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The Blockchain (R)evolution – The Swiss Perspective

White Paper

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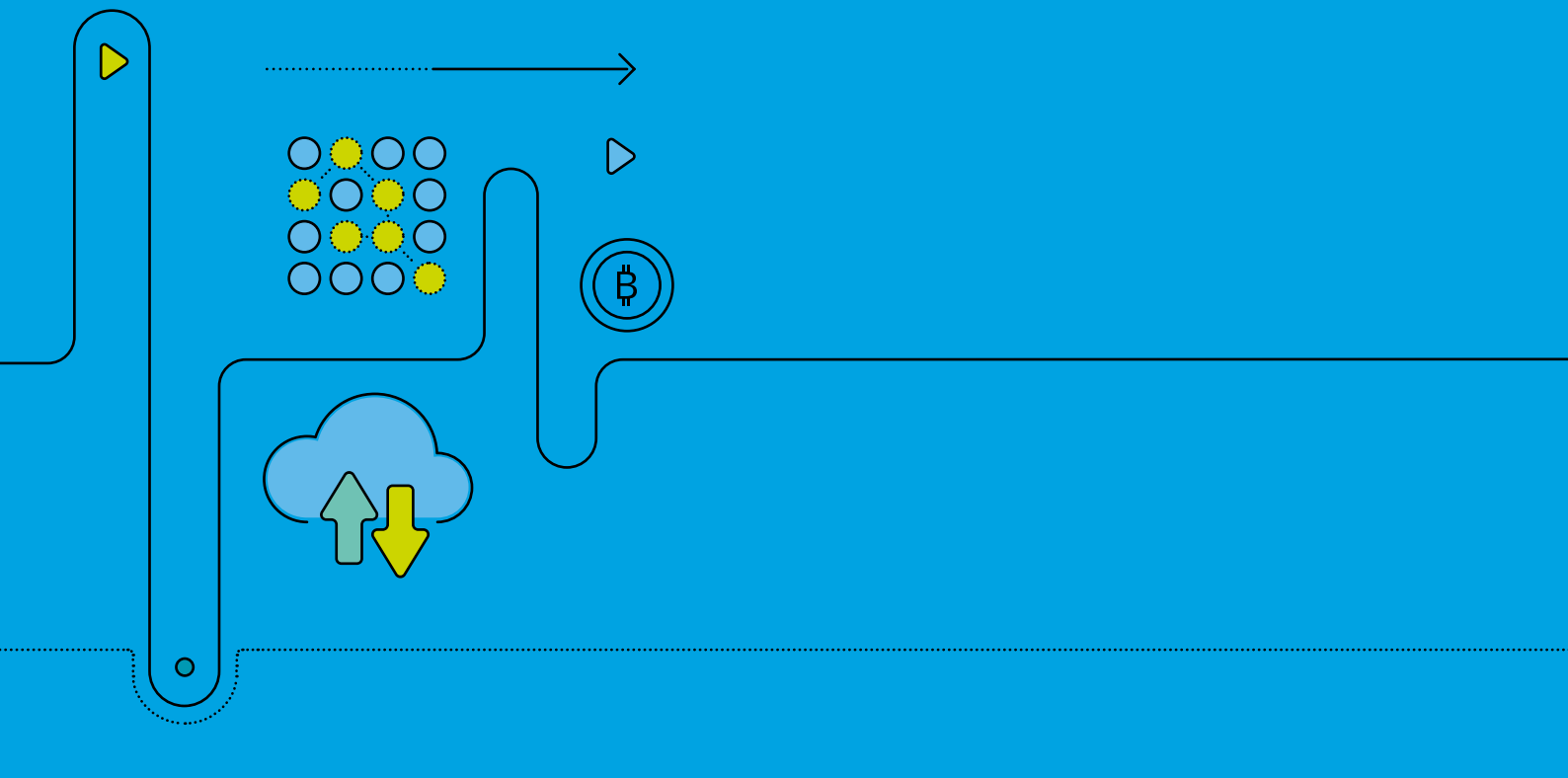

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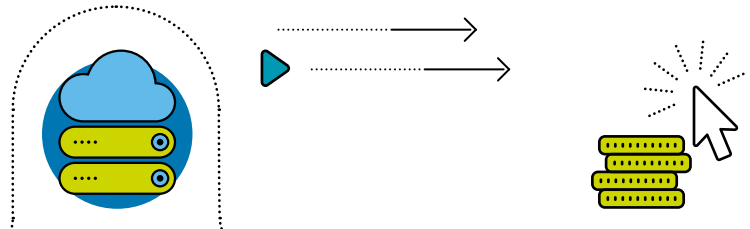

White Paper: The Blockchain (R)evolution – The Swiss Perspective

Dear Blockchain enthusiasts,

Blockchain technology is very much a trending topic, and Deloitte Switzerland is pleased to be able to give you an insight into it with this publication. We herein focus on how Blockchain is seen by the Swiss market, which offers the Blockchain community huge potential as a place in which this technology can be developed and used, of which the prominence of Zug's Crypto Valley provides the most convincing evidence.

Rapid technological development, constantly changing customer behaviour and ongoing regulatory amendments are forcing companies and organisations worldwide to conduct a critical review of their business models and business processes. Blockchain technology presents a great opportunity to all Swiss companies needing to do this, as its distinctive characteristics – such as decentralisation, irreversibility and smart contracts – mean it provides considerable support to this transformation.

We are seeking, by means of this White Paper, to help promote the development of Blockchain in Switzerland and to encourage dialogue between entrepreneurs, service providers and all other parties with an interest in Blockchain.

You can find further perspectives on the topic of Blockchain on the Deloitte Innovations website where we regularly post information about the latest developments on the Swiss market. We will be offering further articles by experts and their insights into technological innovations, examples of real-life practice and regulatory issues, thus covering a wide and varied selection of subjects. We look forward to receiving your feedback and suggestions.

Yours sincerely

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1) https://www2.deloitte.com/ch/de/pages/innovation/solutions/blockchain-practice.html

01

What is Blockchain?

Technological innovations such as robotics, artificial intelligence, cloud technology and the mobile economy have established themselves very quickly over the last few years through developments like social media and digital identities, and have now become a key element of the commercial and social economy (e.g. sharing economy, crowdfunding). It is therefore important for companies to understand the impact of these technological advances on their business models so that they can adapt themselves to new circumstances. The ability to change is now a necessary if not vital skill that companies must possess if they are to defend or expand existing competitive advantages and market shares. These adjustments result in a transformation strategy that makes the difference between success and failure. In recent years the world has demonstrated on numerous occasions how former market leaders such as Kodak[1]or Nokia[2] have continuously lost market share due to a lack of transformation strategies and ultimately exited the market. To prevent this, companies must examine these innovative technologies on an ongoing basis and evaluate whether and what change they could bring about.

If people such as Don Tapscott, the author of the book "Blockchain Revolution", or the news networks and newspapers are to be believed, we are on the verge of a "decentralisation revolution". Driven by Blockchain technology, there is a level of hype similar to that seen prior to the first commercial use of the Internet.

The World Economic Forum defines Blockchain technology as follows: Blockchain or distributed ledger technology (DLT) is a technological protocol that enables data to be exchanged directly between different contracting parties within a network without the need for intermediaries. The network participants interact with encrypted identities (anonymously); each transaction is then added to an immutable transaction chain and distributed to all network nodes.

As a result, Blockchain is expected to offer enormous potential for bringing about radical change in a wide range of industries, business models and operating processes such as payment settlement, accounting or the use of customer and loyalty cards. Please refer to the use case boxes throughout the text as well as the appendix for detailed discussions. In view of the technical complexity and the lack of acceptance of these far-reaching changes in the private, public and commercial sectors, this new technology will in all probability only catch on gradually and depending on how it develops over the coming months and years. It is therefore less a question of whether Blockchain will establish itself and more a question of when and in what areas.

"Blockchain will not only be a new disruptive database technology. Over time, Blockchain solutions will also be implemented in financial software upgrade cycles. In 'restricted areas' at first, then in more comprehensive applications."

Thomas Ankenbrand, Lucerne University of Applied Sciences and Arts

1) http://www.spiegel.de/netzwelt/gadgets/fotokonzern-am-ende-wie-kodak-aus-unserem-leben-verschwand-a-810043.html
2) http://tablet.fuw.ch/article/wer-hat-das-ende-des-nokia-handys-besiegelt/

1.1 Technology on trend

In a recently published report[3], Deloitte analysed the eight most important technological trends and their potential impact on business, as well as their effectiveness and development. A lot is expected of Blockchain, particularly in conjunction with other technologies such as the Internet of Things. These and other trends may be very helpful to companies and organisations over the next two to five years with regard to transformation. Blockchain is unique in this regard, as the technology is geared specifically to the reliance on trust between market participants.

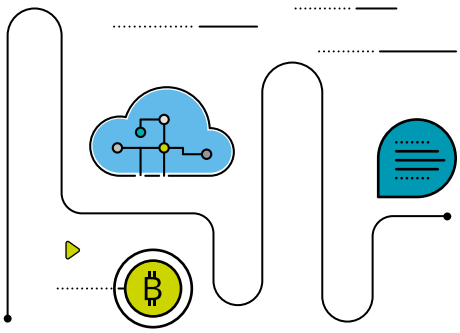
1.2 The value of trust

Trust is an integral part of any dealings between two or more contracting parties. This trust is generally created by involving organisations or specific groups of people as intermediaries. Ongoing globalisation and the growing complexity and volume of global transactions are making this approach increasingly difficult, as it is becoming ever more time-consuming, costly and thus inefficient. Furthermore, the events of the last financial crisis showed that this intermediary-based system is highly vulnerable. This led to a huge loss of confidence in the prevailing system and a shift towards the development of alternatives, which in turn gave rise to Bitcoin[4].

Experts have now recognised the potential not only of bitcoin but in particular that of the Blockchain technology that underpins it. Organisations and companies are conducting extensive research and development into Blockchain. This new technology represents a promising alternative to the current organisational and technical infrastructure, one that is needed to rebuild the trust between organisations, companies and private individuals. A significant portion of Blockchain's potential lies in the simple, technology-driven way in which the required trust and security platform and structures can be developed in order to facilitate efficient business activity. For many organisations, this trust element is a strong argument in favour of exploring Blockchain.

Another key factor in Blockchain's future success will be the technological progress made with regard to scalability.

The current high energy requirement and verification (mining) of new transactions due to proof of work usage means Blockchain is reaching its limits in terms of scalability. Blockchain technology requires each new transaction to be matched with the global register of existing parts of the Blockchain by means of a "hash". New transactions first have to be verified by the "miners", resulting in a time delay of around ten minutes. Research teams are already working on reducing the transaction time and memory size. The technological challenges could also be overcome in future through higher server and broadband capacities.



"The technology behind Bitcoin could transform how the economy works."

The Economist, 31 October 2015

3) Deloitte Digital, Tech Trends 2016: Innovation in the digital era
4) Satoshi Nakamoto, 2008, Bitcoin: A Peer to Peer Electronic Cash System

1.3 Sample applications

1.3.1 Bitcoin

The digital currency bitcoin is probably the best known application of Blockchain and is even better known than the Blockchain technology on which it is based. Bitcoin highlighted the potential of DLT and identified other practical applications of the technology. The way in which Blockchain technology works is explained below using bitcoin as an example.

The cryptocurrency, a digital payment method based on cryptographic principles, is generated via a large number of Internet-linked computers with the aid of a mathematical formula and recorded in a database that is managed decentrally by all participants. The currency can be transferred directly by means of a special peer-to-peer application, in other words without an intermediary. Encryption technologies ensure anonymity and ownership structures in the Blockchain.

