REPORT

Out of the blocks

Blockchain: from hype to prototype

May 2016

Deloitte.

Efma

Contents

Executive summary

Leaders across financial services institutions are both concerned and excited by the businesses implications arising from blockchain technology. Firms across the globe have begun to educate themselves and are now exploring how the blockchain could be used to bring new services to the market and to enhance existing business and operational capabilities.

In this Paper, based on an EMEA FSI C-Suite survey of over 3,000 people conducted jointly by EFMA and Deloitte, we seek to explain how blockchain can impact the financial services industry and how companies are reacting to this development.

Leveraging on these insights and on KBC's real life experience, the Paper will present a view of what is driving FI's blockchain journey, where they currently stand and what actions are needed to fully understand and exploit this exponential technology.

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What is blockchain?

Blockchain is to value what the internet is to information.The transfer of value has traditionally been seen as an expensive and slow process. The revolutionary technology underpinning blockchain makes it a truly digital experience. By creating a decentralized and secure ledger, that gives every party a say in the validation of a transaction, it speeds up the process and cuts out any middlemen. It is an open-source protocol for transferring value peer-to-peer over the internet. Blockchain is not just arguably the hottest topic in FinTech, it is a technological breakthrough, and it is here to stay.

> *"Blockchain is much more than Bitcoin & crypto-currencies and FSI players should consider blockchain outside of cryptocurrency to take full advantage of the technology as early adopters"*
> Patrick Laurent, Partner

At its heart, a permissionless blockchain is a digital, distributed transaction ledger, with identical copies maintained on the network's members' computers. These are part of a network, without any central trusted authority. Anyone participating in a blockchain can review previous entries and record new ones. Disagreements are settled by a consensus of a majority of the participants. Transactions are grouped in blocks that are then recorded one after the other in a chain of blocks, hence the name blockchain and the resilience associated with the technology. The link between blocks and their content are protected by cryptography and cannot be forged.

Therefore, once entered into a blockchain, information can't be erased; In essence, a blockchain contains an accurate, time-stamped and verifiable record of every transaction ever made.

The design of a blockchain protocol can offer different features, but it always guarantees powerful characteristics from different perspectives:

- **Near real time:** blockchain enables the near real time settlement of recorded transactions, removing friction, reducing risk but also limiting ability to charge back.
- **No central authority:** blockchain technology is based on cryptographic proof and doesn't require trust between the transacting parties, thus eliminating the need for a central trusted authority overseeing the process.
- **Distributed ledger:** blockchain technology includes a distributed ledger which generates computational proof of the chronological order of transactions. The peer-to-peer distributed network records a public history of transactions that quickly become impossible for an attacker to change. Blockchain do not typically preserve the identities of the parties nor the transaction data, only the proof.
- **Irreversibility:** a blockchain contains certain and verifiable record of every single transaction ever made. This prevents double spending, fraud, abuse and manipulation of transactions.
- **Resiliency:** a blockchain has no single point of failure and is designed to be resilient to outages and attacks. As a blockchain makes it computationally infeasible to change old records and to erase all the copies of the distributed ledger, it's intrinsically resistant to censorship.

Technical evolution of blockchain

Bitcoin is the most famous blockchain technology use case. When Satoshi Nakamoto developed the original protocol, he built it with some restrictions in order to make the whole ecosystem as safe and secure as possible. Bitcoin was designed as a currency, both resistant and reliable. These features imply some constraints that now might be seen as limits when trying to leverage Bitcoin blockchain for different uses.

- Bitcoin's blockchain does not natively support assets different from bitcoins. In the wake of previous e-cash experiments, Nakamoto's primary goal was to create a currency;

- Bitcoin's blockchain was not designed to be as fast as possible: in order to make a decentralized network as resilient as possible, in Nakamoto's design most of the emphasis was put on reaching the broadest consensus rather than achieving the highest validation speed;

- In order to avoid denial of service attacks by complex malicious programs running on the blockchain, that may severely endanger the network, Bitcoin's blockchain does not support fully programmable application (the bitcoin scripting system is not Turing-complete).

In order to overtake those limits, developers are working on different kind of technological solutions built on top, aside or separately from Bitcoin's blockchain.
Interesting examples are:

- **Colored Coins:** this protocol enables digital assets other than bitcoin to be transferred on the bitcoin blockchain using bitcoin as tokens. Leveraging on metadata that can be included in a bitcoin transaction, bitcoins become a representation, for instance, of shares, securities, commodities, and even real assets (cars, houses, etc.), which can then be traded on the blockchain as regular bitcoins.

- **Sidechains:** this term generally refers to alternative blockchains that are pegged to the bitcoin blockchain. This protocol allows to "freeze" a certain amount of bitcoins on the bitcoin blockchain, moving them to a different blockchain. Once in the new blockchain those bitcoins can be transferred following the rules of the new environment, e.g. a lower time for block validation, a different consensus mechanism, advanced programmability and so on. Then, when needed, a bitcoin can be moved back to the bitcoin blockchain, returning to follow the main chain rules. This is a promising development that will allow to overtake bitcoin scalability and velocity limitations.

- **Ethereum blockchain:** this blockchain allows for fully-programmable applications, called Smart Contracts, in a more complete and efficient way than bitcoin blockchain. Ethereum protocol is different from Bitcoin protocol, the Ethereum's main blockchain is not pegged to bitcoin blockchain and also uses a different native cryptocurrency called *ether*.

Blockchain was invented long before Nakamoto's implementation. In spite of being by far the most successful and provenly resilient blockchain implementation, Bitcoin's blockchain might never become a general standardised blockchain protocol.

Many different developer teams are working on several technical solutions, however this is usually to no avail.

