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Financial IT

Innovations in Technology

Peter Randall,
CEO of SETL

BLOCKCHAIN IN THE POST-TRADE ENVIRONMENT

NO MORE BLOCKING BLOCKCHAIN

Kris Hansen,
Senior Principal Industry Value Engineering, SAP Canada

BLOCKCHAIN DLT: OVERCOMING THE BARRIERS TO CHANGE

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STARTING WITH SECURITY

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Transforming the landscape

The many faces of BLOCKCHAIN

The time has come to stop talking about the characteristics of BLOCKCHAIN and to start realizing its promise.

This is the uncompromising view of one of the financial IT leaders whom we interviewed for this edition of Financial IT. We agree entirely.

Financial institutions and IT companies have been collaborating in order to get a better understanding of Blockchain for at least two years. However, what makes late 2016 different to, say, late 2015 is that some of these organizations are now actually at the point of introducing products and solutions that are based on Blockchain's distributed ledger technology.

In short, Blockchain has moved a long way from just being the interesting technology that underpins Bitcoin. A major French bank will shortly introduce a Blockchain-based system that will greatly facilitate the onboarding of new customers, while complying fully with KYC and AML/CFT requirements. In the past, this has been an overly complex process, and one which has resulted in customer dissatisfaction. In Luxembourg, a Bitcoin exchange is now being overseen by the financial regulator. Elsewhere, Blockchain underpins a working Central Securities Depository (CSD) that provides any financial market participant with a permission registry service for payments, settlement and clearing of cash and financial instruments. There are other examples.

Accordingly, we thought that it would be sensible to devote most of this edition of Financial IT to Blockchain. Many of the articles consider the general strengths of Blockchain, such as its transparency, security and engendering of trust. Others examine actual applications for which Blockchain-based solutions might be ideal. Examples include: faster and cheaper transfer of money across borders; alternative investments; facilitation of international trade between small and medium-sized enterprises (SMEs); verification of identities of clients or employees who need access to an organization's systems; tracking of valuable items as they move through supply chains; facilitation of crowdfunding; and, of course, post-trade settlement and clearing.

Andrew Hutchings,
Editor-In-Chief

Some of the articles contemplate the obstacles to the fast adoption of Blockchain distributed ledger technology. In no particular order, these obstacles include the conservatism of financial institutions, the need to work with and around legacy systems, excessive hype about Blockchain, confusion between Bitcoin and Blockchain, the need for financial institutions to find the right IT partner(s) and the shortage of skilled personnel. It is no coincidence that, as is argued by one of our contributors, there has never been a better time to be an IT professional working in financial services.

And, like all endeavours that depend on human insights, financial IT really is a people business. This is why the title of this edition of Financial IT - the many faces of Blockchain - has a dual meaning. This edition does not just look at what Blockchain is and the many things that it can do. It also introduces a number of the leading thinkers, educators and advocates who are involved with the new technology.

In its entirety, this edition of Financial IT provides a snapshot of the situation of Blockchain in August 2016. This edition also provides clues as to how the technology will develop over the coming year or so. By late 2017, there will be numerous examples of organizations that have adopted Blockchain-based solutions. Some innovators will have actually started to commercialise the products and solutions that they have developed. There will be many more high profile partnerships between financial institutions and financial IT companies (and more than a few low profile separations as well). In short, far more key decision-makers will understand how Blockchain contributes to the disruption of financial services businesses: they will want to be in the vanguard of change, and not the victim of it.

It is certain that in late 2017, unlike in late 2016, there will be far more realization of the potential of Blockchain than talk about its characteristics.

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UNMASKING BITCOIN IDENTITIES:

The next level of thwarting illicit activity on the Blockchain has arrived

While the underlying Bitcoin technology, Blockchain, has gone mainstream, the financial services industry is still hesitant to embrace the full promise of Bitcoin and confidently provide banking relationships to Bitcoin companies. The lack of financial transparency on Bitcoin entities continues to stymie the ubiquitous adoption of Bitcoin and other virtual currencies.

That reality, though, is soon to be short-lived. LexisNexis Risk Solutions, the global big data, technology and analytics firm, has teamed with Elliptic, a Blockchain intelligence company, to remove that roadblock by exposing money launderers, human traffickers, terrorists, and drug dealers who use Bitcoin to make darkweb purchases.

The alliance, which was announced, integrates LexisNexis Risk Solutions' robust anti-money laundering data into Elliptic's Bitcoin transaction monitoring and compliance products. As a result, Elliptic clients can obtain more meaningful insights than ever before by automatically screening Bitcoin entities for links to sanctions, enforcements, politically exposed persons, adverse media and state owned companies.

"For the first time, Bitcoin companies can leverage bank-grade risk management practices to identify Bitcoin entities that appear on sanction and watch lists from around the world," said Dr. James Smith, Elliptic CEO and co-founder."Having this enriched data set built natively into Elliptic's products takes Bitcoin AML and KYC controls to the next level."

Elliptic will use LexisNexis® Bridger Insight® XG platform that includes its WorldCompliance™ database to identify whether Bitcoin transactions are linked to identities that are related to fraud, anti-money laundering, corruption or terrorist financing.

The amount of money laundering activity taking place with any currency, whether virtual or hard dollar, is difficult to calculate due to the complex structures bad actors put in place so that they can mask transactions. However, Elliptic revealed today that the largest dark marketplaces facilitate more than $250 million in annual sales. "The leading Bitcoin companies globally are already using Elliptic products to assess risk on more than $1 billion in Bitcoin transactions each month. By integrating LexisNexis Risk Solutions' robust watchlist data, we are making it safe for a new wave of financial institutions to handle Bitcoin and bank Bitcoin companies," said Dr. Smith.

Tom Brown,
Senior vice president, U.S. Commercial Markets and Global Market Development, LexisNexis Risk Solutions

Dr. James Smith,
CEO Elliptic

According to Ray Valdes, a Gartner analyst who covers virtual currencies and Blockchain technology, et al, the core Bitcoin technology stack has functioned with near-flawless operations over its lifetime, a track record that is unprecedented when compared to complex software from commercial vendors…

However, the security track record of third-party software in the Bitcoin digital currency ecosystem is dismal… Many exchanges have been hacked — or funds have been stolen — due to a combination of unskilled programmers, poor methodologies and perhaps some criminal intent to defraud from the start. The situation is analogous, in the non-digital world, to a poorly run union or bank going bankrupt; such an event would not call into question the core mechanisms of a dollar-based economy. Because of the near-flawless track record of the Bitcoin Blockchain and core stack, developers of competing metacoin platforms and technology stacks will have significant work to prove their capabilities to support mission-critical contexts in this regard.

In coming together, LexisNexis Risk Solutions and Elliptic represent a new global standard in Bitcoin risk management, AML Compliance and KYC Compliance.

LexisNexis Risk Solutions is the data, technology and analytics provider of choice for 100 of the top U.S. banks, helping them achieve regulatory compliance and mitigate business risk, like identity fraud, money laundering, terrorist financing, and tax evasion. The firm also works with 80 percent of U.S. federal agencies.

Elliptic provides Bitcoin transaction monitoring products to the largest U.S. and European Bitcoin exchanges and payment processors, and provides key evidence to law enforcement agencies in the U.S. and Europe for major investigations involving Bitcoin.

“This alliance demonstrates how data, technology and analytics can be used in innovative ways to foster financial transparency from China to Germany to the U.S.,” said Thomas C. Brown, SVP of U.S. Commercial Markets and Global Market Development at LexisNexis Risk Solutions. “More banks, Fintechstartups, payments companies and eCommerce businesses can further consider the usefulness of the permissionless Blockchain because as of today they are able to deploy best-of-breed money laundering screening against Bitcoin. As a result, the virtual currency potential evolves to a new level — from possible conduit for money laundering to trusted technology along the economic value chain.”

Peter Randall,
CEO of SETL

BLOCKCHAIN IN THE POST-TRADE ENVIRONMENT

The next quantum leap?

Interview with Peter Randall, CEO of SETL.

Credited with revolutionizing the equity exchange market in Europe through the establishment of Chi-X Europe Ltd, Peter led the company's growth as founder and CEO, from an unknown multilateral trading facility to become one of the top five trading venues in Europe by volumes traded. Prior to Chi-X, Peter was COO at Instinet Europe Ltd, and Executive Director of FIX Protocol Ltd. In March 2015 Peter Randall joined Anthony Culligan and the Roolo management team to help refine the Blockchain proposition for institutional payments and settlement.

Financial IT: Peter, please tell us a bit about SETL and what issues you are planning to solve with your OpenCSD platform.

Peter: We founded SETL because we feel strongly that the time has come to stop talking about the characteristics of Blockchain and to start realising its promise. Our OpenCSD platform will revolutionize the way securities depositories and payments systems are organised. A group of participants can now permission a working Blockchain platform in a matter of minutes and jointly record and settle changes in ownership. This will help bring competition into a segment of financial markets which has thus far been dominated by quasi-monopolistic incumbents.

The OpenCSD platform, which is SETL's first commercial offering, enables any market participant to commission and run a permissioned registry service for payments, settlement and clearing of cash and other financial instruments. The platform is available today and powered by the SETL Blockchain technology, which has been benchmarked to settle billions of transactions a day in real-time.

- The Blockchain- based infrastructure will be fast enough to meet all financial market participants' requests and handle transactions from numerous locations.
- There is the capacity to add billions of transactions each day to the Blockchain.
- The platform handles all anti-money laundering (AML) and Know Your Client (KYC) requirements.
- The distributed ledger technology significantly improves the ability of regulators to pull out the information that they need and to generate reports

Our platform has been designed to be compatible with existing and forthcoming regulations such as the European CSDR. However, it is not specific to any particular regulatory model and, as such, is jurisdictionally agnostic.

The OpenCSD platform links many different market participants involved in large-scale clearing of transactions, including custodians, registrars and payment institutions. It can be used co-operatively or deployed by a single institution to maintain registers for its own customers. The platform is available on a subscription basis and accessible through a secure user interface or API.

We have clients and partners around the world.

Financial IT: Is there any specific need in the market for such type of solutions?

Peter: Absolutely. Consider what Bank of England Governor Mark Carney said in a speech on 16 June. "Central banks lie at the hearts of payment systems, giving households and firms the assurance that transactions have settled in the most secure form of payment: central bank money. To fulfill that role, our payments infrastructure needs to remain fit for purpose: reliable, resilient and robust. But we must also be responsive to changing payments demands. So earlier this year the Bank announced we would be drawing up a blueprint to replace our current real-time gross settlement (RTGS) system, now twenty years old."

"The great promise of distributed ledgers for central banks is their potential to enhance resilience. Distributing the ledger means multiple copies of the system. It can continue to operate if parts get knocked out. That removes the single point of failure risk inherent in a centralized system. But if we are to entrust the heart of our financial system to such technology, it must be robust and reliable[1]."

I'd also note that the adoption of Blockchain may be a quantum leap – rather like China's adoption of micro-host technology through the 1980s and the 1990s. They did not have the telecommunications infrastructure of the 20th century – physical cables and exchanges – so they went straight to the technology of the 21st century.

Financial IT: What is your marketing strategy?

Peter: We have two messages for potential clients and partners. First, the distributed ledgers can do everything that their current systems are doing – and more effectively. Second, joining us gives them the potential of reducing costs and boosting profitability – and doing so more efficiently than if they tried to do it themselves.

[1] http://www.bankofengland.co.uk/publications/Documents/speeches/2016/speech914.pdf

Financial IT

Kris Hansen,
Senior Principal Industry Value Engineering, SAP Canada

No more blocking BLOCKCHAIN

Like most new technologies, Blockchain brings with it a healthy range of skeptics and believers. Blind to that debate are most ordinary consumers, unaware that their banking experience might be about to drastically change. Virtual currencies and distributed ledgers have been around since 2009, carrying a niche yet loyal following and facing strong headwinds from the traditional industry.

Unfazed by the cynicism of some of those in the know and the obliviousness of the general public, Canadian bank ATB Financial just quietly sent out one of the world's first international Blockchain payments. They are firmly in the optimists' camp.

Working with a proof-of-concept created by the pioneering Blockchain network Ripple and underpinned by SAP technology, ATB sent a payment to a German bank in around 20 seconds. This payment would typically have taken up to 6 days to process in the SWIFT system.

As long ago as 2011, the bank had already migrated its legacy banking systems to a real-time digital core – replacing over 1,400 business applications with a new platform. This opened the door to a new world of speed and innovation that banks with legacy systems couldn't get close to.

The Blockchain demo was another big step forward at ATB, and a powerful demonstration of what digitally ready banks and financial IT companies can do if they work together. Right now, though, it is just experimentation. There's a lot of hard work to do before Blockchain goes mainstream.

Blockchain equals fast payments. And what else?

When it does (just a matter of time, I believe), where else could it help? As one retail example, lending is a target-rich environment for process renovation using Blockchain technology. As a concept, Blockchain has several characteristics that could form a solution to the increasingly intrusive complexity affecting the business of lending.

Firstly, its inherent transparency as an open ledger makes all transactions irrefutable and open to incorruptible analysis. Also, in what seems like a strange combination with transparency, Blockchain also offers privacy to lenders and borrowers by not publicly naming the parties involved. Involved parties are of course privy to the relevant facts. Loans are often securitized into other financial instruments like bonds, and keeping this data on the Blockchain maintains a level of integrity and transparency which the downstream assets would benefit from.

Lending is a contract-intensive area of the banking portfolio, and one that carries significant risk and limited trust across the value chain. Loans have an extensive lifecycle: customer facing, product selection, adjudication and pricing, funding and fulfillment, servicing, and securitization or asset management. Customer information gathering is process-intensive on the front end, needing to be validated and confirmed during onboarding to counter fraud and AML threats.

There is no central trust authority in the Blockchain itself. Instead, transactions link to create a form of referential integrity that ensures parts of the chain are not replaced or substituted unknowingly. This, – along with the prohibitive cost and effort involved in even

About Kris Hansen:

Kris Hansen is a Senior Principal, Financial Services at SAP where he is in charge of driving innovation in Canada for the organization. Kris is also a Director of the Digital Finance Institute and the CEO of Digital Payment Partners LLC, a US based company that specializes in financial services technology innovation and embedded payments. Kris describes himself as "a recovering banking chief architect" and in his recovery has been advising banks and financial services startups on topics related to financial services transformation and innovation. In his spare time, Kris is working on a FinTech Radio Show with Christine Duhaime and Janos Barberis, to showcase FinTech talent in Canada, Iran, Asia and wherever FinTech takes them.

attempting to falsify activities on the Blockchain, gives it a level of stability and reliability that paves the way for a revolution in the lending industry.

This is enough to tell you that the potential of Blockchain goes far beyond just the speed at which a payment is made. In ATB's recent case, the Blockchain transaction wasn't just about moving money, but about greatly accelerating the speed of sending information – settling and reconciling the payment. For a corporate customer wanting to make a deal in a faraway locale, this speed could be a differentiator, changing the bank relationship from commodity to strategic.

