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### Blockchain and smart contracts

Simon J.D. SCHILLEBEECKX

*Singapore Management University, [simon@smu.edu.sg](mailto:simon@smu.edu.sg)*

Miguel SORIANO

Ernie G. S. TEO

*Singapore Management University, [ernieteo@smu.edu.sg](mailto:ernieteo@smu.edu.sg)*

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# BLOCKCHAIN AND SMART CONTRACTS

## INDUSTRY ROUNDTABLE DISCUSSION PAPER

This discussion paper covers and develops the ideas discussed during the Roundtable Discussion on Blockchain and Smart Contracts, jointly organised by the Singapore CFO institute and the Sim Kee Boon Institute for Financial Economics (SKBI) at Singapore Management University (SMU) on the 29th of June, 2016. The discussion was moderated by: Professor David Lee Kuo Chen (SKBI & SMU) and Mr Loh Uantchern (Chief Executive Singapore Accountancy Commission).

Note: See Appendix for the full participant list. For legibility, quotes from participants are paraphrased.

**Prepared by: Simon J.D. Schillebeeckx,  
Miguel Soriano, and Ernie G.S. Teo,  
Singapore Management University**

# 1. DEMYSTIFYING BLOCKCHAIN AND SMART CONTRACTS



Bitcoin was introduced in 2008 as the first working instance of Blockchain technology. Bitcoin started as an experiment for a niche group of developers which quickly attracted much attention in late 2013, when its price spiked at close to \$1,200 USD per Bitcoin. This led to financial institutions looking at the protocol, and the underlying technology of Blockchain was highlighted as a technology that could eliminate the need for trust and increased efficiency. Many large corporations like IBM and Microsoft have established labs which are looking at innovative applications of Blockchain technology.

Blockchain has moved into the mainstream, with a wide variety of organisations that are keen to explore how it can be implemented for their businesses. The roundtable attempts to bring together Blockchain and industry experts in Singapore to discuss developments in the area and their thoughts. The proceedings are summarised in this discussion paper, which presents the different points of view from local industry leaders.

Smart contracts is another topic linked to Blockchain that received much industry attention. This was also discussed at the roundtable. The concept of smart contracts was first discussed in Nick Szabo's (1997) paper<sup>1</sup>. In that paper, he proposed smart contracts as a means to embed contractual clauses into digital assets. Smart contracts are computer agents (or protocols) that facilitate or enforce contractual clauses based on events such as time or user actions. As smart contracts required transparency and trust between the contractual parties for digital assets, the emergence of Bitcoin reignited the discussion of smart contracts as an application for Blockchain. This results in more efforts to put the idea to practice, a prominent example of such implementations is the Blockchain-based Ethereum platform which features smart contract functionality<sup>2</sup>.

<sup>1</sup> [http://szabo.best.vwh.net/smart\\_contracts\\_idea.html](http://szabo.best.vwh.net/smart_contracts_idea.html)

<sup>2</sup> A more detailed introduction can be found here: <http://bitsonblocks.net/2016/02/01/a-gentle-introduction-to-smart-contracts/>



The roundtable started the discussion by defining what is understood by Blockchain. Blockchain can be defined as an irrefutable distributed ledger of transactions that uses cryptographic proofs to verify and secure transactions. A Blockchain is irrefutable, as ledger entries are cryptographically linked with the immediate previous entry, and any attempt to change historical entries will lead to a disruption of the cryptographic integrity of Blockchain. A Blockchain is distributed since transactions are verified by a network of validators who will technically take turns in verification. The network arrives at a consensus on the validity of transactions using this method. The data is not stored centrally but in fact held by members of the network. As a result, there is no single point of failure, the ledger is not controlled by a central authority and cannot be manipulated. Due to the use of cryptographic technology, information that is kept on Blockchain remains pseudo-anonymous. The features of Blockchain can potentially bring many benefits to society. As described by Mr Foong Sew Bun of IBM Cloud, “Blockchain is about consensus and permission. It is immutable”.



***“Blockchain is about  
consensus and permission.  
It is immutable.”***

- Mr Foong Sew Bun  
IBM Distinguished Engineer,  
Senior Cloud Advisor  
IBM Cloud

Mr David Moskowitz, CEO and co-founder of Attores Pte Ltd, highlights 3 benefits of Blockchain technology at the roundtable discussion:

1. It is a decentralised ledger that allows for the transfer of value from one person to another without any counterparty.
2. It allows data to be attached to the transaction, so that it becomes a storage mechanism .
3. This data can be coded such that we get a global computer.