Starting from the basic concept, a new blockchain can be, like any system, programmed to follow rules based on specific needs. Therefore,why not dedicate a blockchain to a specific business segment, activity or type of assets? Why not restrict access to a blockchain to clearly identified parties only? Why not control the role and rights of every single user?

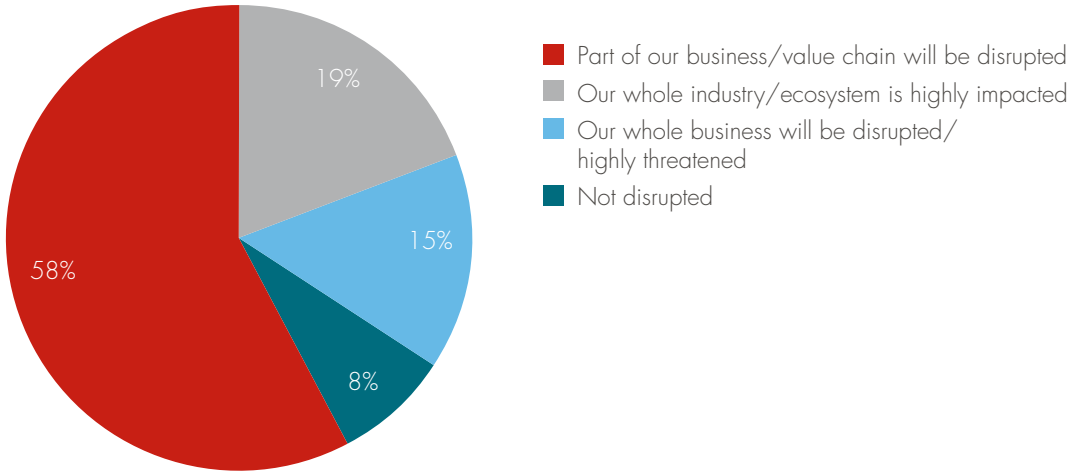
These evolutions and possibilities have led several Financial Institutions to investigate the blockchain space and build their own solutions.

Companies planning to integrate blockchain into their business are assessing different options in terms of data choice, security and confidentiality as well as the type of blockchain. This is what makes this technology so interesting, powerful and flexible, but at the same time makes it difficult for financial institutions to start this journey without leveraging on the right experts when investigating blockchain solutions, even if experts are scarce resources given the technology's infancy.

At what stage of the journey are Financial Institutions now?

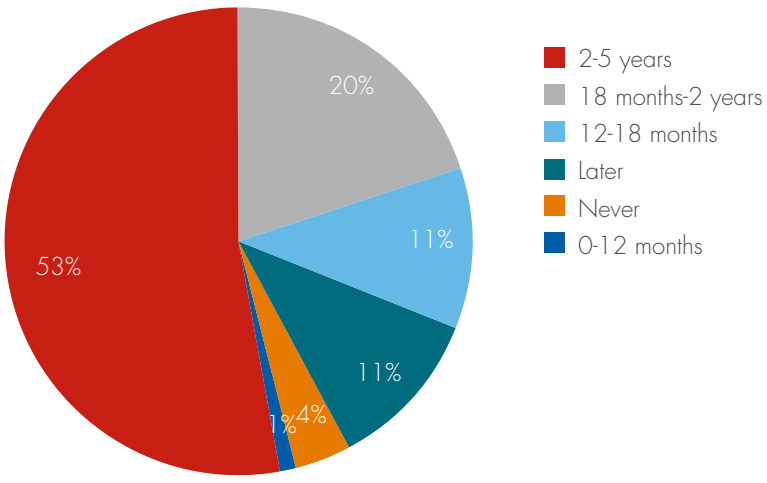
In order to understand how Financial Services are reacting to the blockchain revolution, a wide reaching survey was launched in March 2016.

How disrupted do you think your world will be by blockchain



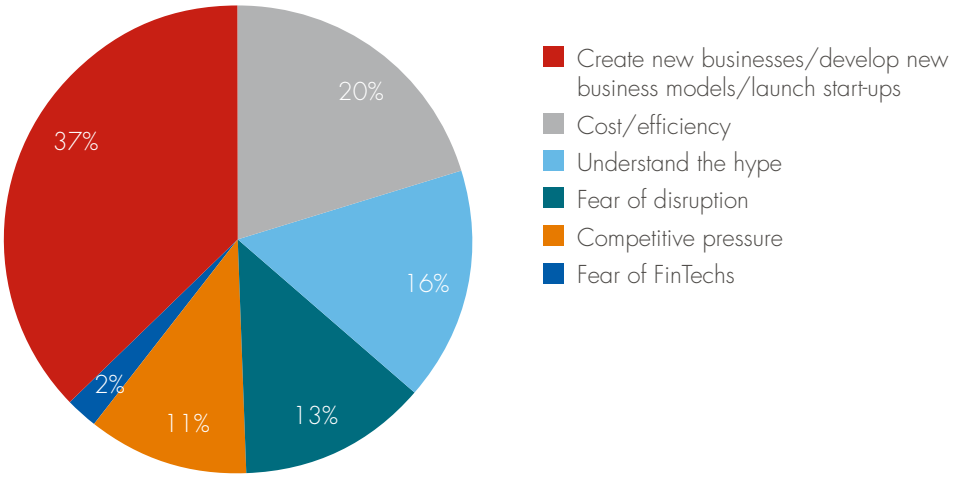
The survey results clearly confirms that, without any doubt, blockchain is on financial institutions executives' agenda, with almost all respondents (92%) forecasting that blockchain will impact FSI (85% within 2020).

