



RESEARCH  
REPORT

# LAND REGISTRY BLOCKCHAIN

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Dr Vidy Potdar  
Director, Blockchain R&D Lab  
Curtin University  
[www.curtin.edu/blockchain-lab](http://www.curtin.edu/blockchain-lab)





## About Dr Vidy Potdar

Dr Vidy Potdar is an entrepreneur and technologist who holds a PhD in Information Security from Curtin University (Australia) and Masters in Information Technology from University of New Castle (Australia). His expertise lies in blockchains, distributed ledgers, smart grids, data management, cybersecurity, and social analytics, with application in the energy sector, supply chain and logistics, and mining.

He has over 15 years of experience in the Australian university sector involving teaching, contract research, consulting and technology development. Vidy has worked with numerous industries in Perth on diverse projects including Department of Transport (data analytics), Main Roads (traffic congestion management), Fleetwood (energy management), StatoilHydro (Internet of Things).

He regularly appears in media (TV, Radio, Newspapers, Online) sharing his technology insights. Vidy has published over 150 technology research articles in leading international journals and conferences.



# Land Registration Process

## Spatial Data

Spatial technology involves capturing and processing spatial data generated by geographic information systems.

Data such as the exact locations and ownership of blocks of land, agricultural land parcels, forestry data, and road infrastructure is getting complex day by day and susceptible to fraud.

Blockchain technology is envisaged to resolve ownership and fraud issues related to land parcels.

## Land Registration

Land registration generally describes systems by which matters concerning ownership, possession or other rights in land can be recorded (usually with a government agency or department) to provide evidence of title, facilitate transactions and to prevent unlawful disposal. The information recorded and the protection provided will vary by jurisdiction.

Source:  
[https://en.wikipedia.org/wiki/Land\\_registration](https://en.wikipedia.org/wiki/Land_registration)



Lets us explore blockchain for land registries

# Challenges Land Registration Process

1. Ownership Verification - One of the challenges faced by land registration authorities worldwide is to ensure ownership verification.
2. Ownership History - On many occasions, many properties do not have a recorded ownership history. Having access to the complete ownership history for an asset (e.g. block of land) increases trust when transacting with unknown parties.
3. Unauthorized sale of properties - Properties may get sold without authorisation causing financial damage to the owners or insurance companies.
4. Delays in Ownership Transfer - Paper-based land registration and ownership transfer are prolonged taking more than a month.
5. Inaccurate valuation of the properties can lead to incorrect tax or insurance premiums.
6. Failure to detect scams - Current paper-based or digital records fail to prevent frauds and identity theft that can lead to illegal sales.



Lets us explore blockchain for land registries

# What is Blockchain & Smart Contracts

## Blockchain

In 2008, Satoshi Nakamoto introduced the bitcoin blockchain as a peer-to-peer electronic cash system to bypass trusted third parties like the traditional banks.

Several industries (finance, supply chain, transport, hospitals, dairy, mining, food security) now using the underlying blockchain technology to achieve data security and data provenance.

