BLOCKCHAIN & LAND REGISTRY

Philippe Thevoz
Executive Vice-President
eGovernment Systems
Keeping track of who owns what pieces of land is still a low-tech affair, involving mountains of hand-signed documents, envelopes, and couriers. That is, if a country is lucky enough to have a functioning land registry—the World Bank estimates that 70% of the world’s population lacks access to land titling. Getting everyone to agree on every stage of a property transaction, and to record it permanently somewhere, is a feat of security, coordination, and trust.
LAND REGISTRY & BLOCKCHAIN

Sweden is trialling a blockchain-powered land registry – which could save taxpayers $100 million

http://read.bi/2r5Z0M9

UK Land Registry Plans to Test Blockchain in Digital Push

May 28, 2017 by Sam Hopkins

The UK’s national land registry is looking to test blockchain technology as part of a wide-ranging digitization effort. Last month, HM Land Registry began searching for new board members and, in a notice published to its website, also detailed its plans for a so-called ‘Digital Street’ – an upcoming scheme the office hopes will improve the speed and efficiency by which titles change hands.

http://bit.ly/2pFS1Kc
LAND REGISTRY & BLOCKCHAIN

Ukraine to use blockchain technology in curtailing corruption when selling government assets


Bitland: Blockchain Land Registry Against ‘Corrupt Government’
By Jamie Redman - May 26, 2016

LAND REGISTRY & BLOCKCHAIN

The First Government To Secure Land Titles On The Bitcoin Blockchain Expands Project

In a vote of confidence for a fledgling technology, the Republic of Georgia committed in a signing ceremony in Tbilisi on Tuesday to use the bitcoin network to validate property-related government transactions.

eGOVERNMENT

Dubai Wants All Government Documents on Blockchain By 2020

Michael del Castillo (@DBeRayMon) | Published on October 5, 2016 at 16:40 BST

The Crown Prince of Dubai announced a strategic plan today that would see all government documents secured on a blockchain by 2020.

Revealed at an event hosted by the Dubai Future Foundation and the Smart Dubai Office, the final goal of the government-led initiative is to open the blockchain platform to other cities around the world.

In remarks, Sheikh Hamdan bin Mohammed bin Rashid Al Maktoum explained the effort is part of a larger bid by the emirate, one of seven in the larger UAE, to set the "standard" for smart cities.

He said:

“The emirate is building on that achievement by constantly working to foresee the future and keep up with the fourth industrial revolution and all the prospects of increased efficiency that come along with it.”
Nine in Ten Governments Investing in Blockchain by 2018 Says IBM Study

Executive summary

According to our recent blockchain research, government organizations across the globe are exploring use cases for blockchains that can impact their jurisdictions. With the support of the Economist Intelligence Unit, the IBM Institute for Business Value surveyed 200 government leaders in 16 countries on their experiences and expectations with blockchains.

Our research revealed that government organizations are looking at how blockchain technology can positively impact operations in a number of areas. For example, nine in ten government organizations plan to invest in blockchain for use in financial transaction management, asset management, contract management and regulatory compliance by 2018. And seven in ten government executives predict blockchain will significantly disrupt the area of contract management, which is often the intersection of the public and private sectors.
THE BLOCKCHAIN IN A FEW WORDS

The **blockchain** is:

- a **ledger**
  - that is
    - **distributed**,  
    - **cryptographically secure**
  
and

- **immutable**
2. Transactions

We define a blockchain as a chain of digital signatures. Each user transfers their stake to the next user in the chain, in the form of a transaction. A transaction is a list of inputs and outputs, where the inputs are signed by the user who is transferring the stake, and the outputs are signed by the user who is receiving the stake. Transactions are verified by a network of nodes, known as miners, who compete to solve complex mathematical problems to create new blocks. Each new block contains a number of transactions, and the first to solve the problem is rewarded with a certain amount of cryptocurrency.