When do you think blockchain will be mainstream



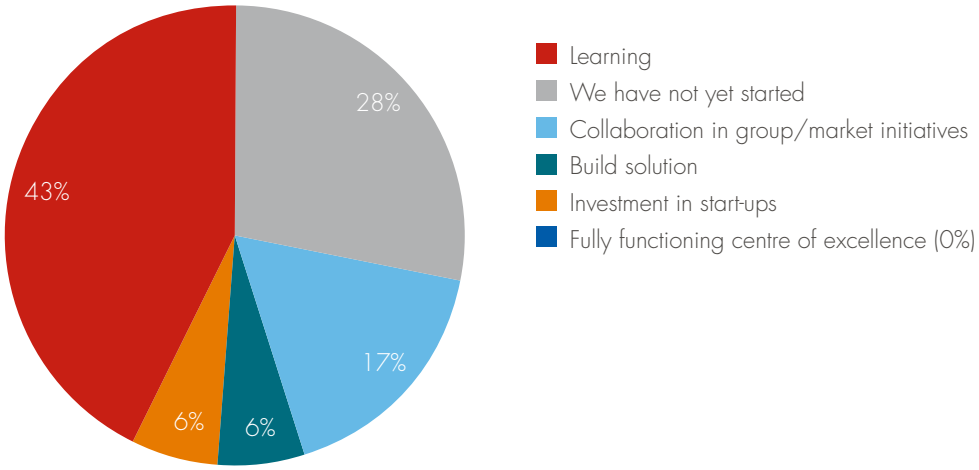
Banks and insurance companies seem interested in this topic not for fear of disruption, but, on the contrary, as an opportunity of either creating new businesses or improving cost and efficiency.

What is driving, or may drive your blockchain journey?



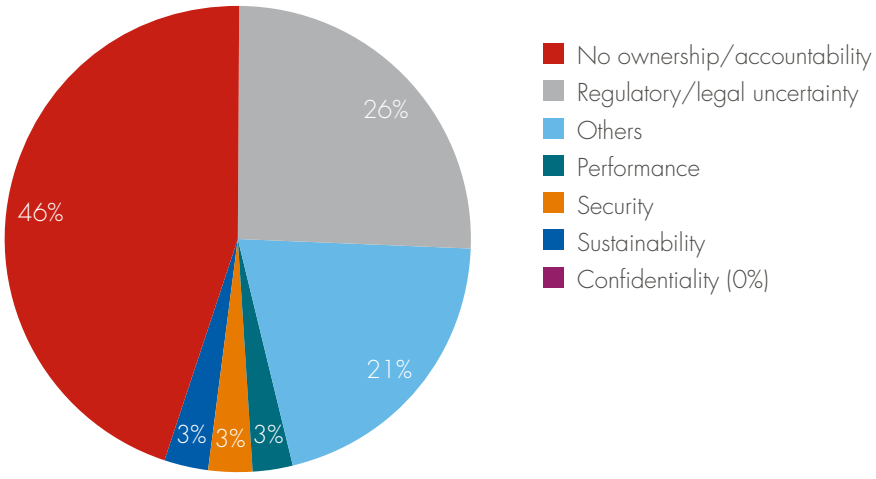
Even though there is a raising of awareness about the potential of blockchain, financial institutions are at the beginning of their journeys, with a few exceptions. None of our respondent firms have developed a center of excellence, even though some leading players have set up incubators and started developing internal capabilities. Rather, the 71% majority are either learning about blockchain (43%) or have not yet started their journey (28%) and 50% did not appoint a blockchain business owner.

Where are you in the blockchain journey?



Lack of accountability is the main reason that hinders organizations in embracing innovation, and blockchain is not different from this perspective, as affirmed by 46% of respondents. These results are not surprising but give a clear indication of the immediate need to begin learning courses, workshops and develop Proof of Concepts in order to develop a good understanding of the technology and to mobilise staff with the capabilities to act on it.

What is the biggest concern that is preventing you from starting this journey?



While we accept we are in the early stages of learning and adopting blockchain technology, we question why the vast majority of respondents who understand the profound impact the technology can have are yet to appoint people within their organisation to get to grips with it.

From what we can observe in the market, 2016 is the year which sees the move from the hype phase to prototype phase. We predict the development and launch of the first blockchain PoCs in FSI at a company level. In this scenario, the majority of financial institutions interviewed seem unprepared to tackle the upcoming challenge.

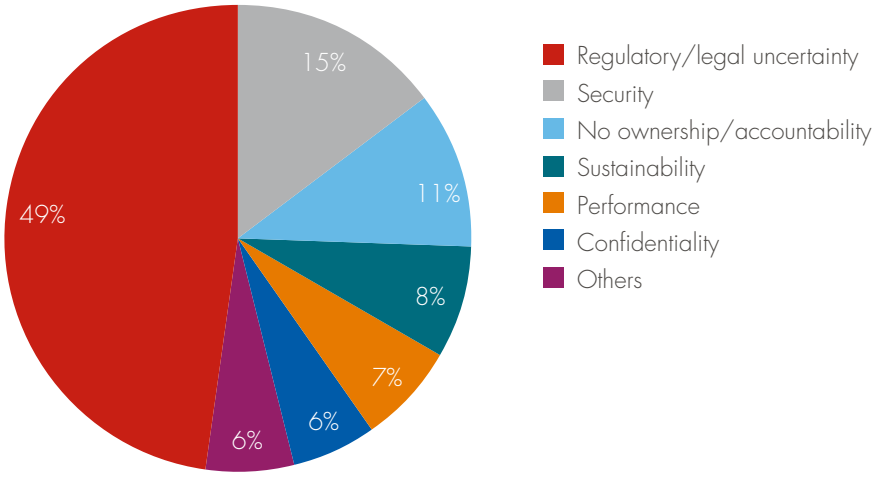
Blockchain could represent the next big shift in technology over the next five years but the pace of innovation within financial institutions seems to be slow. A radical change in culture is required to re-think banks' business models in order to prosper in the future. However, it seems that banks are focusing on "old-world" use cases as **60% believe that payments will be their initial focus**, while in this area a unicorn already exists: bitcoin!