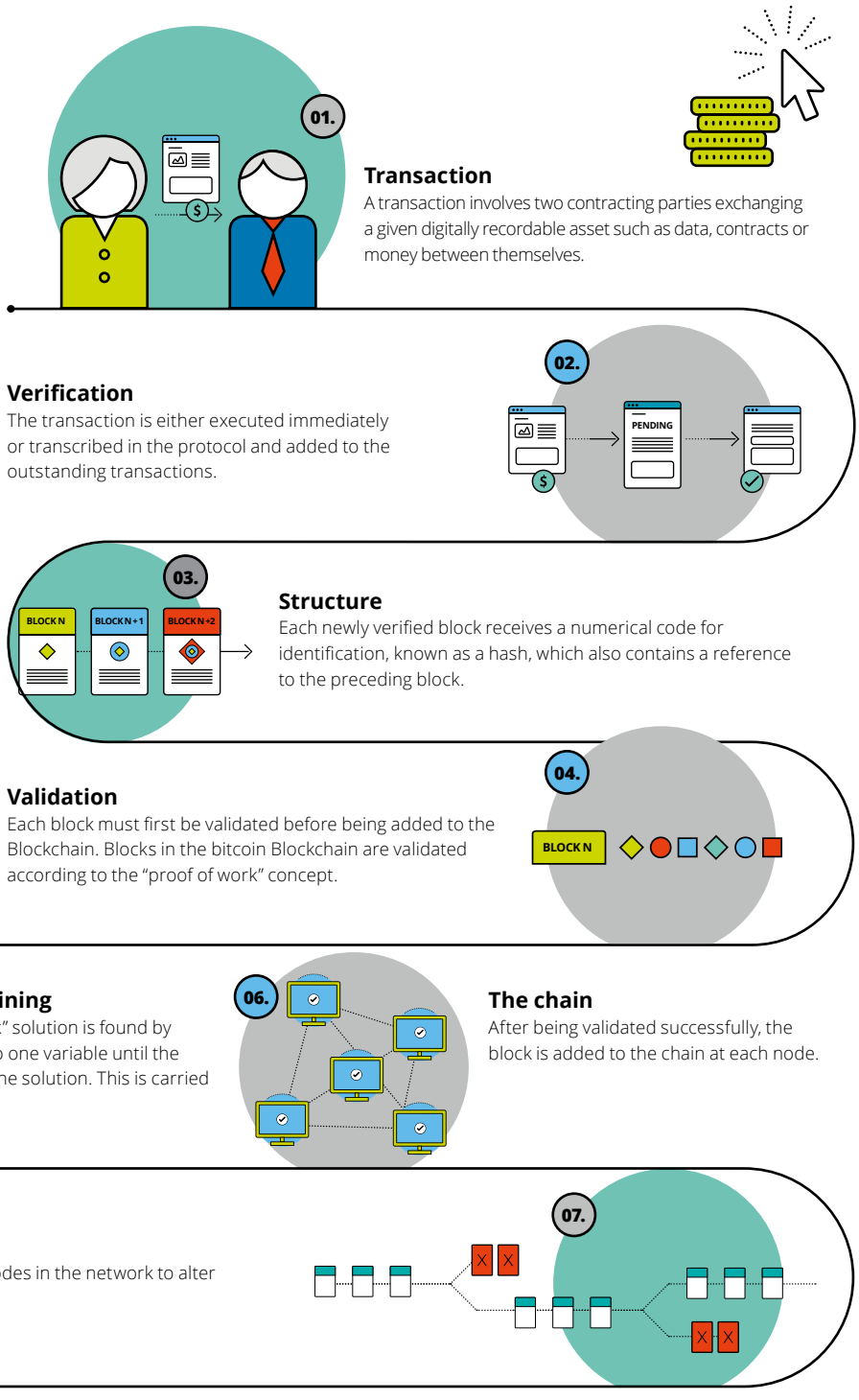
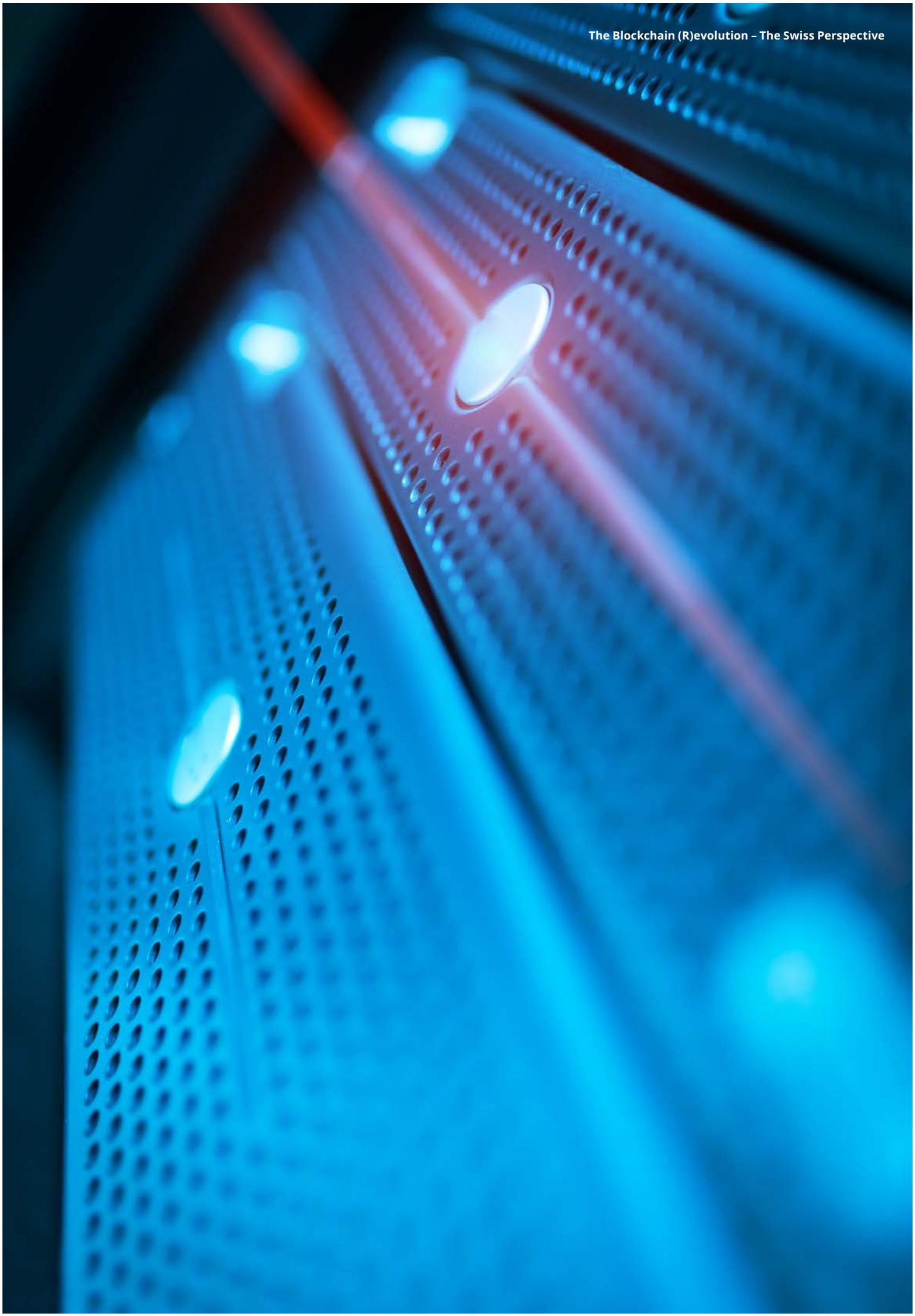


Figure 1: Bitcoin as an example of how Blockchain works *(Source: Deloitte University Press, Tech Trends 2016: Innovating in the digital era)*



"A smart contract is an agreement between two parties that is stored in the Blockchain."

1.3.2 Smart contracts

One interesting application of Blockchain is the smart contract. A smart contract is an agreement between two parties that is stored in the Blockchain.

Such agreements may be concluded between two people, in other words peer-to-peer (P2P), person-to-organisation (P2O) or person-to-machine (P2M)[5]. It can thus be specified that as soon as a given condition is met (e.g. sale of goods "1" on exchange "2"), the contract is executed automatically and assets (e.g. fiat money, digital currency, title of property, data) are exchanged between the contracting parties. The transaction is then replicated and validated on the Blockchain.

Smart contracts make it possible to exchange an asset without third parties being aware of the transfer. This opens up the possibility of disintermediating the entire legal system and creating a new form of virtual agreements.

Blockchain-based electronic health data

Numerous industries are examining the potential applications of these digital contracts. For example, healthcare companies such as Novartis and Pfizer have recognised the added value offered by these contracts. In particular, tests are being conducted on the use of Blockchain-based electronic medical records(EMRs)[(1)]. Personal health records can be stored and managed via the Blockchain in an EMR system. Personal health records are coded as digital assets and stored securely in the Blockchain under a pseudonym (e.g. digital address and not a coded name). Users can allow doctors and other parties to view their medical records as required with their private key. The records might contain information from a fitness tracker, vaccination status, prescriptions, previous treatments, doctors' recommendations and proof of insurance. This anonymised health data will open up new sources of income for drug development for pharmaceutical companies.

Source: 1) http://www.cio.com/article/3042158/health/how-to-monetize-healthcare-using-blockchain.html

5) https://www.linkedin.com/pulse/blockchain-smart-contracts-health-booz-allen-hamilton-tori-adams

02

Blockchain and the path to innovation

2.1 The technology-driven business innovation model

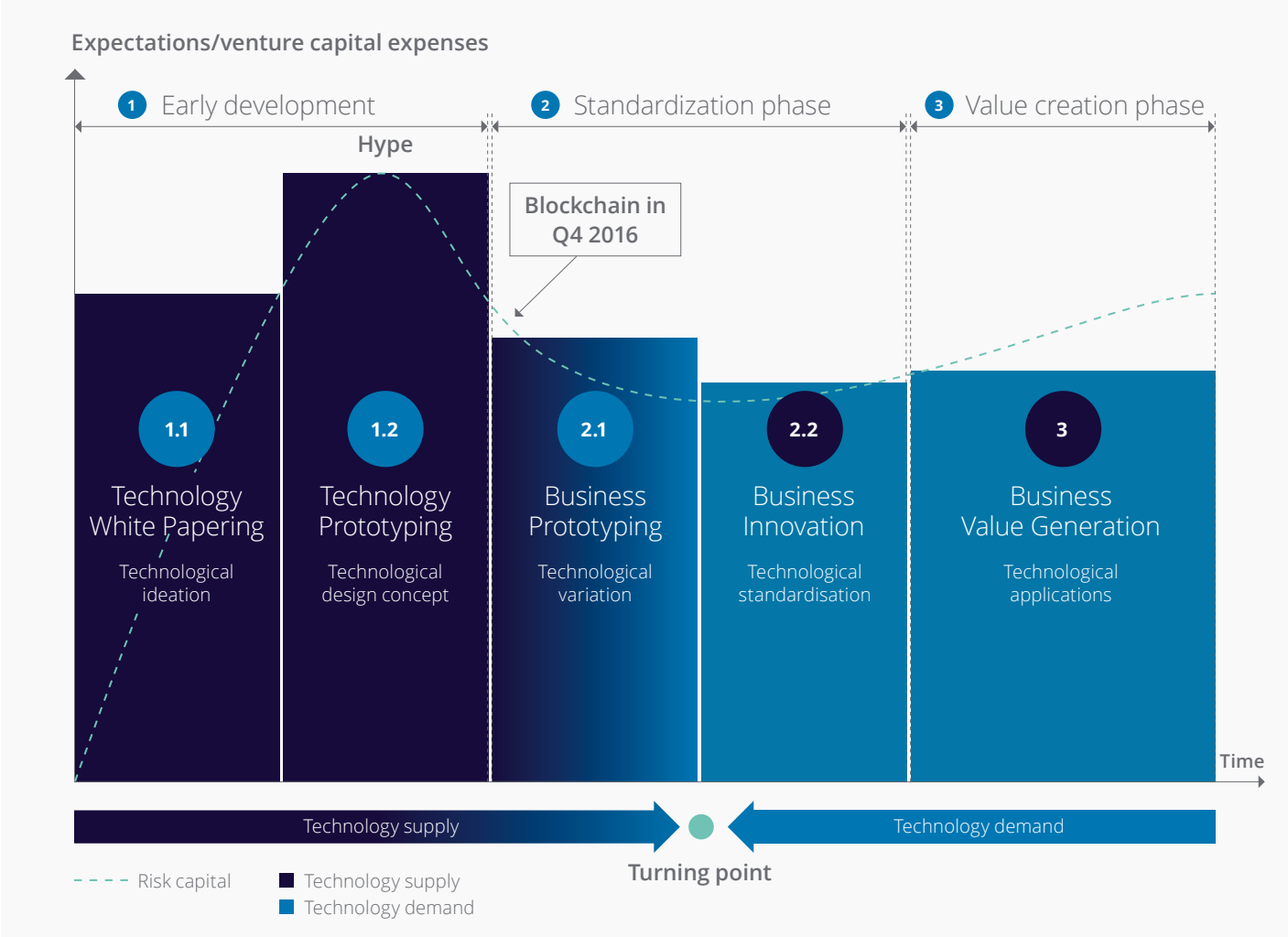


Figure 2: Technology-driven business innovation model *(prepared by the Deloitte Switzerland Blockchain Team for this publication)*

The start of innovation development is driven by a hype initiated by very high expectations that the technology can solve human problems. The Internet also went through this development process, for example. In part, this technology was intended, as it later transpired, to revolutionise communication between people who were a long distance apart, with the Internet itself serving merely as a means to an end. Over the course of the three-phase maturity process these initially high expectations (phase 1.2) were converted into realistic development progress (phase 2.1). This turning point in the standardisation phase is also characterised by the balanced interaction between the supply of and demand for the new technology.

For example, the Internet developed from the hype into a value-creating innovation with increasing experience and acceptance in the deployment and use of the new technology by customers. From the almost endless variety of ideas, more targeted potential applications, known as use cases, are pursued in more detail in phase 2.2. These use cases are the result of prioritising ideas with the greatest possible potential for offering social and economic added value. Concentrating on use cases means that capital can be spent in a more targeted manner and reduces the risk for companies. The Internet only revealed its added value for users with the advent of a growing number of applications and business models, thus taking it into the fifth phase of this model. The key factors in the development of innovative technologies such as Blockchain are the opportunities that the technology offers for creating long-term added value and who the beneficiaries of these are. The example of the Internet showed that user confidence coupled with economic benefit is fundamentally important for a successful business model innovation, although other factors such as security and robustness also have a role to play.

2.1.1 Early development phase

Every technology evolves in the way shown in Figure 2. Blockchain technology was launched in 2008 with the publication of the white paper "Bitcoin: A Peer to Peer Electronic Cash System[6]" and thus entered the first phase, known as early development. This was the trigger for three years of hype, although the public at large did not recognise the potential of Blockchain technology until five years later (2013).

This hype boosts risk appetite, financed by funds from venture capital companies. This in turn allows companies to push ahead with the development of technological prototypes.

2.1.2 Standardisation phase

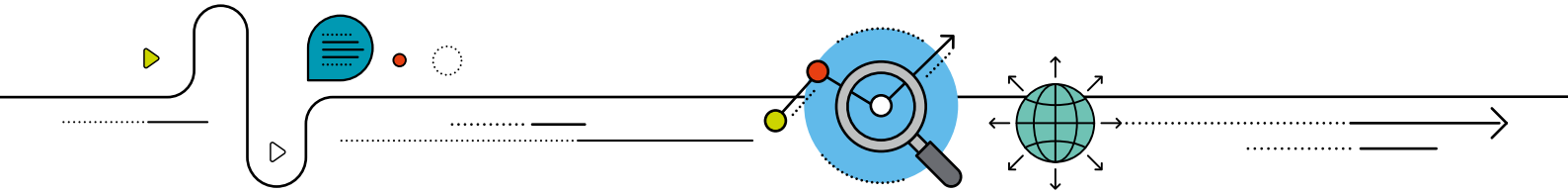
The level of venture capital companies' investment in new technologies reflects market interest and the potential of the technology. Companies also monitor which technologies attract investments so they can adapt their strategy accordingly and focus on those offering the greatest potential. Companies initially take on an observational role (passive), which develops over time into a participatory one (active). The decision to take an active role in the further development of the technology comes when a company concludes that the technology has an impact (be it positive or negative) on earnings in the entire industry in which it operates. To reduce their risk exposure, some companies decide to enter into a collaboration (consortium) with technology service providers, industry peers and/or start-ups. Companies with a strong capital base often decide to develop the respective capabilities on their own in order to claim the full added value for themselves.