ATB included a list of email addresses to notify when the payment was complete, ensuring the information was seen by the right people. The demo showed how much Blockchain can do in almost instantly sending money alongside the related and required information.

If the information can be automatically generated, it becomes much easier to include additional information. You can throw in product information, more detailed invoicing, more data related to the transaction for security analysis.

It's all extremely exciting for the financial services industry, but some people maintain that it's simply not realistic to use Blockchain for real-world mainstream applications. To them I say look more closely – don't immediately think of a project that moves the world's largest banks from SWIFT to a Blockchain-based system. That's bound to be overwhelming.

It will be far more incremental than that. Such a radical change will take time, and will happen in thousands of smaller steps. ATB's payment is one of those small steps. Among the first steps in the world of big banking, in fact. Moments like that are what turn theories and discussion into reality. When we see it happen, we know it's possible. When it happens, others follow suit.

Towards the big questions

I feel now as though I've sat in enough tentative meetings about the possible application of Blockchain in financial services. Given great hope by what was achieved with ATB, I'm confident that we are now moving into the world of doing, not just saying.

Part of the reason banks have been hesitant when it comes to Blockchain is the threat its autonomy presents to a significant portion of their workforces. However, there is only so long you can put off technological innovation for the sake of jobs, and I strongly believe Blockchain could be their big ticket to reinvention and renewed relevance.

Whether or not this happens will depend on the application or use case, and how it is deployed in a digital business network. Knowing where to start is a challenge. In my mind, large financial institutions need established technology partners to create a 'safe innovation layer' to connect them via the cloud to the Blockchain. Hosted cloud platforms present the most logical solution to plugging in securely and safely to emerging technologies, ensuring banks can be nimble enough to keep up with the disruptive fintechs without too much risk.

Big questions hang in the air of bank boardrooms– "can the Blockchain really be 100% transparent?", "what are the regulations and compliance restrictions?", and of course "how can a bank of a larger size and with the complexity of our IT hope to adapt to this?" These are not easy questions, but answering them will be a game changer.

Financial IT

Gary Wright,
CEO B.I.S.S, Research, co-founder BAT & Co-Chair ISITC Blockchain Working Group

BLOCKCHAIN DLT: OVERCOMING THE BARRIERS TO CHANGE

To date, discussion about the opportunities from Blockchain has greatly exceeded discussion about the barriers to the adoption of Blockchain. What, exactly, are those barriers to change?

Blockchain DLT (Distributed Ledger Technology) has escaped from its origins in Bitcoin and is now loose in financial markets, where it has been capturing the imagination of financial services firms and new Fintech companies looking to disrupt the status quo. Over the last few years, we have seen a seemingly never-ending flow of use cases: all look to besound propositions when presented and are fuelling a hungry media, eager to gobble up news that appears to have ground-breaking impact.

Yet, despite the excitement generated, and a huge influx of investment by banks and entrepreneurs, we have yet to see any physical manifestation in business, or any implementation that has truly altered the landscape. We are at an early stage in the evolution of Blockchain DLT where talk vastly exceeds action.

However, the level of interest and investment, clearly indicates that this excitement and energy will eventually produce a meaningful business, and benefits at some stage. It may not be the first generation of technology that will provide lift off, but future generations could. Maybe this is not too far away! It only takes an initial success for the doors of opportunity to be flung open wide, and other innovators will quickly follow. This has always been the case with innovation in financial markets and we can anticipate a similar 'follow the leader' effect with Blockchain DLT.

What, then, are the obstacles to fast implementation of Blockchain DLT?

There is no doubt that over-hype and a rush to invest can cause as much confusion in the minds of users, as encourage interest. Unfortunately, this can neutralize and stall the take up of new technology for a while, before things begin to move forward.

In some cases, fear of what the Blockchain will bring into financial markets can block fast implementation. This is a bit like trench warfare, where protectionism and a defensive attitude can stifle innovation, but can be a successful strategy for larger banks, who have more to lose than gain with modernization.

However, should a new idea like, for example, the Internet take off, then banks can be left trailing in the wake of those who readily embrace new technology. Throughout history we have seen, however, that banks have eventually adapted to changing technology. Indeed, new technology has often altered the balance of power, allowing some banks to surge forward and overtake their larger competitors.

Questions of people and budgets

People can also prove a major obstacle to the introduction of new technology. Banks by their very nature are conservative and have a less innovative environment, where employees tend to feel threatened by new technology and often work towards keeping any changes within their known areas of processing and operations. The unknown risks deemed to be inherent in change are always an unwelcome guest in banks, which have reputations and

budgets to protect. Planned IT development budgets, normally set a year in advance, are unlikely to include implementation of new technology. At best there may be some investigation, but this may be extended year on year, with no decision made – let alone implementation.

Today, the pace of technical innovation is very fast and a two or three-year investigation plan is likely to become outdated. Thus, investment by a bank in new technology does not necessarily mean implementation, as this slow assessment cycle makes it difficult for banks to move as fast as the publication of new use cases. Blockchain DLT therefore demands a far more progressive line of thinking by the banks. This technology is more about producing an alternative to existing infrastructures, thus understanding existing systems and processes in the markets is extremely important if an alternative structure is to be created.

Perhaps Blockchain DLT should be operated in parallel with existing systems? This of course would bring its own challenges, but would reduce risk by allowing legacy systems and market structures to be phased out gradually. However, this type of holistic view is very thin on the ground nowadays, as the industry operates with an organisational focal point, where banks compete and don't share information. Whilst it is true that legacy systems and legacy thinking prevails throughout the industry, and protectionism from vested interests form considerable barriers to change.

Finding people that have a detailed knowledge of industry systems and processes is harder than finding a Snow Leopard: it's this lack of knowledge that limits the fast implementation of change. In addition, there appears to be a lack of courage and foresight for a change that could provide, not just a solution to age the old problems of client servicing, but one that could deliver a real transformation to market structures, and help to future proof the financial services industry.

Data quality

A key component of all Blockchains, is the quality of the data. It's a case of 'rubbish in rubbish out'. It sounds simplistic, but it's true. No system can be operated to any degree of success if the data is not of the required quality and is not available when needed. There have been long standing efforts over many decades to resolve data quality problems, yet all have failed. Data sharing between industry participants would help to raise the quality standards, with Blockchain DLT such sharing becomes a possibility.

Sharing data may also begin the process of resolving the all too common problem of legacy system data silos: Blockchain could be a key solution, in this respect, for both internal banking systems as well as industry utilities. It's highly unlikely any firm will risk ripping out any legacy systems before having the confidence that their chosen Blockchain solution can operate successfully.

So, one of the first questions that needs to be asked is: how can my legacy system provide data into the Blockchain solution? It sounds a fundamental question and it is, but it's one that many use cases fail to address. This question about transiting to Blockchain is as important as what Blockchain solution should we choose!

Security is paramount

In today's world where security is of paramount importance, Blockchain DLT has a huge advantage, once in the chain, the security of data can be assured. Also assured are the transparency and controlled access, However, getting the data into the Blockchain is a vital task and necessitates inter-operability.

With a number of organisations developing their own Blockchain solutions, inter-operability between different Blockchains and legacy systems looks to be a clear hurdle that needs to be overcome. Inter-operability is often synonymous with standards and it's here where the financial markets are lacking. When standards are discussed it usually relates to message standards, but there are many more de facto standards in operation. Even FIX is still a de facto standard, with the protocol, industry accepted rather than approved by the International Standards Organisation (ISO).

Gaining approval by ISO for a standard takes time. The procedures and committees demand that all tests and boxes be ticked. We are talking decades here, rather than years. Of course is not nearly fast enough for financial markets and firms, urgently needing to evolve their businesses and supporting technology.

ISITC Europe recently announced an initiative to list and define the standards required to implement and operate a Blockchain DLT system. This is an important project and will have wholesale benefits not only in terms of selection and development, but also in the creation of an architecture that is married to industry wide standards. Work on the Blockchain DLT standards has only just started, but it looks to be vital to accelerate Blockchain DLT implementation.

The current vogue for Blockchain technology means that Blockchain companies/developers are charging premium prices, even though the technology is relatively simple. Inevitably, this will subside, as the industry come to terms with the technology, and what it can do. So, there is no need to rush and make a bad decision!

Choosing the right partner

There are a growing number of Blockchain vendors flooding the market and its difficulty to know which one to choose. All will look good and many have already gained significant financial backing. It's best not to be swayed by rhetoric, backing, or flashy demonstrations, but to dig deep into the technology architecture, and probably more importantly, understand what problem you are trying to solve and what business benefits you are hoping to accrue.

The opportunities afforded by Blockchain are numerous and need to be considered by the user from the outset. There is a good case for internal application, for example, a firm might want to link their client account information throughout the various operational areas. This might replace a number of databases and systems providing a central point of control and access. Another design feature within the Blockchain might include a smart contract, which brings benefits in streamlining operational functions, facilitating some systems redundancy.

We don't know the future of Blockchain DLT. We cannot say if this is the technology that will change global financial markets, but we can say that this technology is an important stepping stone to change, and where centralised markets and processing can move to a decentralised model. We don't know when, but I bet it will be sooner rather than later and the thinking and planning has started.

Financial IT

Donna Dillenberger,
IBM Fellow, Enterprise Solutions

STARTING WITH SECURITY

What organizations must consider before embracing blockchain

The story around Blockchain over the past several months has been one of ascent. Organizations of all sizes are fascinated and eager to learn how the technology can transform their businesses. Now, companies are beginning to move from concepts and small test cases to larger implementations and real-world solutions that improve day-to-day operations or uncover new revenue streams.

Similar to other technology revolutions – such as the Internet, big data, IoT – the initial wave of excitement and expansion of the technology into the mainstream is soon followed by questions. How does it work on a larger scale? Does it truly make businesses more efficient? Can it boost my bottom line? Is it secure enough for my business assets?

Blockchain, though it relies on encryption and is immutable in nature – such that an attacker would have to go back and change all of the blocks in the chain to alter its data, an extremely complex and time-consuming task – cannot be completely immune to the most skilled and determined cyber criminals. It's not just the outside threats that companies should be concerned about, however. With more than half of all attacks originating from within an organization, it's critical that the Blockchain be impenetrable to malicious users that may have obtained system administrator or root user credentials.

Why Blockchain security matters

Keeping the Blockchain secure and ensuring the integrity of the overall business process is critical because of the broad range of potential uses for the open ledger technology. Most often when we hear about Blockchain projects and innovation, it's around banking transactions, contracts, or, as it's traditionally been most well-known for, trading Bitcoin.

But it's not just financial systems or currencies that Blockchain assigns value to, tracks and regulates. It can help identify and trace just about anything of value through its lifecycle. In a way, Blockchain helps democratize the very idea of value. After all, what a $10 million fund is to a hedge fund manager in New York City could be of similar relative value to a small plot of land to a coffee picker in Nicaragua.

No matter the item of value, Blockchain can track it as it changes hands, appreciates or depreciates and is exchanged for other

goods or services. Due to the ledger's immutability, Blockchain can ensure that the item is not tampered with or altered. Neither the hedge fund manager nor the farmer are subjected to third-party fees as the transaction is settled or the contract is fulfilled. With Blockchain, no preferential treatment is given based on one party's socioeconomic status, background or otherwise – Blockchain ensures a degree of trust that does not require linkage to personal information, helping ensure privacy. Blockchain helps further trust between parties that do not know each other, streamlining exchanges of value.

The trust factor

A unifying theme for all of these uses, though, is trust. Whether it's stocks, real estate deals, marriage licenses or even new forms of currency, Blockchain will only serve its purpose if the trust that's built in as a cornerstone to the technology remains intact, without being compromised by cyber criminals, so that end users can be absolutely certain that every transaction is valid.

So, how do organizations adopting Blockchain work to preserve this trust? There are five components they should look for at the infrastructure level to help ensure Blockchains run in a secure environment that protects all data that flows through it from threats.

1. ***Isolated partitions*** – Logical partitions are a way of isolating workloads and running them alongside one another on the same system, without crossover. This enables Blockchain peers to run in protected environments to prevent leaks through shared memory.
2. ***Fast, tamper-resistant cryptography*** – Encrypting Blockchain data and transactions is essential but traditionally perceived as compromising system throughput and response time, and therefore has been a barrier for IT departments. Systems that can encrypt without compromising throughput will help the transactions that make up Blockchain be completed in a timely and secure manner. Tamper-resistant crypto key storage and memory ensures that encryption keys are never exposed. This is important because if somebody has access to the encryption keys, Blockchain data is at risk.
3. ***Real-time security and communications*** – Secure systems for Blockchain should include hardware accelerators for encryption and authentication functions. In addition, virtual machines on the system must be able to communicate with one another in near real-time either through network connections that provide improvements in response time and throughput, or by being hosted on the same system as one another and taking advantage of secure, accelerated, optimized communication paths between virtual machines.
4. ***Attestation*** – Vendors can include signed and encrypted certificates within appliances on the system – such as containers – that can prove authenticity in communicating with remote parties. For example, an SSL certificate built into an appliance will always remain encrypted within it and cannot be changed, ensuring genuine communication throughout the appliance's lifecycle.
5. ***Standards-based security*** – The best systems to ensure secure Blockchain transactions are those that are certified to meet stringent industry standards. Systems that meet high Evaluation Assurance Levels (EAL) and Federal Information Processing Standard (FIPS) 140-2 Level 4 standards are essential for Blockchain networks. EAL indicates a system's ability to isolate data and workloads on a network to prevent one party from leaking into another environment through shared memory or other hardware. FIPS indicates a complete envelope of protection around the cryptographic function, which allows the organization to detect and respond to unauthorized access attempts.

Trust as a guiding principle

One company already following these steps to ensure security and trust in their Blockchain applications is Everledger, a UK-based startup that is building a digital business network using a variety of Blockchain solutions to power its global certification system to track valuable items through the supply chain. As a result, Everledger is helping to protect suppliers, buyers and shippers against theft, counterfeiting and other forms of corruption.

Everledger uses Blockchain to protect the provenance of high-value goods such as diamonds, fine art and luxury goods. In an industry such as the sale of diamonds, which is highly vulnerable to fraudulent activity, Everledger is helping to protect buyers and sellers by providing a Blockchain-based ledger that allows stakeholders throughout the supply chain to cross-reference identifying characteristics of the stones against the ledger to ensure authenticity of both the item and its associated transactional history. Trust is now built into the ledger, not a (potentially fraudulent) third party.

For Everledger CEO and Founder Leanne Kemp, it's the ability to apply Blockchain technology to any item of value that makes it truly unique and drives what Everledger does. "Blockchain is an amazing innovation for a number of specific industry use cases alone," she says. "We are using it to find ways to help stamp out fraud in the diamond trade, and bring a reputation layer to international trade and open marketplaces online. The importance of this technology lies well beyond the industry's core trade; the ability to protect items of value or national treasures is of paramount importance to heritage, whether that be people or nations. If we can improve even one person's life by applying Blockchain technology, we'll have been successful."