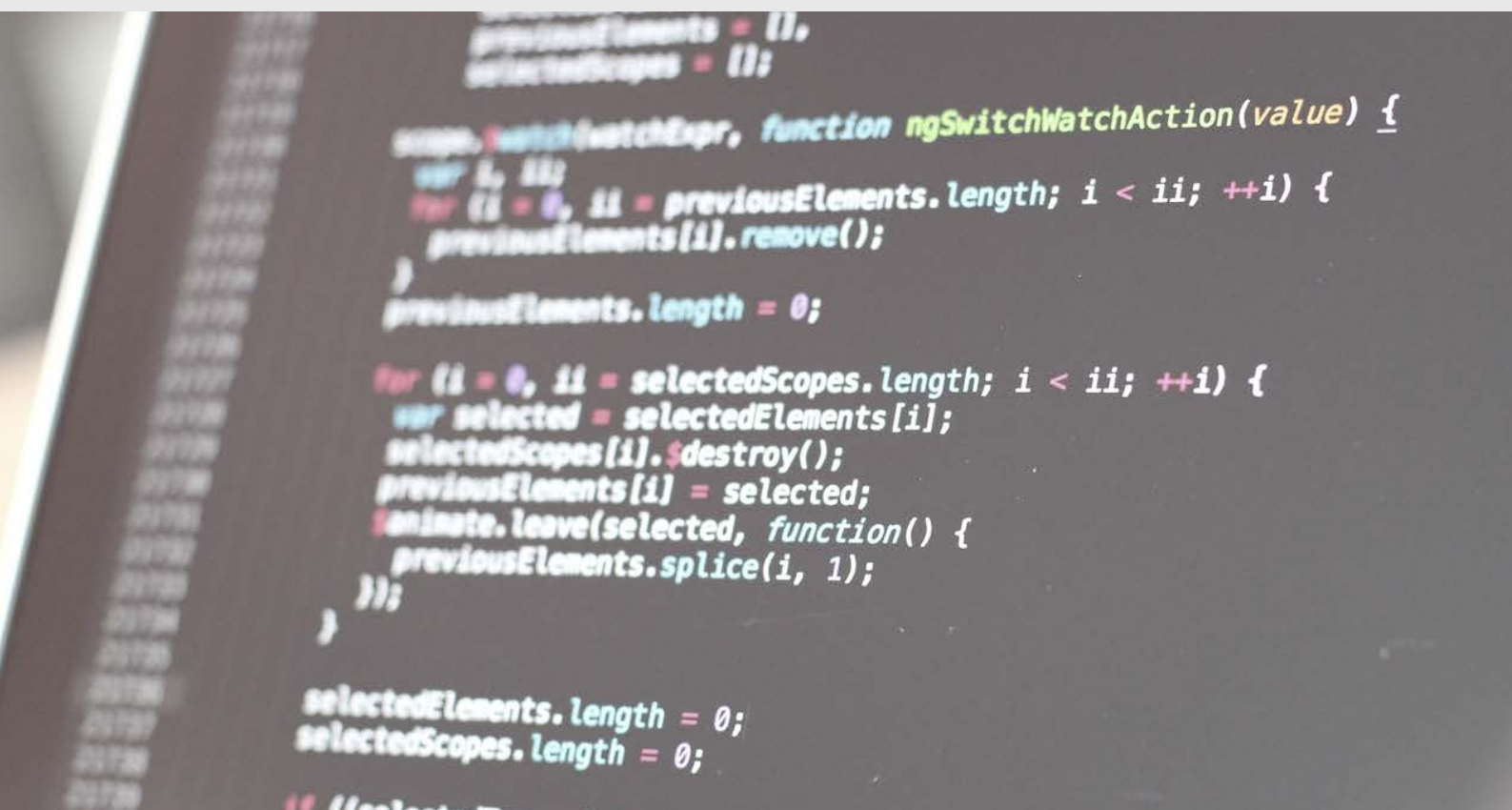
This report examines the potential of blockchain technology for managing land registries and real estate transactions.

## Smart Contracts

Smart contracts introduced by Ethereum are software programs that allow business logic to be programmed using a blockchain.

Smart contracts enable coding of business logic and expand blockchain's functionality from just being a cryptocurrency to enterprise technology.

Several blockchain technologies now offer smart contract functionality including the Hyperledger Framework.



Blockchains are immutable and transparent



# Land Registration Process

## Current Purchase Process

Step 1:

Land owner wants to sell a block of land



## Blockchain-based Purchase Process

New Step 1:

Land owner logs in to the blockchain enabled web platform to verify their identity and ensure there are no obstacles in the sale process

Step 2:

Seller appoints a real estate agent and signs a contract to engage real estate agents services



New Step 2:

Seller directly appoints a real estate agent using the web/app. The agent accepts the offer. A digital contract is created and signed by both parties.

Step 3:

Real estate agent contacts the land authority to confirm sellers credentials to ensure the seller is the rightful owner and is authorized the sell the property.



New Step 3:

Real estate agent can check the property ownership via the web/app, avoiding the need to contact the government authority, thus saving time.

Step 4:

- The land is listed for sale.
- Agent advertises it to buyers.
- Agent manages home opens.
- Buyers secure a preliminary loan approval from their bank.
- Buyers make an offer.
- Seller selects the best offer.

