# BLOCKCHAIN IN THE CASH AND SECURITIES SETTLEMENT SPACE: UTOPIA OR REALITY?

**The chief promise of blockchain technology in the settlement of cash and securities transactions is the elimination of the costs of reconciliation between multiple counterparties in the value chain through the sharing of a single but distributed ledger. Andreas Park, associate professor of finance at Toronto University, cited to the panel he chaired at Sibos[1] in Toronto a Nasdaq finding that trading a single stock might involve as many as 40 separate intermediaries, indicating the savings from disintermediation could be substantial. But the immaturity of the technology, and the sunk investments of the incumbents, mean it will almost certainly take time to realise them.**

1 *Blockchain in the cash and securities settlement space: Utopia or reality?* Held on Monday 16 October 2017.

"What we have been doing for the last 20 years is not working anymore," said Monica Singer, the former CEO of STRATE, the South African central securities depository (CSD), who resigned her position in August this year after nearly 20 years at the helm to pursue her passion for blockchain technology. She has now joined blockchain technology vendor Consensys, as what the company calls a creator of opportunities. "I truly believe that this [technology] will change the world, and the reality is that it will change the world much faster than we all expect," Singer told the audience at the panel discussion.

## Initial Coin Offerings provide means as well as proof that blockchain works

Her confidence rests in large part on the surge of Bitcoin-style Initial Coin Offerings (ICOs), which have raised over $3 billion this year. Singer pointed out that ICOs have already raised more money for blockchain than the entire venture capital industry, providing start-ups and vendors with substantial staying power, and proving that the issuance of currency and securities no longer requires intermediation by a stock exchange or central bank.

She added that ICOs also demonstrate that the exchange of value no longer requires reconciliation between intermediaries such as brokers, fund managers and custodians, clearing through a central counterparty clearing house (CCP) or settlement in a CSD. "Once you can see that this is possible, why would you ever want to ask for a faster horse?" asked Singer.

Tom Casteleyn, head of product management for custody, cash and foreign exchange at BNY Mellon, was more cautious. He argued that blockchain technology would struggle to replace existing clearance, settlement and custody infrastructures and service providers because it lacks the required speed and capacity: the ability to settle a million transactions a minute. Casteleyn added that, since blockchain networks settle transactions gross in real-time, they will devour much more liquidity than the current net settlement systems. Since liquidity is expensive, this will make blockchain networks uncompetitive with current clearing and settlement services.

Casteleyn also pointed out that, even after the technical obstacles to the adoption of blockchain are resolved, the transition to the new technology was bound to be prolonged. "If you really want to move to a blockchain world, you have to create distributed ledgers in parallel with the legacy you have today, and at some point migrate over from the legacy to the parallel," he said. "But until you have moved everything over completely, you will have two systems in parallel. Twice the cost, none of the efficiencies, and a timeframe which is impossible to imagine." The timetable he thought most pertinent was the transition to the TARGET2-Securities settlement system (T2S). That took the European securities industry more than ten years to accomplish.

## Central bank money settlement essential to blockchain success

Another obstacle, highlighted by the success of ICOs, is the absence of fiat currencies on blockchain networks, forcing participants in digital currency markets to interact with existing automated clearing houses (ACHs) and real-time gross settlement systems (RTGSs) when buying and selling the assets. It is to solve this problem, said Tom Casteleyn, that BNY Mellon has joined forces with other banks to develop the so-called "utility settlement coin" (USC). This aims to tokenise central bank money on a blockchain, which would make delivery of securities versus payment (DvP) in central bank money, for example, possible on a blockchain.

"It is important that we find a good way to do this quickly because, until we have got a real representation of a fiat currency on a blockchain, the delivery of securities versus payment – which all the exchange of value in our world is based on – is not possible on a blockchain," said Casteleyn. He predicted that the central banks would eventually overtake the USC initiative, and issue fiat currencies directly on to blockchains. Certainly, it is difficult to describe the tokens as true central bank money. Dirk Bullman, an adviser on FinTech activities at the European Central Bank (ECB), described USC flatly as "commercial bank money."

However, Bullman also said that the ECB was extremely interested in the potential of blockchain technology. He

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**- Monica Singer, Consensys**

explained that the central bank wanted to move beyond abstract discussion of the benefits and assess whether blockchain – more broadly, distributed ledger technology (DLT) - could actually be used in either existing or planned services, or both. Blockchain was even considered as the foundation of the instant retail cash payments infrastructure being built by the ECB, and due to go live in 2018.[1] The idea was eventually abandoned. “We came to the conclusion blockchain technology is not as mature as we had maybe hoped,” said Bullman.

## Encouraging blockchain experiments by the ECB and the Bank of Canada

Despite this concern about the maturity of the technology, the ECB has conducted a separate technical experiment with the Bank of Japan. Codenamed STELLA, the experiment used Hyperledger technology to assess whether DLT could improve liquidity-saving in cash payments systems. The study concluded that the technology was both scalable and robust enough to work. It easily accommodated the 350,000 transactions a day processed by the TARGET2 real-time gross settlement system (RTGS), though the efficiency gains inevitably diminished as the network expanded. It also proved resilient in the face of simulated cyber-attacks, with the “nodes” able to recover within 30 seconds “If I appear to be pessimistic on blockchain, that is not the case,” concluded Bullman. “It has big potential.”

Another central bank, the Bank of Canada, has also worked with industry partners - Payments Canada, which operates the retail and high value payments schemes in Canada, and the R3CEV consortium of banks – to explore the use of blockchain. The experiment, codenamed Project Jasper[2], tested the viability of issuing and using central bank money on a blockchain.