The cooperation between technological supply and demand (turning point) promotes standardisation and makes it more likely that the technology will gain broad acceptance. The active involvement of authorities, supervisory bodies and politicians is crucial during this phase. Blockchain technology has recently moved out of the hype phase and is currently at the start of the standardisation phase in the business innovation model. The proof of this is twofold: companies are increasingly taking on a participatory role, and there are also signs of growing interest among authorities and politicians.

2.1.3 Value creation phase

Driven by standardisation and the first successful use of the technology, the value creation phase gives rise to renewed euphoria, albeit watered down. Companies develop a greater risk appetite regarding investment in the technology, resulting in economies of scale for technology providers and growing acceptance in the wider society.

The successful use of the technology leads to it being combined with established and new technological trends with the aim of creating new entrepreneurial value. The nature of the technology and the impact on the value creation mechanism also



6) Satoshi Nakamoto, 2008, Bitcoin: A Peer to Peer Electronic Cash System

has a significant influence on the extent of the change. The use of technological innovations in the design of new values and service offerings, such as Uber or AirBnB in the sharing economy, has thus triggered major value distortions in the industries concerned, while other technologies have had a rather minor impact on value creation. Blockchain is expected to have a substantial impact and that the ways in which DLT may change the value creation process in traditional industries are not yet fully clear.

This is underlined by the fact that Blockchain is trusted to offer the potential to create new and comprehensive transaction platforms and therefore change the core of current value creation in established companies such as banks and insurers. In the following section we will examine how going through these phases is likely to affect Swiss firms in particular, and how Switzerland can evolve in a way that enables it to take on the role of a progressive innovator.

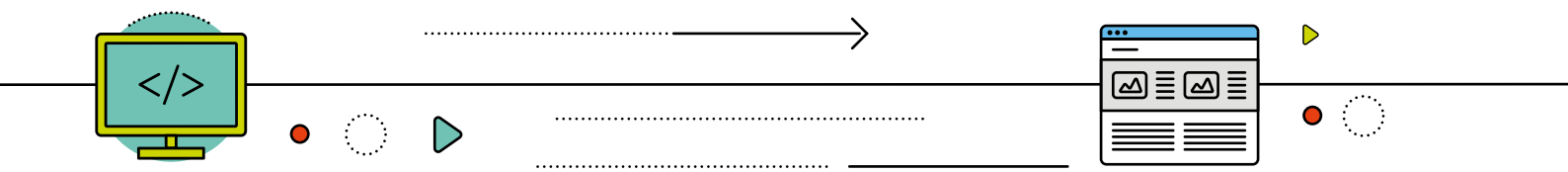
2.2 Impact on key sectors of the Swiss economy

The success of an innovation depends on a diverse range of factors and the interplay between them. Seemingly simple factors such as the timing of the launch can be unexpectedly critical. Microsoft launched some early tablets that never made the breakthrough, whereas Apple achieved spectacular success with the iPad. As for Blockchain, it is realistic to assume that the technology will only deliver long-term success when there is lasting positive confirmation of the perceived benefits, economic and regulatory conditions and risk appetite of the players involved during the hype period. Other external factors such as the positioning of competing developers in both the public (other countries courting FinTech firms) and private sectors (companies experimenting with Blockchain on both the supply and demand side) also have a significant impact and increase the complexity of development.

The current focus of Blockchain technology is primarily on using the Blockchain to validate, execute and store transactions, which is why development is being driven mainly by companies in the financial industry. However, the transformational impact of Blockchain, as calculated by us and presented in the matrix below, stretches to all sectors of the Swiss economy, albeit to varying extents.

The positioning calculated for an industry in this matrix distinguishes between four different groups (observers, experimenters, opportunists and pioneers) and calls for different approaches for Swiss firms depending on which quadrant they fall into.

The impact of Blockchain technology is identified on the basis of two criteria. The horizontal axis measures the impact on costs and earnings. Sample questions in this respect include "What opportunities does this technology open up? Is there scope for new sources of income? Does it create potential for cost savings?" The vertical axis measures the transformative impact in each sector. Transformative in this context refers to the impact of the technology on how business is conducted and on corporate strategy. One sample question in this regard is "Does Blockchain influence or change the execution of internal and external core processes and procedures?"



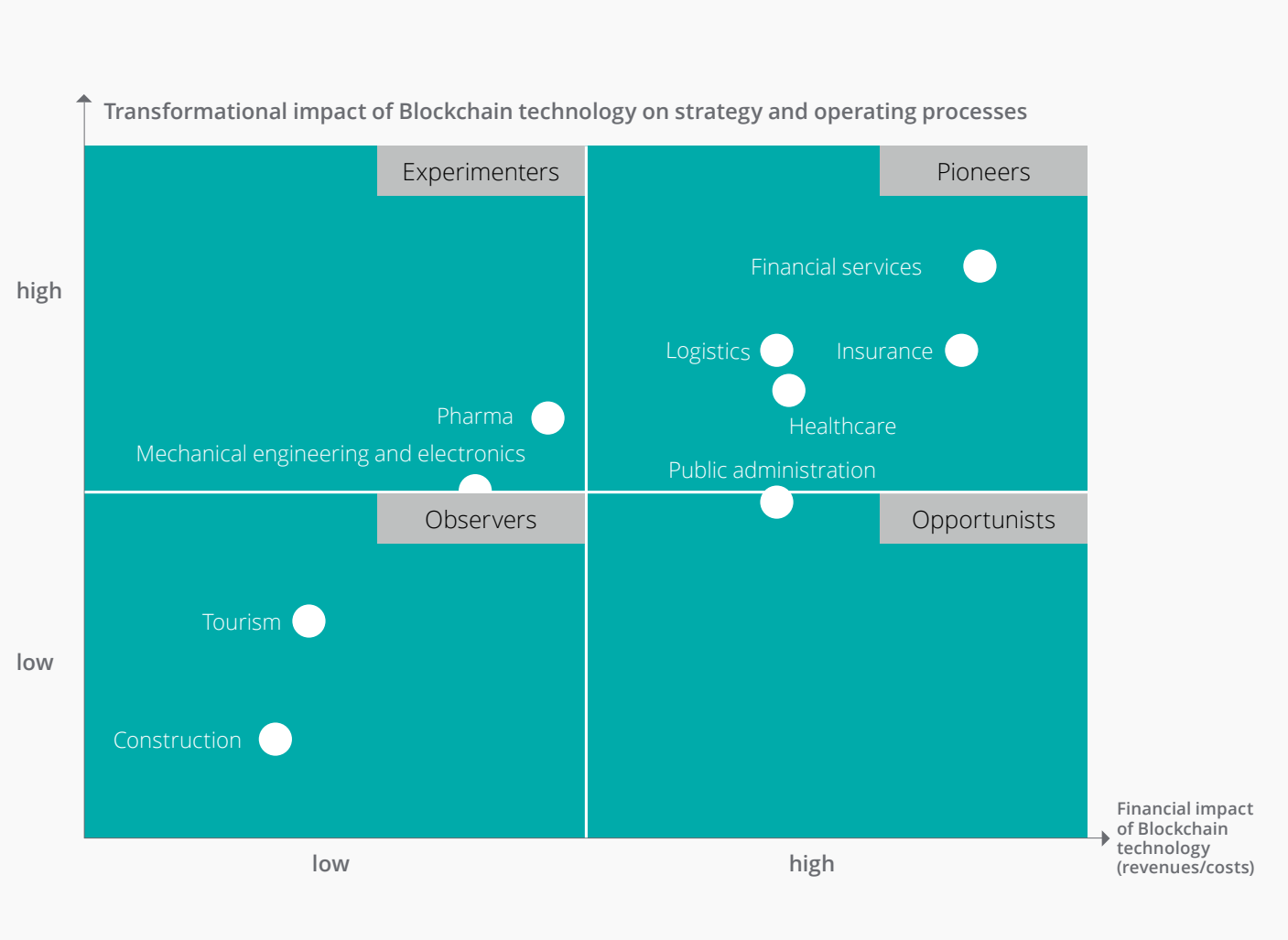
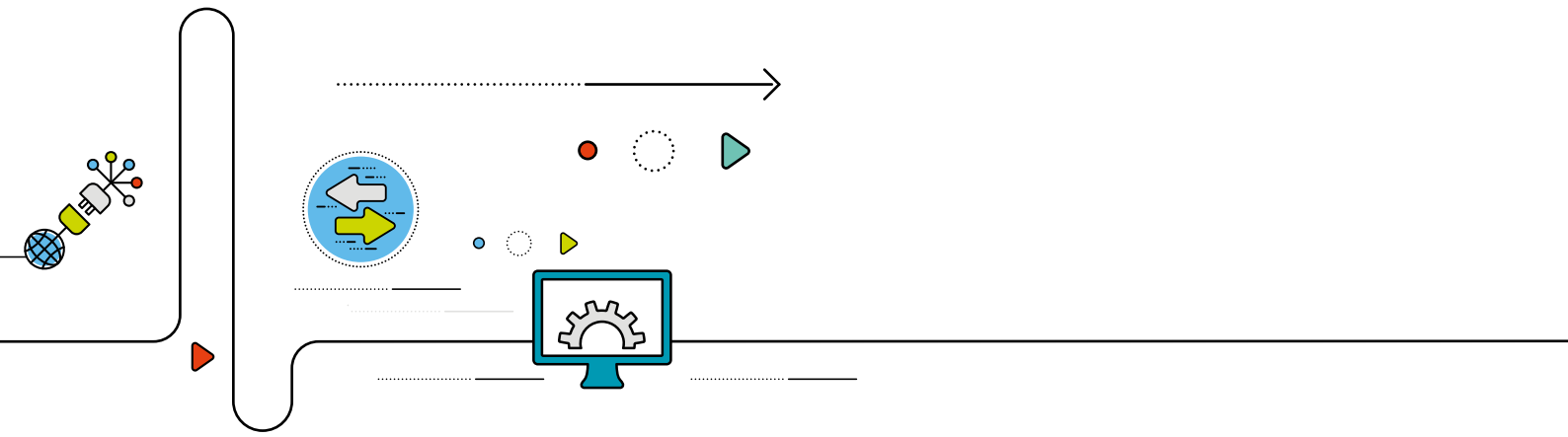


Figure 3: Technology impact analysis matrix *(prepared by the Deloitte Switzerland Blockchain Team for this publication)*



These two decision criteria give rise to two fundamental strategies, the "pioneer" strategy and the "observer" strategy.

The "observers" are sectors or companies in which the operational impact of Blockchain technology can be classified as low. The impact on or threat to these sectors from Blockchain technology (as things stand) is low, and market competitors will not gain a decisive competitive advantage by using the technology. Another indication that the observer strategy should be preferred is if using Blockchain technology has only a minor impact on a company's costs and earnings.

By contrast, the pioneer strategy is characterised by a high strategic and operational impact coupled with a similarly major impact on costs and earnings. Blockchain technology allows pioneers to realise enormous savings on the cost side. A primary example would be the clearing and settlement of a financial services provider's securities transactions, a very labour-intensive and time-consuming task within a bank that currently takes three days to complete. Using Blockchain technology reduces the workload to a minimum, allowing transactions to be settled and completed in minutes (currently around ten minutes).

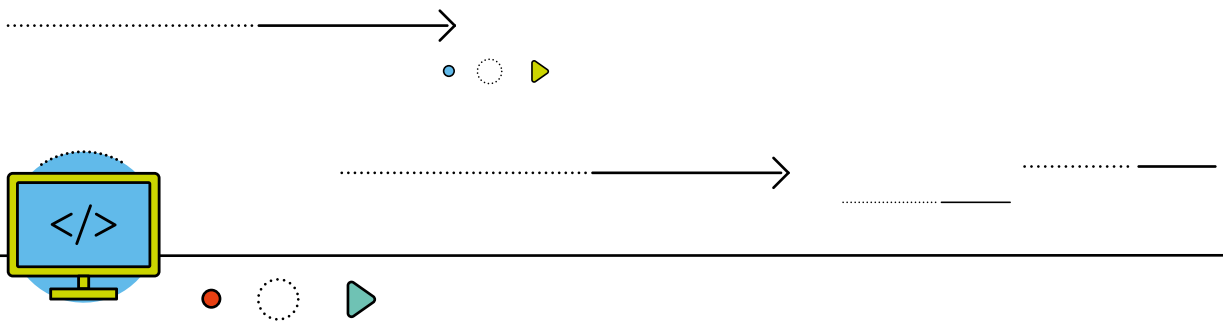
This efficiency gain results in considerable cost savings, reduces the risk for the parties involved and means that the capital in question is available almost immediately and can feed back into new business and transactions. The pioneer strategy should also be pursued if using the technology offers considerable strategic competitive advantages or has the potential to significantly impact operational business processes. Experimenters are under little pressure to focus more closely on the technology due to the limited impact on net profit in the short term. However, they could nevertheless decide to engage with the technology in order to secure long-term benefits like those sought by pioneers. One such example would be companies from the Engineering industry, who are already experimenting with the technology since it could lead to synergies with their current priorities such as the Internet of Things or robotics.

By contrast, opportunists identify short-term impacts on their finances from selected effects that are not part of their core business. One possibility for opportunists would be to enter into a partnership with other companies or conduct small-scale feasibility studies in order to familiarise themselves with the technology.

Methodology

The impact matrix for the key industries in the Swiss economy is based on a structured method that distinguishes between two dimensions and ten parameters to enable the current positioning to be evaluated.

The data for this were obtained through interviews with Deloitte experts from these industries. This provides a snapshot, with the volatility of the assessment taken into account by highlighting the currently visible trend in each industry. The detailed results can be found in Figures 7 and 8 in the appendix. The matrix compares the operational impact of Blockchain technology with the impact on revenues and costs. The individual parameters for each industry are evaluated on a scale from 0.0 (low) to 3.0 (high) and aggregated to determine the final cumulative value (more detailed evaluations and derivations can be found in the appendix). The resulting matrix is a key indicator of the impact that Blockchain will have on the various industries.



03

Switzerland's positioning

Blockchain technology will continue to develop, characterised above all by increasing maturity and a growing number of participants contributing ideas, prototypes and initiatives to this evolution. It is therefore important for Switzerland to conduct a critical appraisal of its own position, examine its strengths and weaknesses and define a clear positioning strategy. As the most competitive country in the world[7] and the leader in numerous economic sectors, due in no small part to its strong position as a driver of innovation, Switzerland possesses characteristics that make it a suitable candidate to press ahead with the further development of Blockchain. The Swiss Confederation should aim to become the central global contact for Blockchain opinion leaders, start-ups and related firms at the cutting edge of Blockchain innovations. The diagram below illustrates Switzerland's innovative qualities.