Being a revolutionary idea that breaks away from the standard systems most are used to, the concept of Blockchain can be hard to comprehend at the onset<sup>3</sup>. American security researcher Dan Kaminsky once said this about Bitcoin: “The first five times you think you understand it, you don’t.” In the course of the roundtable, three useful metaphors came up that shed light on the security, novelty, and the vision behind Blockchain technology. These are summarised in the next section.

<sup>3</sup> See here for a longer introduction:  
<http://blogs.wsj.com/cio/2016/02/02/cio-ex-plainer-what-is-Blockchain/>

## THREE USEFUL METAPHORS

While a basic understanding of the technology underlying Blockchain is undoubtedly useful for every novice interested in learning more, instilling readers with a deep grasp of Blockchain's technological complexity is beyond the aim of this discussion paper. More importantly, it is perhaps not particularly useful either.

Blockchain is a new technology that over time could become an Internet-like infrastructure that remains largely hidden from most of the users, much like the TCP/IP protocol of the World Wide Web provides the foundation for much of the functionality most Internet users use on a daily basis. We do not need to understand how TCP/IP works to be able to use the web. Is something similar possible for Blockchain? Some of the roundtable participants believe this is indeed the case, and they provided some informative metaphors to better understand what Blockchain as a technology means, rather than what it is.

Blockchain developer Mr Mano Thanabalan drew an analogy that should ring true to accountants and CFOs. It is specifically relevant to the security of Blockchain as an immutable ledger<sup>4</sup>: “Blockchain can be understood as an interconnected network of typewriters, i.e. there is no Delete key. It is a permanent ledger and thus is almost impossible to hack. You can only undo a transaction by posting a reverse transaction, you cannot erase a transaction once it has been written down in the ledger. This also means that a Blockchain creates a complete audit trail. Anyone can view the trail, provided that it has not been encrypted”.

Public Blockchains, like the Bitcoin or Ethereum Blockchains, are thus incredibly hard to hack. One would need an enormous amount of money or resources to attack the network. Additionally, there is a double bind, because a successful attack on the network, would almost automatically drastically reduce the value of any currency that is tied into the network. For instance, an attack on the Bitcoin network (which would require an “evil consortium” to hold over 50% of the entire network computer power and coordinate a reversal of specific blocks. This is known in Blockchain lingo as the 51% attack) is like the snake biting its own tail as it would reduce the value of the Bitcoin currency.



<sup>4</sup>This discussion took place before the Ethereum hard fork to technically erase the DAO hack was implemented. Mano was against a hard fork. See e.g. <http://blog.ethereum.org/> and <http://blog.kraken.com/post/147619017767/on-the-ethereum-hard-fork> for more info on the hard fork.



Besides the issue of security, the participants provided some useful insights into the **novelty of Blockchain** as a technology. The reason for thinking about its novelty is important because more often than not, people are somewhat afraid of truly new, and disruptive ideas. However, when it comes to smart contracts, Mr Victor Lysenko of Acronis International GmbH, suggests that “some concepts like smart contracts sound frightening, but many of us interact with smart contracts in real life such as vending machines”. Indeed, a vending machine is a form of a smart contract in which an individual interacts with a machine through the establishment of a rapidly executing contract. Coins are inserted in a vending machine (or payWave technology is used) and the machine user trusts the machine will deliver a good (e.g. can of soda) in exchange.

In many ways, smart contracts on the Blockchain are similar but more powerful. Rather than having a single instant transaction (money for soda), you could have more complex transaction agreements over a prolonged period of time. Rather than working via the current fiat financial system (using either cash or cards backed up by the VISA, MasterCard, or NETS payment system), smart contracts use different currencies such as Ether and Bitcoin. But in essence, the smart contract simply enables a transaction that two or more parties agree to.

Mr Thanabalan added that such Blockchain-enabled transactions are generally not new. “In fact we are going back to history by enabling a peer-to-peer (p2p) system. From barter system to cash, Blockchain is going back to empower end users with a p2p system, eliminating middlemen”. While this may sound scary to those organisations that consider themselves middlemen, Mr Lysenko stressed that in general, “Technology can be disruptive, but it also creates new jobs and opportunities”. A system that enables direct transactions between actors, that are reliable and can be trusted, without the need for verification of a third party that merely serves as a ‘check and balance’ actor, can be highly beneficial for the actors (be they natural persons or organisations), because it will cut the costs of the middleman.