What will your initial blockchain use case focus on?

International money transfers	60%
Securities clearing and settlement	23%
KYC and anti-money laundering	20%
Fiat currency payment and settlement	19%
Creating transparency	19%
Decentralised notary	16%
Fraud deterrent	15%
Asset registries	12%
Security issuance and transfer	11%
Prediction and stock markets	7%
Syndicated lending	7%
Securities asset servicing	7%
Trade surveillance	5%
Collateral management	5%
Derivatives contracts and clearing	5%
Other	9%

The first movers in the blockchain space among **financial institutions identify regulatory uncertainty as the biggest concern (49%).**

What is your biggest blockchain concern?



The lack of frameworks they can refer to for cryptocurrencies and for the adoption of blockchain technology in the financial services industry is a twofold concern. On one hand, banks and financial institutions are accustomed to complex and detailed legal frameworks (e.g. EMIR, MIFID,..) and are not confident to move their offering outside regulated environments. While on the other hand, investors are fearful that a regulatory intervention will translate in over-regulation that might endanger their blockchain-related business cases. This could be an over-estimated concern, as some European regulators seem open-minded regarding cryptocurrencies. The main examples are the Grand Duchy of Luxembourg and the United Kingdom. The former, granted the license of Payment Institution to SnapSwap International[1] in October 2015 and to Bitstamp in April 2016[2], which became the first nationally licensed bitcoin exchange. The latter awarded an Electronic Money license to Circle in April 2016[3]. Whatever the direction the regulator will follow, 64% of respondents believe that cryptocurrencies and blockchain applications in financial services will be subject to regulation in the upcoming 12 months.

> *"Governments and Public Institutions have grasped the benefits of blockchain. They are starting to authorize experimentations or testing various use cases like the issuance of mini-bonds for small and medium companies in France, the management of the distribution of grants in the UK, land registry… etc. The aim is to confirm the opportunities and have a better understanding of the risks of blockchain technology adoption. We think that this will ultimately facilitate the emergence of coherent regulation around blockchain and then its generalization."*
> Hugues Magron, Partner Deloitte

[1] Luxembourg for Finance "Virtual currency operator SnapSwap granted license as payment institution by Luxembourg Finance Minister" December 2015

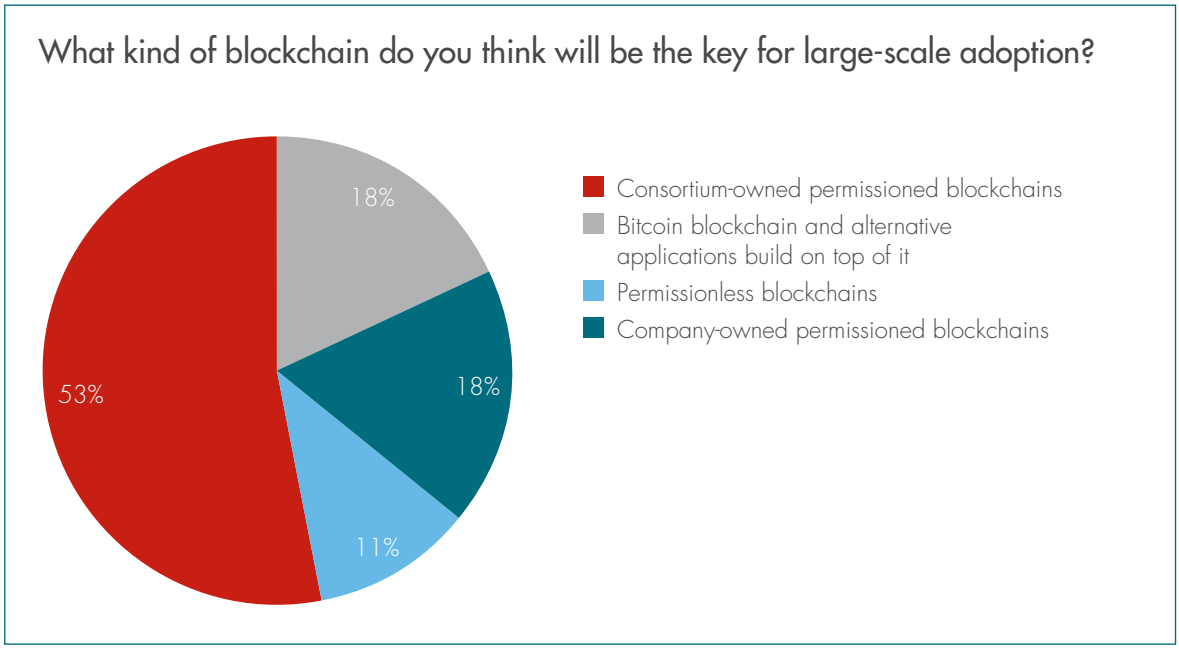
[2] Forbes "Bitstamp Becomes First Nationally Licensed Bitcoin Exchange; License Applies In 28 EU Countries" April 2016

[3] Circle Blog "Circle and British Pound Sterling, Social Payment App Updates, Limitless Spends and Withdrawals" April 2016

The technology itself and the idea of collaboration behind it attracts great attention in the financial services industry. The preferred approach for large-scale adoption of this new technology seems to be leveraging on permissioned blockchains (64% of respondents). In a permissioned blockchain, only approved users can join the network and transaction processing is performed by a predefined list of subjects with known identities. Moreover, permissioned blockchains do not generally have native tokens. Native tokens are necessary in cryptocurrencies to provide incentives for transaction processors; in permissioned blockchains, transaction processors are rewarded by other means[4].

