What Blockchain Technology Might Mean For Risk Management In Financial Services

Prof. Michael Mainelli, FCCA FCSI FBCS, Executive Chairman, Z/Yen Group
PRMIA

“When would we know our financial system is working?”

What Blockchain Technology Might Mean For Risk Management In Financial Services

Professor Michael Mainelli
Executive Chairman, Z/Yen Group
Webinar, 15 April 2015
Special – City of London’s leading commercial think-tank
Services – projects, strategy, expertise on demand, coaching, research, analytics, modern systems
Sectors – technology, finance, voluntary, professional services, outsourcing

- Independent Publisher Book Awards Finance, Investment & Economics Gold Prize 2012 for *The Price of Fish*
- British Computer Society IT Director of the Year 2004 for PropheZy and VizZy
- DTI Smart Award 2003 for PropheZy
- *Sunday Times* Book of the Week, *Clean Business Cuisine*
- £1.9M Foresight Challenge Award for Financial Laboratory visualising financial risk 1997
Z/Yen in Finance Research

- Blockchains (current)
- Long Finance predicting bubbles (current)
- LIBOR and FX litigation (current)
- Market Intelligence – Ministry of Defence, e.g. Vision 2020 (1994-present)
- Avatars for Big Data (2010-2012)
- PropheZy and VizZy – Automation of Compliance monitoring (2003-2008)
‘When would we know our financial system is working?’

Objectives:
- Expand Frontiers
- Change Systems
- Deliver Services
- Build Communities
Lunacy, Heresy, Or Orthodoxy?

<table>
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<tr>
<th>Measurement</th>
<th>Financial System</th>
<th>Monetary Systems</th>
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</thead>
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<td>Confidence Accounting**</td>
<td>Insured Utility Banking*</td>
<td>Common Tenders*</td>
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<tr>
<td>Long-Term Performance Measurement</td>
<td>Futures of Finance</td>
<td>Eternal Coin*</td>
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<tr>
<td>Uses and Abuses of Discount Rates*</td>
<td>Clustering*</td>
<td>Cryptocurrencies (aka Alt Coins) and Blockchains*</td>
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<td></td>
<td>Asset Management*</td>
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<td>Global Financial Centres**</td>
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<td>Emerging Markets*</td>
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<td>Sell-Side Research</td>
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<table>
<thead>
<tr>
<th>Regulation</th>
<th>Governance</th>
<th>Structure</th>
<th>Behaviour</th>
</tr>
</thead>
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<tr>
<td>Mortgages*</td>
<td>Ethics</td>
<td>Pensions Indemnity Assurance and Internal Growth Rate Measures for Pensions**</td>
<td>Concepts of “Fairness”</td>
</tr>
<tr>
<td>Voluntary Standards Markets*</td>
<td>Ethical Banking*</td>
<td>Cyber Reinsurance*</td>
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<tr>
<td>Compliance Architectures</td>
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| Sustainability                   |                                    |                                        |           |
| London Accord 2007** (24 Integrated reports) & London Accord* | Burn it all?!                        | Policy Performance Bonds (Index-Linked Carbon Bonds & Index-Linked Forestry Bonds)* |

(* indicates research at an active stage  (**) indicates research at an advanced stage

“Get a detailed grip on the big picture.”

Chao Kli Ning
Money is the self-referential system upon which all our financial analysis is based:

- community values
- economic activity over space
- debts over time

Quick Poll Question

1. There is only one Blockchain, the Bitcoin Blockchain
   a. True
   b. False
“Money is a technology communities use to trade debts across space and time.”

“Tokens of indebtedness are social desires frozen at a point in time – tokens depend on the future persistence of the community and its values.”
Look Under The Bitcoins

Diagram of a Bitcoin
Chain Of A Lifetime:
How Blockchain Technology Might Transform Personal Insurance

December 2014
A Long Finance report prepared by Z/Yen Group

http://www.longfinance.net/publications.html?id=903/
What Might Blockchain Technology Mean For Traditional Financial Services?

♦ Registries – ships, aircraft, artworks, tax, …
♦ Trade reporting, consolidated tapes
♦ Personal insurance blockchains and smart insurance contracts
♦ Identity blockchains for anti-fraud protection or anti-money laundering
♦ Multi-entity contracting and virtual contract companies
♦ Corporate voting
♦ Accounting registries
The Blockchain ‘Ecosystem’

Ways to Use AltCoins
- Sell for fiat money
- Use in a transaction to pay another user
- Save as an investment

Ways to Get AltCoins
- Buy using fiat money
- Mine them by verifying transactions
- Accept a payment transaction from another user

The currency supply varies by system: e.g. for Bitcoin, it’s capped.
Blockchain is a transaction database based on a distributed cryptographic ledger shared amongst all nodes participating in a system. It is:

- Aka ‘chain of blocks of transactions’
- A publicly accessible ledger of all transactions that have ever occurred in a protocol
- Fully decentralized and accessible to every node of the system (protocol)

- The Bitcoin experiment began in January 2009
- Hundreds of AltCoin experiments
- ‘Permissioned distributed ledgers’
2. What is a blockchain?

a. cryptocurrency infrastructure
b. distributed ledger
c. exciting Web X.00
d. boring archiving tool
Distributed Applications

- Smart contracts (aka scripts) enforced when certain pre-defined conditions are met, e.g.:
  - Oracles, e.g. crop insurance smart contract coupled with ‘trusted’ weather data feed
  - Arbitrators, e.g. appointed ‘experts’ e.g. software development smart contract appointing software experts to test the product

- Decentralised autonomous organisations (DAO) – sophisticated, conceptual, types of ‘smart contracts’ creating autonomous entities involving both a governance system and a way for the DAO to fund and manage resources, e.g. through the sale of a service or endowment

Long Finance koan – “If you have trust I shall give you trust; if you have no trust I shall take it away.”
“Bitcoin gives us, for the first time, a way for one Internet user to transfer a unique piece of digital property to another internet user, such that the transfer is guaranteed to be safe and secure, everyone knows that the transfer has taken place, and nobody can challenge the legitimacy of the transfer. The consequences of this breakthrough are hard to overstate.”

Marc Andreessen (co-author of Mosaic, co-founder of Netscape, and Bitcoin investor), 2014
Identity

What if …
you had a portable, secure, globally available store of personal data in a blockchain? You could have all of your health records or driving history available instantly to hand on to trusted third parties. You might hand over your health record to a new doctor or to obtain a life insurance quote, or your driving history at an airport counter for a car rental insurance discount. Your personal data store might also have your biometric data, thus giving you the ability to prove at any time it is you before someone, and that data contained in the blockchain is yours.
What if …
the importance of regulatory boundaries diminished? With blockchain applications, insurance products could reach scale at both local and global levels. Further, insurance coverage could be adjusted across space almost instantaneously while catering to ‘local’ needs.

What if …
there were no more disputes about the ‘last’ will and testament? When someone dies and the coroner verifies death and cause of death to their blockchain, then their last will and testament is released publicly, their health records are donated to medical research charities, their life insurance policy pays out automatically.
What if … any group of people could elect to create their own pooling system on the spot? These could be instant mini-insurers or mini-mutuals, a shared economy approach to insurance. An extensive Indian family might provide mutual health insurance to each other, backing it up with a combination of reciprocal arrangements with uncorrelated UK village health schemes and a standard international reinsurance product that a global reinsurer had developed for such family schemes. What if insurers never needed to fund risks? For example, people could have adjustable payments pooled to reflect rising and falling risk levels. Unemployment insurance could be merged with educational loans and deals struck over a lifetime so that young people could be funded in education, insured against unemployment, yet simultaneously be extending part of their employment income to provide others with risk cover.
Quick Poll Question

3. Are ‘trusted third parties’ important to risk management?
   a. Yes
   b. No
What’s Interesting About Blockchain?

- Displaces two roles of trusted third parties:
  - Can’t do the same transaction twice* - no double spending or transaction repudiation
  - Public history of transactions* - one unified unalterable state of the ledger at all times shared by all nodes
  - Trustful – initial entry requires high degrees of trust but then system operates on a trustless basis

- Decentralised - robust, no central control or authority required to coordinate behaviour or interaction
## Distributed Ledgers & Blockchains

“Napster for Accountants”

<table>
<thead>
<tr>
<th>Category</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial instruments, records, models</td>
<td>Currency, private and public equities, bonds, derivatives, voting rights associated with financial instruments, commodities, derivatives, transaction records (e.g. trading), credit data, collateral management, client monies segregation, mortgage or loan records, crowd-funding, P2P lending, microfinance, (micro)charity donations, etc.</td>
</tr>
<tr>
<td>Public records</td>
<td>Land and property titles, vehicle registries, business license, business ownership/ incorporation/ dissolution records, regulatory records, criminal records, passport and ID, birth or death certificates, voting ID, registration and rights, health and safety inspections, tax returns, building and other types of permits, court records, government/ listed companies / civil society - accounts and annual reports, etc.</td>
</tr>
<tr>
<td>Private records</td>
<td>Contracts, ID, signature, will, trust, escrow, any other type of classifiable personal data (e.g. physical details, date of birth, taste) etc.</td>
</tr>
<tr>
<td>Semi-private/semi-public records</td>
<td>High school/university degrees and professional qualifications, grades, certifications, human resources records, medical records, accounting records, business transaction records, locational data, delivery records, genome and DNA, arbitration, genealogy trees, etc.</td>
</tr>
<tr>
<td>Physical asset keys (e.g. in relation with Internet of Things)</td>
<td>Key to home, office, car, locker, safety deposit box, mail box, hotel rooms, etc.</td>
</tr>
<tr>
<td>Intellectual property</td>
<td>Copyrights, licenses, patents, proof of authenticity or authorship, etc.</td>
</tr>
<tr>
<td>Other records</td>
<td>Cultural, historical events, documentary (e.g. video, photos, audio), (big)data (weather, temperatures, traffic), sim cards, etc.</td>
</tr>
</tbody>
</table>
Experimentation Continues