***“Technology can be disruptive, but it also creates new jobs and opportunities.”***

- Mr Victor Lysenko  
Vice President, Blockchain  
Acronis International GmbH

Thirdly, another key question during the Blockchain roundtable is to what extent it promises or over-promises many things that are currently not possible and perhaps will never be possible. This raises the question of what is the **vision for Blockchain**. Roundtable participants argued that the concepts of Blockchain are too abstract and do not seem applicable to their daily operations. While this is undoubtedly true, for Professor Lee, the problem is that people think of Blockchain in the context of the old world. However, he suggests, we should think of Blockchains as a new world and throw away all preconceived ideas (regulation and constitutions) and consider a non-physical world. Rather than pick on the technical details, one should look at the bigger picture of Blockchain as an enabler for digital infrastructure.

To shine a clearer light on the vision for Blockchain, it is useful to turn back to the early days of the Internet. Back in 1996, John Perry Barlow, a cyber-libertarian political activist and poet wrote a famous paper called “A Declaration of the Independence of Cyberspace”<sup>5</sup>. This document captures an imaginary speech to ‘a **government**’ and prophesied: “Your legal concepts of property, expression, identity, movement, and context do not apply to us. They are all based on matter, and there is no matter here”.

Applying Barlow’s views to the Internet seems to be largely true. Defining digital property rights, digital identity, and limiting freedom of movement of digital avatars, let alone ideas, has proven incredibly difficult on the World Wide Web. One of the promises of Blockchain is to make legal concepts like property and identity digital realities. Although the original ideology of Bitcoin was diametrically opposed to this (and many hardcore cyber libertarians still are), Vinay Gupta, a famous Ethereum foundation member and policy analyst, stated in a recent interview that the Cyberpunk ideology of anonymity on the Internet has now become so unimportant one should not even speak of it anymore.

So, what is the vision for Blockchain? Dr Simon Schillebeeckx of Singapore Management University, summarising an idea discussed by Bitcoin evangelist extra-ordinaire Andreas Antonopoulos said that

“Blockchain is a new digital infrastructure. What the Internet did for information, Blockchain is doing for property and value. Think back to the time when cars and roads were disrupting horses and dirt roads. Initially, cars were not superior because they had to drive on an infrastructure that was designed for horses. The cars got stuck and the horsemen were laughing at the “idiots” in their motorised vehicles. However, over time, a new infrastructure was developed and the superiority of cars became evident, and importantly, the horses still function on the new infrastructure as well. We are at that moment, where we are transitioning infrastructure for many financial services or other services which requires the transfer of asset ownership. Blockchain is the road, coins or applications are the cars, and Ethereum is an infrastructure company”.

Right now, many of the old applications and services do not work very efficiently on the new infrastructure, and the new infrastructure is riddled with growing pains. But very few people deny that the Blockchain technology has the potential to completely rewrite the way we transact value. It is a distributed and decentralised system. Blockchain can be an enabler for identification, collaboration, and asset ownership. It can create decentralised social networks, an unowned version of Uber (see Arcade City) and a decentralised competitor to Airbnb. It can facilitate dating apps that are provably fair, i.e. Showing you the best matches possible rather than suboptimal matches so that you keep on using the app (according to Vinay Gupta). This is the vision of Blockchain, and while every disruption creates winners and losers, we cannot stop it, and should not fear it.

<sup>5</sup> <https://www.eff.org/cyberspace-independence>

<sup>6</sup> <https://www.youtube.com/watch?v=5ca70mCCf2M>



## 2. THE GOVERNMENT'S ROLE

According to Mr Sopnendu Mohanty, Chief FinTech Officer for the Monetary Authority of Singapore (MAS), the focal task of MAS is to serve as an enabler for financial innovation, and FinTech more specifically. He discussed his viewpoint at the AmCham “Joint Financial Services and ICT Committee Meeting” which was held on July 5th 2016. Regarding Blockchain, he believes the government has an important opportunity to build infrastructure that the private sector could meaningfully use, but lacks the will or coordination ability to develop. The examples he gave focused on identity and authentication (KYC for banking), consent standards around Big Data, and a payment infrastructure for mobile transfers. Besides these concrete solutions for business challenges, Mr. Mohanty suggested the government should play a role in talent development and talent attraction, which at the moment remains an important challenge for Singapore. Finally, he promised that the MAS would start implementing novel policy approaches that depart from co-creation and experimentation, rather than top-down rule-making. Additionally, the ambition is to steer clear from white papers and opt for a more active approach. An example of the latter is the [Fintech Festival](http://www.fintechfestival.sg/)<sup>7</sup>, to be hosted between 14 and 18 November 2016, which focuses on [100 published problem statements](http://www.fintechfestival.sg/wp-content/uploads/2016/06/Hackcelerator-Problem-Statements.pdf)<sup>8</sup> the government solicited from the financial services industry.