A lynchpin in Everledger's business is the ability to securely track items — without risking that the data on the Blockchain will be intercepted by malicious attackers. Without being able to deliver secure Blockchain solutions, the company would have difficulty making a true impact.

Everledger is far from alone. Innovative organizations large and small are racing to implement Blockchain solutions to optimize their businesses. Companies around the world – from banks to retailers to shipping and logistics organizations – are working on concepts, test cases and implementations of Blockchain, all while implementing security safeguards to guide their process.

As they begin to roll out Blockchain-based solutions, these businesses would be wise to consider ways to harden cloud-based Blockchain solutions' barriers to threats – both insider and outsider. By examining the underlying IT infrastructure that runs Blockchains – or supports cloud-based Blockchains – organizations like Everledger and others can add an additional layer of protection and better position themselves as true leaders in bringing Blockchain to business.

Financial IT

Aurélien Menant,
CEO & Co-Founder, Gatecoin

THE NEXT IMPACT OF BLOCKCHAIN ON FINANCIAL MARKETS?

Investors are looking for new alternative assets. Those alternative assets could be blockchain assets.

A blockchain asset is any digital asset, commodity or currency derived from an application built on a decentralized blockchain. Several types of blockchain assets have already gained traction among traders, investors and merchants over the last few years, such as bitcoin and Ether. We are seeing a continuation of this trend thanks to all the hype around blockchain and extensive media coverage of bitcoin.

2016 has brought Brexit induced stock market volatility, falling commodity prices, debt and real-estate bubbles, dismal returns for hedge funds and significant losses for major private equity firms. In this context, blockchain assets present a major opportunity for investors and funds looking for an alternative with little correlation to other assets and superior absolute performance.

If we just look at ether, the fuel or currency of Ethereum blockchain, the price has increased by 1500% since the asset was launched in mid-2015 and already has the second highest market capitalization (above US$1 billion) for blockchain assets after bitcoin, which was released in 2009. Driving this price increase is confidence in the growth of the Ethereum ecosystem, with more developers and corporations using the platform to build innovative decentralized applications and organizations run on smart contracts.

The long term potential of Ethereum has also been recognized by major global firms such as Microsoft, UBS, IBM and Deloitte among others, that have been experimenting with smart contracts. The growth and viability of the ecosystem with tangible applications in development, provides significant weight behind the underlying value of ether.

Recognizing the promise of Ethereum early on, Gatecoin was the world's first exchange to list ether, which significantly boosted our trading volumes especially after the price took off in early 2016. We have also been a first mover to list other Ethereum blockchain assets aside from ether, including several 'tokens' (equivalent to shares, voting or usage rights) of ambitious decentralized applications and organizations.

Other opportunities emerging from the Ethereum ecosystem

Starting with Augur, a decentralized prediction market (currently in beta phase), which uses 'reputation' or REP as its token to place bets, we have also enabled participation in the crowd sale of The DAO, a decentralized venture capital fund and listed DigixDAO, a decentralized organization that creates digital tokens for physical assets such as gold.

In the case of The DAO and DigixDAO, token holders are entitled to a share of the profits made by the organization and have decision-making power proportional to the number of tokens they hold. In the case of The DAO, tokens can also be used in exchange for the services provided by the decentralized applications in which The DAO invests.

We view the issuance of tokens for decentralized autonomous organizations (DAOs) as a novel way for startups to raise capital and providing a more democratic decision making process for investors. Anyone can participate in a DAO's crowd sale or initial coin offering (ICO).

In March 2016, DigixDAO completed the first ever crowd sale on the Ethereum, and surpassed expectations by reaching its US$5.5 million target within 12 hours. The DAO raised more than US$150 million during its 28 day 'creation phase' (crowd sale), garnering worldwide interest from both media and investors. All this attention attracted malicious actors to exploit (known) vulnerabilities in the code of the (no so) smart contract underpinning The DAO, enabling them to cipher US$60 million equivalent from the fund. This resulted in the Ethereum community to vote for a 'hard fork', which effectively disavows The DAO's compromised funds in a new strand of the blockchain and will likely lead to stricter, self-imposed capital raising limits for future crowd sales.

Despite these growing pains in the Ethereum ecosystem, there are many promising decentralized applications - or dapps - that are already available or soon to be released. Dapps offer many advantages such as greater

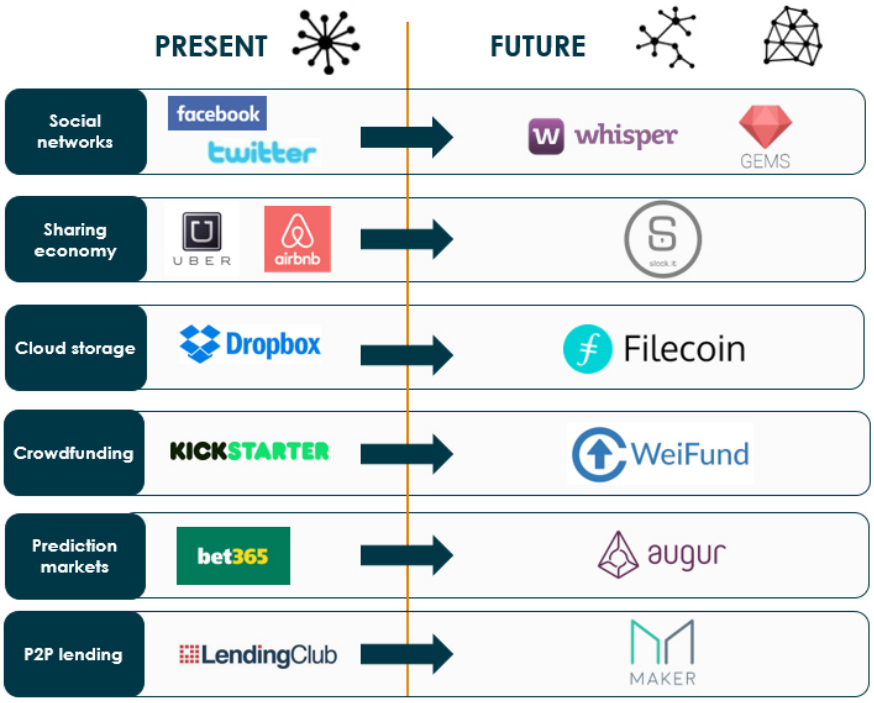
About Aurélien Menant:

Aurélien is co-founder and CEO of Gatecoin, a regulated online trading platform for cryptocurrency and blockchain assets based in Hong Kong. A former investment banker, working for major global CIBs in Europe and Hong Kong, Aurélien quit the banking world in 2013 to start Gatecoin, following his discovery and new found passion for bitcoin and blockchain technologies. He has a BSc in Engineering from UPMC, Paris VI and a MSc in Management from EM Lyon Business School. Aurélien is a well-known member of the bitcoin community and regularly speaks at conferences and events. He is also a founding member of the bitcoin Association of Hong Kong.

security, no threat of censorship, fraud, downtime or third party interference and intuitive computer languages for their creators. As there is an app for almost everything today, there will be a dapp for everything as well. Taking this further, we believe that dapps with be the disruptors of the disruptors, challenging the models or established players as in the table below.

Besides the advantages for startups and developers building applications and organizations on top of Ethereum and other decentralized blockchains, tokenization has broad implications for the future of financial markets.

Mostly likely, this will start with commodities, where it's possible for units of precious metals such as gold, copper, diamonds to be tokenized on top of blockchains such as Ethereum. Once tokenized, these physical assets are fully fungible and can then be traded globally across any market with instant settlement. Digix the company behind DigixDAO is the pioneer, with their Ethereum based gold token, DGX, where each token represents 1 gram of 99.99% LBMA standard gold and is fully redeemable for physical gold. Gatecoin also plans to list DGX on our trading platform once it is released later this year.



The potential of tokenization could then be expanded across the financial markets spectrum to include securities, real estate, debt, etc. with blockchains providing more transparency and efficiency to markets, and preventing the repeat of opacity and corruption which lead to the global financial crisis.

In the long term, blockchain assets will be a highly lucrative and transparent alternative investment for those seeking to gain from the innovations of the decentralized economy or enjoy the faster speed and efficiency of financial markets.

For blockchain assets to be considered an integral part of investment portfolios there needs to be clear and universal regulatory guidelines, reputable industry associations and increased awareness among mainstream investors and financial industry professionals.

Stefan Thomas,
CTO of Ripple

THE SUBTLE TYRANNY OF BLOCKCHAIN

Re-learning old lessons about shared state

The past months have become a new chapter in the evolution of blockchain technology. Ethereum's fork in the wake of the DAO hacks. Bitcoin's almost-fork in the wake of the (still unresolved) block size debate. All of this is leading to the growing frustration and even disillusionment of key figures in the crypto-currency community.

I left the Bitcoin community in 2012 for very similar reasons. In 2011, I was part of the group that helped Gavin Andresen design the Pay-to-Script-Hash (P2SH) feature. The design wasn't very complex, it was backwards-compatible and provided crucial building blocks for improving Bitcoin's security and performance.

In a blockchain, everyone has to think the same.

Unfortunately, getting it deployed turned out to be very political. It was easy to extrapolate from this change to more advanced functionality still on the roadmap and get depressed about our chances to make important progress in the future. As the Bitcoin price rose, the number of stakeholders expanded and the amount of money at stake increasingly dominated the technical discussion.

Blockchains are systems of central state

With this context in mind, the recent situation with Ethereum is not surprising in the slightest. As a blockchain grows, the larger and highly vested userbase becomes more and more difficult to shepherd. When combined with time pressure (i.e. the 27-day DAO split creation period), something had to give. There wasn't enough time to get the sort of buy-in and preparation needed to safely hardfork a system like Ethereum.

At the root of the difficulty in updating blockchains is the need to maintain shared state. In any protocol, everyone has to act the same. But in a blockchain like Ethereum, everyone has to think the same. Everyone's memory (also known as "state" in computer science terms) has to be exactly the same and evolve according to the same rules.

Shared state adds tremendous complexity and that has a big impact on developers: Blockchains are a pain to work with. Everyone who has done it knows what I'm talking about. The fact that blockchain has been largely ignored by major tech companies and embraced by the financial industry is partly because that industry has a relatively high tolerance for arcane and complex systems.

Harmony and consensus are valuable. If we didn't agree on who is president or how much money is in anyone's bank account, society would be unable to function. But harmony taken to the extreme becomes a detriment. In the Lego Movie utopia, "everything is awesome" only on the surface. Behind the scenes, there is tremendous diversity and a rapidly changing world, which doesn't match the established consensus.

So how do we find the right balance between too much consensus and too little?

Xanadu and the Web

I expect that almost everyone is familiar with the World Wide Web. That's probably where you are reading this very article. What you may not know is that there was a much older project, started all the way back in the 60s called Project Xanadu. Not only had Xanadu been around for longer, it also had a significantly more ambitious feature set than the Web. There would be no broken links in Xanadu and two-way links would be possible as well.

There are many reasons why the Web won in the end, but I believe its stateless architecture was critical to its success. Both Xanadu and the web are decentralized, but the web was much simpler. All it required was a minimal protocol and simple data format. No interaction was needed between websites, which meant that they could evolve independently from each other, and rather than waiting for the Xanadu creators to add a feature, many features that users cared about could be created just by changing a website or a client.

Instead of blindly replacing centralized functions with blockchains, we should be thinking about ways to avoid having those functions be centralized to begin with.

As active participants of the W3C and IETF, we're always fascinated by the process by which the technology powering the web is updated. For instance, HTTP 2 was implemented under the name "SPDY" by Google who happened to control a number of web servers (Google Search, Gmail, etc.) and clients (Google Chrome). The fact that one corner of the system can be updated and good ideas can eventually spread to the system as a whole has been essential for the Web's ability to keep pace with technological innovation.

A better way

What can the blockchain industry learn from Xanadu and the world of Web standards? Instead of blindly replacing centralized functions with blockchains, we should be thinking about ways to avoid having those functions be centralized to begin with. We need to build stateless protocols like the Web that can be incrementally improved upon in different corners of the system.

To illustrate what I am talking about, let's consider the example of payments. Bitcoin is a replacement for existing centralized ledgers like the credit card networks. This is arguably a great idea. But Bitcoin still has a lot of shared rules that participants must agree to. I need to be on board with using proof-of-work as the consensus mechanism. I need to agree to the currency distribution function. I need to be ok with the block size limit. I need to accept the lack of anonymity.

By contrast, in adding one more layer of abstraction, the Interledger Protocol allows me to choose a ledger that has the consensus mechanism, the currency, the performance characteristics and the level of anonymity that I like and still seamlessly transact with someone who has made different choices in each of these categories.

That doesn't mean that Interledger doesn't require any agreement — we still need a common data format for instance. However, these choices aren't going to affect me economically or politically nearly as much, which makes it easier to compromise. And, crucially, we don't share global state, so at least our thoughts can be—once again—our own.

Financial IT

A different kind of FOREX MARKET

Interview with Nejc Kodrič, CEO and co-founder of Bitstamp

Nejc Kodrič,
CEO and co-founder of Bitstamp

Financial IT: Can you please describe the history of your company? What's the main sector you serve technologically and geographically?

Nejc: We are one of the first Bitcoin exchanges globally. We started our business five years ago, when we saw that Bitcoin could have a revolutionary impact on finance. Sticking to this vision, we have managed to grow to be one of the largest player in this market. With effect from the beginning of July 2016, we have become the only company in the industry properly licensed as a financial institution. We have 35 employees, and three offices around the world. We serve 600,000 international clients.

Financial IT: What is the flagship offering of your company? Please explain what you see as being your competitive advantage.

Nejc: Our core service / business is Bitcoin exchange. We are a market where users can exchange euros and US dollars for Bitcoins and vice versa.

We are proud of our reputation, both among our clients and in the industry generally. We understand that our clients are looking for security, stability and good service. As pioneers, we would argue that our understanding of the Bitcoin market is as good as that of any organization.

Financial IT: How do you think that Bitcoin will change the world's financial system?

Nejc: First, it is important to remember that Bitcoin is money. It could easily be used as a unit of account. It is a store of value and of deferred value. It is also, of course, a means of exchange.

As noted, we had the vision that the impact of Bitcoin, and of the Blockchain Distributed Ledger Technology (DLT) that underpins it would be enormous. Because Bitcoin is a crypto-currency, where trust is generated by the technology that underpins it – rather than an actual or explicit central bank or government guarantee, we see Bitcoin as a symbol of the democratization of finance.

Democratization means many things. Democratization could involve people getting a better understanding of the mechanics behind money. It could involve greater access by the presently unbanked. It could involve remittances of money across borders at low cost. It could involve micro-transactions, because a single Bitcoin is divisible to eight decimal places.

Financial IT: What are the main challenges that you face?

Nejc: For a long time, our main focus was on getting regulatory approval and a suitable licence. We are delighted that, with effect from the beginning of July 2016, we have been licensed by the Commission de Surveillance du Secteur Financier (CSSF – the Luxembourg regulator). Looking forward, we see a need for a greater number of players who are also licenced. This will enable brokerage of Bitcoins to move to the mainstream.