1 See the comments by Mehdi Manaa, head of market infrastructure development at the European Central Bank (ECB) in Instant payments over SWIFT, **LINK**

2 See Jan Pilbauer, executive director of modernisation and CIO and Andrew McCormack, senior director, technology, Payments Canada, Canada investigates banking on blockchain, MI Forum magazine, June 2017, **LINK**

“This was a once-in-a-generation opportunity to have this dialogue,” said Andrew McCormack, senior director, technology, at Payments Canada. “We were literally talking at times of having to open up the Banking Act for the first time to issue a new type of currency. Central bank cash on a distributed ledger is a fundamental building block. It is an enabler for a lot of other use-cases. There is always a cash leg and it is much better, in both economic theory and in terms of monetary policy, if that cash is underwritten by a central bank. If it is a liability of a central bank, it gives everyone a higher degree of confidence.”

## Distributed ledgers can be surprisingly centralised

McCormack added that the experiment provided invaluable experience. It provided knowledge of different versions of DLT. The resilience of some certainly impressed him. “The resilience of the Ethereum and Bitcoin vision is truly remarkable,” said McCormack. “You can chop that network in half and it still keeps operating. That is an amazing feat.”

Project Jasper also demonstrated that the proof-of-work model of classical Bitcoin would not work in central bank money, because of the risk of collusion between members of the network. Another discovery was that the privacy and security characteristics of DLT were inadequate, because chains of encrypted transactions could be reverse-engineered. Using the Corda technology created by R3CEV solved the privacy and security issues, but the end-result turned out to be a lot more centralised than McCormack had expected.

“We discovered it is not really a blockchain system per se in the traditional blockchain-Ethereum-Bitcoin sense of the word,” he explained. “In the Corda version, and in Hyperledger and other proprietary or open source enterprise platforms, you end up being a lot more centralised than you expect. You end up a lot closer to what you started with, quite frankly. You have got a lot of public key infrastructure. You have got centralised services. And the most startling thing for me was that the

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**- Tom Casteleyn, Head of product management for custody, cash and foreign exchange, BNY Mellon**

**Blockchain in the cash and securities settlement space: Utopia or reality?**
took place on Monday
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View the entire panel discussion **here**

Moderator

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Associate professor of finance, University of Toronto

Panellists

**Alexis Francis Thompson**
Head of global securities services – managing director, BBVA

**Tom Casteleyn**
Head of product management for custody, cash and foreign exchange, BNY Mellon

**Monica Singer**
Independent FinTech expert, Blockchain Consultancy (Pty) Ltd

**Andrew McCormack**
Senior director, technology. Payments Canada

**Dirk Bullman**
Adviser, European Central Bank

data itself ends up being partitioned around this network. As an operator we have designed ourselves completely out of the system - we literally do not even have a node, which is interesting – but the data itself, unlike the Ethereum or Bitcoin version of a blockchain, where everybody has the same copy of the database, you only get the data for the transaction you are participating in. What that means is that the database is shared all over the network."

## Neither the technology nor the industry is ready for a rapid transition

It is findings of this kind, said Tom Casteleyn, that will slow down the adoption of blockchain technology. In his view, proving the efficiency of the technology with successful applications in limited areas was the ideal way to make progress. "The best thing we can do now with blockchain is take very discrete elements of our settlements eco-system, like the secured loan market or the trade finance market or the gold settlement market, and try to solve for those in a blockchain," he says. "That will do two things. It will prove that the theory works, and once we have a few of those going we can see how much it scales. Then you could potentially expand into the bond or equity markets."

Alexis Francis Thompson, managing director and head of global securities services at BBVA, also thought adoption would be slower than Monica Singer predicted. Although he believes that blockchain has moved beyond the hyperbolic stage – it is "undoubtedly the future" and "opens up a world of opportunity to improve how things are done" - sunk investments such as T2S would not be jettisoned readily.

The industry also found change difficult. The switch in 2016 from settlement on trade date plus three days (T+3) to T+2 in Spain, as part of the transition of the Spanish market to T2S, was "traumatic" enough. "On blockchain we can do instant settlement, but as an industry we are not ready for instant settlement," said Thompson. "Operationally, we are just not ready for that. We can talk about technology, but we need first to go back and look at our processes."

## It is better to disintermediate yourself than to be disintermediated

Thompson thought progress towards widespread adoption of blockchain would, ultimately, be driven by clients. "'What does the client want? What does the client need?'" he asked. "That has to be the basis for everything. Then it is, `How can we give this to the client?' To look at it from a client perspective, Utopia is about taking out all the middlemen that are involved – obviously, this goes against what I do every day – but I think there are too many middlemen in the whole chain, so that complicates things."

Tom Casteleyn was more concerned not to cede to new entrants the opportunities created by blockchain. In fact, he argued that custodians will thrive as service providers to investors in blockchain-based assets, which is why BNY Mellon is exploring the use of DLT to create new asset classes to custody and service as well as using it to replace internal technologies and processes.

"I do not believe our industry will get disintermediated from the outside," said Casteleyn. "I think we will change ourselves from the inside. At the same time, we have to be sure we are not too slow to adopt this ourselves. We need to keep up with the pace. We do believe this technology will enable us to change from the inside, but we do need to take up the challenge. We cannot ignore it."

Monica Singer remained bullish. She urged both financial market infrastructures and payments and custodian banks not to worry about writing off sunk investments, or to feel threatened by new entrants that use the technology, but to ask what inefficiencies blockchain could address within their own organisations.

"We are changing the world one project at a time, and it is happening very fast," she said. "With blockchain, you no longer have that waterfall project management process. You can just say, `Guys, let us do it agile.' Because the technology is not as expensive as it was 20 years ago,

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