During the roundtable discussion, the moderator (Mr. Loh Uantchern) offered his view on the government's role regarding the regulation of Blockchain technology. Basically, he believes the approach is to set up the framework and maintain a light touch. He quoted MAS approach regarding crowdfunding as an example. Other roundtable members agreed with this view, and believe that regulators in Singapore are encouraging companies to look into the different applications of Blockchain technology, as well as assist with potential funding of these activities. It is important to highlight that while the government is maintaining a “light touch” on Blockchain, it is not a hands-off approach. The government regulators are fully aware of what is going on, and are carefully analysing the different implications.

There was concern expressed by different participants that the implementation of Blockchain may result

in the loss of control by the regulators. However, Mr Thanabalan believes that the due process will not change, but who performs this function, and the way transactions are executed may change with the implementation of Blockchain. Therefore, regulators will need to evolve in order to adapt to this new paradigm. To add to this perspective, Professor Lee views Blockchain technology as an enabler for efficiency, and echoes Mano's views on the evolution of the regulatory framework. In fact, thinking about regulations from a traditional perspective is challenging, so we need to change our mindset and look at it from a digital perspective. Professor Lee believes that the biggest user of Blockchain technology will eventually be the government, through a wide variety of applications such as tax collection and voting.

Another perspective offered by the roundtable participants is rooted in libertarian economics which was the intellectual and philosophical backbone of the early Bitcoin movement. From this economic perspective, regulation is a market inefficiency. Blockchain's long term goal is to make the markets more efficient by increasing transparency and embedding trust into the transactive technology which reduces transaction costs. If markets become more efficient and transparent, the need for regulation should automatically go down. Therefore, as Blockchain technology is adopted, less regulation will be needed in the future when the markets become more efficient.

<sup>7</sup> <http://www.fintechfestival.sg/>

<sup>8</sup> <http://www.fintechfestival.sg/wp-content/uploads/2016/06/Hackcelerator-Problem-Statements.pdf>

### 3. WHAT ARE THE BIGGEST HURDLES TO BLOCKCHAIN IMPLEMENTATION?

As Donald Rumsfeld once said, there are still a lot of “unknown unknowns”. This makes this new technology both confusing and at times scary for various people in industry and government. During the roundtable discussion, it became clear that when it comes to hurdles to Blockchain implementation, industry and Blockchain experts are facing “perspective paradoxes”. These paradoxes appear when roundtable participants are in explicit disagreement about a variety of hurdles to implementation. What some see as a key challenge,

others deem unimportant; what some see as an enormous hurdle, others barely find a bump on the road. This shows that there is currently no agreement about the “true” state of affairs, or where to go next, which underlines the importance of interdisciplinary conversations. Below we introduce the most pressing perspective paradoxes.



## STANDARDISATION: THE NEED FOR A GLOBAL STANDARD

Some roundtable participants suggested the need for international standards for Blockchain, similar to 3G, which was created for mobile telephony. However, other participants thought this is potentially risky because we might set standards too early based on an imperfect understanding of the technology's potential. An important question is what would be the cost of setting an imperfect standard. Normally any standard is imperfect and it becomes better over time as improvements are added by governing bodies. Would this be possible at all in a decentralised world or do we need a much better design right from the start? This is a relevant question because it might be much harder to change a decentralised standard than it is to change a centralised one. But it could actually also be easier and more democratic, if some Blockchain-based voting mechanism could be used.

Mr Kwek Buck Chye of Temasek Corporate Advisors mentioned that “Blockchain is an enabler that will redefine the industry and take business forward. To gain efficiencies, the business rules need to change in order to optimize the use of Blockchain. The faster standards are defined and published, the better it is for businesses to jump on the ‘train’”. Similarly, Mr Choo Chek Siew of ComfortDelgro Corporation argued that **“components need to be globally accepted, standards need to be formed”**, but the more technically-minded favoured a more gradual approach so that the market could eventually settle on de facto standards.

## TRUST: CAN TRUSTLESS DECENTRALISATION BE TRUSTED?

When it comes to trust, the panel had a rare moment where most industry and Blockchain specialists' views were largely aligned. For instance, Mr Thanabalan claimed that “Until Blockchain reaches a stage where it is truly trustless and unhackable, trusted parties are still required”. He added, however, that over time Blockchain could reach that stage. Mr Holger Lindner of Tüv Süd AG, was slightly less techno-optimistic arguing **“there will always be a market for trusted institutions. Majority as the sole provider of trust is highly risky”**. Clearly, there is truth in that statement as well. There is an old saying that tyranny of the majority is still a form of tyranny, and many democratic systems have been put in place to protect minorities from being disregarded by a dominant majority. Hence, checks and balances are probably going to be required for a long time.