Financial IT: Please comment on the likely spread of Blockchain DLT?

Nejc: We can comment on the spread of Blockchain as far as it affects our business. We are a licensed exchange where Bitcoins can be traded. Because we are licensed, we are accepted by banks as being an equal partner. That should boost trading volumes. By definition, greater usage of and trading in Bitcoins means greater acceptance of Blockchain. Taking a longer view, Blockchain will grow in importance as crypto-currencies move towards the mainstream.

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Financial IT

SolidX: the fintech company and educator

Interview with Bryan Reyhani, the Chief Commercial Officer of SolidX

Traditionally, organizations that have had to authenticate the identities of employees or clients have depended on centralized records of shared secrets – usernames and passwords. These centralized records are vulnerable to attack by cyber-criminals. SolidX has launched its Vida platform, which uses Blockchain technology to decentralize identifying information and eliminate the cyber risks of a centralized system. As Bryan Reyhani, the Chief Commercial Officer of SolidX explains, technology companies need to do more to educate potential clients about the specific issues that Blockchain-based solutions can address.

Bryan Reyhani,
the Chief Commercial Officer of SolidX

Financial IT: Bryan, can you please describe SolidX's experience with Blockchain technology?

Bryan: "We decided to build a Blockchain-based identity application that will be useful for the financial services industry and multiple other sectors. In July 2016, we launched our platform, Vida: this is a Blockchain-based decentralized identity management solution. Because it is decentralized, there is no centralized honeypot of personal identifying information that cyber-criminals can attack. Yet, organizations can still authenticate identities without the need to hold the shared secrets of usernames and passwords on a central server. Currently we are speaking with financial services companies, insurers, information dissemination companies, and other organizations which have to authenticate, credentialize or provide entitlements to individuals internally or externally."

Financial IT: Can you please explain how Vida works?

Bryan: "An organization that uses Vida is an organization that wants to eliminate centralized liabilities, improve the status quo of cyber-security, and provide individuals a streamlined user experience. Vida is what we believe to be the first full-stack identity platform – providing everything from authentication, attestations, access management, and other attributes that are tied to one's identity. From an authentication perspective, Vida allows individuals access to an organization's systems on the basis of blockchain-established identifiers and PKI (public key infrastructure). Various levels of entitlement access are simple to establish, as is the decommissioning and recommissioning of network access. Individuals use private keys only stored on their mobile device as part of the authentication mechanism. If the mobile device is lost, setting up a new device takes just minutes, and that process can be done by someone you know, without the need to relay PII to call centers and the like. No matter the new device, the identity of the user remains unchanged."

Financial IT: In your opinion, what will determine the speed of adoption of Blockchain in the financial sector?

Bryan: "The biggest challenge for financial services companies in terms of Blockchain adoption is education. Blockchain remains in the midst of the hype cycle and is being bandied about as a panacea for all technology ills within a company – which it is not. But Blockchain technology is very good for certain purposes. And one of those purposes is authentication of identities without dependence on a central server. We help potential clients that have had issues with authentication of clients or employees, or cyber-security problems, by educating them as to the potential of Blockchain-based solutions such as Vida. We are educators, not evangelizers, and certainly advise companies when potential Blockchain-based applications are no better than centralized systems. There of course are other niches where Blockchain technology looks very promising. But we have no doubt that it will come to play a key role in identity management."

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Financial IT

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Questions of Costs and Trust

Once crypto-currencies become trusted for cross-border payments, they could produce a massive reduction in the cost of transferring money from one country to another.

Have you ever tried sending a payment across borders? If it were to the U.K. or somewhere in Europe it likely went smoothly. If it was one of the BRIC countries, Spanish speaking South America, or the any of the developing nations on the Pacific Rim, you understand the painstaking experience of figuring out how to send money to these countries and then hoping your transfer makes it to the intended destination.

Technologies like Venmo here in the U.S. mean that sending payments is only a little more complex than sending an email. If you're trying to do the same thing to any of the more difficult countries I mentioned above, you can wait five to fifteen days and lose an average of 8% (

(https://remittanceprices.worldbank.org/) to the legacy banking system that's handling your money.

I know this subject only too well as the founder of an international payroll and payment processing company called Bitwage. We use Blockchain technology in order to reduce transfers to same or next day in these hard to reach countries, with fees averaging just 1% above the interbank rates.

The Blockchain is a "cryptographically protected immutable public ledger". What that means is that complex mathematics are used to write a stream of transactions into a distributed database in such a fashion that no one can go back in time and "cook the books". As a result, you are able to replace intermediary entities, previously used to build a chain of trust between two entities with very little knowledge about one another. Instead, the Blockchain itself acts as the trusted intermediary, and it's much cheaper.

Although only eight years old, the first Blockchain that has been successfully implemented is valued at over $9 billion as I write, with over $60 million worth of its tokens of value changing hands in the last twenty four hours. The large, diverse pool of industry participants on top of this public ledger provides the liquidity companies like ours need to safely transfer payroll and payments across international borders.

This is the Bitcoin Blockchain
The old style of cross-border payments

Before getting too deep into the details of how we move funds across borders, it is important to understand the other options for payments. There are two typical ways to make transfers; bank wires and floating funds.

Bank wires are the traditional way of sending money internationally. They use a system called correspondent banking to move money between institutions. Each bank has it's own private ledger, which is maintained to keep customer balances private and to reduce information that competitors can use. However, because they have private ledgers, when a small bank in South Africa sends an email to a small bank in Argentina saying "I just sent you $10,000", the small bank in Argentina would automatically not trust the message. The bank in Argentina is going to think "How do I know this bank actually sent the value? How do I even know it had this much value to begin with?". Remember, each bank has a private ledger, so that information is not publicly visible.

Instead, what happens is that banks have bank accounts with one another called correspondent accounts. Let's say I have a bank account at Bank of America (BofA) and a friend has a bank account at Wells Fargo. If I want to send her money, it moves from my account on BofA to Wells Fargo's account on BofA, then Wells Fargo will register this payment, moving funds out of BofA's account on Wells Fargo into her account. This is all good when there are direct connections between banks, but this is not the case when sending payments across borders, especially when you are sending to developing nations.

In order to manage correspondent accounts, banks require a certain level of trust with the institutions they maintain accounts with, which typically depends on geographic proximity and access to large amounts of capital. As a result, you find chains of inter-

About Jonathan Chester:

Jonathan Chester is founder and President of Bitwage, a blockchain-powered international wage payment and payment processing company named top 7 blockchain companies in the US and top 21 in the world. He is also contributor on forbes for all things bitcoin & blockchain related. Jonathan has been featured in Entrepreneur magazine and spoken in front of members of the European Parliament regarding regulation of the blockchain industry as well as for the Amsterdam Institute of Finance and conferences such as SCAPayments, Transact15 and Inside Bitcoins.

mediary banks sending money to each other until the funds hit their destination. This is the slowest and most expensive way to send money across borders.

The second method of sending money across borders requires the financial institution to maintain capital in multiple countries. This method is similar to Hawala, the international money transfer system which adheres to Islamic jurisprudence. This is often defined as "money transfer without money movement" Using this mechanism, an entity in the source country receives a payment and then informs an entity in the recipient's country to pay out.

This is how Western Union and some more recent fintech companies facilitate international payments, only they themselves have branch businesses in each country they service, instead of relying on a third party person or entity to do the last mile distribution. This might seem like it removes the intermediaries, and it does, but only so long as the business maintains a symmetric flow of cash to and from a given country.

The float method gets tricky when there is an imbalance of funds flowing, which often happens in payment corridors between a developed and a developing nation. The company's funds in the originating country build up, while the funds in the destination country are drained. Instead of many small payments from the origin to the destination there are periodic reconciliations leading to large payments. Since there are large, regular transactions the company involved can do some shopping, but they still face the correspondent banking system to make the replenishment transfer.

Any transactions that move through bank wires are slow and costly, which means the more money that has to be reconciled, the larger the fee. Additional fees and risks include the cost of capital sitting idly in a bank account until it is needed and foreign exchange risk, as exchange rates change significantly between when payments and reconciliations occur.

The new paradigm

Blockchain payments are an entirely new paradigm. Buying Bitcoin using one fiat currency then selling it immediately for another fiat currency, you have achieved nearly instant settlement across borders with minimal fees.

Without needing a bi-directional flow of payments within any particular corridor, you are able to achieve next day to same day payments with access to some of the best and most direct exchange rates in the world. Why exactly does this happen again? Remember that the Blockchain, unlike the ledgers used within the correspondent banking system, is a public ledger, albeit an incredibly secure ledger that enables personal privacy.

As a result, in the example of the small bank in South Africa sending a payment to the small bank in Argentina, when the bank in Argentina receives an email that says, "I just sent you $10,000 through the Blockchain", there is a link they can click in the email, that brings them to a public ledger they can verify. When we put funds on the Blockchain the party on the other end will have an immutable, public confirmation of the transfer. The Blockchain replaces the need to build a bridge of trust through the antiquated correspondent banking system.

So why isn't everyone doing this already? The reason is trust and the conservative views of most entities that handle money. Banks are an old idea, Banca Monte dei Paschi di Siena has been around since 1472. Western Union started moving money in 1871 and its second biggest competitor, MoneyGram, was founded in 1940.

The first Blockchain, Bitcoin, was only just developed in 2009 and companies like Bitwage, which leverage the Blockchain as a value movement mechanism, have only been around since about 2014. Luckily, unlike the years when banking and companies like western union were just beginning, information moves at lightning speeds with the internet, and soon, so will payments through the web of trust.

Financial IT

Martijn Groot,
VP Product Management, Asset Control

ASSET CONTROL

CREATING A SHARED SERVICE FOR FRTB COMPLIANCE

Financial institutions are increasingly leveraging shared services, from enabling Know Your Customer (KYC) compliance to post-trade reference data management, in order to reduce both cost and compliance resources. And, as the new data requirements associated with the Fundamental Review of the Trading Book (FRTB) become clearer, whether it is the new risk models or the depth of historical information requirements, there is growing industry concern regarding the challenges ahead and the tight timescales.

From quote collection to risk factor approval, organisations are beginning to question the viability of institution-specific compliance activity. While there are without doubt challenges to address in areas such as instrument classification and determining the modellability of risk factors, the potential upsides of a single service approach that leverages data pooling and data sharing to mutualise the modellability of risk factor creation and approval are compelling.

Martijn Groot, VP Product Management, Asset Control examines the opportunity for a mid-office shared service to address the complexity of FRTB compliance.

Early Collaboration

It has become patently clear over the past decade that early collaboration with regulators is now an essential part of the compliance process. As organisations progressively look for commonalities in regulatory data requirements, it is the industry's feedback and input into the procedures and standards needed to realise each specific requirement that are now underpinning the necessary change management programmes.

The Fundamental Review of the Trading Book (FRTB) is a prime example. Since its finalisation in January, organisations have started to get to grips with the data requirements associated with this new need to calculate and report market risk and the refreshed risk modelling methodology. FRTB's replacement of Value-at-Risk (VaR) with expected shortfall (ES) as the standard risk measure has very significant data implications.

Most notably, the concept of non-modellable risk factors (NMRF) will mandate banks demonstrate that the data going into their risk models is real and derived from actual transactions or committed quotes. The expected shortfall measure itself will be calibrated on a history of 10 years. Regulators have become more prescriptive; not only on the content of the data (length of history and modellability), but also on the enterprise-wide integration and the explicit links to P&L and Prudent Valuation.

The depth, range, volume and quality of information now required is unprecedented. Where Basel II risk engines could work with relatively simple price histories, FRTB requires them to be managed as risk factors, which implies an understanding of their behaviour and relationships. Apart from that, data quality isn't just for modellability, the increased computation requirements mean that data errors become harder and more expensive to correct.

Historical Data

From a data management perspective this will demand the collection, analysis, validation and reporting of information across multiple product silos, organisational entities and risk areas. And it raises two key issues: the need for a common data foundation and access to a depth of historical time series information. However, FRTB is just one component of a reinvigorated focus on historical data.

About Martijn Groot:

Martijn Groot leads Asset Control's Product Management division, steering the company's strategy for innovation and directing product investment and communications. Martijn has unrivalled financial and risk experience, as well as extensive knowledge of Asset Control's customers, having held Market Strategy and Business Development roles here prior to re-joining the company in 2015. A published author, with an MBA from INSEAD, Martijn's career history spans a variety of areas, including software development, financial analytics, risk, product and consultancy, at firms such as ABN AMRO, Euroclear and IGATE.

From identifying gaps in history to flagging history that doesn't qualify for use due to inaccuracy and adding external data sources and proxies, institutions need to create a strong information management architecture to support the growing regulatory focus on historical time series data.

Does it, however, make sense for each and every institution to collect transactional data, identify gaps, introduce new sources and validate ten years of history across every single risk factor? Few, if any, institutions routinely store real price data, therefore collaboration will be required at some level to fill the gaps. If each bank seeks to solve this data gap separately not only will costs rise but there will still be a risk of data gaps and inconsistency.

There is clearly an opportunity for a shared service model, where one provider undertakes to consolidate this information and provide it as a service to the market.

Data Challenge

The challenges with creating this unified model will be in defining a common understanding of risk factors and then mapping and cross referencing this data. The role of EDM will be key – enabling the collection and reconciliation of quotation data in multiple different formats from numerous banks and cross-referencing different instrument classes and alternative ways of labelling the same financial product types.

With a common data foundation and a common basis upon which to create or derive the various risk factors, the contribution of quotes to the shared service by multiple organisations will resolve the data acquisition problem. There should be no gaps, and hence no need for complex estimates. The shared service can then leverage the data foundation and data resource to undertake risk factor mapping and provide proof of modellability. The resultant 'on-demand' service would deliver institutions a cost effective risk data foundation, overcoming all the traditional data collection and data supply chain costs and integration issues.

The benefits would extend beyond financial institutions: regulators would have to approve this shared facility but, once risk factors and definitions are agreed, only the shared service would require audit, not each individual bank, significantly reducing the burden on each regulator.

Proven Approach

The way the market has responded to other regulatory requirements – such as KYC – with new, consolidated data providers clearly demonstrates the industry's appetite for shared services. Given the challenges now faced by financial institutions in meeting the FRTB reporting requirements, there is a strong case for collaboration in the middle office.

With the time constraints associated with FRTB, is it really viable to source and validate the required data, from multiple internal and external sources; map that data to risk factors and prove that it has sufficient market data to be deemed modellable?

By sharing the data collection burden and creating a single, audited model for data structure and risk definition, a shared service will enable institutions to significantly reduce the financial and resource overhead associated with FRTB compliance.

The onus is now on the industry to engage in communication with regulatory bodies and embark on a collaborative process to realise the benefits of this shared service approach.

Financial IT

Abhi Dobhal,
VP Business Development of Factom.

factom

BLOCKCHAIN AND THE FUTURE OF BANKING

A key strength of Blockchain is that it generates trust. What could this mean in practice for banks?

Bitcoin proved how a Blockchain could be used as a reliable "payment rail" to transfer value. What was implied, but under-appreciated for a long time, was the use of Blockchain as a "trust rail."