Switzerland's special position as a global innovation centre

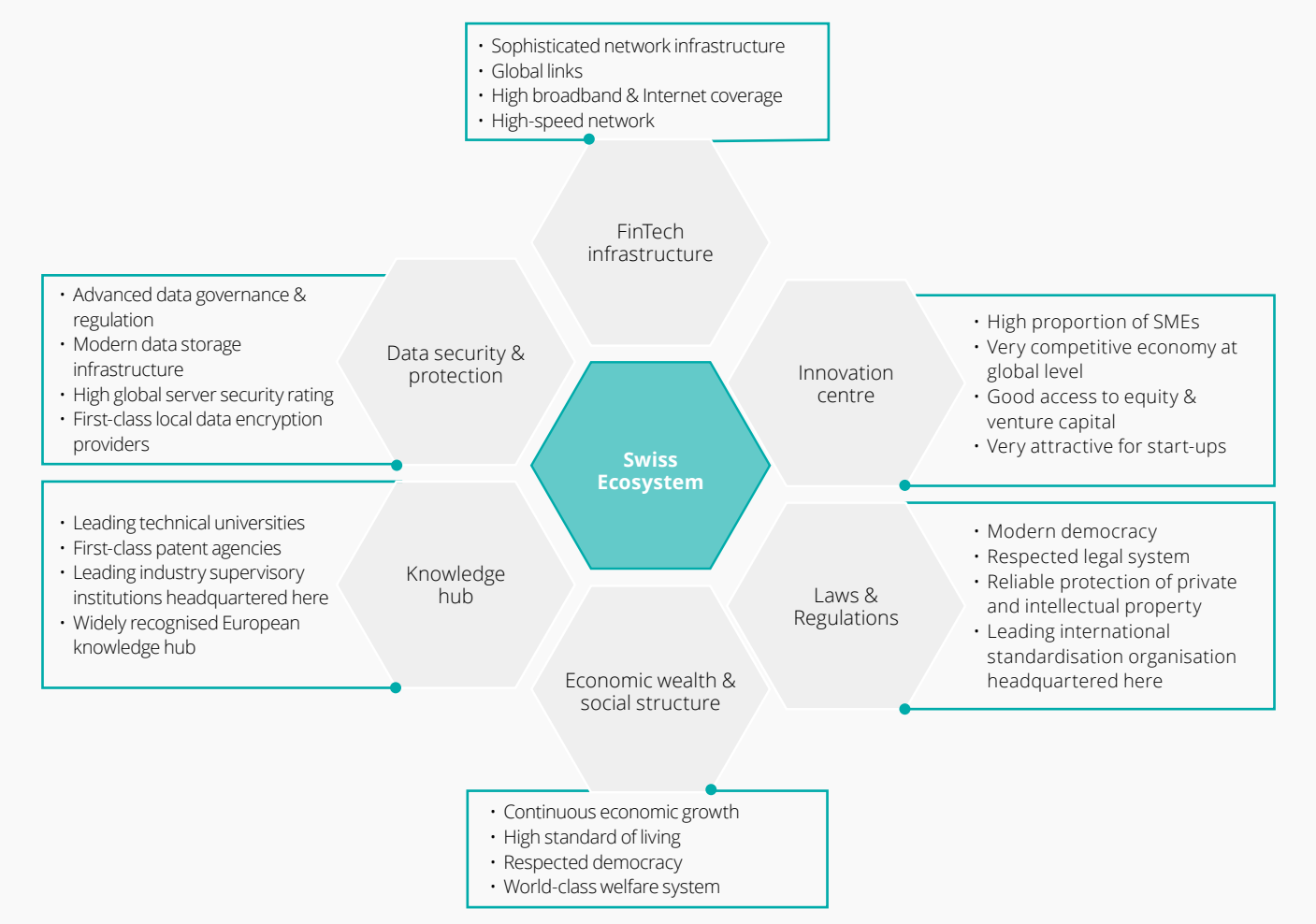


Figure 4: Swiss Blockchain ecosystem *(prepared by the Deloitte Switzerland Blockchain Team for this publication) The diagram shows that a wide range of aspects and stakeholders have an impact on Blockchain technology and conversely are also affected by the change that this technology entails, from consumers and producers to lawyers, government representatives and regulators. We call this the Blockchain ecosystem for stakeholders. It is vitally important that all interest groups are involved in the dialogue at local, cantonal and federal level and pursue a common goal.*

7) http://www.swissinfo.ch/ger/wirtschaft/wef-berich_schweiz-bleibt-wettbewerbsfaehigstes-land-der-welt/42479270

The most recent communiqué[8] from the Federal Council is already a clear move in this direction, as it announced plans to relax FinTech legislation and give firms greater freedom in line with the UK.

Government representatives and regulators will play a key role in establishing Blockchain as a fundamental enabler of change in the Swiss economy and must encourage and drive open debate. Their role will be less that of an innovator and more that of an intermediary promoting the usability and acceptance of the technology in day-to-day transactions.

This intermediary role can extend to various tasks:

1. Educating the population about the potential applications of Blockchain and the benefits of the technology both for individual companies and for the Swiss economy as a whole
2. Steering open debate through forums with company and industry representatives
3. Working with representatives from the legal profession to adapt and issue laws and regulations to promote this new technology.

The promotion and acceptance of Blockchain technology by legislators and regulators will be a key factor in its speed of development and distribution in the Swiss economy. Legislators and regulators must also take on a leading role in the development of the concepts and frameworks that will be needed to build "trust in the code". Blockchain eliminates the intermediaries from the transaction process, creating a gap in business transactions that must be filled by developing new settlement processes in the digital world. Swiss legislators and regulators must lay the foundations for establishing Switzerland as a Blockchain hub, while other interest groups must nonetheless also work to drive development and remove obstacles in order to achieve this objective.

We have identified a total of seven focal points for the country's positioning going forward, which will give Switzerland the maximum opportunity to assume international leadership over the long term by ensuring that all players in the Swiss ecosystem pull together.

> "Switzerland has always been open to blockchain technology and crypto-currencies. There are no alternative locations that offer these opportunities in the same way."
>
> ***Taylor Gerring, , Director of Technology, Ethereum Foundation***

Figure 5: External influences and recommendations for action *(prepared by the Deloitte Switzerland Blockchain Team for this* publication)

8) https://www.newsd.admin.ch/newsd/message/attachments/45936.pdf

3.1 Identification of business opportunities

Swiss firms can take advantage of Switzerland's security, neutrality and reputation to underline the competitiveness of the location with regard to Blockchain technology. Resident companies must utilise this advantage and quickly identify areas where Blockchain can be used, enabling them to position themselves accordingly at a global level.

The financial and insurance sectors, in which Switzerland is excellently positioned, offer a particularly large number of possible DLT applications, as do the energy sector and the services sector. Claims management can be simplified in property and casualty insurance, for example, as automated Blockchain processes assisted by smart contracts can issue improved expert opinions based on historic claims and reduce the potential for fraudulent claims[9].

Pilot Blockchain projects are also being conducted in other industries such as utilities, however. Some are focusing on the creation of DLT-based trading platforms for distributing solar energy between various parties, with transactions authenticated automatically and invoicing carried out by the technology. Others are working on solutions for integrating Blockchain technology into smart urban innovations in order to optimise energy management in cities[10].

The following specific sample applications are currently being examined by Swiss players. Following a two-year experimental phase with Blockchain technology, UBS is planning to implement a DLT-based trade finance system for rationalising import-export transactions at a global level.[11]

Another use case is the redesign of the process for settling over-the-counter equities with the aid of Blockchain technology.[12] This is being investigated by a consortium comprising the Lucerne University of Applied Sciences and Arts, Zürcher Kantonalbank, SIX, Swisscom and other players.

Increasing the efficiency and reducing the risk of financial transactions through Blockchain

The vision shared by UBS, Deutsche Bank, BNY Mellon and other financial institutions is to develop a digital currency that is linked to central bank accounts and tied directly to a fiat currency[(1)]. They created the Utility Settlement Coin (USC), a series of cash cryptocurrencies with a version for each of the major real currencies such as the US dollar, euro or Swiss franc[(2)]. Blockchain technology enables transactions to be settled quickly and integrated into regular markets such as Switzerland.

By automating processes, a coin such as this has the potential to reduce risk factors such as counterparty, settlement and market risk and improve capital efficiency while at the same time reducing costs[(3)]. This will revolutionise, speed up and significantly improve the payment and processing of trading transactions between financial institutions. It will also reduce the capital-intensive loan collateral requirements for banks by avoiding short-term liquidity bottlenecks in real currencies. This means banks can increase the frequency of their trading activities and make better use of their capital. The high level of transparency and auditability of the Blockchain also offers considerable advantages for regulatory authorities such as the Swiss Financial Market Supervisory Authority. As soon as the regulators can be convinced about the concept, the USC will be tested under real market conditions. This underlines the desire but also the need for financial institutions to review and recast their current approach.

Sources:
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2) http://www.coindesk.com/utilities-settlement-all-about-banks-not-blockchain/
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11) http://www.nzz.ch/finanzen/fonds/utility-settlement-coin-ohne-eigenleben-usc-die-anti-bitcoin-ist-da-ld.112819
12) https://www.hslu.ch/de-ch/hochschule-luzern/ueber-uns/medien/medienmitteilungen/2016/09/08/blockchain-als-basis-fuer-ausserboerslich-gehandelte-aktien/

Blockchain-based platform for over-the-counter equity trading

The consortium's goal is to develop an open system standard for the Swiss financial centre to simplify the settlement of over-the-counter trading[(1)].). Trading in unlisted Swiss securities is currently conducted bilaterally between financial institutions, making it frequently complex, risky and time-consuming. Redesigning the process with DLT speeds up the delivery and payment of the securities. In the best case scenario this even occurs in real time. Using Blockchain technology could also significantly reduce the costs and risks involved in settling over-the-counter securities transactions.

In addition to the consortium, the standard is also to be made available to all other interested financial institutions and the supervisory authorities. The high level of transparency would give regulators better oversight of the legal compliance of over-the-counter trading[(2)].

Sources:
1) https://www.hslu.ch/de-ch/hochschule-luzern/ueber-uns/medien/medienmitteilungen/2016/09/08/blockchain-als-basis-fuer-ausserboerslich-gehandelte-aktien/
2) http://www.finanzen.ch/nachrichten/aktien/Blockchain-fuer-ausserboerslichen-Aktienhandel-Forschungsprojekt-der-Uni-Luzern-1001388896

These and other concrete applications that offer huge potential for simplification and efficiency gains through Blockchain are characterised by the existence of one or more intermediaries and interdependencies. Other characteristics include the involvement of several parties with a certain degree of mutual mistrust and the shared use of an information store[13]. Swiss companies, irrespective of their industry, need to understand which applications can generate added value for themselves and their customers and should make appropriate levels of human resources and investment capital available.

In addition to established companies, it is young start-ups in particular which are using disruptive technologies to fundamentally change industries. Many start-ups are focusing on Blockchain to identify better solutions for current market challenges[14], for instance in wealth management, land register management, adaptive data intelligence for digital identity and decentralised autonomous emerging reporting systems, and thus optimise their own business or that of their customers through the use of Blockchain technology.

Some established Swiss companies are considering working with start-ups to analyse the impact of DLT on existing business. Based on this, the key is to draw the right conclusions to ensure sustainable growth.

Many start-ups, which are proactively shaping the rapid development of Blockchain applications for redesigning

"Blockchain technology is an excellent fit for Switzerland and for typical Swiss values such as security and democracy. It is important to take advantage of the solid basis that currently exists for Blockchain and establish Switzerland as a Blockchain location over the long term."

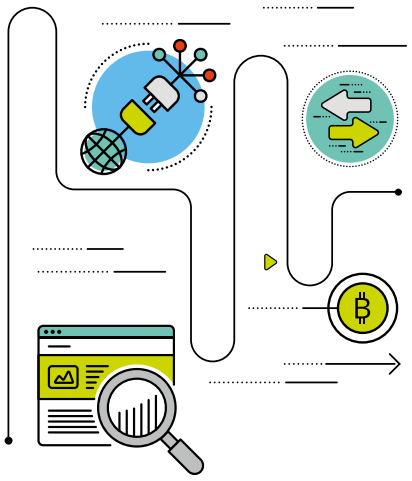
Daniel Grassinger, Co-Founder, nexussquared

13) http://www3.weforum.org/docs/WEF_The_future_of_financial_infrastructure.pdf
14) http://dapps.ethercasts.com/

transaction processes have already set up operations in Zug. The city in central Switzerland has already been dubbed "Crypto Valley Zug". For example, bitcoin is already accepted in Zug as a payment method for fees up to CHF 200[15]. Furthermore, in mid-November the SBB launched the sale of bitcoin at all ticket machines[16]. Start-ups and established companies, but also cantons and municipalities, must be prepared to invest in test landscapes in order to carry out feasibility studies to identify potential business areas.

In addition, everyone must actively promote and advocate Blockchain technology within their own sphere of influence.

In many cases these market challenges force companies to tackle regulatory requirements that negatively impact the costs and functionality of their solutions. This underlines how important it is that all players in Switzerland join the Blockchain network in order to reach mutually efficient agreements and ensure that the needs of all stakeholders are met.



The SBB sells bitcoin at all ticket machines

The SBB, Switzerland's largest rail company, believes in the future of bitcoin and started selling the online currency in November 2016. The SBB allows its customers to withdraw bitcoin at any of the more than 1000 ticket machines throughout the country[(1)]. To purchase the digital currency, which is based on DLT, customers need a Swiss mobile phone number, a security code for identification and a bitcoin wallet[(2)].

The SBB, one of the biggest public sector companies, has thus created Europe's largest network of ATMs for bitcoin withdrawals[(3)]. The extensive network offers permanent and rapid access to the digital currency. By selling bitcoin, the SBB has strategically expanded its service portfolio and taken up a pioneering role in the digital age. To secure this position over the long term the rail company should not only sell bitcoin but also integrate blockchain technology more heavily in its service offering and combine it with existing services. The obvious move towards paying for travel tickets or other SBB products directly via a bitcoin wallet offers enormous potential. The payment process could also be coordinated with numerous partners such as Snow 'n Rail, while the supply chain could be completely revolutionised through the use of smart contracts.