4. Proof-of-Work

To implement a blockchain consensus protocol, we will need to use a proof-of-work (PoW) mechanism. A PoW is a computationally intensive process that requires a significant amount of computational power. The miner who solves thePoW first is rewarded with the next block and its associated rewards. The difficulty of the PoW increases or decreases based on the network's hash rate, which ensures that the block creation rate is consistent.

8. Simplified Payment Verification

It is possible to verify payments without knowing the full network state. A copy of the block header is broadcast to all nodes, which then verify the transactions in the block using a proof-of-work system. If the proof-of-work is valid, the transaction is considered confirmed. If the proof-of-work is invalid, the transaction is discarded. It is important to note that there is a risk of double-spending if a transaction is verified prematurely.

https://bitcoin.org/bitcoin.pdf
DIGITAL FINGERPRINT – SHA256 ALGORITHM

SHA-256

94dfbabefc05247d1f5e3d2f2362be2f08d08334295ee9f1b5577339fb9822e9

1ec3cc7497ee0fed85a095775a7e6bf2ada83da6e5c0d127eb9abd9aaeaf00b4
BLOCKCHAIN STRUCTURE
THE CHAIN PRINCIPLE
TRANSACTION IN THE BLOCKCHAIN

Block 10
- Prev_Hash
- Timestamp
- Tx_Root
- Nonce

Block 11
- Prev_Hash
- Timestamp

Tx_Root

Block 12
- Prev_Hash
- Timestamp
- Tx_Root
- Nonce

Hash01
- Hash0
- Hash1

Hash23
- Hash2
- Hash3

Tx0
- Tx2
- Tx3

Tx1

Hash01 and Hash23 are involved in the transaction process, indicating the flow of data within the blockchain.
TRANSACTIONS - MERKEL TREE

Tx0 → Hash0 : a7af08b04d86df90104c1cb52988e105f8b0c5e41afcb49dbb624928c23ceed7
Tx1 → Hash1 : 55f743d0d1b9bd86b6bd96a46ba4272dde19f09e3f6e47832e34bb2779a120b5
Tx2 → Hash2 : 80ed43f7a1b3295850dd90cc0cfc9a80334f433af8d3d88a1c5e78aff14988f
Tx3 → Hash3 : 13288c2ba4bb9af05aa9cc69b0cc603dc9e30471d97565c9ef3c3604b7ca23

Hash01 : b88ef7a07b91cc49d6b81a1b17e4f08b31185bed41d71fe6036d2be55945984
Hash23 : 46a920ea0df1972748e87d3cf74759a9f94d4f65a6260531a3b85064c86b814d

Tx_Root : 561e964c28335b1c99255d0f80ccc9025789c087e5d388247fef9275f1cbeb1
**TRANSACTIONS - MERKEL TREE**

<table>
<thead>
<tr>
<th>Transaction</th>
<th>Hash</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tx0</strong></td>
<td>Hash0 : a7af08b04d86df90104c1cb52988e105f8b0c5e41afcb49dbb624928c23ceed7</td>
</tr>
<tr>
<td><strong>Tx1</strong></td>
<td>Hash1 : 55f743d0d1b9bd86bbd96a46ba4272dde19f09e3f6e47832e34bb2779a120b5</td>
</tr>
<tr>
<td><strong>Tr2</strong></td>
<td>Hash2 : 31b6be0266a8be6c1570e7ae79e13b1f2339c12723be2d9bfba1cb9bf6e753be</td>
</tr>
<tr>
<td><strong>Tx3</strong></td>
<td>Hash3 : 13288c2ba4bbc9af05aa9ccd39b0cc603dc9e30471d97565c9ef3c3604b7ca23</td>
</tr>
</tbody>
</table>

Hash01       : b88ef7a07b91cc4d9d6b81a1b17e4f08b31185bed41d71fe6036d2be55945984
Hash23       : 8e48fa97e0d8a00e78363e9080befa5dda1e3f1b6aa192bfc8b5aee76aa6ec11