A ledger that secures monetary value simply distils down to immutable data entries. This immutability is achieved by publishing and linking entries of encrypted data, or a cryptographically unique representation, to serve as a source of truth for data and processes secured by them.

So, how does one take advantage of such technology beyond "money?" After all, the world is ridden with data problems. How does one secure data for large private and public organizations under this new paradigm for data integrity?

How does one balance publishing entire data sets on public or private Blockchains and risk making available too much detail publicly with privacy requirements?

Blockchain: a blank piece of paper

The answer to scalability lies in a universal, data and attribute agnostic Blockchain – a blank piece of paper – that allows end users to decide what gets written permanently while allowing users to easily find what's useful in an ocean of cryptographic hashes.

A public utility Blockchain that enables chains within chains seems to be the logical answer. Imagine an immutable forest where

About Abhi Dobhal:

Abhi has more than 15 years of experience pioneering high-growth and efficient technology operations across both large-scale and start-up arenas.
Abhi is a co-founder of Factom Inc, an Austin-based Blockchain startup where he heads business development.

each tree represents a unique chain, and one that is easy to identify and share. This design allows applications using this forest to watch relevant trees to "prove the negative" and ignore everything else. An irreversible publishing engine, where you write once but never erase, opens up a world of possibilities in industries that are over-engineered with redundant failsafe processes due to a lack of trust.

Factom, a data agnostic Blockchain protocol, hopes to accomplish exactly this. It's a blank piece of paper, secured by Bitcoin, which is beautifully positioned to serve as a ledger of ledgers. Factom's data layer allows users to keep private data private while simplifying access to public proofs. What follows a are few simplified situations from the financial world that can be redesigned using a Blockchain to address data integrity and trust problems.

Anti-Phishing and Authenticating Messaging

Most retail banks still use promotional and transactional messages to target customers and prospective clients in electronic formats (email, text message, etc.). Currently, phishing is a primary concern in this space. Perpetrators of fraud use the bank's branding to acquire account information from customers. While there are ways for a bank and consumers to mitigate this risk, they are not foolproof or particularly user-friendly.

A Blockchain-based solution combined with some cryptography can be used to certify and authenticate communications from the bank. Each message would refer to a unique, immutable, Blockchain-based signature to prove the authenticity of each communication at the device or server level. A cryptographic hash representing each communication could be published in a public ledger to determine the source, length, and timing of communication. A Blockchain-based certificate could validate and provide a real-time proof of authenticity for the electronic communication.

Overall, a Blockchain-based solution is a great fit for authentication of emails, messages, and websites. It eliminates substantial costs and risks of third-party authentication solutions, particularly Man-in-the-middle (MitM) attacks. MitM is an attack where the attacker secretly spoofs or alters the communication between two parties who believe they are directly communicating with each other. Alternatively, Blockchain architecture can allow third-party authentication solutions greater transparency and validation.

Document Management, Data Lineage, and Standard of Care

Wealth Management divisions in most retail banks offer a wide array of services to high and ultra-high net worth individuals and families. These services involve a broad range of documents, including wills, trust agreements, and estate plans. While relatively static, there are modifications and addendums made to these documents. Document changes can be tracked, notarized, and time stamped using a Blockchain. This process would ensure execution of the most recent versions of documents. Customers of Wealth Management services would know which chains are tracking their records. When a new entry shows up, they can be alerted to the activity, and can request more information about the client without fear of loss of messages.

Similarly, tracking document versions of various documents/templates can be applied to various internal and external processes of any financial institution where regulators demand strict process controls and data provenance. Publishing cryptographic hashes during each step of a mission-critical business process can provide an irrefutable "proof of existence." Blockchains would provide transparency in an otherwise opaque process.

According to one of the leading Big Four audit firms, using an incorrect version of a document template due to negligence can amount to almost $1,000 per record in fines for the insurance industry. In this scenario, Blockchain can be used to compare and track the unique fingerprint of a document template being used to that of a template that's supposed to be used. An audit trail like this allows financial organizations to reduce audit costs and prove a "standard of care."

Another example would be generating unique fingerprints for documents and photographs submitted for an insurance claim and showing that the same documents were indeed used to settle the claim. In this particular example, using Blockchains to secure data is like buying "data insurance" and is very useful in processes sensitive to litigation and where the burden of proof may rest on the defending party.

Enhancing System of Records

Banks typically have a massive system infrastructure to support their operations. In some instances, data transactions between disparate systems contain data that is incorrect or out of date, thus initiating a reconciliation process and, subsequently, an audit review. As the number of systems multiplies, each system has sway over some sets of data, and settlement becomes increasingly difficult. In a Blockchain world, each data set has its chain of state or events maintained in the immutable ledger. Disparate systems communicate the latest state of a particular data set (example: customer record) by publishing a new hash to signal activity to any other interested system without sharing the details of the event.

Affected systems trigger processes based on their requirements for the corresponding data set. Instead of using multiple micro-APIs to connect disparate systems to pull updated information, all the systems publish or read from the shared ledger (according to their privileges, managed by private keys) on a "push" basis. This push mechanism helps this network of systems to evolve from a reactive to a proactive state. The disparate systems use a Blockchain as a decentralized, immutable database for storing both data and a pointer for large data sets. Even if the data transport does not change, a Blockchain-based middleware allows data provided by one system to pass between many other systems without having to trust the intermediary systems.

Blockchains thus present an opportunity to move from a system of record to a system of authority. A Blockchain ensures that transactions and data shared within core systems are consistent and error-free. Immutable time stamps would allow any system to recognize the latest data related to a particular record without querying other systems. A data store secured by a Blockchain would serve as an Oracle, a truth engine, for the rest of the system's infrastructure. Having all the data in the correct state is critical to any settlement. A well-designed, scalable Blockchain solution would make such processes fast and inexpensive.

Saurabha Sahu,
Senior Consultant at Mindtree

Mindtree
Welcome to possible

Blockchain can deliver smart trading of shares

But how, exactly?

Blockchain is a disruptive technology that has created a buzz in the financial and non-financial worlds. It is challenging long-standing relationships and assumptions in financial markets.

Consider equity trading, for example. Currently, investors place orders with traders, who execute trades through exchanges. Often, market makers are also direct participants in the trading process. In these cases, there is no direct link between the investors and the execution of the trades,nor is there any link between the investors or the trade settlement process. This is because the settlement and clearing is handled through infrastructure associated with the exchange.

This complexity serves to reduce the transparency of the entire system. In past there have beeninstances of fraudulent and duplicate trade executions. In these cases, the Central Counter Party (CCP) plays the vital role in resolving disputes. The resolution of disputes sometime takes a long time, resulting in monetary losses to the buyers, sellers, traders, and market makers.

Given the excitement about Blockchain, an obvious question is: could it overcome these complications? Put another way, could Blockchain deliver smart trading of shares?

Back to basics: what is Blockchain?

Blockchain is a digital, chronological, distributed, and cryptographic secure ledger of events. Blockchain technology is also a method of storing and confirming transactions, within a decentralized platform, whereeach participant holds a complete record of digitally verified transactions. The digital and distributed ledger comes with a transparent environment, but without a trusted authority to validate transactions.

The transactions are validated by 'miners', who arespecific nodes on the Blockchain network. The ledger produced has the history of all verified transactions: moreover, multiple copiesof this ledger are distributed to all participants across the network.

This means there is no central recording system: rather, each participant keeps a record of all transactions ever made.

In case of trade settlement, this means that trades could be settled by participants and confirmed through the peer-to-peer network. The network (likely made up of brokers) would record the details of participants, the number of shares traded, price of shares, time of trade and the exchange of funds.

Advantages of Blockchain at a glance

Speedy transaction processing:

- Transaction processing on a peer-to-peer basis, without any intermediary
- Auto update of the ledger
- Simultaneous execution of both sides of a transaction

Low Cost:

- Auto-reconciliation
- Machine based computing with little or no human input

Transparent and Audited:

- Digitally secure information comes up with distributed ledger
- Transaction traceability
- Immutable transaction history maintenance

Reliable:

- Trust of encryption – allow users to reveal information either privately or public
- No Single point of failure
- Irrevocable transaction storage combined with time stamp
- Auto Verification – no need to trust a third party for verification
- Smart contract – Immutability of data is hard wired in the system

Blockchain technology comes with a change in trading ecosystem, let us try to understandthe implications on participants.

What does it mean for the various players?

Investors (whether they be buyers or sellers):

- Lower costs of transactions
- Greater likelihood that large scale investors will be able to execute the trades that they undertake

Brokers/ traders and market-makers

- Greater liquidity
- Paradigm shift from primary role of trading to primary role of advising

Central Counter Party/ Central Clearing House:

- Storage of key information buyer's and seller's information, the number of shares traded, price of shares, time of exchange will be held in distributed ledgers across the entire network based on Blockchain (which will likely include brokers/traders and market-makers).
- Clearing will likely take place through the network.
- Central Counter Party/ Central Clearing House's role becomes one of observer

Custodians:

- Many activities carried out by the custodians will be assumed by the network.
- Custodians may act as observers who confirm the proper functioning of the system
- Custodians may well continue to provide value added services such as forex overlay and fund administration.

Greater efficiency

Blockchain boosts efficiency in the trading, clearing and settlement processes by removing intermediaries. The importance of parties that currently act as observers – such as auditors and custodians – arealso reduced. The expenses of record keeping are reduced.

Currently, the standard settlement period is two working days (T+2). The Central Clearing House needs to ensure that the participants have the cash and the securities ready to exchange. In a Blockchain-based system, there would be nearly real time settlement. This would make shares even more liquid than they are today – and nearly as liquid as cash in hand. Higher liquidity means lower risk. Lower risk means greater trading and investment.

All participants would have a full record of transactions. This would make for complete transparency in the share market. This process makes it almost impossible to misrepresent transactions or to alter prior transactions.

The Blockchain-based system would also deliver benefits in the post-trade and Transfer Agency spaces.

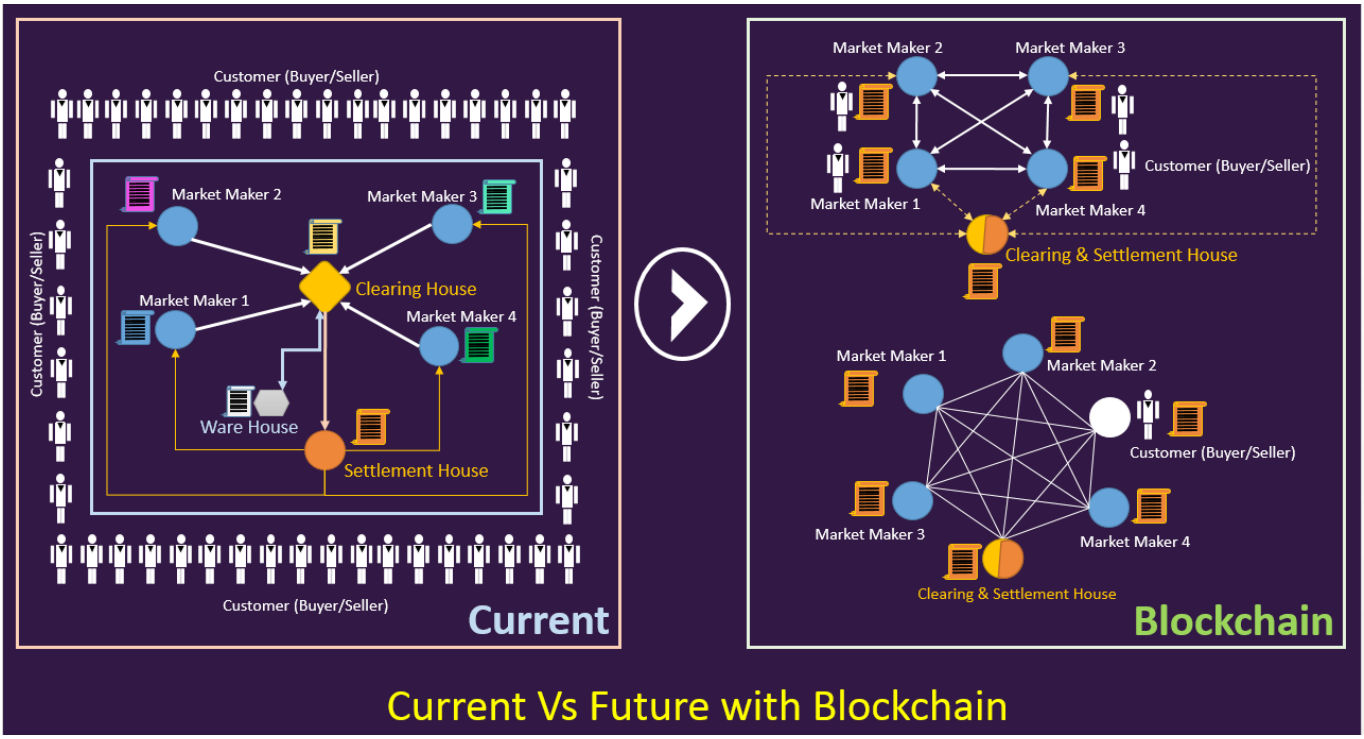
Post-trade in the Blockchain-based system

- Digital asset holdings, upgrading the Transfer process through distributed ledger technology
- Investors' current holding positions visible in real time
- Improved audit
- Greater control of correct allocation of dividends and handling of corporate actions
- Direct access to all investor communication documents, including payment statements and Dividend Reinvestment Plan confirmations
- Reduced need for Transaction Cost Analysis
- Transparency in share allocation
- No important documents that can be mutilated
- Digital signatures verified by private and public key concept
- Verification of identities for purposes of KYC, AML/CFT and FATCA
- Fewer disputes and easier resolution

Towards a truly global market

In essence, Blockchain provides the potential for a new paradigm, and one that involves much smarter trading and post-trade activity in share markets. The nature of Blockchain means that trust, security and transparency are increased, while costs of all kinds are reduced. The potential for real time settlement changes the liquidity of shares for the better.

There is no reason why a Blockchain-based trading network should be confined to one national market or currency. Bids and offers could be aggregated in global order books that operate on a 24/7 basis. Depending on the identities of the investors, traders and market-makers that are involved with the transaction, different currencies could be used for the execution of the trade, the holding of balances and the remittance of payments. The new regime would contribute to downwards pressure on trading costs and forex costs on a global basis.



Comparative View of Current and Futuristic Blockchain

Financial IT

Emma Wadey,
Product Marketing Manager at Temenos

BLOCKCHAIN AND CENTRAL BANKS: FRIEND OR FOE?

How can central banks prepare for blockchain technology? And how can cryptocurrencies help them?

Bitcoin emerged with a lot of excitement in 2013 and now there is a new wave of excitement for public online ledgers using blockchain technology. Often referred to as a 'distributed ledger', blockchain works by encouraging users to verify for themselves, and others, blocks of transactions made over time. As everyone in the system has the right to do this, and everyone can see the results, there is no need for a trusted, centralised clearer. The opportunities are endless for areas such as payments and settlement of fiat currencies, asset registries without the need for a central authority, the facilitation of regulatory reporting and the issuance, transfer and clearing of securities though more efficient post-trade processing. But what does this mean for central banks whose central role is to manage settlement?