> *"Permissioned blockchains are what Financial Institutions are looking at today. However, permissionless solutions are gaining traction on the market and interesting improvements for large scale adoption are under development. It is still not clear what kind of solution will prevail: as Deloitte it is thrilling to support our clients in exploring the forefront of innovation."*
> Paolo Gianturco, Partner Deloitte

Although companies are not ready yet to work in a fully shared and trustless manner, **the majority (53%) believes in the benefits that consortium owned permissioned blockchains could generate.** This fact is particularly interesting, as banks seem to have understood that it is safe to leverage on blockchain technology in their relationships with third parties (e.g.other banks). However, the process of setting up a consortium will slow things down. For instance, it took 4 years to launch SWIFT message systems (1973-1977) and it generally takes up to 3 years to agree on a standard (according to the NSAI – National Standards Authority of Ireland).



[4] Bitfury "Public versus Private Blockchains" October 2015

To provide a meaningful example, R3 CEV, the biggest consortium in the blockchain-FSI environment, gathers 45 of the world's leading banks aiming to set common standards for blockchain adoption in FSI. R3 is still in its learning phase and the system they have developed, Corda™, is not a blockchain and it only partially relies on distributed ledger technology. To quote Richard Gendal Brown (R3): "We are not building a blockchain. Unlike other designs in this space, our starting point is individual agreements between firms… We reject the notion that all data should be copied to all participants, even if it is encrypted." (http://www.coindesk.com/r3cev-blockchain-regulated-businesses).

The bottom line is that consortia are delivering great value in education, but, at the same time, their attempt to work with blockchain is running slowly due to the need of agreements among participants. These initiatives demonstrate the need of institutions to move on from the learning phase and start developing PoCs otherwise either we will return to consolidated technologies such as databases or we will be stuck in negotiation phase in order to meet stakeholders' expectations.

Institutions that stated they have invested more than €2 Million (12%) in blockchain technology say that they are doing it to develop new businesses or create/redefine business models. The perceived threat of FinTech is currently quite low and blockchain experienced firms are focusing on opportunities to improve their own value propositions.

Despite this growing interest, the risk to be stuck in the learning phase or in time-consuming consortia seems high. Embracing a new technology requires time and effort. Besides understanding how the technology works and which type of blockchain may fit best the identified use case, the crucial part is to integrate these new systems with legacy systems and with existing organizational procedures and controls.

More than ever before, learning by doing seems the best way to explore the real potential of blockchain technology.

In Deloitte experience, a simple 5-steps approach can help to progress in the blockchain journey and move on from the learning phase to technology full adoption:

1. Learn and understand how the blockchain can be used
2. Find a good use case to develop
3. Build a relatively small network (intra-departmental) within the organization with 3-5 nodes and integrate it with legacy systems
4. Scale to a larger (inter-departmental) network, add nodes (5-10), extend the system integration perimeter and roll out the solution at a company scale
5. Adopt blockchain to build an industry wide network and connect separate institutions (inter-organization).

Significant development in FS world

From humble beginnings in 2008 as a simple peer to peer electronic cash system, people today are confidently claiming the only limitation on harnessing the vast potential of blockchain is our imaginations. While many industries are looking on intently at the rapidly developing technology, it is the financial services industry which is at the forefront of innovation. The majority of research has been looking into the capability of blockchain to modernise legacy systems/old processes, which are both costly and inefficient.

Several leading banks including Intesa Sanpaolo and Unicredit, and the leading e-commerce payments institution in Italy, Banca Sella, have published several white papers and articles about blockchain and are actively recruiting blockchain developers and promoting initiatives in this space. Sponsoring or organising blockchain hackathons is just one way they are promoting the technology (prime examples to note are Fidelity and Citi in Dublin, and BNP Paribas in Paris, Brussels, Rome, Istanbul and San Francisco).

Some companies are unifying their effort and hoping to establish an industry standard. As well as the aforementioned R3 Consortium, the Post Trade Distributed Ledger Working Group (including 37 members such as CME Group, Euroclear, HSBC, the London Stock Exchange and UniCredit[5]) was founded in the UK with the goal of identifying integration points for the technology across capital market requirements.

Another group the "Caisse des Dépôts" has been launched in France, bringing together 11 partners from insurance, banking and FS industry groups, working to leverage their research in exploring blockchains potential and investigating the ethical, regulatory and normative aspects of the technology.

Even though these initiatives are important for the industry, it seems that it is difficult to agree on standards which would enable the development of a scalable solution. The consortia are favouring research and experimentation with the distributed ledger technology comparing various blockchain solutions. "It's not clear there's a well-defined playbook in how to evaluate these technologies side by side. We want to help bring that clarity," R3 managing editor Tim Grant told the publication Coindesk[6]. However these consortia operate in a "lab" environment, not taking into account the full ecosystem required for the operationalization of a viable use case. Maybe aiming for standards is too early, but favouring research and transferring knowledge is essential.