Sources:
1) http://www.handelszeitung.ch/unternehmen/die-sbb-wagt-den-schritt-die-welt-der-bitcoins-1246341XX
2) http://www.nzz.ch/wirtschaft/internetwaehrung-sbb-fahren-auf-bitcoin-ab-ld.124937?_sm_au_=iQV6pMspvjpWr1Pr
3) https://www.bitcoinnews.ch/4909/das-groesste-bitcoin-atm-netzwerk-europas-sbb-billettautomaten/

15) http://www.nzz.ch/schweiz/crypto-valley-zukunftsmodell-oder-marketing-gag-ld.22911
16) http://www.sbb.ch/bahnhof-services/dienstleistungen/weitere-dienstleistungen/bitcoin.marketingurl_$$$bitcoin.html

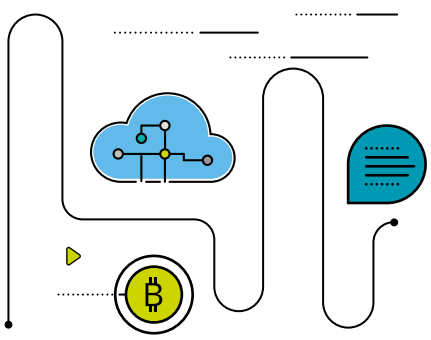
3.2 Supportive legal environment

Legal certainty is a key non-technical factor that is vitally important if a new technology is to become permanently established. This applies in connection with both the political stability of the economic environment and a binding legal framework. The applicable legal framework may be generally restrictive or liberal depending on the prevailing political, social and macroeconomic conditions. In the case of FinTech in general and Blockchain in particular, numerous experts have already highlighted the importance of support from the relevant bodies[17], without which Switzerland will be unable to steal a march on other major Blockchain centres such as Singapore or London.

Options for Switzerland to position itself as a supporter of the legal environment for Blockchain call above all for the courage to be innovative and creative. One example that has already caught on in financial centres is the provision of a regulatory sandbox[18]. Through this and similar schemes, a country can give a clear signal to up-and-coming Blockchain companies and those that are attempting to introduce the technology in their business that they are welcome and can count on support.

Comparable recommendations can be derived for Switzerland, possibly building on the pioneering role being played by the city of Zug. Like other cantons, the canton of Zurich has already adjusted the tax conditions for start-up companies to create incentives for them and for investors and to encourage Blockchain companies (or FinTech companies in general) to locate in the canton. Such financial or material incentives from cantons or municipalities, supported by new rules and laws at federal level, are important for convincing as many start-ups as possible to locate in Switzerland.

Accompanying initiatives such as digitalswitzerland[19] must also be widely supported in the Swiss economy and actively promoted by representatives from politics and business in order to create an impressive image of Switzerland as a forward-looking Blockchain centre beyond its own borders.



"The introduction of Blockchain will have a bigger impact in developing countries than in Switzerland, as they have less mature systems, for example in the area of payment settlement. Switzerland already has very stable systems, meaning that the pressure and opportunity for conversion is lower."

Thomas Ankenbrand, Lucerne University of Applied Sciences and Arts

17) http://oliverbussmann.com/best-fintech-accelerator-your-regulator/?utm_content=buffer0a65b&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer
18) http://www.mas.gov.sg/News-and-Publications/Media-Releases/2016/MAS-Proposes-a-Regulatory-Sandbox-for-FinTech-Experiments.aspx
19) http://digitalswitzerland.com/

3.3 Controlled business process costs

The dynamic nature of their activities means that Blockchain companies, especially start-ups that are still in their infancy, have to maintain rigid controls on their finances. For Switzerland, which is known globally as a high-cost country, this presents a challenge in respect of its positioning in the Blockchain environment, as it means that these companies are extremely analytical regarding investment in separate infrastructures and any mid or back office functions. They will only choose Switzerland as a location if these outgoings are offset by appropriate added value in other areas.

The resulting recommendations for action are therefore on two levels: firstly, Switzerland (in the form of representative institutions at communal, cantonal and federal level) must demonstrate that it is willing to help develop a Blockchain cluster by maintaining and expanding excellent framework conditions in the financial sector too (such as the availability of venture capital, cooperations between universities and companies). Secondly, these locational advantages that are relevant for Blockchain companies (chiefly excellent infrastructure, high level of education, good network of international contacts) must be aggressively emphasised and reiterated on a regular basis by means of specifically tailored media releases.

3.4 Coordinated standardisation

Technological innovations, particularly those that become established over a long period and impact numerous players in various sectors, rarely appear in a standardised form. One example from the not all too distant past is the battle between Blu-ray and HD DVD, which ended when the former established itself as the de facto standard in 2008[20].

The absence of a uniform industry standard can delay the operational implementation of an innovation or even prevent it entirely, as private sector players attach risk profiles to their investments and would struggle to justify committing capital and human resources under such circumstances. It is therefore in the interests of all parties to reach agreement as quickly as possible so that development of the technology can continue through to integration into actual day-to-day business.

For Switzerland this means once again that it must actively seek to become part of this development process. The recently announcement by the International Organisation for Standardisation (ISO) of the establishment of a technical committee for the development of Blockchain standards offers a good example of this; Australia was rewarded for its pioneering role to date with the chair of the committee, while Switzerland is only involved as an observer[21]. One area of focus for all Swiss-domiciled players with links to Blockchain should therefore be efforts towards the active shaping and rapid adoption of a uniform standard.

3.5 Security and encryption

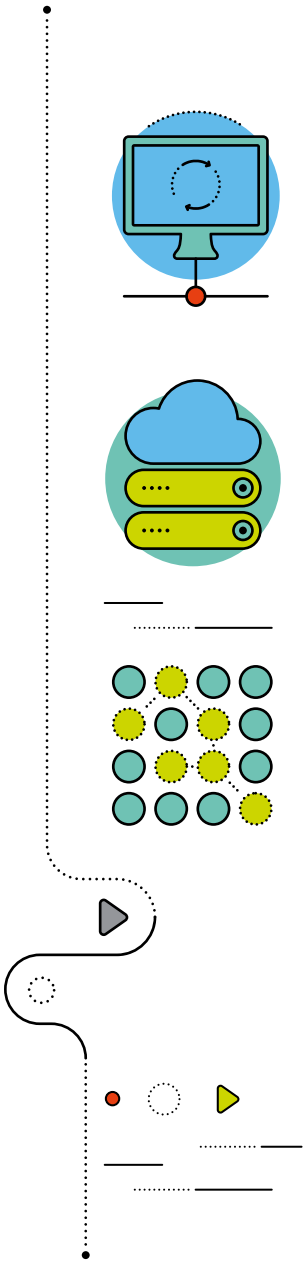
One proverbial key element of Blockchain with a special connection to Switzerland is encryption in particular and security in general. The best known application of Blockchain technology – as the basis for cryptocurrencies such as bitcoin – has attracted a great deal of attention due to its security-related features, and this means that Switzerland, with its tradition as a neutral and stable location offering strong protection for personal and economic rights, is excellently positioned to establish itself as a global Blockchain hub.

Many investment firms have already recognised the potential of cryptocurrencies and made a significant portion of their investments in Switzerland, to the extent that the term "Crypto Valley Zug" is now long established in the industry jargon[22]. It is for precisely these reasons that these companies which are experimenting with Blockchain technology opt for Switzerland as their domicile[23].

One security risk, for example, is the loss of the private Blockchain key. The public and private key approach is a standardised feature of Blockchain implementations.

The public key is not secret and known to outsiders, but the private key belongs

20) https://www.engadget.com/2008/02/20/two-years-of-battle-between-hd-dvd-and-blu-ray-a-retrospective/
21) http://www.iso.org/iso/home/standards_development/list_of_iso_technical_committees/iso_technical_committee.htm?commid=6266604
22) http://fintechnews.ch/blockchain_bitcoin/crypto-valley-zug-7-companies-you-might-not-have-heard-about/3131/
23) https://xapo.com/resources/switzerland/



"On one side you have the visible public Blockchain with a valuable network in terms of transparency and security..."

exclusively to its creator. Best practice for avoiding this risk is to store the key locally offline so that unauthorised persons are unable to access it, and Switzerland offers optimal conditions for this. One such example is xapo, which offers local offline storage in a military bunker in the canton of Uri[24].

The combination of preventive measures like this and specific examples of active cases from the financial world such as cum-ex fraud[25] clearly demonstrates that companies must attach great importance to the security and auditability of their Blockchain activities. Switzerland offers a locational advantage over other countries in terms of security. Cum-ex trades are a good application, as a Blockchain solution would in all probability have prevented the underlying practice of multiple tax refunds, since the chain would have highlighted refunds that had already been made and rejected any other repayments.

In this context, specific system security documentation and audit standards become vital elements for further Blockchain adoption.
During development there is a definitive need for public accountability. On one side you have the visible public Blockchain with a valuable network in terms of transparency and security, while on the other are the private Blockchain solutions that offer greater flexibility with regard to data protection and access. Within this entire spectrum of public and private Blockchains lies the solution of centralised data challenges, audits and analysis.

With possibilities such as the ability to compare accounting entries between two trading partners (without sacrificing data protection), this approach promises to significantly reduce the auditing work required for financial transactions. We expect this to have a substantial impact on the role of the Chief Information Security Officer (CISO) in companies, as a growing number of technology decisions will need to be taken on the basis of security factors and risk tolerance.

This gives rise to various concrete recommendations for action for Switzerland. It makes sense to aggressively emphasise the country's history of strong protection for law and security in external communication. It is also important to understand the specific requirements of potential companies which are interested in basing their headquarters in Switzerland,

24) http://www.finews.ch/news/finanzplatz/18313-bitcoin-xapo-aufbewahrungsstaette-virtuelle-waehrung-kryptowaehrung-monetas-bitcoin-suisse-attinghausen
25) http://www.mondaq.com/germany/x/471646/Financial+Services/German+CumExTrades+Enhanced+Risks+and+IndustryWide+Challenges

"This gives rise to various concrete recommendations for action for Switzerland.."

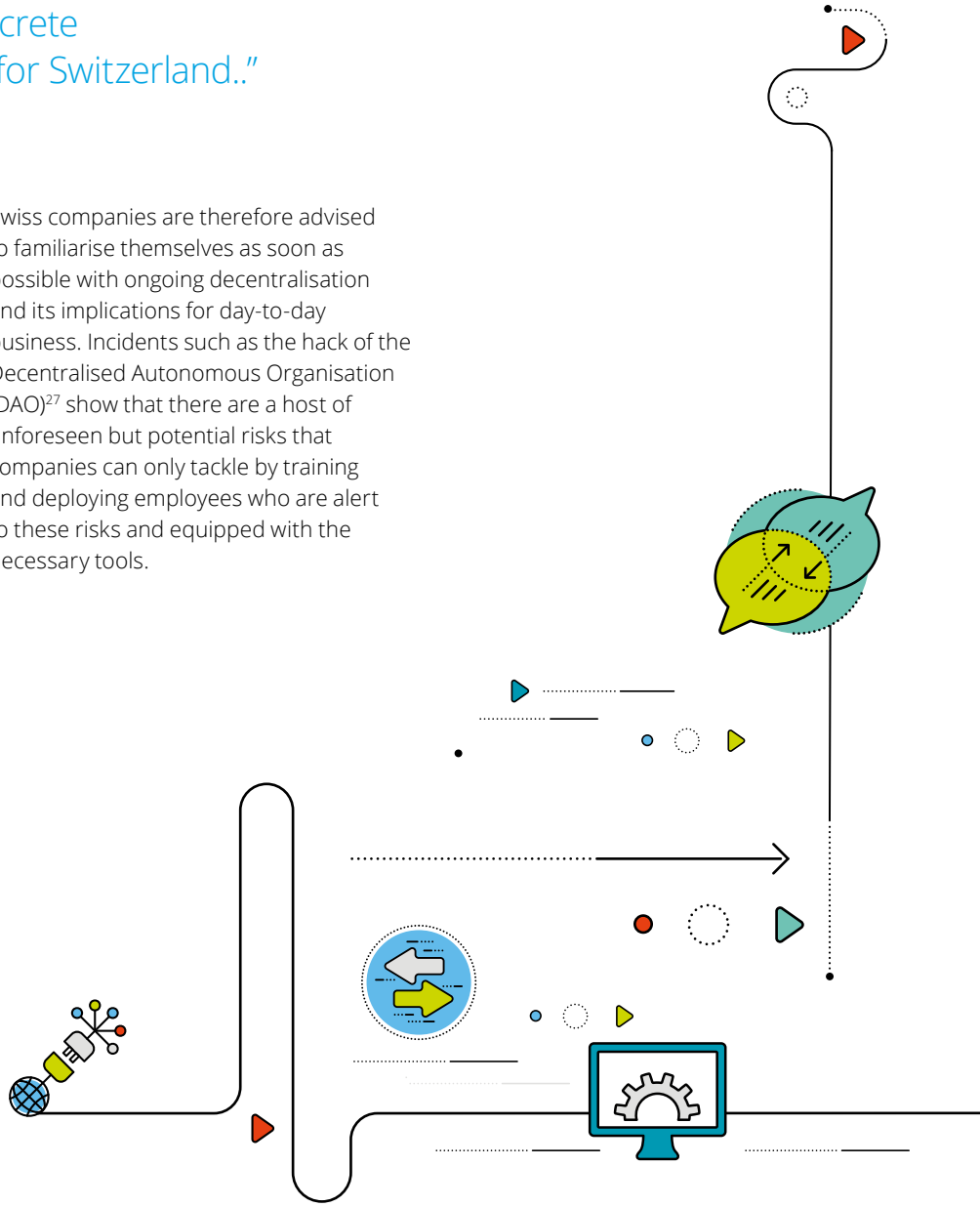
and show them how this can be achieved. The secure storage facilities in central Switzerland are a perfect example to use for this.