**Tx_Root**   : d92eed688f508d916946afcb49c9afa0d7e05e6098e51a80385d0ef411a9e4f6
BLOCK VALIDATION – PROOF OF WORK (POW)

Hash of the block header

561e964c28335b1c99255d0f80cccc9025789c087e5d388247fef9275f1cbeb1
BLOCK VALIDATION – PROOF OF WORK (POW)

Nonce

561e964c28335b1c99255d0f80cccc9025789c087e5d388247fef9275f1cbeb1

17 zero’s

Hash of the block header
BLOCK VALIDATION – PROOF OF WORK (POW)

17 zero's

Hash of the block header

Nonce = 1

Nonce = 1
BLOCK VALIDATION – PROOF OF WORK (POW)

Hash of the block header:

a7af08b04d86df90104c1cb52988e105f8b0c5e41afcb49dbb624928c23ceed7

Nonce = 2
BLOCK VALIDATION – PROOF OF WORK (POW)

Hash of the block header

Nonce = 3

17 zero’s

55f743d0d1b9bd86bbd96a46ba4272ddde19f09e3f6e47832e34bb2779a120b5
BLOCK VALIDATION – PROOF OF WORK (POW)

Nonce = 2'289'308’096
CONSENSUS & BLOCK VALIDATION
TRANSACTIONS
TRANSACTIONS

- Record of the transfer of Assets

- Record of a character string
TEXT IN BLOCK 0 OF THE BITCOIN BLOCKCHAIN

Block #0

Summary
- Number Of Transactions: 1
- Output Total: 50 BTC
- Estimated Transaction Volume: 0 BTC

Transaction Fees: 0 BTC

Height: 0 (Main Chain)

Timestamp: 2009-01-03 18:15:05

Difficulty: 1

Bits: 486604799

Size: 0.285 KB

Version: 1

Nonce: 2083236893

Block Reward: 50 BTC

Transactions

4e01e5e45aebab9b5e32518a6a8c31cc876187b87b7a2c7a127b7d8eda33b

No Inputs (Newly Generated Coins)

Transaction View information about a bitcoin transaction

CoinBase

4f4f016010d2b45e7685204989e3857520332324e461e233e330930203436896d8d64072208fa2083726edc5

Welcome to your preview of The Times

Chancellor Alistair Darling on brink of second bailout for banks

Billions may be needed as lending squeeze tightens

Alistair Darling has been forced to consider a second bailout for banks as the lending drought worsens.

The chancellor will decide within weeks whether to pump billions more into the economy as evidence mounts that the £37 billion asset-nationalisation last year has failed to keep credit flowing.
TRANSACTIONS

- Record of the transfer of Assets

- Record of a character string
  (e.g. “Hash” in the Bitcoin Blockchain)
UNIVERSITY DEGREE CERTIFICATION

Hash of the Certificate
94dfbabefc05247d1f5e3d2f2362be2f0…….

Hash of the Index
1ec3cc7497ee0fed85a095775a7e6bf2…….

Hash of the Certificate
94dfbabefc05247d1f5e3d2f2362be2f0…….

Output Scripts

Hash of the Certificate
94dfbabefc05247d1f5e3d2f2362be2f0…….

Hash of the Index
1ec3cc7497ee0fed85a095775a7e6bf2…….

TRANSACTIONS

- Record of the transfer of Assets
- Record of a character string (e.g. “Hash” in the Bitcoin Blockchain)
- Smart Contract (Ethereum)
EVERLEDGER – DIAMOND CERTIFICATION & TRACKING ON THE BLOCKCHAIN

PROTECTION.

We are a fraud detection system, overlaying big data from closed sources like insurers and law enforcement.

PERMANENT.
IMMUTABLE.

Everledger is a permanent ledger for diamond certification & related transaction history. Verification for insurance companies, owners, claimants & law enforcement.
WHICH BLOCKCHAIN FOR GOVERNMENT SERVICES?
HOW TO SECURE MILLION OF DIGITAL DOCUMENTS?

Tax Authority  
Land registry  
People registry  
...
PUBLIC VS PRIVATE BLOCKCHAINS