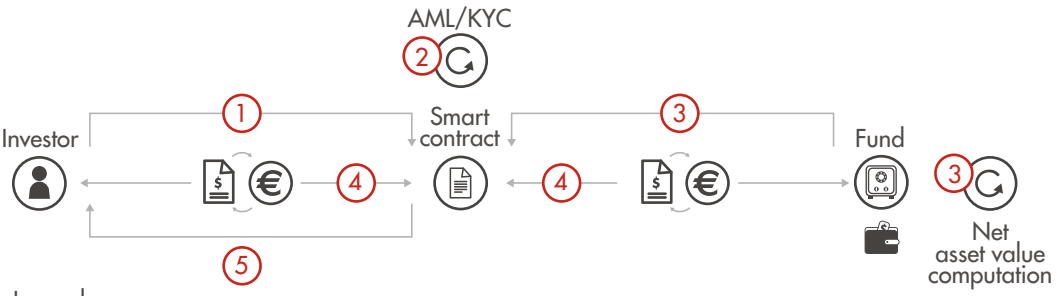
Worldwide, several large financial institutions, Barclays, Santander, Citi and UBS to name a few, have set up innovation labs focused on distributed ledger technology and announced successful experiments or event patents. For example Bank of America has 15 filed blockchain related patents registered and is currently working on an additional 20 patents. The use cases tested can be of any topic but most traction is around processes that were once simple but increased complexity with the evolution of the industry but weren't updated or re-thought.

Indeed, the distribution and settlement processes today have a multitude of intermediaries and take quite a long time in operation. The blockchain would allow investors and issuers to directly operate in a peer-to-peer manner, without any intermediary to interfere, and subscriptions could be executed automatically once the NAV is computed. Transaction events would be stored in a permanent, immutable and time-stamped manner.

[5] Coindesk "Post-Trade Distributed Ledger Group Grows to 37 Members" May 2016

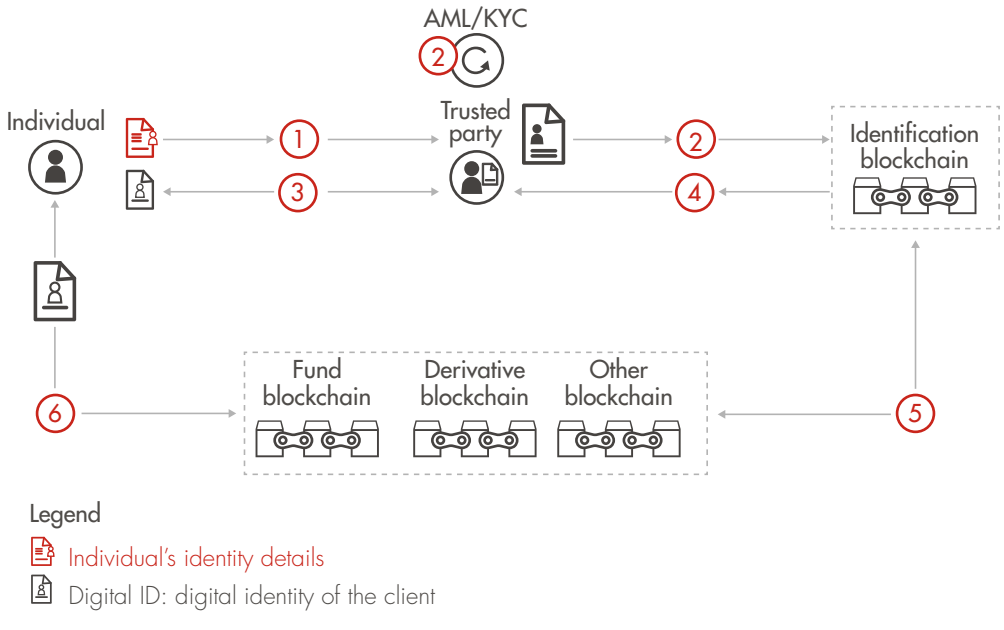
[6] Coindesk "40 Banks Trial Commercial Paper Trading in Latest R3 Blockchain Test" March 2016

New business process of fund subscription



Another potential complex and time-consuming process that could be revolutionised via blockchain is AML and KYC. The distributed ledger increases access to information and transparency, reduced duplication effort between entities, secures an audit trail and enables both a mutualisation and an upgrade of the underlying technologies, hence a substantial increase of the related cost-efficiency ratio.

New business process for AML/KYC checks



One innovation lab that has had big traction is the Nasdaq Indeed. They have successfully developed a platform (Linq) to issue private securities and keep track of ownership while executing subscription documents online, eliminating the need for paper stock certificates and reducing settlement time and risk to nearly zero.

A similar initiative has tested the automation of Credit Default Swaps processes via blockchain, respecting confidentiality and privacy of data between parties. Other initiatives show how blockchain technology can improve the security and accuracy of data flows in the post-trade environment, as well as cut back-office costs[7].

One worry most Financial Institutions have is how to include existing regulation in the technology. However Bank of Ireland has recently proven in a proof-of-concept that blockchain technology can be integrated into an existing system architecture while respecting regulation. Indeed, they have the potential to build an immutable, distributed, searchable repository of information across the full trade cycle that makes it difficult to alter transaction histories and facilitates meeting EU regulations such as the Markets in Financial Instruments repealing Directive (MiFID II).

It is not yet known who has the next scalable solution on the blockchain but what is for certain at this point to parties interested in technology is that this is only the start of realising the vast potential of this truly disruptive technology.

[7] Coindesk "Interdealer Broker ICAP Completes Post-Trade Blockchain Trial" March 2016

KBC Securities – blockchain experience and use cases

What is KBC Securities doing today?

Investigations have been ongoing for the better part of 2015 with a small group building their understanding of the benefits and potential opportunities that this nascent technology promises and also the challenges associated with leveraging such a disruptive technology. Pragmatism and entrepreneurialism are corporate virtues in the group, which has led to a very hands on approach taking form. In this environment, there is little appetite to build solutions for the sake of the solution or the technology itself, the solution must demonstrate the ability to generate business value from a very early stage or it will find itself on the chopping block. Some industry players have taken another approach whereby they launch experiments in the lab and when success is achieved, they try to convince the business stakeholders that there was a problem in the first place. As a result, they end up with 35+ use cases that they are working on but no clear view as to whether these are pain points acutely felt by the business. We do the opposite: identify the pain point for customers and then assess which solution could offer relief, one of which is a blockchain based approach.