3.6 Controlling operational risks and vulnerabilities

The preceding sections have already dealt with various risk types connected to the technology-driven business innovation model. Another important factor that can also hinder the spread of DLT are individuals and their proprietary views on the operational implementation of Blockchain technology.

High operational risks and payment default risks (Lehmann Brothers being a prominent example[26]) across the board call for strong mitigation measures. By contrast, a classic structure such as that encountered today whereby a central party assumes the role of a risk-mitigating trust figure involves a high degree of centralisation. This runs counter to a decentralised structure (see Chapter 1.2: The value of trust) in which the distributed infrastructure makes it possible to control the trust factor. Here risks are mitigated by the almost real-time authentication and verification of transactions and the elimination of an individual central weak point.

Swiss companies are therefore advised to familiarise themselves as soon as possible with ongoing decentralisation and its implications for day-to-day business. Incidents such as the hack of the Decentralised Autonomous Organisation (DAO)[27] show that there are a host of unforeseen but potential risks that companies can only tackle by training and deploying employees who are alert to these risks and equipped with the necessary tools.



26) http://www.finance-magazin.de/risiko-it/hedging/risiko-adressenausfall-1223331/
27) http://www.coindesk.com/understanding-dao-hack-journalists/

3.7 Diverse stakeholder map

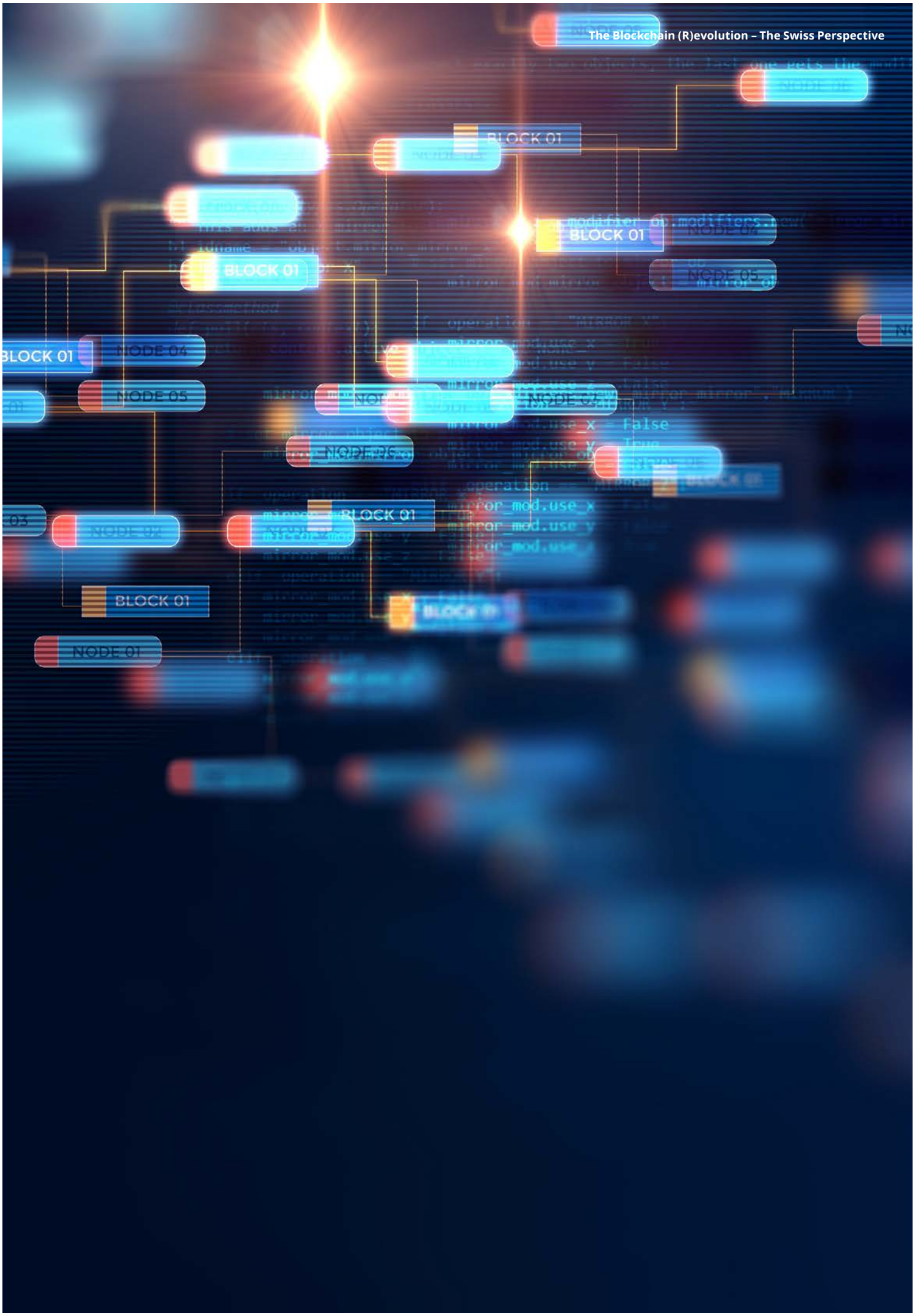
Technological advancement and technology adoption are defined to a large degree by the number and type of stakeholders in the environments concerned. The map of parties with relevance to Blockchain has become disparately more complex than previously, for example during the Internet's development into a mass medium. The diagram below shows the groups that are relevant for Switzerland with regard to Blockchain and need to be involved in the process. While the questions that all players need to answer and their common goal are identical – to ensure that Switzerland is positively positioned in the global Blockchain environment – the procedure is not necessarily coordinated. The cantons and the federal government pursue different interests, for example regarding the location of certain regulatory bodies, while the trade associations of various industries may disagree on the best approach for attracting new Blockchain-based firms.

Given the range of challenges involved, the successful long-term positioning required to ensure that players are able to respond to even the most detailed questions concerning growing data volumes, data types, transaction details and nodes can only be secured through an institutionalised round table. The issues that need to be resolved include whether regulators or consortia define standards for the various industries and who takes responsibility for the execution of smart contracts.

A coordinated group with the ability to conduct critical discussions characterised by agile decision making and implementation and involving all relevant stakeholders would send out an extremely positive signal that Switzerland can be a global leader in Blockchain and offers a reliable environment for companies in this field.

Many start-ups have chosen to base their headquarters in Switzerland in order to apply Blockchain technology to the wide range of influences that are emerging in numerous areas such as finance, transport, loyalty programmes (such as Migros Cumulus), public administration and insurance. The Swiss Blockchain ecosystem shown (see Figures 4 and 6) has the potential to play a leading role in this as a global innovation centre. Before long the resulting opportunities will increase the pressure on companies to evaluate the impact of Blockchain on their own business models. The most important thing is for business and IT managers to determine their company's role in the Blockchain ecosystem (lead, cooperate or wait).

Figure 6: Circle of involved parties *(prepared by the Deloitte Switzerland Blockchain Team for this publication)*


BLOCK 01
BLOCK 01
BLOCK 01
NODE 04
NODE 05
BLOCK 01
BLOCK 01
NODE 01
false

04

A look into the future

Total venture capital investment in Blockchain activities reached a new high of USD 1.1 billion in 2016[28]. The main reason for this rapid growth is the effort being made by the financial industry to capitalise on this highly promising technology. New consortia are being established almost daily and investing further hundreds of millions of US dollars in Blockchain technology.

At this rate, Blockchain could soon overtake all other technological developments (such as cloud computing, data analysis and the Internet of Things) in terms of venture capital activity and increase the gap to other prominent topics such as artificial intelligence and robotics. However, Blockchain has not achieved the level of hype that surrounded the Internet, which peaked in 1996.

This is in part attributable to the challenges facing Blockchain in terms of scalability. The traceability offered by Blockchain can only be achieved by storing the full details of each stage of a transaction, which in turn influences the size of each block and the time required to validate a transaction. The number of storage nodes also grows, and synchronisation becomes more difficult as the number of nodes increases. This ultimately increases the waiting time until a transaction is confirmed in a Blockchain network. Power and server costs also rise sharply as a result and negatively affect DLT's eco-logical footprint[29].
Blockchain networks can currently record and validate up to seven transactions per second[30]. Fast-paced industries such as financial services need to process thousands of transactions per second and require correspondingly scalable networks and infrastructures. Blockchain networks such as bitcoin and Ethereum are developing concepts for multiplying transaction volumes in order to fulfil these requirements. For example, bitcoin is to switch to a payment approach (the Bitcoin Lightning Network) that is able to process around 45 000 transactions per second[31]. This is achieved by breaking down the settlement process into several steps. The Lightning Network makes it possible to execute the transactions themselves outside the Blockchain, with only validation taking place within the Blockchain. This is implemented by opening up payment channels between two or more parties to a transaction contract outside the Blockchain. As soon as the transaction is closed out it is transferred to the Blockchain for validation and recording, in line with the current principle. The transaction between the contracting parties is broken down and encrypted during negotiations.

Another solution for scaling the Blockchain could be a decentralised database that has the characteristics of a Blockchain and can be used for both public and private Blockchains[32]. Such databases will not replace Blockchain platforms but are intended to be used alongside them. One advantage of this is its linear scalability; performance and capacity improve as more nodes are added to the platform.

As soon as there are a given number of copies of a data record, these are replicated in the network. In addition, all transactions are first laid out in a row and then validated, allowing invalid transactions to be removed and added back into the block after correction.

With everything moving so quickly, there is another aspect of this innovation that the Swiss authorities need to address: the legal framework for cryptocurrencies. There has recently been cause for optimism in this regard, however, in June 2016 the Swiss parliament submitted a proposal to reduce the hurdles for market entry by Blockchain start-ups. The motion was rejected by the financial supervisory authority FINMA. FINMA did offer some concessions, however, and approved the principle of the regulatory sandbox in line with the measure discussed in Chapter 3 in connection with the MAS. The sandbox provides for new licensing categories for innovators from the financial sector and exceptions to licence obligations in certain areas. This signals that FINMA is supportive of innovative firms which intend to conduct a range of banking activities, albeit with limited acceptance of customer assets and no lending activity.

One of the most important developments in the Blockchain ecosystem in recent months is the examination of the idea of private Blockchains. In areas such as the financial industry, a private approval-based Blockchain currently appears to be the only realistically feasible option. The network

28) http://www.coindesk.com/state-of-blockchain-q1-2016/
29) http://blog.frankfurt-school.de/blockchain-technologien-konsens-mechanismen/?lang=de
30) https://en.bitcoin.it/wiki/Scalability
31) https://letstalkpayments.com/how-bitcoin-lightening-network-could-solve-blockchain-scalability-problem/
32) http://www.ibtimes.co.uk/meet-bigchaindb-scalable-blockchain-database-hitting-one-million-writes-per-second-1544918

for such Blockchains can only be joined by invitation, meaning that participants must be known and vetted in advance. The private Blockchain concept will drive acceptance and implementation of this new technology. This is particularly true for industries in which strict compliance, regulated activities, data protection and specialist knowledge are prerequisites for settling contracts and doing business. The Hyperledger project[33] is a key example of this trend. The project is a global open source collaborative initiative to advance cross-industry DLT and is hosted by the Linux Foundation. The collaboration includes leaders in financial services, the Internet of Things, supply chains, manufacturing and technology. A key aspect of the project is the protection of privacy through identity and membership services that offer a private Blockchain.

Two groups of innovators have formed on the technology supply side: infrastructure providers (platforms and frameworks) on the one hand and software providers on the other. These two groups are currently driving innovation and permitting demand-driven business innovations. Another unique feature of the Blockchain ecosystem is the formation of consortia from the software supply side and the demand organisations with the aim of speeding up the generation of business innovations.

The vast majority of these applications are currently being pursued in the financial industry, but Blockchain is also picking up speed in other industries as well. Examples of this include the supply chain, container shipping and healthcare sectors, and also public services. This trend will spread to other industries as Blockchain technology becomes increasingly mature.

Blockchain is a highly dynamic technology. In addition to an increase in activities in all sectors, Deloitte expects to see further innovations and surprises that will confirm Blockchain's potential. In view of the factors highlighted above, all these developments offer a host of opportunities for Switzerland to expand its profile as an internationally competitive and innovative centre.

Deloitte Blockchain activities

To keep pace with the topic, Deloitte will provide ongoing information about the further development of Blockchain and its areas of application in form of perspectives on our website. We will also be analysing the impact on Switzerland's key industries and drawing up specific recommendations for how they should respond.

We look forward to engaging in dialogue with all parties interested in Blockchain and to receiving feedback on this white paper. We are happy to discuss not only potential developments but also specific problems and proposed solutions, for which Deloitte offers a global portfolio of professional services.

33) https://www.hyperledger.org/about

05

Appendix

	Transformational impact of Blockchain technology on strategy and operating processes					
	01. Organisation (people)	02. Processes	03. Governance (stakeholders & legal)	04. Data & technology (security)	Cumulative effect	Trend
Mechanical engineering and electronics	0,5	1,8	2,3	1,7	6,3	Upwards
Pharmaceuticals	2,0	1,9	2,0	1,5	7,4	Upwards
Healthcare	2,2	1,5	1,8	2,0	7,5	Upwards
Logistics	1,7	1,7	2,4	2,3	8,1	Upwards
Insurance	1,7	2,2	2,2	1,8	7,9	Upwards
Public administration	1,3	1,0	1,4	2,1	5,8	Flat
Tourism	0,7	0,8	1,0	1,5	4,0	Flat
Construction	0,4	0,4	0,4	0,4	1,6	Flat
Financial services	2,5	2,5	2,6	2,6	10,2	Upwards

Figure 7: Transformational impact of Blockchain technology on strategy and operating processes (0 = low, 3 = high) *(prepared by the Deloitte Switzerland Blockchain Team for this publication)*

	Financial impact of Blockchain technology (revenues/costs)							
	01. New markets & customers	02. Transaction-driven	03. Security and encryption	04. Legal	05. Standardisation	06. Participants in the value chain	Cumulative effect	Trend
Mechanical engineering and electronics	0,8	0,6	1,5	0,7	1,0	1,3	6	Flat
Pharmaceuticals	0,4	0,6	2,0	2,0	1,0	1,2	7	Upwards
Healthcare	0,6	1,3	2,7	2,3	1,6	2,0	11	Flat
Logistics	1,1	2,4	2,0	1,8	1,5	2,0	11	Flat
Insurance	0,7	2,6	2,2	2,6	2,4	2,0	13	Flat
Public administration	0,7	2,7	2,6	2,0	1,0	1,8	11	Flat
Tourism	1,0	0,3	0,7	1,0	0,7	0,7	4	Flat
Construction	0,5	0,3	0,3	0,5	0,3	0,3	2	Flat
Financial services	3,0	2,7	3,0	2,6	2,2	1,4	15	Flat

Figure 8: Financial impact of Blockchain technology (revenues/costs) (0 = low, 3 = high)) *(prepared by the Deloitte Switzerland Blockchain Team for this publication)*

Sample applications in detail

Payment settlement

In contrast to national or regional payment settlement (SEPA in Europe), which is often already highly efficient, the global payment settlement system is still based on a network of clearing bodies or correspondent banks. There is only limited standardisation and digitisation, meaning that costs and settlement periods are correspondingly high. Blockchain technology could remedy these specific problems and therefore appears to be particularly worthwhile. See Figure 9 below, which compares the current system with an ideal Blockchain system. In an ideal scenario, Blockchain would remove the need for third parties, boost standardisation and digitisation and increase security and transparency. Settlement speeds could in theory rise sharply and move towards real-time settlement.