New Step 4:

Offline activity.

Step 5:

Buyers bank receives property evaluation from a register evaluator to assess the property value and then issues the loan.



New Step 5:

The registered evaluator can add the property valuation to the blockchain for the bank to check and approve thus saving time. The agent can be confident that the sale will proceed without any hurdles.

## Blockchain enhances trust in a system

# Land Registry Blockchain

## Current Purchase Process

Step 6:  
Before signing final contract, the agent again checks the buyers details with the government authority and buyers loan approval.

Step 7:  
Contract copies are posted to the buyer, the seller, the agent and the buyers bank.

Step 8:  
The bank posts loan agreement to the buyer.

Step 9:  
Buyer signs the loan agreement and requests the bank to make a down payment to the agents trust account.

Step 10:  
Buyer inspects the property as a condition of sale. The contract now becomes binding. Agent pays the down payment to the seller and deducts their fees.

## Blockchain-based Purchase Process

New Step 6:  
The agent and the bank can directly fetch this information from the blockchain. Property inspection reports can be attached to the web/app.

New Step 7:  
Blockchain based smart contracts execute the sale and generate a digital contract using the sale information (e.g. buyers details, sale price, agent name, date of sale etc.) and permanently store it on the blockchain. All authorized parties have access to the contract.

New Step 8:  
Bank uploads the loan agreement on the web/app and digitally signs it and allows access only to the buyer.

New Step 9:  
The buyer digitally signs the loan documents and the bank can process the agents down payment via the web/app.

New Step 10:  
Buyer updates the inspection details and approves the contract to become binding. Agent pays the deposit to the seller. Agent deducts their fees.

Only 0.5% of world's population uses blockchain

# Land Registry Blockchain

## Current Purchase Process

Step 11:

The buyer instructs the bank to do complete the transfer to the seller.

Buyers bank does a online transfer to the sellers account.

The sellers bank acknowledges the payment.

Step 12:

The buyer, seller and the agent keep a copy of the final executed contract. Buyer now takes possession of the property.

Step 13:

Buyers settlement agent submits the loan documents to the government authority to request issuing the Certificate of Ownership.

Step 14:

Government authority calculates the stamp duty and any other charges/taxes and notifies the bank, the buyer and the settlement agent. Settlement agent makes the payment. Certificate of Ownership is issued.

## Blockchain-based Purchase Process

New Step 11:

Combined with Step 12.

New Step 12:

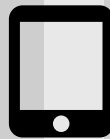
The contract is digitally executed using a smart contract and the blockchain is updated with the bank transfer transactions. The executed contract is available in the web/app for all the authorized parties.

New Step 13:

The Certificate of Ownership request along with the required documents are available in the web/app. The government authority can verify the status and issue the Certificate of Ownership.

New Step 14:

Stamp duty and other charges/taxes are calculated automatically in the web/app. Settlement agent makes the payment online. The Certificate of Ownership is created and registered on the blockchain.



# Blockchain is transforming industries



## Blockchain for Land Registry

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# Preliminary Requirements for Developing Land Registry Systems using Blockchain

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Land Registry blockchain will comprise the following functionalities:

1. Register and authenticate actors to the network - Buyer, Seller, Buyers Bank, Sellers Bank, Real Estate Agent, Government Department, Registered Evaluator/Surveyor.
2. Appoint a real estate agent to manage the sale.
3. Register a property for sale.
4. Validate the sellers ownership of the property.
5. Buyers request loan pre approval from their bank.
6. Contract for executing property sale and transfer of ownership.
7. Record property inspection reports including photos and videos.
8. Process payment to the sellers.
9. Process payment to the real estate agent.
10. Record executed sale contract.
11. Process transfer of ownership.
12. Compute stamp duty and other charges/taxes.
13. Record new ownership details with the government authority.