Does blockchain remove the need for a central body?

At the end of last year, the Bank for International Settlements (BIS), often referred to as the central bankers' bank, published a report that in part reviewed the impact of 'digital currencies' and their associated technology, i.e. blockchain. From a digital currency perspective it only identified risk in "some extreme scenarios". Suggesting that the role of a central body that issues a sovereign currency could be diminished by protocols for issuing non-sovereign currencies that are not the liability of any central institution. However, it did highlight that "the emergence of distributed ledger technology could present a 'hypothetical' challenge to central banks. A challenge, not by replacing a central bank with some other kind of central body but mainly because it reduces the functions of the central body and, in an extreme case, may obviate the need for a central body entirely for certain functions", according to the BIS Committee on Payment and Market Infrastructures. But like many formal institutions that face the threat of change, the only way to address a challenge is usually to embrace it. So how can central banks work this new technology to their advantage?

Broadening opportunities beyond 'the bankers bank'

Back in March this year, Dr. Ben Broadbent, Deputy Governor, Monetary Policy at the Bank of England gave a speech reviewing what blockchain might mean to central banks. His view looked to embrace the technology rather than focus on the risk of disintermediation. He highlighted that the interest from a central bank perspective is not from an alternative unit of account perspective (such as bitcoin currency) but in terms of the distributed ledgers, which as we've already heard at first glance might be seen as disintermediating central clearing banks. Dr. Broadbent suggested that if a private-sector digital currency uses the technology to substitute for a third-party clearer, the central bank counterpart could do the opposite. It could widen access to the central bank's balance sheet, beyond commercial banks. With no rigid correspondence present, in principle, one could introduce the technology and preserve the current arrangements.

This opportunity for expanding a central bank's remit was further reinforced in a speech transcript released last month by the Bank of England Governor Mark Carney. He asked, "If distributed ledger technology could provide a more efficient way for private sector firms to deliver payments and settle securities, why not apply it to the core of the payments system itself?" To support this, Carney stated that he would also work on new methods for handling non-bank payment service providers. This could provide huge opportunities for blockchain businesses with such business models and further escalate the adoption of blockchain as a whole.

About Emma Wadey:

Emma Wadey has over 15 years of experience in Transaction Banking. She currently works with the product planning and execution teams for the Transaction Banking, Financial Crime and Islamic Banking area within Temenos, focusing on overseeing their communication strategy. Emma joined Temenos in 2013 as a consultant to manage the launch of their payments hub solution. Prior to Temenos, she headed up the communications team at VocaLink for 5 years and Lloyds Bank.

Providing a transparent view to support the real economy

Another advantage that blockchain technology may offer is from a liquidity perspective. An article on Business Insider based on HSBC reports recently highlighted that HSBC sees a real opportunity for blockchain to support central banks and in turn the economy as a whole. The theory is that central banks could push for blockchain-based digital currency systems to capitalise on transaction transparency and create a clearer picture of a country's financial system. That information could then be used to add targeted cash injections into the real economy via consumer bank account deposits or tax refunds. This could add great value to the economy, moving money into the real economy faster compared to the private credit sector route. In theory, this transparency could give a central bank the ability to tailor how much cash it wants to inject into an economy at a given time. Also addressing the risk that too much cash added to the public money supply could trigger inflationary issues.

The article highlighted HSBC's view that, "Online e-commerce stores are able to give out loans to merchants without collateral, because they know all the flows already from the merchants' point of view: from how much people are spending to the conversion rate of pages viewed to purchases. In the same way, a modernised monetary transmission system, based on real-time big data analysis through blockchain, could allow the government to balance the economy more efficiently and systematically." So blockchain could offer real insight into trends, enabling issues to be controlled earlier on, thus protecting the economy.

However, on the other hand this technology could also pose a risk to the 'real economy'. It could increase the liquidity risk by removing friction. If, for an example, the stock market were to crash, a bank run could be more likely to happen because investors would be able to quickly move their stocks into (digital) cash—that is cash the bank might not actually hold. So while blockchain provides transparency to predict and control the economy so in turn does it offer transparency for banks to react promptly to market changes.

Security through simultaneous global systems

But the opportunity to protect doesn't stop there. There has been a recent spate of financial crime that could easily have been prevented had blockchain technology been in place. In February this year, $81 million was stolen from the central bank of Bangladesh. A commercial bank in Ecuador said it was held up for $12 million last year, while a bank in Vietnam said criminals tried, and failed, to steal $1.1 million in what experts say may have been a practice run for Bangladesh.

All of the attacks were committed by cybercriminals, and at least some used SWIFT messaging system for the transaction. Blockchain could help prevent such hacks. Unlike SWIFT, a banking system run on a blockchain would be distributed with no one point of failure because the system runs simultaneously on all the computers linked to it around the world. And the benefits of blockchain from a risk mitigation perspective go further, particularly from a central banks perspective, as Bank of England Governor Carney said, "the great promise of distributed ledgers for central banks is their potential to enhance resilience. Distributing the ledger means multiple copies of the system. It can continue to operate if parts get knocked out. That removes the single point of failure risk inherent in a centralised system."

Failure to prepare is preparation to fail

There is no doubt that for a financial institution to fail to review and explore blockchain technology would likely have grave consequences. Central banks, who have historically shied away from fintech activities to date, are already discussing the considerations and opportunities that this new technology offers. In fact, some are reviewing even opening their own working groups and fintech incubators to explore new concepts in development such as distributed ledgers.

We have heard that blockchain technology could pose both an opportunity and a risk to central banks and the 'real economy', however, blockchain is set to dominate and potentially become part of the financial industries very infrastructure. Without preparation, those risks will still remain but the opportunity to address them and even benefit from this new technology will diminish, after all, as I said in a June article, 'Is blockchain looking for a problem to solve?', if we do not start investing and working with the technology now, it will still take 15 years once we do start! But central banks must decide which role they want to play. They can operate the digital networks themselves, issue digital assets, hold those assets, create products and services to run on those networks or just observe them. However, there is no doubt that all central banks should be taking notice of this technology and understanding the part they should play. Just as the banking world is being disrupted by new technology so too will the bankers' banks in time.

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Financial IT

AGILITY, COLLABORATION AND INNOVATION: A CAREER IN 21st CENTURY

Joseph Soule,
Senior Director Technology at Capital One (Europe) plc

What is driving technology firms into the financial services industry? And what does it mean for the professionals themselves?

The financial services industry has changed fundamentally and is continuing to evolve at a fast pace. International financial services brands such as Capital One are increasingly transforming themselves into technology firms which operate in the financial services industry – as opposed to traditional finance firms which operate technology.

The result of this change is that the type of people and skill sets required by the UK credit card and financial services industry – as well as the ways of working it expects to see – can be surprising to the outside world. The digital transformation of finance, underpinned by mobility, social, big data, cloud human-centred design and process automation, is creating huge opportunities for IT professionals to work on some of the most innovative and leading edge development programmes within the business environment.

What is driving the change? It's a confluence of several factors: the greater power of technology itself; the expectations from customers for modern, well designed technology-driven financial products, apps and services; as well as the impact of new ventures such as challenger banks.

It means that organisations like Capital One need to build a deep understanding of what customers are looking for from the financial services products that they want to use. We need to help customers interact with us whenever and wherever they choose, and customers appreciate our help in providing a service that will make it easier for them to manage their money effectively.

So, for technology professionals who value a challenge, there has never been a better time to work in the financial services sector. While regulatory compliance, cyber security, project delivery and risk management clearly continue to be key requirements from IT specialists, innovation, lean agile methods and design thinking are now riding just as high on the skills agenda.

The path from idea to getting a new product or service into the hands of the customer needs to be a lot shorter than in the past. The Agile product-centric delivery methods being adopted by some financial services organisations mean that customers are being engaged via a continuous release of innovative, well-designed products.

This is an exciting shift in focus and speed, particularly for IT professionals at the beginning of their career. They are moving into an industry in which they can make a difference to a significant client base extremely quickly. The products and services they are developing, alongside colleagues, are solving problems at scale, in a 24x7, highly regulated environment. It's akin to working in a hot start-up but without the risks of working in a small company with limited development budgets or resources.

Capital One has always been a technology innovator, and is known for having developed the balance transfer concept years ago. An example of a recent innovation includes the QuickCheck product. QuickCheck turns applying for credit on its head by allowing customers to see if they will be approved for a lending product before submitting

an application, taking away uncertainty and avoiding an impact on consumer credit records. The concept of checking your eligibility for lending products in such a transparent way has the potential to disrupt the industry as a whole.

As a result of its ongoing digital transformation Capital One has introduced new approaches to how it conceives products and brings them to market, including Agile development. This brings together software engineers, product managers, designers and other stakeholders from across the business to work together in a cohesive and collaborative structure.

Lots of companies claim to work with the Agile methodology but at Capital One it underpins everything, including the way in which the business is run and the way the team solves problems and challenges. It even extends into the way in which graduates and other more experienced team members are able to move between different 'job families' so they can follow the career that is most rewarding to them and the company.

Of course, becoming a technology company rather than a financial services company has an impact on how to attract the very best technologists to work for a traditional FS brand over a traditional tech company or FinTech start-up.

Capital One is not alone in needing to attract high quality IT people, so has thought extremely carefully about what it can offer beyond the kudos of an international brand that is close to its customers and is a long-term innovator in the financial services technology world. We know that technical challenges are at the top of the list and there is plenty for talented individuals to get involved with as we seek to reinvent our business

In recognition of the positive and empowering working environment Capital One offers, we have been named amongst the top five best companies in the UK to work for five years consecutively (by the Great Place to Work Institute). We are also about to open new offices at the White Collar Factory in the heart of London's technology hub, providing a new development centre that will be one of the most inspiring workplaces in the UK for IT professionals.

And we are running our first 'Capital One Growth Labs', where selected FinTech businesses have been invited to work with Capital One for ten weeks at our Nottingham HQ. The companies are showcasing their achievements and will bid for development finance, contributing to the culture of innovation within the business.

Our approach has recently resulted in the appointment of Andy Reeves, from Amazon in February 2016, as vice president of technology and Aline Baeck from eBay in April as our new head of design. We will continue expanding the team as we move forwards.

The further digitisation of the financial services sector will only continue to gather pace as even more technological advances, for example machine learning and artificial intelligence, are adopted by providers willing to embrace change as part of their efforts to delight customers in an ever-more competitive environment. IT professionals will be at the heart of that change.

DEALS

The Merger of SWACHA and EastPay is Approved

Date: *03.08.2016*

The merger of SWACHA and EastPay, announced on June 28, has been formally approved by their respective Boards of Directors. The merger of the two Regional Payments Associations (RPAs), effective August 1, 2016, was also approved by the SWACHA membership, as required by SWACHA's bylaws. The new association, ePayResources™, is the second-largest RPA member of NACHA – The Electronic Payments Association.

Convergys Corporation Purchased buw

Date: *02.08.2016*

Convergys Corporation, a global leader in customer management, today announced that it has completed its previously announced acquisition of buw, a leader in the German customer management BPO industry.The combination creates a team of approximately 7,000 German-speaking service professionals, located in 19 sites and four countries – Germany, Hungary, Romania, and Poland – to serve the growing EUR 3 billion German outsourced customer management market.

Equinix Acquires Digital Realty's Operating Business

Date: *02.08.2016*

Equinix, Inc. completed the purchase of Digital Realty's operating business in St. Denis, Paris, including its real estate and data center facility, for EUR €189,750,000 (approximately USD $211 million). The site currently houses Equinix's PA2 and PA3 International Business ExchangeTM (IBX®) data centers and the transaction furthers Equinix's corporate strategy of acquiring assets to invest behind customers and business ecosystems in key operating markets.

Wells Fargo Acquired GE Capital's Commercial Distribution Finance

Date: *01.08.2016*

Wells Fargo has completed the purchase of the Australian and New Zealand segments of GE Capital's Commercial Distribution Finance (CDF) business. The acquisition includes CDF assets, and 123 team members across 5 sites in Australia, along with CDF assets and 7 team members across 2 sites in New Zealand. As previously announced, Wells Fargo agreed to purchase GE Capital's CDF and Vendor Finance platforms as well as a portion of its Corporate Finance business.

Equiniti Completes Acquisition of Toplevel

Date: *29.07.2016*

Equiniti completed the acquisition of digital case management provider, Toplevel. The acquisition is further example of Equiniti's growth strategy of integrating scalable technology platforms to provide mission critical non-discretionary services. Equiniti already supports a number of public sector organisations through the provision of technology-led services and will continue to invest in Toplevel's clients and operate a strategy of targeted investment and focus in this area.

Fidor Group Acquired by Groupe BPCE

Date: *13.06.2016*

Fidor Group, the German digital challenger bank and fintech pioneer, is today announcing its acquisition by Groupe BPCE , the second largest banking group in France. Groupe BPCE has signed an agreement with the key shareholders, founders and managers of Fidor Group relating to the acquisition of their equity interests in the company. Following the deal, Fidor will remain as an independent business.

MANDATES

Commercial Bank First in Qatar Introduces Finger Vein Authentication Technology Powered by NCR

Date: *03.08.2016* ***#Authentication Technology***
Provider: *NCR Corporation*
Client: *Commercial Bank Q.S.C.* ***Mandate value:*** *Undisclosed*

NCR Corporation, the global leader in consumer transaction technologies, announced today that The Commercial Bank Q.S.C., Qatar's first private bank, has become the first bank in the country to introduce finger vein authentication technology powered by NCR to speed-up authentication and accelerate ATM transactions making every customer interaction an exceptional experience.

Gemalto Supplies Hellenic Bank with its Optelio Contactless EMV Payment Wristbands

Date: *02.08.2016* ***#Payments***
Provider: *Gemalto*
Client: *Hellenic Bank* ***Mandate value:*** *Undisclosed*

Gemalto supplied Hellenic Bank, a major Cypriot financial institution, with its Optelio contactless EMV Payment wristbands. These water-resistant NFC wristbands that are marketed as PayBand to Cyprus consumers will ensure that Hellenic Bank customers no longer have to worry about carrying cash or cards, even when they head to the beach or pool this summer. Gemalto has worked alongside its local partner Mellon Cyprus to provide Hellenic with an initial end-to-end solution for black silicone payment wristbands.

NSE of India Implements ITRS Geneos

Date: *01.08.2016* ***#Security,Regulatory Standards***
Provider: *ITRS Group*
Client: *National Stock Exchange of India*
Mandate value: *Undisclosed*

ITRS Group has announced the successful implementation of its real-time monitoring software, Geneos, across the National Stock Exchange of India's (NSE) global IT operations as part of a wider project to ensure it remains at the technological forefront of the region's securities industry. The implementation of ITRS Geneos forms a key part of the NSE's strategic objective to pioneer technological advances and streamline its complex operations, keeping it ahead of the huge recent regulatory reform in the Asian securities market.