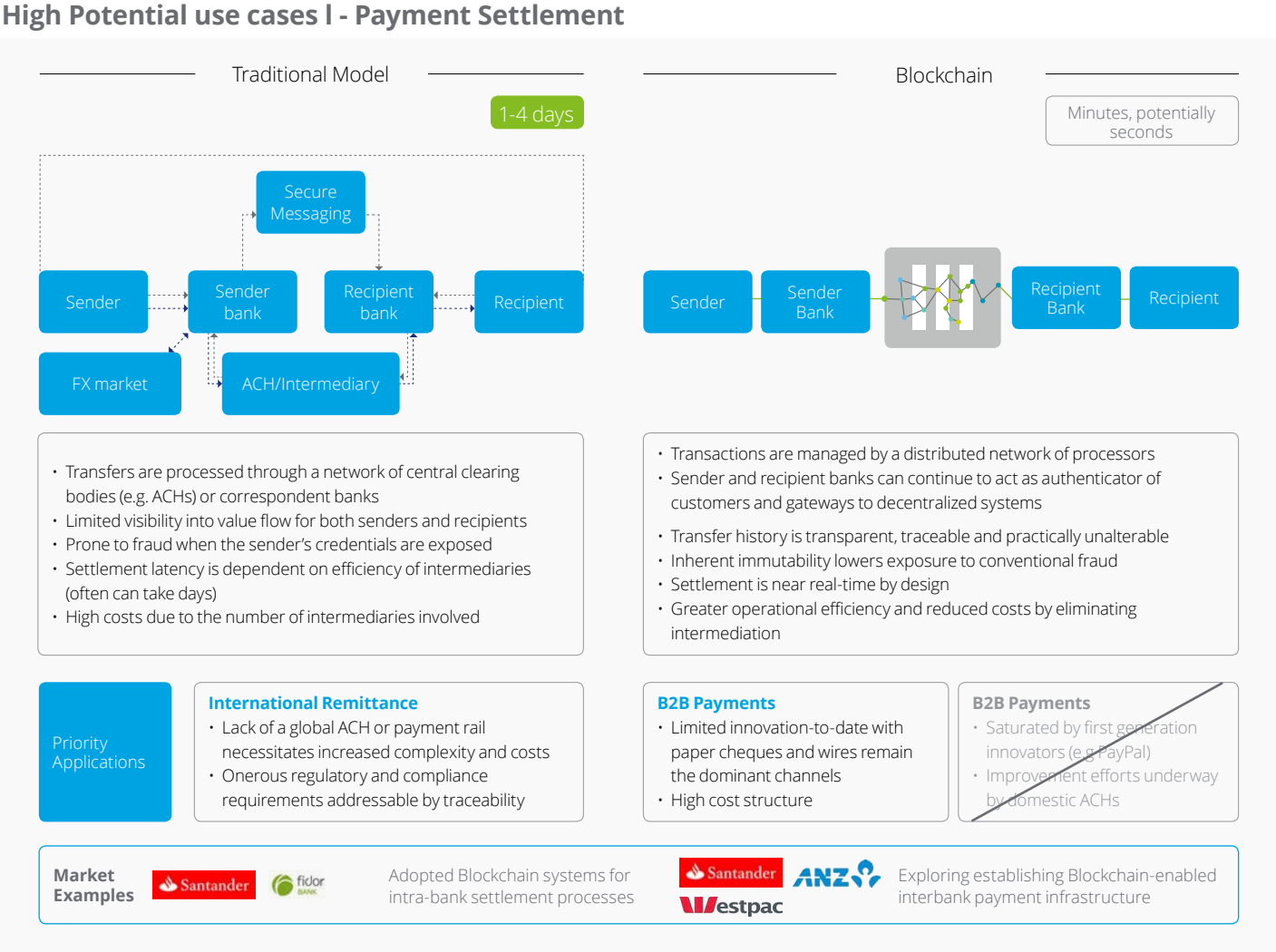


Figure 9: Payment settlement – traditional model compared with an ideal Blockchain solution *(Source: Deloitte (2015), The Future of Financial Services Infrastructure. Overview of Blockchain and its transformative potential)*

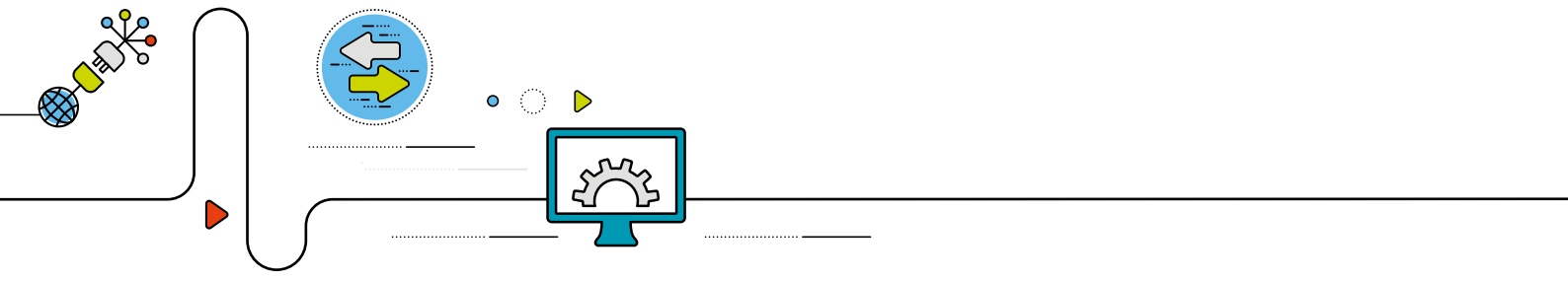
One of the fundamental prerequisites for using Blockchain in international payment settlement, however, would be the definition of uniform standards and thus the removal of one of the main obstacles at present. Further standardisation could generate significant advantages regardless of the technology used. Secure and fast payment settlement systems that do not use Blockchain technology are already available. For example, Switzerland's SIC payment settlement system has allowed real-time transactions since 1987. Converting a payment settlement system is enormously costly and time-consuming due to the high number of transactions that are now executed, and conversion becomes even less attractive the more developed an existing system already is. From today's perspective, the greatest advantages of Blockchain-based systems could therefore lie in the modernisation of less efficient systems, such as those in developing countries, and in the impetus that Blockchain could provide for standardisation in international payment settlement.

Blockchain is already used in payment settlement, and not just to settle transactions in bitcoin or other digital currencies. Existing solutions are only partially based on Blockchain, however, as current processing capacities and speeds are nowhere near sufficient. According to Blockchain.info, as at the beginning of June 2016 the processing time for a Blockchain transaction was 9.8 minutes and thus a long way from real-time settlement.

Accounting[34]

Regulatory requirements designed to guarantee the reliability and veracity of accounting entries are particularly high, which may be a factor in the comparatively low level of digitisation in this area. The current system is based on multiple entries and duplications to preclude the possibility of fraud as much as possible and frequently involves manual work steps. The basic standard is still the system of double entry accounting, which was first introduced during the Renaissance in the 15th century. Third parties then have to verify a company's accounts.

Blockchain technology could automate this process, at least for standard transactions. Instead of double entry accounting, companies would also enter their transactions in a shared Blockchain database (triple entry accounting). The change could be introduced on a gradual basis, with Blockchain technology initially used to guarantee the integrity of existing systems.



34) http://www2.deloitte.com/content/dam/Deloitte/de/Documents/Innovation/Blockchain_A game-changer in ac-counting.pdf

Sample accounting application

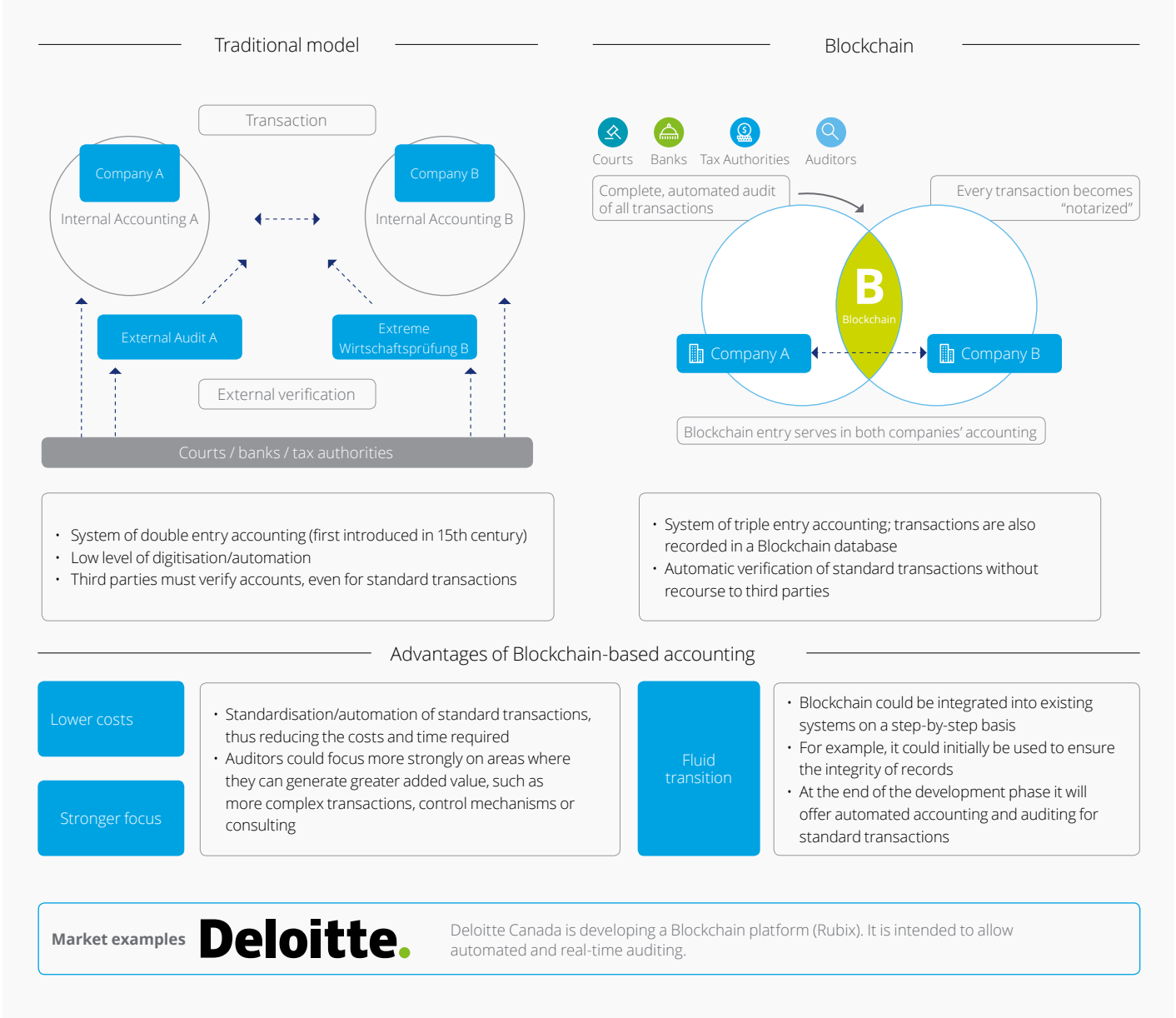


Figure 10: Accounting – traditional model compared with an ideal Blockchain solution *(Source: Deloitte (2015), The Future of Financial Services Infrastructure. Overview of Blockchain and its transformative potential)*