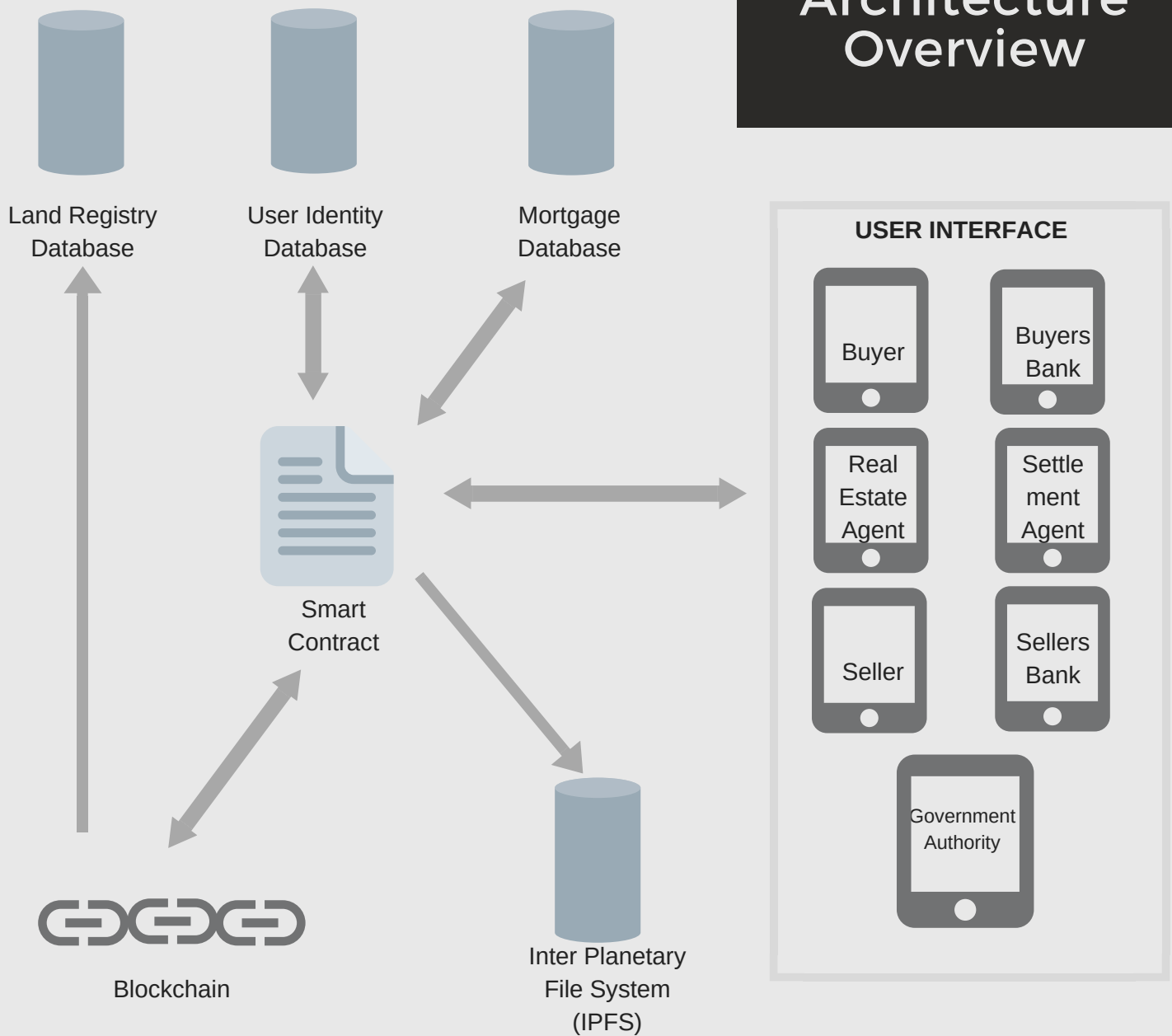


## Possibilities with Blockchain

# Blockchain improves property registration process and eliminates delays

1. Processing time reduced from months to few days.
2. Paperwork and postage eliminated from the purchase process.
3. Fraud prevented because the buyer receives a pending property title, hence the property cannot be resold.
4. Chance of property title not being issued reduces significantly because all documents required by law are added to the blockchain.
5. Reduces manual intervention and realizing real-time property title assignment.
6. Digital signatures ensure high levels of security in the property transaction process.

# Blockchain Architecture Overview





**LAND REGISTRY  
ON  
BLOCKCHAIN**

**THANK YOU!**