Frontier Bank Selects Banc Intranets' DirectorsLink

Date: *03.08.2016* ***#Banking***
Provider: *Banc Intranets*
Client: *Frontier Bank of Texas* ***Mandate value:*** *Undisclosed*

Banc Intranets, a provider of secure, web-based enterprise content management solutions for financial institutions, announced that Frontier Bank of Texas has selected DirectorsLink® web-based board portal to increase savings and strengthen director oversight.The bank selected DirectorsLink at the recommendation of its IT security vendor, Solis, which works with numerous other financial institutions that use the board portal to increase efficiencies and flexibility.

ČSOB Opts SIA to Launch the First Mobile Wallet with NFC Technology in the Czech Republic

Date: *01.08.2016* ***#Payments***
Provider: *SIA*
Client: *ČSOB* ***Mandate value:*** *Undisclosed*

ČSOB, one of the largest commercial banks in the Czech Republic and part of the Belgian KBC Group, and SIA, a company specializing in the management of electronic payments, have developed and launched the first mobile wallet for NFC payments in the Czech Republic that supports both the MasterCard and VISA circuits.

The new mobile application "NaNákupy" enables ÈSOB clients to make contactless payments to retailers by smartphone.

SS&C Technologies Holdings' APX and Moxy Selected by Alpima

Date: *28.07.2016* ***#Investment Management***
Provider: *SS&C Technologies Holdings*
Client: *Alpima* ***Mandate value:*** *Undisclosed*

SS&C Technologies Holdings reports that Alpima, a London-based advisory firm serving professional and institutional clients, has selected Advent Portfolio Exchange®(APX) and Moxy® to support its digital advisory platform.Together with SS&C, Alpima's platform combines the power of digitalization with personalization to give its institutional clients a new investment experience.

PEOPLE MOVES

Northern Trust Appoints Marco Siero to Lead Regional Sales from Luxembourg

Date: *01.08.2016*

Northern Trust appointed Marco Siero as senior sales representative, Luxembourg to spearhead Northern Trust's growth in the region. Siero joins from RBC Investor Services in Luxembourg where he was managing director client service and solutions for Europe. He has more than 25 years of experience in the investor services industry and holds a master's degree in Economics from the University of Amsterdam.

HSBC Names Joe Abruzzo as Business Head of North America

Date: *25.07.2016*

HSBC Private Bank announced the appointment of Joe Abruzzo as Business Head of North America. In this role, Abruzzo will be responsible for driving and executing HSBC's strategy for private banking across North America, particularly in the US, a key market for HSBC Global Private Bank. He will also serve as a member of the HSBC Global Private Bank Executive Committee.

BNY Mellon Welcomes Hani Kablawi as New Head of Investment Services for EMEA

Date: *19.07.2016*

BNY Mellon appointed Hani Kablawi as the new Head of Investment Services for Europe, the Middle East and Africa. Formerly Head of Asset Servicing for EMEA, Kablawi will lead the business strategy for Investment Services in the region and will continue to be based in London. Kablawi will report to Brian Shea, CEO of Investment Services and Michael Cole-Fontayn, Chairman of EMEA.

Finstar Strengthens its Senior Fintech Team

Date: *11.07.2016*

Finstar Financial Group ("Finstar") announces further senior appointments to its management team with the recruitment of Eugene Timko as Investment Director, Michele Tucci as Head of Mobile Products and Business Development, and Alexander Ivanov who has been appointed to develop venture capital investments. These latest appointments reflect Finstar's strategy to continue with the successful expansion of its fintech and financial services investment program.

Dennis M. Nall Elected to Morgan Stanley's Board of Directors

Date: *26.07.2016*

Morgan Stanley announced that Dennis M. Nally has been elected to the Company's Board of Directors, effective October 1, 2016. Mr. Nally, 63, is the former Chairman of PricewaterhouseCoopers International Ltd. Prior to that he was the Chairman and Senior Partner of the U.S. firm of PricewaterhouseCoopers LLP.

GFT Appoints Mohit Dwivedi as Principal Architect, Data Technology

Date: *22.07.2016*

Mohit Dwivedi has joined GFT as Principal Architect, Data Technology. Mohit joins GFT from Citibank where he was the Global Head of Front Office Risk Technology for their Credit Markets business. In his role at Citi, he designed a next generation enterprise-wide risk platform built on big data technology, grid computing and service-based architecture.

Deutsche Bank Names Patricia Giangrande as Global Head of Business Control Officer

Date: *18.07.2016*

Deutsche Bank's Global Transaction Banking unit today announced that Patricia Giangrande has rejoined the Bank as a Managing Director and Global Head of the Business Control Office function for Institutional Cash Management (ICM). Giangrande will be based in New York and report to Susan Skerritt, Chairwoman, President and CEO of Deutsche Bank Trust Company Americas; Global Head of ICM and Head of Global Transaction Banking Americas.

Former Microsoft Executive Becomes New CEO of Starmind

Date: *05.07.2016*

Starmind International AG's ambition to become the global leader in Brain Technology and self-learning knowledge networks took a major step forward today with the announcement that Peter Waser will be the new Chief Executive Officer. The former IBM and Microsoft top executive, who brings 20 years of top level experience to the role, will take over the leadership reins on July 1st, 2016.

Financial IT

Financial Technology Buyers' Guide

August 2016

Chain is a blockchain technology company that partners with financial firms to build and deploy blockchain networks that transform markets. Chain has formed strategic partnerships with leading financial services firms like Nasdaq, Visa, Citi, Capital One and Fiserv. Chain develops and maintains the Chain Open Standard, an open source blockchain protocol for high-scale financial applications. Chain's platform includes Chain Core, an enterprise-grade production node, and the Chain Sandbox prototyping environment. Chain has raised $45M from leading venture capital firms and strategic investors. The company's board of directors includes the former CEO of American Express as well as one of the founding executives of PayPal.

COMPANY PROFILE	
Company type	Privately Held
Annual turnover	Undisclosed
Number of Customers Total	Undisclosed
Number of Employees	25-50
Inception	2014
Geographical coverage	Global

COMPANY CONTACT DETAILS	
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China Systems is the leading Trade Services Solutions vendor in the world, with offices throughout Europe, the USA, Asia, and the Middle East. Established in 1983, China Systems has gained extensive experience in international banking systems by exploiting the functional adaptability and development capabilities of Eximbills, its renowned toolkit for Trade Services within the banking industry.
Apart from our rich technical heritage, we also offer true global product implementation as well as support and maintenance services. We have worked with banks to implement our products throughout their global branch network.

COMPANY PROFILE	
Company type	Private Company
Annual turnover	Undisclosed
Number of Customers Total	+200
Number of Employees	Undisclosed
Inception	1983
Geographical coverage	Europe, the USA, Asia, and the Middle East

COMPANY CONTACT DETAILS	
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Founded in 1976, CGI is a global IT and business process services provider delivering high-quality business consulting, systems integration and managed services. With 68,000 professionals in 40 countries, CGI has an industry-leading track record of delivering 95% of projects on-time and on-budget. In the Financial Services industry, CGI professionals work with more than 2,500 financial institutions including 24 of the top 30 banks worldwide. We are helping our retail and wholesale banking clients reduce costs, achieve strategic objectives and drive competitive advantage. As a demonstration of our commitment, our average client satisfaction score consistently measures higher than 9 out of 10.

COMPANY PROFILE	
Company type	Corporation
Annual turnover	$10 billion
Number of Customers Total	Undisclosed
Number of Employees	68,000
Inception	1976
Geographical coverage	Americas, Europe and Asia Pacific

COMPANY CONTACT DETAILS	
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Compass Plus provides proven software and services for financial institutions, including retail banks and payment processors across the globe that operate in complex and rapidly changing business and technology environments. Compass Plus builds and quickly implements comprehensive and integrated payment technologies that allow customers to increase revenue and profits, and improve their competitive position by implementing flexible systems that meet market demands. With hundreds of successful projects spanning card, account and merchant management, card personalisation, mobile and electronic commerce implemented in record breaking time, Compass Plus ensures its customers make the most of their technology investments.

COMPANY PROFILE	
Company type	Limited Partnership
Annual turnover	Undisclosed
Number of Customers Total	Undisclosed
Number of Employees	Undisclosed
Inception	1989
Geographical coverage	Global

COMPANY CONTACT DETAILS	
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Established in February 2006, with the sole objective of delivering fast, agile and functional business software to the Investment Management sector, CYMBA Technologies, from its very inception has concentrated exclusively on the delivery of such products within the Front Office environment and has successfully delivered on this objective as evidenced by its ever increasing global customer base. The Company's detailed knowledge of Hedge Funds and Investment Management processes has enabled the development of leading edge Investment Management systems for Algorithmic Trading, Execution Management, Real-time Profit and Loss (CYMBA Athena IMS), and Compliance (CYMBA Centurion).

COMPANY PROFILE	
Company type	Private Company
Annual turnover	Over £ 1 Million
Number of Customers Total	over 15
Number of Employees	Less than 10
Inception	2006
Geographical coverage	UK, US & Asia

COMPANY CONTACT DETAILS	
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CustomerXPs is an enterprise software product company offering Enterprise Financial Crime Management (EFCM), Anti-money Laundering (AML) and Customer Experience Management (CEM) products for Tier-1 global banks. CustomerXPs is revolutionizing Fraud Management and Customer Experience Management in Fortune 500 banks by harnessing the power of extreme real-time, cross-channel intelligence. Voted 'Best Fraud Detection Product 2016' by OpRisk / Risk.net, CustomerXPs' flagship product Clari5's differentiated approach deploys a well-synchronized, context-aware 'central nervous system' in banks with the ability to stop fraudulent transactions with real-time, actionable insights.

COMPANY PROFILE	
Company type	Sole proprietorship
Annual turnover	Undisclosed
Number of Customers Total	15+
Number of Employees	70
Inception	2006
Geographical coverage	South Asia, South East Asia, GCC, MENA, North America

COMPANY CONTACT DETAILS	
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Since 1991 Diasoft has been providing cutting edge financial software solutions supporting all the aspects of retail, corporate and universal banking, treasury and capital market services, and insurance business. The company's main offer to the global financial market is FLEXTERA – a SOA-based software solution for front-to-back automation of financial services. Using the most advanced technologies to create its software products, Diasoft became one of the first companies having implemented SOA-principles in the banking solutions, which is attested by IBM Banking Industry Framework certification. The company is ranked in TOP 100 global financial technology providers and TOP 5 software vendors in Russia.

COMPANY PROFILE	
Company type	Sole proprietorship
Annual turnover	2014 results: 69.2 Million Dollars
Number of Customers Total	400
Number of Employees	1,600
Inception	1991
Geographical coverage	Asia, Europe, Russia

COMPANY CONTACT DETAILS	
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Elliptic is an established authority on blockchain compliance. The firm provides AML technology to the leading European and US Bitcoin exchanges, assessing risk on more than $1 billion in Bitcoin transactions every month. In addition to providing data and analytics services to financial institutions and law enforcement agencies around the world, Elliptic advises governments on blockchain regulatory matters. In 2016, the firm was selected by KPMG as a "Top 10 Global Emerging Star" among Fintech startups and in March this year, went on to secure $5m Series A funding lead by Paladin Group and Santander InnoVentures.

COMPANY PROFILE	
Company type	Blockchain intelligence
Annual turnover	Undisclosed
Number of Customers Total	Undisclosed
Number of Employees	Undisclosed
Inception	March 2013
Geographical coverage	UK, Europe, US

COMPANY CONTACT DETAILS	
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essDOCS is a leading enabler of paperless trade, providing customer-led solutions that automate and accelerate trade operations & finance. essDOCS' flagship solution – CargoDocs – delivers significant value to the entire supply chain: enabling users to streamline processes, reduce working capital needs and risk, while improving collaboration, compliance and visibility across organisations. As of Q1 2016, Over 3,600 companies, ranging from 12% of the Fortune Global 500 to innovative SMEs, use essDOCS solutions across 72 countries in the energy, agriculture, chemicals and metals & minerals markets.

COMPANY PROFILE	
Company type	Privately Held
Annual turnover	Undisclosed
Number of Customers Total	3,600+
Number of Employees	55
Inception	2005
Geographical coverage	EMEA, Asia Pacific, Americas

COMPANY CONTACT DETAILS	
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FERNBACH, a medium-sized software company, was established by Günther Fernbach in 1986 and now operates internationally. The company focuses on the automation of reporting processes, particularly in the finance and accounting sectors. Reports are created automatically for all stakeholders, employees, managers, investors and supervisory authorities. Each year, FERNBACH has been listed in the upper third of the 100 leading risk technology vendors worldwide by Chartis Research, the main provider of global research and analyses for risk management technology.

COMPANY PROFILE	
Company type	Sole proprietorship
Annual turnover	Undisclosed
Number of Customers Total	more than 50
Number of Employees	150
Inception	1986
Geographical coverage	Africa , Asia, Europe

COMPANY CONTACT DETAILS	
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Fiserv is highly regarded for its financial services technology and services innovation, including solutions for mobile and online banking, payments, risk management, data analytics and core account processing. Fiserv is helping its clients push the boundaries of what's possible in financial services delivering deep expertise and innovative solutions to help financial institutions, businesses and consumers move and manage money faster and with greater ease. The most popular solutions invented by Fiserv are DNA, CUnify, Signature, Agiliti Platform.

COMPANY PROFILE	
Company type	Public Company
Annual turnover	Undisclosed
Number of Customers Total	13,000+
Number of Employees	10,000+
Inception	1984
Geographical coverage	Global

COMPANY CONTACT DETAILS	
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FIS is a global leader in financial services technology, with a focus on retail and institutional banking, payments, asset and wealth management, risk and compliance, consulting, and outsourcing solutions. Through the depth and breadth of our solutions portfolio, global capabilities and domain expertise, FIS serves more than 20,000 clients in over 130 countries. Headquartered in Jacksonville, Fla., FIS employs more than 55,000 people worldwide and holds leadership positions in payment processing, financial software and banking solutions. Providing software, services and outsourcing of the technology that empowers the financial world, FIS is a Fortune 500 company and is a member of Standard & Poor's 500® Index. For more information about FIS, visit www.fisglobal.com.

COMPANY PROFILE	
Company type	Publicly traded (NYSE:FIS)
Annual turnover	Undisclosed
Number of Customers Total	Over 20,000
Number of Employees	55,000+
Inception	Undisclosed
Geographical coverage	Global

COMPANY CONTACT DETAILS	
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GFT Group is a business change and technology consultancy trusted by the world's leading financial services institutions to solve their most critical challenges. Specifically defining answers to the current constant of regulatory change – whilst innovating to meet the demands of the digital revolution. Utilising the CODE_n innovation platform, GFT is able to provide international start-ups, technology pioneers and established companies access to a global network, which enables them to tap into the disruptive trends in financial services markets and harness them for their out of the box thinking.