High potential use cases II - Trading & Settlement

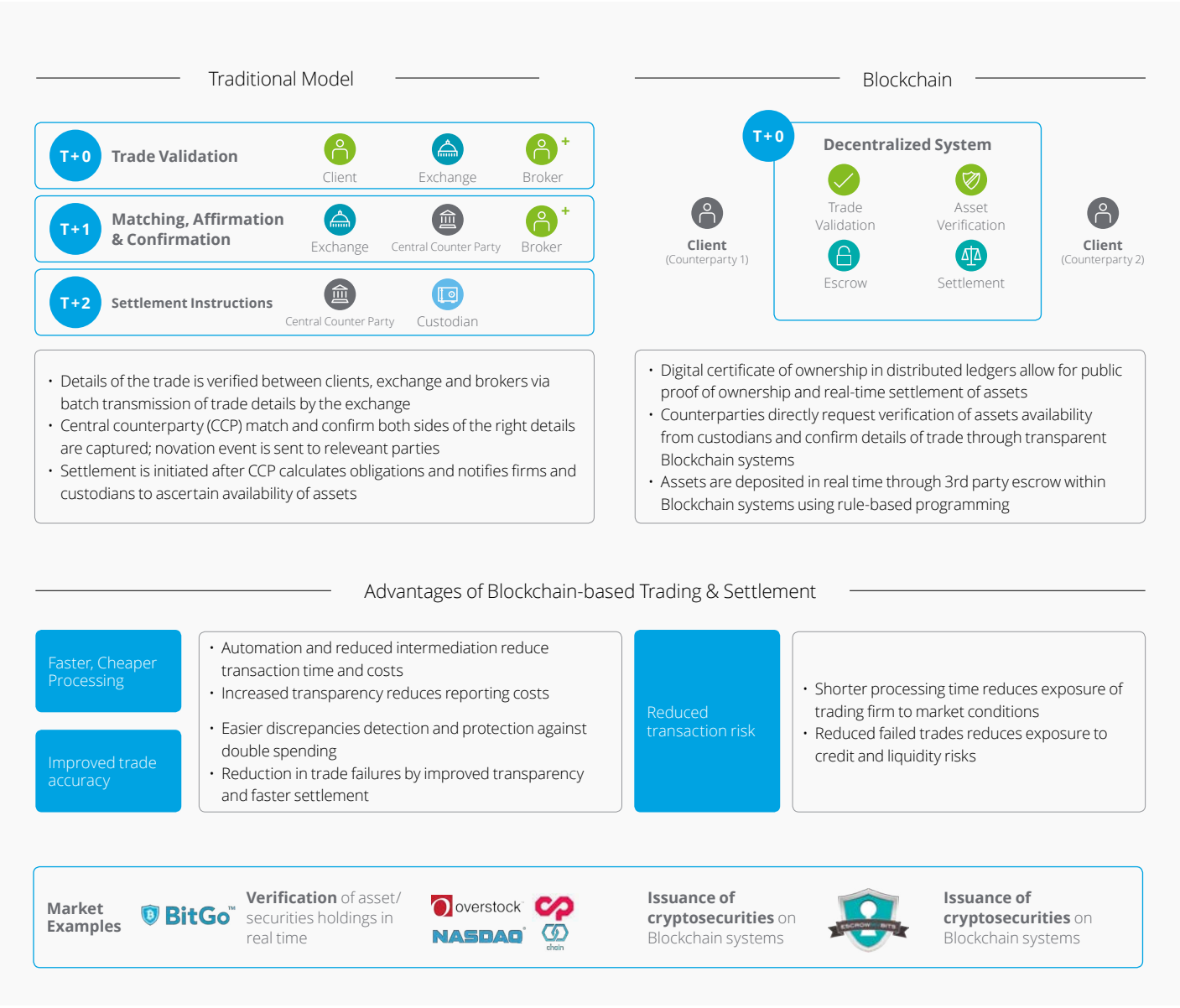


Figure 11: Securities transactions – traditional model compared with an ideal Blockchain solution *(Source: Deloitte (2015), The Future of Financial Services Infrastructure. Overview of Blockchain and its transformative potential)*

High potential use cases III - Smart Contracts

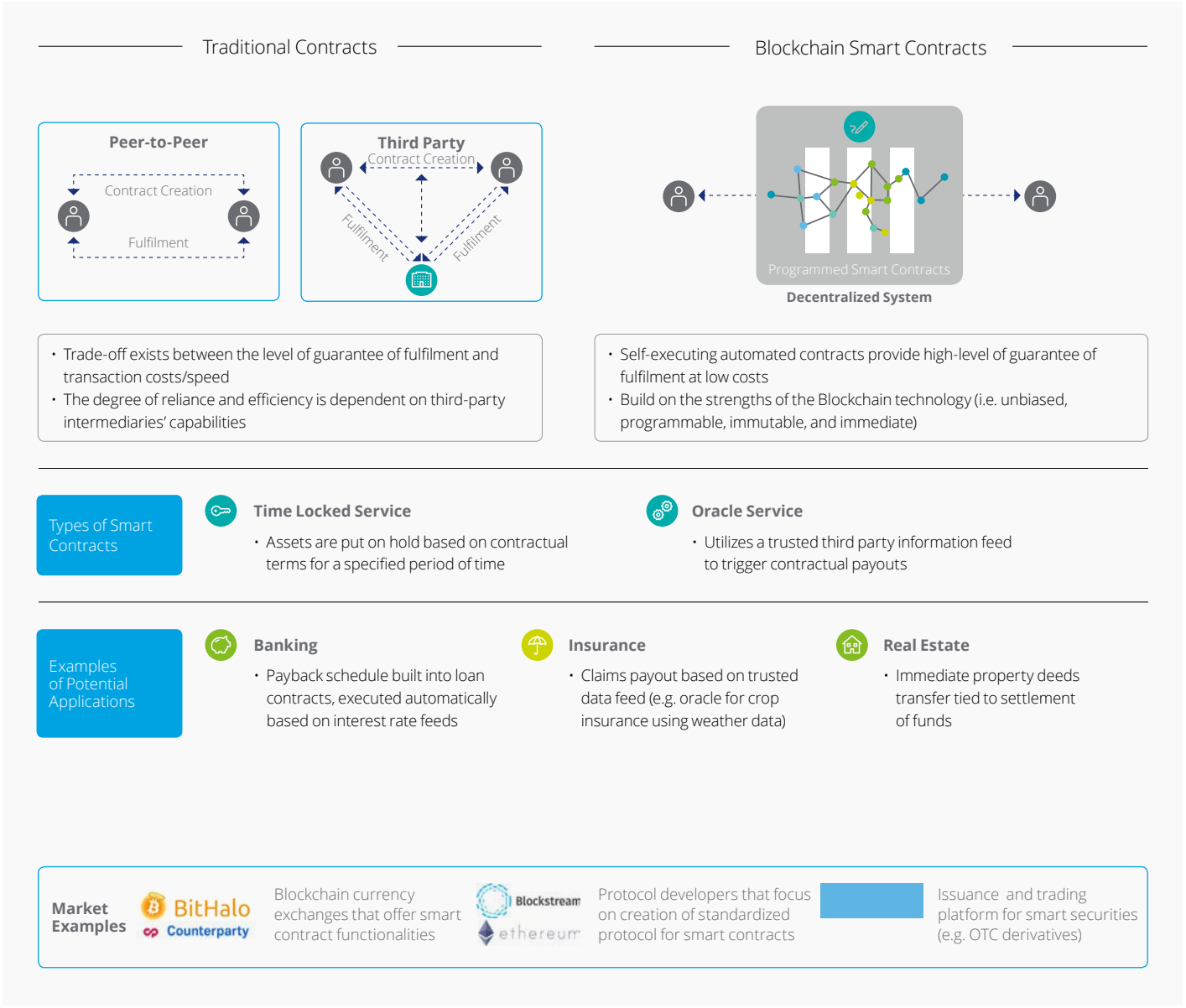


Figure 12: Smart contracts – traditional model compared with an ideal Blockchain solution *(Source: Deloitte (2015), The Future of Financial Services Infrastructure. Overview of Blockchain and its transformative potential)*

High potential use cases IV - Loyalty

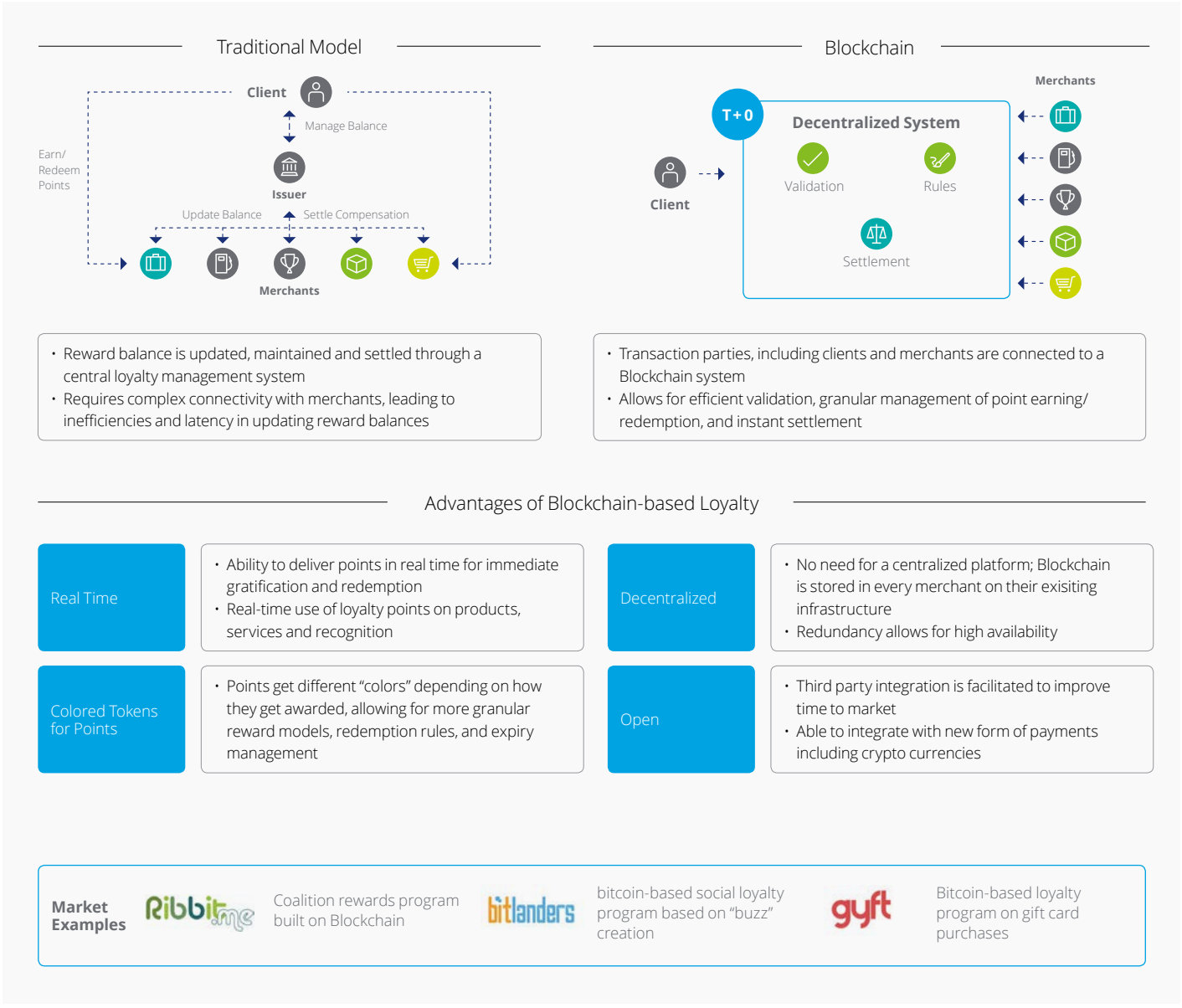
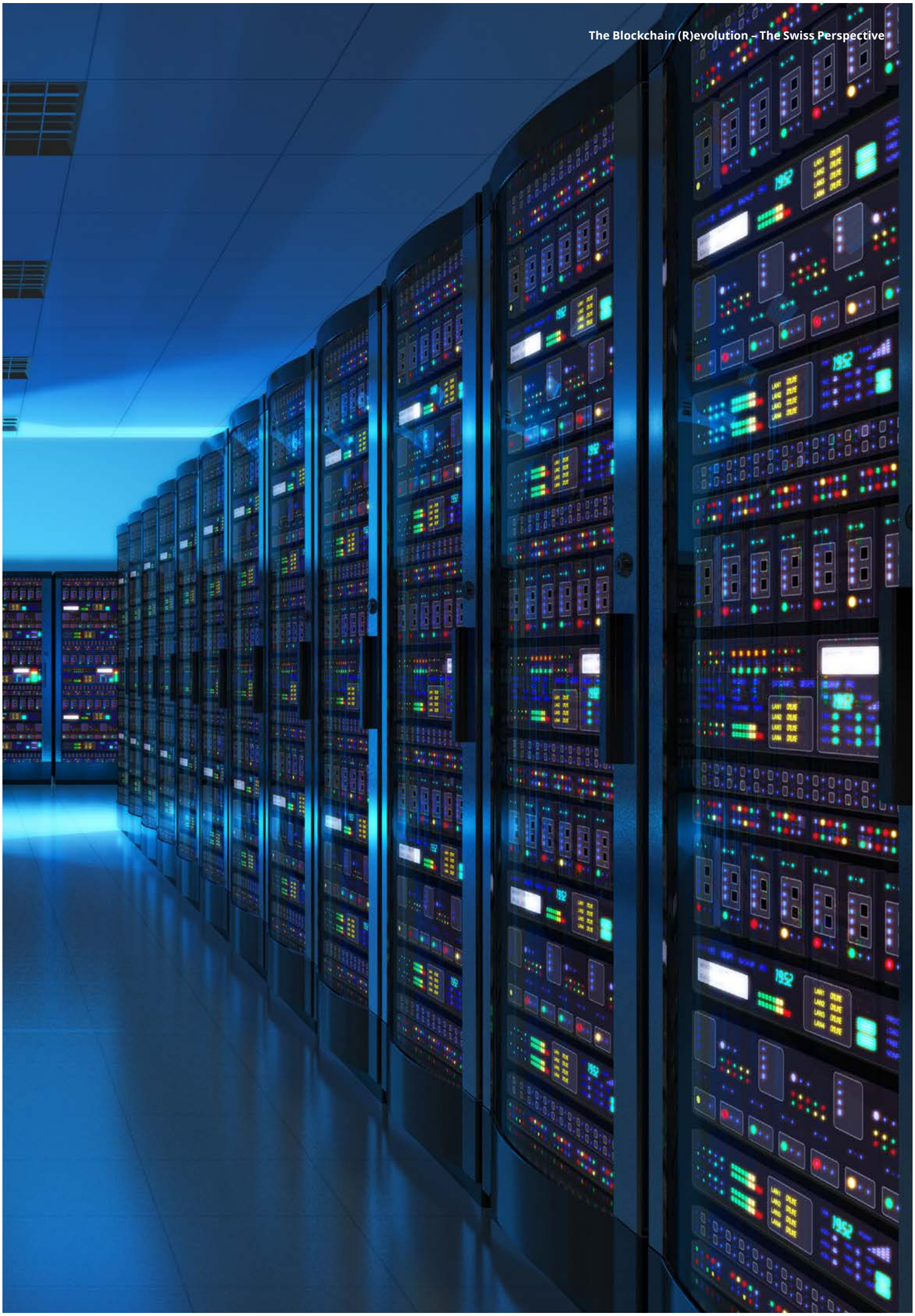


Figure 13: Customer/loyalty cards – traditional model compared with an ideal Blockchain solution *(Source: Deloitte (2015), The Future of Financial Services Infrastructure. Overview of Blockchain and its transformative potential)*



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