Where can trust come from? Mr Lindner said that the problem is that the Blockchain **“promises trust but there is no experience to really trust it”**. This is true because conventionally trust is placed into a natural person, an organisation, or an institution, but we never really think about the abstract way in which we all fundamentally trust the TCP/IP protocol that underlies the World Wide Web, or the way we trust a telephone

line to transfer my voice to another person without changing the content of what I am saying. That trust is highly abstract and until we reach the same level of trust with the Blockchain, trust will remain an issue.

Mr Choo drew an analogy with his own taxi business: “Taking the taxi industry as an example. People recognise there are risks involved with taking Uber (such as unverified drivers). However, there need to be incidences before people consider these risks seriously. The incidence of such cases would not be so high that Uber is not used altogether. Similarly for Blockchain; until there is chaos, the train moves on”.

There is however still a long way to go. Mr Kwek, stated it best: “The subject matter is creating a system to handle trusted transactions. The system needs language translators, locks (security which needs to be commonly agreed upon and trusted) and aggregators. Right now, the components are not clear for most of us, for instance how to establish ownership and translate that from the digital into the physical world”. Real trust takes time to emerge, and with Blockchain, it is still early days.



## AUTHORITATIVENESS: LEGAL AUTHORITY AND ENFORCEABILITY OF SMART CONTRACTS

During the roundtable discussion, there was debate about the relation between Blockchain and the legal system. At the moment, many questions around the legal enforceability of anything that happens on the Blockchain remains uncertain. As Dr Kelvin Low of Singapore Management University, pointed out **“Technologists do not understand what ledgers represent legally. Ledgers are not authoritative”**. More specifically, Dr Low took objection to various Blockchain startups that aim to digitise assets.

For example, DigixGlobal is digitising gold in Singapore. Other companies like Everledger and Provenance are looking into other assets such as diamonds and apparel. Dr Low also points out that “To digitise assets that exist in the old world such as diamonds, presents some issues. Uninformed third parties may be disadvantaged”.

These legal questions are pertinent and need to be resolved. Depending on the institutional system, they will either have to be resolved before an issue emerges by introducing new laws, extending the application field of the law, or they will be resolved through case

law set by lower courts.

A more aspirational idea was proposed by Otonomos Blockchain developer Mr Thanabalan who argued that we, as a society, need to radically rethink the way we design systems, away from using a centralised approach. He suggested that there might be alternatives to “monetary policy which is dependent on the central bank or a legal system which is dependent on the courts”.

In theory, decentralised courtrooms could be woven into smart contracts in such a way that arbitration of non-compliance or force majeure becomes a full-time job, with the potential advantage that the different parties to the contract could agree on the specific court (and virtual jurisdiction) in which they would want to be heard. Such a court would need to become holder of the assets and its decisions would need to be respected, if not the problem of enforcement would re-emerge.



*“There might be alternatives to monetary policy which is dependent on the central bank or a legal system which is dependent on the courts.”*

- Mr Mano Thanabalan  
Blockchain Developer,  
Otonomos BCC Pte Ltd

## RISK: INDIVIDUAL RISK AND INSURANCE

The panel discussed the transfer of risk and responsibility at length. This issue specifically rose to the attention when discussing the option of creating a decentralised stock exchange. When excluding the middleman as Blockchain enables us to do, actors at the sending and the receiving end of any type of value exchange have to bear full responsibility and thus risk. Specifically, Dr Low made a valid point when comparing the use of snail mail to the use of e-mail, arguing that as long as both options coexist, consumers have a choice. If they are afraid of being hacked, they can use snail mail instead (presumably he assumes snail mail to be safer). However “If you change the entire system (e.g. moving the entire SGX to a Blockchain-based approach), users will not be given a choice. This leaves uninformed consumers exposed to security risks”.

We deem this a reasonable point, but on the other hand, Mr Kwek suggested that “the use of insurance can hedge against such risks and may be cheaper than middlemen”. This can also be true. Especially when it comes to smart contracts, short snippets of “insurance code” could be added to insure the parties against specific risks. But there is a more fundamental question. To what extent are uninformed consumers currently safeguarded from security risks? To a large extent, the trust they put in an intermediary is likely to come from word of mouth, social networks, or institutionalised stability. It is not self-evident that a Blockchain-based approach would invalidate these sources of trust. Moreover, if it can be designed in a low cost way, it could cut transaction costs dramatically and hence improve access to those who currently lack the means to hedge their savings.