Crypto-Tech Platforms, Programs and Protocols

Non-Bitcoin Blockchain

- Bitcoin Currency
  - Blockstream
  - Truthcoin

- Non-Bitcoin Currency
  - Ripple: XRP
  - Stellar: STR
  - NXT: NXT
  - Hyperledger
  - Tendermint
  - Pebble
  - Open Transactions

Bitcoin Blockchain

- Bitcoin Currency
  - Bitcoin: BTC

- Non-Bitcoin Currency
  - Factom: Factoids
  - Mastercoin: MSC
  - Counterparty: XCP
  - Namecoin: NMC

Blockchain Neutral

Smart Services

- Eris Industries
- PeerNova
- Codius
- SmartContract
- SAE
- Tezos
- Tillit

## Distributed Ledgers

<table>
<thead>
<tr>
<th>Ownership of on-platform assets</th>
<th>Ownership of off-platform assets</th>
<th>Obligations and rights arising from an agreement</th>
<th>Who do I trust to maintain a truthful record?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Bank, Commercial Bank</td>
<td>Custodian Bank</td>
<td>Clearing House</td>
<td>A central authority</td>
</tr>
<tr>
<td>A group of known actors</td>
<td>Hyperledger</td>
<td>Eris</td>
<td>A group of actors, some known</td>
</tr>
<tr>
<td>Ripple (XRP)</td>
<td>Ripple (Gateways)</td>
<td>Ripple (Codius)</td>
<td>Nobody</td>
</tr>
<tr>
<td>Bitcoin</td>
<td>Colored Coins, Counterparty</td>
<td>Ethereum</td>
<td></td>
</tr>
</tbody>
</table>

*Source: Richard Brown*
## BlockChainZ

### Links (10) + Add New Link

<table>
<thead>
<tr>
<th>Date</th>
<th>Account Code</th>
<th>Link Code</th>
<th>Geolocation</th>
<th>File</th>
<th>Message</th>
<th>FileHash</th>
<th>ChainHash</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015-01-01</td>
<td>8Bc9Bb8c-dc89-11e4-aa45-00163e05280f</td>
<td>308a8532-18-11e4-8e-0163e05280f</td>
<td>23345678</td>
<td>Link_FINAL</td>
<td>Taken from old捆绑开关...</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Membership – what is the community?
Validation – consensus, ‘proof of work’, etc.
Persistence – risk of loss
Pervasiveness – risk of performance
Integrity – risk of tampering and level of functionality
IT - speed, volumes, cost (transaction energy, bandwidth, storage), …
## The Long-Term?

<table>
<thead>
<tr>
<th>Theme</th>
<th>Service</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trust</td>
<td>Identities</td>
<td>authentication</td>
</tr>
<tr>
<td>Space</td>
<td>Transactions</td>
<td>services</td>
</tr>
<tr>
<td>Time</td>
<td>Debts</td>
<td>value-added</td>
</tr>
<tr>
<td>Mutuality</td>
<td>Communities</td>
<td>common-wealth</td>
</tr>
</tbody>
</table>

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**Chain Of A Lifetime:** How Blockchain Technology Might Transform Personal Insurance

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**Receipt:**

The Pembury Tavern
90 Amhurst Road
London E3 1NH
Tel. 020 8966 8597

- Hilton Pegasus (4.1% ABV) pint £3.00
- Subtotal £3.00
- Bitcoin 0.0474 £3.00

Individual Pubs Limited
Pegasus House
Pembroke Avenue
Waterbeach
Cambridge
CB25 9PT

VAT reg no. 763 9983 50
As £2.50 net, £0.50 VAT @ 20.0%
Total £3.00

Receipt number 721636
2013-06-25

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**Breaking bit:**

Bitcoin is the poster child of the cryptocurrency world, but it's not alone. Michael Manelli and Bill McCaw take a look at the real-world implications of the rise of Altcoins.
Discussion – Risk Managers?

- Using blockchain technology for regulation – persistent trade reporting, ‘too big to fail’
- Displacing traditional financial services technologies, e.g. registries, ‘tickers’
- Encouraging new business services, e.g. identity, multi-party credit monitoring
- Internal applications – collateral management, credit management, segregated accounts
When Would We Know Our Commerce Is Working?

“Get a big picture grip on the details.”

Chao Kli Ning

Thank you!
Questions for the Presenter?

Send them via the Question Pane in the webinar utility panel on the right hand side of your screen
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