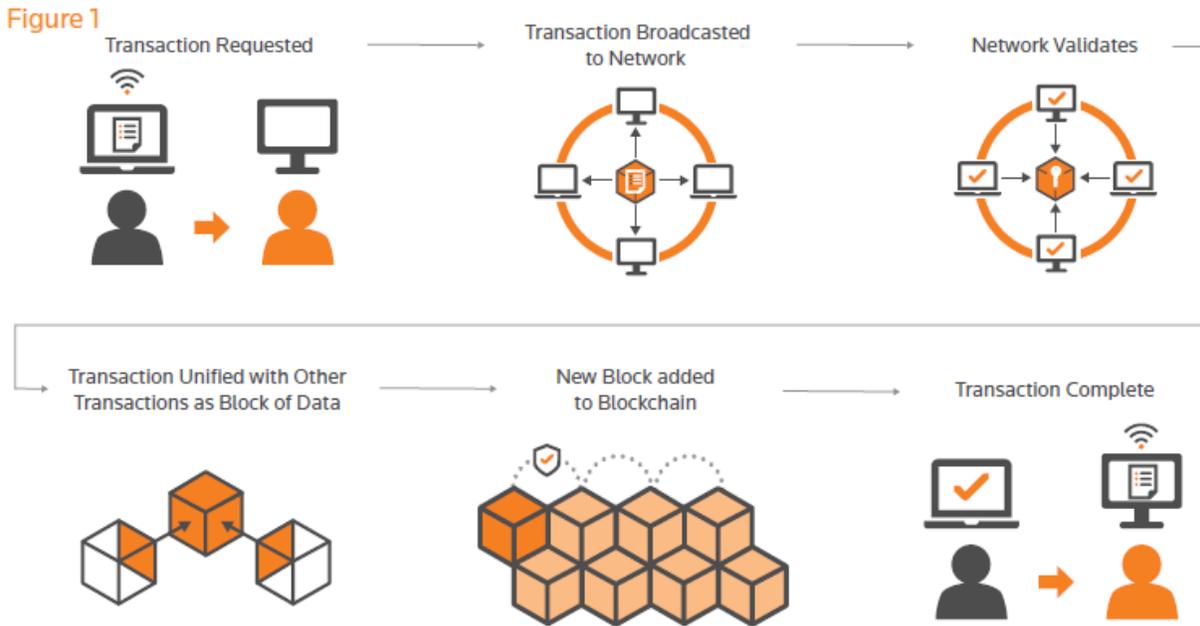
- **Trust:** Blockchain offers once and for all an unhackable public record, allowing all parties to enter into and complete transactions in good faith.
- **Load distribution:** Blockchain distributes storage across all participating entities.
- **Increased accuracy and efficiency:** Smart automation opportunities streamline common transactions and enhance accuracy by eliminating preventable human error and/or manipulations.
- **Continuity:** Land record transactions are already kept in a chain. Key data is kept in a blockchain, allowing data integrity among all tabular data.
- **True paperless potential:** Paperless transactions could finally become a reality across all jurisdictions, lowering costs and furthering security.

Ultimately, each land agency has its own ecosystem and set of problems to address. Blockchain technology offers an intriguing opportunity to solve for today's pain points while answering the call to modernize the land management function.

How Does Blockchain Work?

Blockchain can revolutionize land governance with a new approach to building, securing and sharing transactional records without disrupting existing processes. But how does it actually work?

Blockchain forms a virtual chain of transaction history, with each transaction forming a secure data block called a "hash" that is validated, time-stamped and immutable. The chain builds over time, showing the full history and activity of all verified users. (See Figure 1.)



Hashing itself is not a new concept. It's used in blockchain because it creates a one-way function that cannot be decrypted, and is created from the previous block that has already been "accepted." Hashing creates a unique data fingerprint and securely locks the blocks in order.

Finally, the overall network itself is the third component of blockchain technology. The network is full of distinct nodes, and each node will contain the full record of all transactions on a blockchain. The more nodes there are and the more geographically dispersed they are, the better it is for growing trust in the ledger.

Why Blockchain Can Transform Land Governance

Most land agencies worldwide are looking to lower implementation and operational costs while providing the highest levels of data integrity, security and validation — all of which go directly to work solving land administration's most pressing problems.

If blockchain is to be trusted as a transformative technology for land management, it must authoritatively address these three requirements. Fortunately, it is poised to do so.

- **Data Integrity**

Data integrity is the assurance that digital information is uncorrupted and can only be accessed or modified with authorization. It is a constant concern, involving maintaining the consistency, accuracy and trustworthiness of data over the entire lifecycle.

Blockchain addresses data integrity from the very start. Users jointly establish and control all parameters for transactions upfront and as needed in the blockchain. If transaction protocols and expectations are not met, a new link cannot be added to the

blockchain. Unauthorized transactions or other fraudulent manipulations of the property records can't be performed and added to the immutable shared ledger.

Blockchain's robust data integrity offers many benefits. Notably, there is no more need to constantly recheck and verify the individual work or conflicting records that arise from separate offices all working on property transactions. Instead, all vested parties enjoy real-time information and the peace of mind that the property information shown in the blockchain is actionable, current and uncorrupted.

From a third-party point of view, data exposed by a blockchain solution has the needed integrity ensuring data validity.

- **Security**

Security demands the defense of digital information and other IT assets against internal and external, malicious and accidental threats. And in recent times, it's understandably become the front and center concern for most all government agencies.

Fortunately, blockchain technology offers a powerful option for decision-makers vested in protecting valuable government property data. Since the data is spread across a huge network, hackers would have to corrupt an entire expanded network, an impossible feat. This also means no single party, even when authorized, has the power to tamper with any property records. All end-users have to be cleared to participate, and they establish transaction rules together that are built into the blockchain acceptance protocols.

- **Validation**

Validation is the process of ensuring that operations are based on clean, correct and useful data. Various validation rules and constraints check for the correctness, meaningfulness and security of the data that is input to the system.

Using a blockchain distributed network allows third-party users (e.g., notaries, cadasters, bank clerks, etc.) to make queries of information and entities which have the required permissions, and to also validate and verify the data stored in blockchain itself.

The emergence of blockchain technology has also spurred the creation of multiple blockchain consortia across several industries. The goal of each consortium is to help develop the best practices that will further cement trust in the technology's ecosystem, as well as share the load of research costs and leadership responsibilities. Ultimately, land management thought leaders particularly don't want to be left behind as blockchain is an exciting opportunity to solve painful business problems and expand future profits.

Though it addresses the necessary concerns of data integrity, security and validation, blockchain undoubtedly represents a fundamental shift in the way that technology is deployed to improve land governance. It also represents a change in the way governments must procure and utilize land information system (LIS) technology.

Explore Blockchain Technology for Land Governance: Consider Our Pilot Program

As a trusted partner to governments working to develop innovative land and property tax technology, Thomson Reuters has already committed resources into blockchain technology and its practical applications in both the public and private sector. Blockchain is currently implemented on Aumentum Registry as a security layer, ensuring validation of stored registry data.

We believe blockchain technology will notably impact land governance in the coming years. This is why we have developed a pilot program to allow interested agencies the opportunity to partner with us in discovering how blockchain technology could both impact and improve day-to-day land management operations. We are seeking agencies interested in making their firms future-ready and whose priorities are security, transparency and validation.

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