## DISINTERMEDIATION EQUALS REDUNDANCY. DOESN'T IT?

Professor Lee made the point that “new problems can create new jobs” and that universities need to step up their game “to address the pain points and identify what are the deep skills needed to address these issues”. The need for new skills was most evident in the fear that Mr Rajesh Sreenivasan of Rajah & Tann Singapore analysed. He suggests the fear of Blockchain in sectors such as law, accounting, and finance, is rooted in the idea that disintermediation automatically means redundancy. As Mr Vincent Lim Boon Seng of Motorola Solutions puts it: “Blockchain will change the world, practitioners may not see it before it is too late”.

However, there is a more optimistic viewpoint:

From the practitioner standpoint, the concept that disintermediation equals redundancies in the Blockchain space leads to a lack of adoption. Blockchain should not be thought of as a threat but an opportunity. An opportunity to look at the inherent inefficiencies that have been created in the current system and a chance for this new platform to come in to “threaten” our way of doing business. Lawyers are looking at the inefficiencies of the contracting model today and are looking at ways their clients can benefit from Blockchain. The value proposition is to move up the value chain. Many small contracts can be easily

automated. Lawyers’ value and fees from such small contracts are minimum. Time can be spent on the master contract which still needs to be negotiated and locked down and where lawyers can truly add value.

Thus, smart contracts will take off not just in the context of Blockchain but in various other technologies as well. The more relevant point from a lawyer’s perspective is contract management, how contracts live and continue to be relevant. Smart contracts managing themselves, e.g. triggering breaches based on events, will free up much time for lawyers to do more important things. Predetermined breaches can be coded into contracts so that one does not have to go to court and contracts can be self-resolved”. This will automate part of the legal process, but that part is not very interesting or profitable anyway.

## USER EDUCATION: IMPORTANT OR NOT?

Another matter of heated debate was whether or not user education was an essential part of making Blockchain more appealing to the masses. While participants agreed that some basic knowledge of the Blockchain was useful and could be included in university curriculae, whether more profound and technical knowledge was required remained an unanswered question. Mr Choo, argued that “technology is sweeping the world and users are not fully educated” which could raise problems. Mr Dennis Chia of Starhub Limited also said that there is a “need to increase the awareness about Blockchain for people to embrace the technology”. Similarly, other roundtable members were worried about creating a new kind of illiteracy that would leave Singapore behind.

On the other hand, some Blockchain experts suggested that “the goal should be to make Blockchain an underlying infrastructure similar to TCP/IP. Very few people actually need to understand how that works, but many can use the Internet”. Relatedly, it was argued that Blockchain ought to develop in such a way that “there is no need to understand it with an application layer on top of it”. Of course, for Blockchain innovation to emerge, people with technical skills will be necessary, just as much as people with business skills will be needed to turn the next technological development into a viable commercial opportunity. Yet this does not necessarily require user education about how Blockchain works. Professor Lee pointed out that “the key ingredient is M2M (machine to machine) and IoT (Internet of Things), these need to take off for Blockchain to take off in a big way”. If these applications are indeed the key future uses for Blockchain, user education is clearly not the big issue but deep skills for developers and professionals are still needed.

Mr Lysenko aimed to suss the debate by suggesting that “once real use cases, i.e. beyond pilot test cases, appear, and companies start to use them, more people will understand what Blockchain does and what it can do”. We should however not forget how far the space has come in the last few years. At any Bitcoin/ Ethereum (or any other Blockchain) event now versus only 12 - 18 months ago, it’s apparent the audience has changed. What used to be a fringe crowd populated by hackers, gamers, and geeks, has turned mainstream almost overnight, replaced with finance, supply chain, and academic specialists as attendees and even speakers.



***“There is a need to increase the awareness about Blockchain for people to embrace the technology.”***

-Mr Choo Chek Siew  
Group Financial Officer,  
ComfortDelGro Corporation Ltd



## SOLUTIONS: BLOCKCHAIN MUST SOLVE EVERYTHING OR NOTHING

Penultimately, a paradox that was also apparent is that some discussants were struggling with Blockchain as an imperfect solution. Some participants seemed to be hell-bent on the idea that either the Blockchain solves every problem in the world, or we should not speak of it. This is probably inspired by the big promise Blockchain technology holds but it creates blockages in the progress we can aspire for, because by no means is the technology in its current state perfect, nor will it ever be.

Mr Chia for instance lamented the assumption that “everything will turn virtual. Physical world and the concept of geography still exists. There are frameworks that exist. In the scheme of things, for Blockchain technology to take over the world, there needs to be consensus. Until the algorithms take care of all the permutations and all the complexities that exist in the business world, there won’t be complete consensus. There needs to be a blending of two worlds”.