With this approach, the efforts to identify first use cases for this technology began to gain speed in Q3 2015 with a first capital markets proof of concept demonstrated internally in December and 2 additional projects in other parts of the Belgian operations have since gotten underway. With the successful demonstration in December in the capital markets area, we have since doubled down our efforts in this area and in March we launched our first publicly available blockchain solution, further refining the solution and putting it in the hands of real customers.

The benefits that are expected to be generated from the blockchain based solutions are multi-faceted; ranging from reduced throughput times for the settlement of transactions, consolidation of records across departments and geographies, improved transparency (auditability), operational improvements, lower cost and opening up new commercial opportunities. Initial business cases have been evaluated and budgets secured to begin the first experiments in these areas. These groundbreaking projects officially kicked off between December 2015 and February 2016. After the first phase, we are continuing in these areas to further develop the solutions.

The steps taken in 2015 and in Q1 2016 have been in a “learn as we go” modus, a general approach to blockchain technology in all domains can be distilled, which has consisted of:

- Identify persistent business challenges or inhibitors to growth in each business line
- Investigate whether or not blockchain technology could unlock a solution that is not feasible given the current technology from a cost, regulatory or complexity perspective
- Discuss the idea internally with business stakeholders and gather insights from external sources
- Define a manageable scope for a first experiment and secure support and funding
- Build an early stage prototype and gather feedback from stakeholders to validate that the prototype can provide the sought after solution.

An important element of the approach is the iterative process being applied, which includes rapid prototyping, refining and re-aligning with the needs of the business based on experiments with these prototypes (in place of theoretical discussions), further developing the solution and releasing functionalities commercially.

Although we are not yet through the cycle to commercial launch, we launched the second proof of concept in March 2016. This was the Bolero Crowdfunding app called "Boleuro" that is available now in the app store and the google play store. This marked the first time we exited the lab with a blockchain application and put a product in the hands of customers. This application is a virtual trading application for stocks and bonds issued by private companies. As it is in a virtual environment, this allows us to experiment and gain feedback in a "safe" environment, both in terms of the blockchain technology itself and in terms of UX as customers provide feedback on the usability of the user interface of the application. Step by step we will go for broader commercial applications and cooperation with other market participants to fully leverage the benefits that blockchain promises from a commercial, cost, time, audit and risk perspective.

To be sure, the investment of time and resources will take several years to blossom and to reach a state where the full benefits of distributed ledger technology will come to the fore for KBC Securities. Critical to the success of the approach will be balancing short term demonstrable gains that secure interest and funding from stakeholders with the longer term benefits that blockchain technology promises to deliver when utilised in a broader perspective. Our aim is to position ourselves on the forefront of this evolution in our industry.

But what specifically are you working on?

Enough with the high level stuff, time for a peek inside the kitchen to see what kind of blockchain dishes we are cooking up. Here we will focus on two applications. One that has already been developed for knowledge building and demonstrated internally and one that was launched in March.

Innovative solutions to investment inhibitors

As some of the readers of this paper will have heard, KBC Securities launched an award winning Crowdfunding platform in 2015 and was awarded the EFMA-Accenture Innovation Award winner for Best New Product or Service in 2015. In our research leading up to and in customer feedback following the launch, a common hurdle for investors is the lack of liquidity available to equity and bond crowdfunding investments.

As an investor in the equity of early stage companies, one knows that they going to be in it for quite some time, the timing of an exit is uncertain and the nature of an eventual exit is also uncertain. Will a later stage investor consolidate the shares of the company by the means of a buyout? Will the management facilitate a buy out? Will the company be bought by another player in the industry? Will the company reach Walhalla and have an IPO? If one of these potential exits does present itself, it is unclear at the time of investing at what valuation the exit will take place. Or perhaps none of these will occur and the company will not grow and an exit opportunity will not present itself.

On the other hand, one could also invest in bonds issued by early stage companies. With these, the interest rate is pre-defined and the exit timing and valuation are clear. These offer clarity on the return, the interest and the maturity date however, the maturity date can be several years off and, as a retail investor, one's personal financial situation may change in the meantime. It is not uncommon that an investor might just need the money for other purposes before the bond reaches maturity. Although some are comfortable with the lack of clarity that comes with investing in early stage companies and the extended horizon for these investments, these conditions make many other investors think long and hard about putting their money into early stage companies through equity and bond crowdfunding.

The daunting exit question is precisely what Bolero Crowdfunding aims to solve by introducing a means for investors to potentially exit their equity crowdfunding investment prior to one of the exit opportunities above presenting itself. After investigating other potential solutions, we are turning to blockchain technology as the bricks and mortar for the solution for the time being. In doing so, we expect that the target market for equity crowdfunding will evolve from a relatively small group of savvy investors to a broader group of interested investors.

But wait, we've found more

In investigating how best to provide a potential exit opportunity for the investors, a number of alternatives were considered and integrating distributed ledger technology presented itself as an elegant means of potentially alleviating illiquidity. In addition to the opportunity for earlier exit, solutions to a number of other business challenges presented themselves when the integration of blockchain technology into the technological stack for Bolero Crowdfunding was considered.

First is the initial notation of the newly minted shares or bonds by the entrepreneur and the registration of intent to invest by the investors on the platform. These initial notations by the entrepreneur and registrations of intent by investors will be recorded on the blockchain using smart contracts.