COMPANY PROFILE	
Company type	Public Company
Annual turnover	€178.76 M in H1 2015
Number of Customers Total	9 out of 10 world's top investment banks
Number of Employees	4,000
Inception	2001
Geographical coverage	Global

COMPANY CONTACT DETAILS	
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Gem partners with people and companies to unlock the value in blockchain technology. Gem's modular platform for blockchain applications can be applied to a variety of use cases across multiple industries. Utilizing hardware security modules, key-based identity management, and automated workflows, Gem adds an industrial application layer to any blockchain. Gem's blockchain application platform empowers companies that are ready to build smarter networks and efficient economies. This transformation will be a journey, which is why our platform is built to withstand the trends of the bleeding edge and evolve.

COMPANY PROFILE	
Company type	Privately Held
Annual turnover	Undisclosed
Number of Customers Total	Undisclosed
Number of Employees	11-50
Inception	2014
Geographical coverage	Global

COMPANY CONTACT DETAILS	
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INDATA is a leading industry provider of software and services for buy-side firms, including trade order management (OMS), compliance, portfolio accounting and front-to-back office. INDATA's iPM – Intelligent Portfolio Management technology platform allows end users to efficiently collaborate in real-time across the enterprise and contains the best of class functionality demanded by sophisticated institutional investors. INDATA provides software and services to a variety of buy-side clients including asset managers, registered investment advisors, banks and wealth management firms, pension funds and hedge funds. What sets INDATA apart is its single-minded focus on reducing costs and increasing operational efficiency as part of the technology equation.

COMPANY PROFILE	
Company type	Limited Liability Company (LLC)
Annual turnover	Undisclosed
Number of Customers Total	Over 200
Number of Employees	Over 150
Inception	1968
Geographical coverage	North America, Europe

COMPANY CONTACT DETAILS	
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NICE Actimize is the largest and broadest provider of financial crime, risk and compliance solutions for regional and global financial institutions, as well as government regulators. Consistently ranked as number one in the space, NICE Actimize experts apply innovative technology to protect institutions and safeguard consumers and investors assets by identifying financial crime, preventing fraud and providing regulatory compliance. The company provides real-time, cross-channel fraud prevention, anti-money laundering detection, and trading surveillance solutions that address such concerns as payment fraud, cyber crime, sanctions monitoring, market abuse, customer due diligence and insider trading.

COMPANY PROFILE	
Company type	Public Company
Annual turnover	Undisclosed
Number of Customers Total	over 100
Number of Employees	over 500
Inception	1999
Geographical coverage	Global

COMPANY CONTACT DETAILS	
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Pendo Systems was established to provide a new standard in Investment Accounting System Delivery. At Pendo Systems, our mission is to be a premier provider of software solutions to global financial institutions. We strive to not only help our clients achieve their business objectives and goals, but also to contribute to the success of individuals, businesses and communities throughout the world. We are driven to work with our clients in a collaborative partnership, and are guided by the fundamental values of professionalism, respect, teamwork and quality in delivering products and services to our clients.

COMPANY PROFILE	
Company type	Sole proprietorship
Annual turnover	over $5M
Number of Customers Total	20+ top tier banks worldwide
Number of Employees	over 10
Inception	2006
Geographical coverage	North America

COMPANY CONTACT DETAILS	
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Pegasystems develops strategic applications for sales, marketing, service and operations. Pega's applications streamline critical business operations, connect enterprises to their customers seamlessly in real-time across channels, and adapt to meet rapidly changing requirements. The solutions offered by Pegasystems are available on-premises or in the cloud and are built on its unified Pega 7 platform, which uses visual tools to easily extend and change applications to meet clients' strategic business needs.

COMPANY PROFILE	
Company type	Public Company
Annual turnover	Undisclosed
Number of Customers Total	2000+
Number of Employees	3000
Inception	1983
Geographical coverage	Asia, Europe and North America

COMPANY CONTACT DETAILS	
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Polaris Consulting & Services Limited is a global expert in Financial Technology (FT) for Banking, Insurance, and other Financial Services. Polaris innovates digital transformation offering solutions that result in performance breakthroughs where incremental improvements are not sufficient. The specialized practice areas include: mobile, user experience, data & analytics, systems integration, testing, infrastructure management and business process outsourcing; along with specialized vertical practices in consumer and corporate banking, capital markets, and insurance.

COMPANY PROFILE	
Company type	Public Company
Annual turnover	Undisclosed
Number of Customers Total	Undisclosed
Number of Employees	5001-10,000
Inception	1993
Geographical coverage	Global

COMPANY CONTACT DETAILS	
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Profile Software, an ISO-certified and listed company, is a specialised financial solutions provider, with offices in Geneva, Dubai, London, Singapore, Athens and Nicosia. It delivers market-proven solutions, with an exceptional track record of successful implementations, to the Banking and Investment Management industries. The company is acknowledged as an established and trusted partner across many regions, offering a wide spectrum of solutions to the financial services sector.
Profile Software's solutions have been recognised and approved by leading advisory firms and enable Institutions worldwide to align their business and IT strategies while providing the necessary business agility to proactively respond to the ever-changing market conditions.

COMPANY PROFILE	
Company type	PLC/listed firm
Annual turnover	Undisclosed
Number of Customers Total	250
Number of Employees	152+
Inception	1990
Geographical coverage	Global

COMPANY CONTACT DETAILS	
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Ripple provides global financial settlement solutions to enable the world to exchange value like it already exchanges information – giving rise to an Internet of Value (IoV). Ripple solutions lower the total cost of settlement by enabling banks to transact directly, instantly and with certainty of settlement. Ripple bridges these siloed networks with a common global infrastructure that brings new efficiency to financial settlement by enabling real-time settlement, ensuring transaction certainty and reducing risk.

COMPANY PROFILE	
Company type	Privately Held
Annual turnover	Undisclosed
Number of Customers Total	25 active integrations
Number of Employees	110
Inception	2012
Geographical coverage	Global

COMPANY CONTACT DETAILS	
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SAGE SA delivers innovative solutions that help financial institutions make better investment decisions and build client trust even in uncertain market conditions by allowing them to communicate investment decisions in total transparency. SAGE SA has solutions for investment tracking, wealth management, asset management, risk management and more. SAGE SA has the ideal solution for today's financial services provider. SAGE SA offers Prospero, a suite of wealth management solutions that is user-friendly, robust and cost-effective; and BlackSwan Finacial Platform, a Portfolio Optimization solution. SAGE SA, which was founded in 1986, has its headquarters in Switzerland, and has branches in Dubai and Singapore

COMPANY PROFILE	
Company type	Corporation
Annual turnover	Undisclosed
Number of Customers Total	Undisclosed
Number of Employees	80
Inception	1986
Geographical coverage	Asia, Europe

COMPANY CONTACT DETAILS	
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SmartStream provides Transaction Lifecycle Management (TLM®) solutions and Managed Services to dramatically transform the middle and back-office operations of financial institutions. Over 1,500 clients, including more than 70 of the world's top 100 banks, 8 of the top 10 asset managers, and 8 of the top 10 custodians rely on SmartStream's solutions. SmartStream delivers greater efficiency, automation and control to critical post trade operations including: Reference Data Operations, Trade Process Management, Confirmations and Reconciliation Management, Corporate Actions Processing, Fees and Invoice Management, Collateral Management, Cash & Liquidity Management and Compliance Solutions.

COMPANY PROFILE	
Company type	Privately Held
Annual turnover	Undisclosed
Number of Customers Total	1,500 clients
Number of Employees	over 500
Inception	2000
Geographical coverage	Global

COMPANY CONTACT DETAILS	
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Strands is a global provider of personalization and recommendation solutions for digital banking and retail markets, serving customers worldwide, including Barclays, BBVA, BNP Paribas, Bank of Montreal, Carrefour and Panasonic. Strands serves its customers via two business units:
Strands Finance – develops innovative FinTech, empowering financial institutions to offer superior customer experiences through their digital channels
Strands Retail – drives the businesses of over 100 online retailers with industry-leading recommendation and customer segmentation solutions.

COMPANY PROFILE	
Company type	Private Limited Company
Annual turnover	Undisclosed
Number of Customers Total	20+ top tier banks worldwide
Number of Employees	100
Inception	2004
Geographical coverage	Global

COMPANY CONTACT DETAILS	
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SunTec Business Solutions is the leading provider of revenue management and business assurance solutions to financial services and digital and communications services industries. With deployments in 58 countries, SunTec's highly functional and technology-agnostic product suite Xelerate™ empowers the clients to create real-time personalised offerings to improve profitability and customer experience while optimising customer lifetime value. The product suite enables service providers to develop, launch and monetise innovative offerings quickly. Xelerate has helped create products and services for over 300 million end-customers today.

COMPANY PROFILE	
Company type	Privately Held
Annual turnover	Undisclosed
Number of Customers Total	40
Number of Employees	800+
Inception	1990
Geographical coverage	Global

COMPANY CONTACT DETAILS	
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VocaLink is a global payments partner relied on by financial institutions, corporates and governments to provide high availability and resilient payment solutions. VocaLink provides payment clearing systems and ATM switching platforms which underpin the majority of UK electronic payments – we provide a national grid for payments. Platforms developed by VocaLink enable to make payments confidently, securely and cost effectively. In 2015 VocaLink processed over 10 billion transactions with a value of £5 trillion.

COMPANY PROFILE	
Company type	Privately Held
Annual turnover	Undisclosed
Number of Customers Total	Undisclosed
Number of Employees	1000+
Inception	2007
Geographical coverage	Global

COMPANY CONTACT DETAILS	
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Volante Technologies is a global leader in the provision of software for the integration, validation, processing and orchestration of financial messages, data and payments within financial institutions and corporate enterprises. Many clients use Volante to assist with multiple product implementations ranging from message transformation and integration, through to the processing and orchestration of transaction data and payments. Along with its products, Volante Designer and its VolPay suite of payments integration and processing products, Volante constantly maintains a growing library of over 85 domestic and international financial industry standards plugins with more than 250 prebuilt, customizable, and bidirectional transformations to and from these standards.

COMPANY PROFILE	
Company type	Private Company
Annual turnover	Undisclosed
Number of Customers Total	more than 80 in 26 countries
Number of Employees	around 120 and growing
Inception	2001
Geographical coverage	US, Latin America, UK, Europe, Middle East, Africa, India

COMPANY CONTACT DETAILS	
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Way Back is a Brazilian company working in the Debt Collection industry since 1991 and experienced both out-of-court and court debt collection stages. With a significant portfolio of customers, Way Back is a company with strong presence in Brazil and abroad working with the collection of receivables in different sectors of the economy, such as the financial, industrial, trade and services sectors. Headquartered in São Paulo, Brazil, and with a branch in Miami, USA, Way Back is present in over 155 countries and offers the best performance and service structure in the credit and collection segment by means of its business sectors: Debt Collection B2B, B2C, Judicial, International and other BPO services.

COMPANY PROFILE	
Company type	LTD (Brazil LTDA)
Annual turnover	Undisclosed
Number of Customers Total	186
Number of Employees	212
Inception	1991
Geographical coverage	Global

COMPANY CONTACT DETAILS	
Contact	Jefferson Viana
Job Title	President
Contact address	80 SW 8th Street , Suite 2000 Miami, USA
Telephone number	+ 17866001005
Email	jefferson@wayback.com.br
Homepage address	www.wayback-usa.com

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Way Back

International Debt Collection

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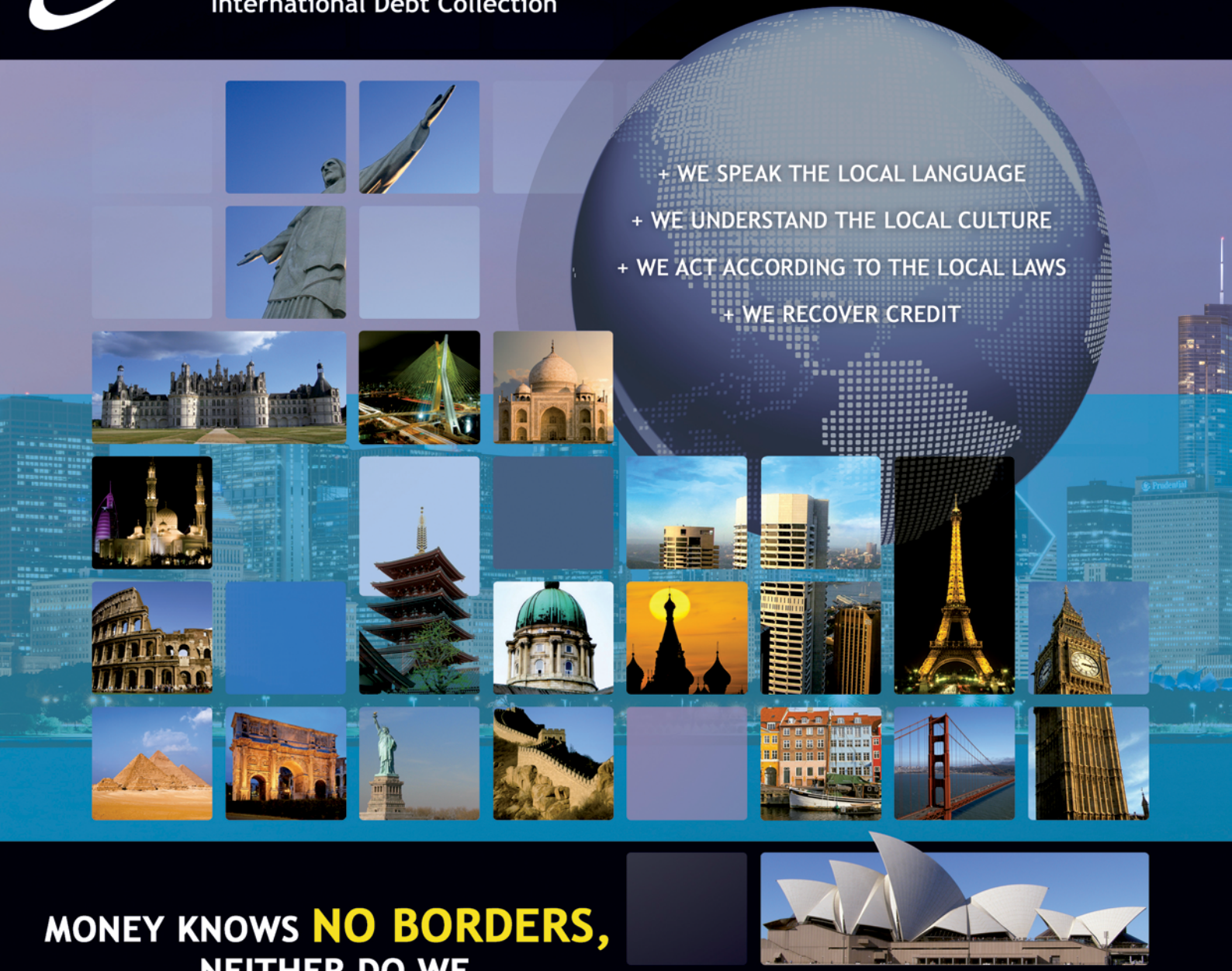

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