This blending of two worlds is a nice way of framing the middle ground. Not everything will turn virtual, not every asset will have an equivalent digital token, and digital tokens might never overtake the more established forms of currency. However, it is notable that in the panel more people believed that fiat currency would disappear in the next 50 years than there were people who thought Bitcoin would disappear.

There was a discussion in the panel on to what extent cryptocurrencies could be used for government aid. The benefit, Dr Schillebeeckx argued, would be that cryptos could be coded in such a way that they could not be used for buying arms or non-aid related items and hence could make the fraudulent usage of international aid more difficult. However, others in the panel rebutted by saying that such cryptocurrencies would create new problems and we need to learn what those problems are and that it would be difficult to ensure that aid would not be used on non-aid uses such as buying arms. Dr Low argued that “fraud will move to the virtual world regardless”. While this is clearly correct, it also exemplifies the paradoxical expectation that the Blockchain-based solution needs to provide a perfect solution or none at all.

We contend this is an impossible expectation because it is based on a false mental straw man, i.e. the current way of doing things is almost perfect. Clearly, sending international aid in cash or via bank transfers is also an imperfect solution. While there are checks and balances in place, abuse is possible. The key point is that Blockchain technology could make fraud more difficult, not that it would make it impossible. It’s not the secret portal into utopia, but we should be happy if Blockchain enables us to get less corruption.



## TECHNOLOGY AND THE DANGER OF OVER PROMISING

The final paradox that was discussed at the roundtable was the technology one. Many voices were concerned about overpromising: Mr Moskowitz, reminded us that “we are still at very early stages, and have not hit a critical mass. Entry costs are high. We may be over promising”. Similarly, Mr Lysenko stressed that right now, the system is inefficient: “You need enough users to gain efficiency and for the system to mature” and we have not reached that stage yet. Nonetheless, Mr Chng Lay Chew of Singapore Exchange Limited was also convinced that “the train has left the station for the journey. It is about adapting to Blockchain and learning how to use it”. So despite the current trouble, there seems to be a shared belief that the technology will overcome its current limitations.

The key paradox here is that we are in the midst of a technological revolution, if we may believe the Blockchain advocates, but the key limitation to that revolution, is... technology itself. Professor Lee put it best:

*“What is the precondition for Blockchain to have an exponential effect or scale? We are approaching singularity, technology, ironically, is the biggest problem right now, mainly because of scalability issues. But technology won’t disappoint in the long term.”*

While the current technology is indeed highly imperfect and does not scale to compete with the speed of transaction processing of VISA, MasterCard, or SWIFT, it is good to be reminded of the metaphor of infrastructure inversion. Initially, the car performed worse than the horse on the old gravel roads. Thus, the growing pains of the infant technology are normal and will not disable the technology’s future development.

***“What is the precondition for Blockchain to have an exponential effect or scale? We are approaching singularity, technology, ironically, is the biggest problem right now, mainly because of scalability issues. But technology won’t disappoint in the long term.”***

-Professor David Lee  
Singapore Management University



## 4. WISHLIST FOR BLOCKCHAIN

The roundtable of industry, academic, and Blockchain experts developed a wishlist of items they would like to see take place for the increased adoption of Blockchain within the next 6-12 months. Most experts agreed that having more user education on the benefits and applications of Blockchain is extremely important in order to increase user adoption. To accomplish this task, users need to have clarity that Blockchain is an enabling technology and gain a better understanding of its numerous possibilities and applications. As Mr Chia, said, “There is a need to increase the awareness for people to embrace the technology. Look at what you can do instead of what you cannot do.”

In addition to increasing user education, some participants believe that the different industry sectors should do more testing of Blockchain to see how it works and how it applies to their particular businesses. The testing will lead to real and scalable solutions beyond the pilot or proof of concept stage, with a view to ultimately generate real efficiencies and savings. One of the main ways to significantly increase traction, Professor Lee suggested, is by having large corporations such as Alibaba or Tencent adopt Blockchain technology in their businesses.

Given the current limitations of Blockchain technology, some participants wished for more realistic expectations of what can be accomplished with the technology. The gap between what is currently feasible and what is being (over)-promised when it comes to potential applications for users is quite sizeable. On the other hand, some participants advocated the opposite perspective (please refer to Section 3) and suggested that technology must be significantly ahead of user expectations in order for innovations to be adopted. Even though users may not understand it right away, they will eventually see the benefits and adopt it. As Dr Schillebeeckx mentioned, “When building technologies that fundamentally change the way people interact, relying only on user feedback does not work”. For instance, Henry Ford famously said that if he would have asked users what they wanted, they would have said faster horses. Another example is the iPhone, where Steve Jobs did not ask people what kind of mobile phone they wanted. He had a vision of a touch enabled smart phone which he executed. People followed once the user case became clear.