Second is the distribution of the shares to the investors following the successful closing of a crowdfunding campaign. The successful closing of a campaign will be a condition in the smart contract that triggers the transfer of ownership of the shares from the entrepreneur to the investors. A number of additional triggers will also be included such as receipt of proof of identity of the investors, completion of the appropriateness test and the acceptance of the terms and conditions of the investment.

Third is the disbursement of dividends and interest payments in equity and bond investments respectively. At the time of payment, the entrepreneur will remit the total amount of the dividend or interest payment, the proportional ownership of all investors will be extracted at that moment (keep in mind that shares will have changed hands several times via the secondary market) and the full payment amount will be distributed based on the registrations on the blockchain at that moment. This will replace the need for the entrepreneur to follow up with all investors at the time of pay out to ensure that his/her shareholder registry is up to date and to make individual remittances to each investor.

Fourth is the organization of voting for the annual shareholder meeting. The Bolero Crowdfunding platform already provides a facility for virtual board meetings and the blockchain integration will be used to also coordinate voting of shareholders when this is needed. Each investors will automatically be allocated the correct number of votes during the meeting based on the proportion of shares they hold in the company at the time of the meeting.

But wait, you don't need a blockchain solution to do all those things

To be clear, these business challenges could be solved using a host of other technologies and/or solution providers, however, the prospect of offering a highly integrated solution using blockchain technology is very promising and will mean that the cost to the end-users, both entrepreneurs and investors, for these additional services can be kept to a minimum. While this is possible without blockchain utilization, after thoroughly analyzing different ways of building this solution, we determined that the underlying processes will be considerably optimized when using blockchain technology.

Sounds cool, what's next?

As mentioned previously, an iterative approach is being used for our blockchain projects so we will not go for a big-bang launch covering all of these functionalities from day one. In December we built a very quick and dirty blockchain application in which we set up different nodes in five countries around the world and built a very basic primary and secondary market. The users of the app were able to buy and sell virtual shares in fictitious companies. Holders of securities could offer these at a price they set and buyers could view all available offers on the market, select the offers they were interested in and buy the securities with the virtual currency of the application, the Boleuro (Bolero+Euro = Boleuro). Securities moved from original investor to new investor in exchange for Boleuro's and settlement was instantaneous. It didn't look very pretty from a UI perspective, but it worked. A key practical learning from the test is that partial fills were not possible on a blockchain application. If a holder of a security offers to sell 10 shares at 100 Boleuro's a piece and another only wants to buy five at that price, bad luck. You need to create tokens for each of the 10 securities offered. These are the simple things you learn quickly as you experiment rapidly.

For our next proof of concept, we improved upon the UI and delivered a fully functioning virtual market for the issuance of securities (mini-IPO) and a secondary market for these securities. This virtual environment is in the hands of actual customers at our regional pitch events that are taking place across Belgium. At these events, entrepreneurs pitch their ideas to a crowd of 140 potential investors on average and these attendees are able to virtually buy the shares of early stage companies in real time. After the pitches are done, we open the secondary market for about an hour during the reception afterwards. At the end of the event, we will calculate the virtual market cap of the entrepreneurs based on the price of the shares and the quantity bought in the secondary market and voila, the entrepreneur with the highest virtual market cap is the winner, which guarantees them a spotlight booth at our 3rd annual Entrepreneurial Summit in October. For us, this provides a great opportunity to continue learning and experimenting in a virtual environment with the setup of our distributed ledger and the programming of the smart contracts required for these transactions. Below are a few screenshots of the app:

A few months after the launch of our virtual investing app, we are engaging the regulators and the banking authorities in Belgium to explain where we plan to go with blockchain technology. Having a fully functioning application that addresses investor concerns and pain points in hand allows us to demonstrate exactly what we plan to do and this goes a long way. A picture may say a thousand words but a fully functioning demonstration says it all.

Start your blockchain journey – NOW!

Stop reading and get active by testing your ideas. You may believe that you have not gained a full understanding yet, but don't worry, blockchain is in a period of evolution, which means even the experts at the forefront of the industry are unsure what is next for the technology. Reading and hearing about definitions, opinions and tests is interesting but we recommend learning by doing as the best way to gain true understanding of the untouched potential at our fingertips.

The majority believe that the financial services industry will be disrupted by blockchain in the next two to five years but few FS companies have entered the POC stage. Be part of the transformation of your industry and influence it by sharing your experience and ideas and building solutions yourself.

> *"Blockchain technology is disrupting the financial services industry for the better when it comes to transparency, efficiency and improving trust. There is significant demand from clients who are looking to use blockchain to speed up payments and transfer clearances, aid fraud prevention and enable market predictions. By bringing together the best of Deloitte experts and building upon our capabilities, we believe we can play a significant role in lifting blockchain use within financial services to a new level"*
> David Dalton, Partner Deloitte

As you start or indeed continue your blockchain journey, in the first instance we recommend looking beyond payments/bitcoin based use cases and push banks, insurers, fund managers and asset servicers to investigate how blockchain could be used to address some of your business problems. You are your business SMEs and are the ones who truly understand your industry, therefore you are the best people to identify use cases where blockchain can actually make a difference in your business. Time to roll up the sleeves, get your hands dirty and start developing POCs to better understand what this potential game-changing technology can do. In the immortal words of Mark Twain, "Explore. Dream. Discover".

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Acknowledgements

We would like to thank the following people for their valuable contribution to this report:

Annalisa Izzo, Lory Kehoe, Michele Mandelli, Stefania Pizzuto, Cillian Leonowicz, Nadia Andersen, Emanuele Guzzoni, Yonathan Grigiac, Giacomo Gabrieletto, John Hallahan, Georges Massaad.

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Out of the blocks

Blockchain: from hype to prototype

May 2016