Professor Lee’s wish list for Blockchain is to have a shift in paradigm, where the Blockchain community sends the message that their purpose is to serve wide-ranging adoption of Blockchain technology, rather than protect and shield it from the rest of the world. Openness should be the main objective, and banks should adopt this openness to become the app store for financial services. For example, Fidor Bank in Germany offers core banking services and partners with third party companies to offer other financial services like fund transfers and loans<sup>9</sup>. Professor Lee believes that governments will actually become the largest users of Blockchain, and envisions a system that is fully transparent and serves the entire pyramid. For example, Blockchain could provide transparency in China’s One Belt One Road infrastructure project<sup>10</sup>.

For this to happen however, we need a change in thinking. At the moment regulation is set up to rule rather than to serve. Professor Lee submitted that **“the underlying Satoshi ideal is to serve rather than rule”**. The whole wealth pyramid, including the bottom of pyramid that consists of the unbanked who lack access to the most basic of financial services, can be served as Blockchain lowers the cost of doing business by decentralising trust and cutting costs of intermediaries who add little value. “If the business model is to serve, then you will automatically create new jobs and you won’t have to worry about being disrupted. Many Blockchain consortiums are trying to control the gateway (or to rule) and to serve the top of the financial pyramid. To be inclusive is the only way to grow. It’s important to think of Blockchain as a new job creator in the digital world”.

Exploring the different applications of Blockchain, one of the roundtable participants wished that a Blockchain currency (i.e. coloured coin) would be established to provide UN development aid. The use of this Blockchain currency would be restricted for the use of aid on specific items such as food and medicine. It would instantaneously create a global market and presence. Even though it can solve some of the fraud and issues with current development aid programs, potentially new issues may arise which will need to be understood.

<sup>9</sup><http://www.businessinsider.sg/fidor-bank-launches-in-the-uk-2015-9/>

<sup>10</sup><https://www.csis.org/analysis/building-china%E2%80%99s-%E2%80%99Cone-belt-one->



## 5. CONCLUDING ARGUMENTS

Whether Blockchain technology is still in its early stages or if it is ready to be implemented, one thing for sure is that opinions on it are still being formed by the community. As presented in Section 3, what is considered an obstacle for the industry for some is not to others. As we see large implementations of Blockchain in various forms either in government or industry, this article could hopefully serve as useful reading material for the newly initiated.

The article attempts to present industry viewpoints in an unbiased manner and the reader is encouraged to form their own opinions based on what is presented here.



## 6. APPENDIX

### Roundtable Participant List

Mr Victor Lysenko	Vice President, Blockchain	Acronis International GmbH
Mr David Moskowitz	CEO, Co-founder	Attores Pte Ltd
Mr Choo Chek Siew	Group Financial Officer	ComfortDelGro Corporation Ltd
Mr Foong Sew Bun	IBM Distinguished Engineer, Senior Cloud Advisor	IBM Cloud
Mr Vincent Lim Boon Seng	Director of Finance	Motorola Solutions Singapore Pte Ltd
Mr Mano Thanabalan	Blockchain Developer	Otonomos BCC Pte Ltd
Mr Rajesh Sreenivasan	Partner & Head, Technology, Media & Telecommunications	Rajah & Tann Singapore LLP
Mr Chng Lay Chew	Chief Financial Officer	Singapore Exchange Limited
Dr Simon Schillebeeckx	Assistant Professor of Strategic Management, Lee Kong Chian School of Business	Singapore Management University
Mr Miguel Soriano	PhD Student	Singapore Management University
Dr Ernie Teo Gin Swee	Research Fellow, Sim Kee Boon Insti- tute for Financial Economics	Singapore Management University
Dr Kelvin Low	Associate Professor of Law	Singapore Management University
Mr Dennis Chia	Chief Financial Officer	Starhub Limited
Mr Kwek Buck Chye	Independent Corporate Advisor	Temasek Corporate Advisors Pte Ltd
Mr Holger Lindner	Chief Financial Officer	Tüv Süd AG, Product Services Division

For Enquiries regarding this report:

Singapore Accountancy Commission  
Mr Kevin Wee  
Associate Director, Singapore CFO Institute  
Tel: +65 6325 0513  
Email: [kevin\\_wee@sac.gov.sg](mailto:kevin_wee@sac.gov.sg)

Singapore Management University  
Sim Kee Boon Institute for Financial Economics  
Tel: +65 6828 1981  
Email: [skbi\\_enquiries@smu.edu.sg](mailto:skbi_enquiries@smu.edu.sg)

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