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OPEN ACCESS GOVERNMENT

BLOCKCHAIN INNOVATION

THE RISE AND FUTURE OF BLOCKCHAIN

THE FOUNDER AND CO-FOUNDER OF THE BLOCKCHAIN FEDERATION PROVIDE INSIGHT INTO THE FUTURE FOR A BLOCKCHAIN-BASED PURPOSE-ECONOMY

IN THIS ISSUE

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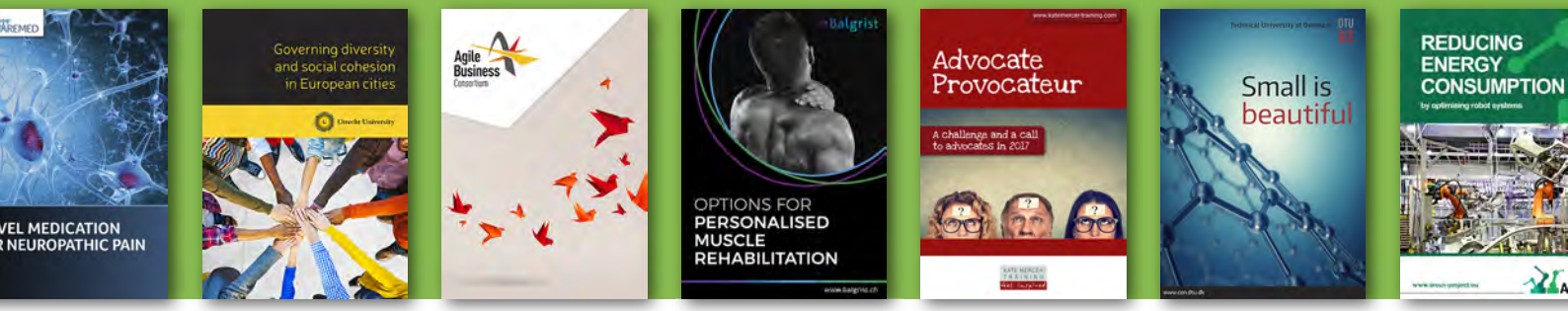

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OPEN ACCESS GOVERNMENT

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OPEN ACCESS

INTRODUCTION

Welcome to the November edition of Open Access Government's special Blockchain supplement. This special focus underlines the exciting world of Blockchain, with an array of exciting features around the subject from many prestigious contributors.

Blockchain technology is a very exciting area, as highlighted for example in an excellent article from the founder and co-founder of the Blockchain Federation, who both provide a fascinating glimpse into the future for a Blockchain-based purpose-economy.

In another feature, we discover that Blockchain in the world of insurance is constantly growing and therefore also has much potential, particularly in commercial lines, the reinsurance business and around intra-group transactions.

There is also a very compelling glimpse into Bitcoin – in a written piece by the European Commission's Benoît Abeloos. In this intriguing article, we learn that the publication of the white paper, "Bitcoin: a peer to peer cash system" in October 2008 by the mysterious Satoshi Nakamoto (a fake identity), will be seen in the history of technologies as a disruptive milestone.

I hope that you find this supplement thought-provoking. I would certainly welcome any comments you have on this edition, or for any in the future. ■

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The rise and future of Blockchain

In this article, the founder and co-founder of the Blockchain Federation provide insight into the future for a blockchain-based purpose-economy

During the years following the rise of Bitcoin in 2008, Blockchain and related digital technologies have spiralled into a revolutionary phase of development, spearheaded by idealists, anarchists, and investors. This is why the authors Eddy Wagenaar and Irina S. Zimakova founded the Digital Embassy in 2016, the international umbrella organisation for 16 digital technology federations: 3D Printing Federation, Artificial Intelligence Federation, Augmented Reality Federation, Big Data Federation, Blockchain Federation, Cloud Computing Federation, Crpytocurrency Federation, Cybersecurity Federation, Drones Federation, FinTech Federation, ICO Federation, IoT Federation, Quantum Computing Federation, RegTech Federation, Robotics Federation, and Virtual Reality Federation.

With the Blockchain Federation as its flagship federation, the Digital Embassy aims to connect local governments, businesses, and educational institutes to digital technologies, anticipating future changes through agile-like discussions to ensure a hyper-intelligent and smooth transition into the digital era. It is putting together an international digital think tank of global thought leaders to address regulatory issues, expedite law-making and political shifting, and provide for social-economic architectures to effectively integrate digital tech into existing societies.

Blockchain has been explained many times over. For those still unable to understand, please think of Blockchain as if it were a 'digital database', roughly one hundred times safer than Google's infrastructure. It is basically Bitcoin's 'operating system', recording financial transactions peer-to-peer, cutting out the middleman (bank). The ability to record almost anything onto this digital distributed database, is probably the greatest invention since the Internet, which is why the Blockchain is often referred to as the Internet of Value.

Eddy Wagenaar and Irina S. Zimakova

In the very near future, anything and everything will be put 'on the Blockchain': passports, ID-cards, medical records, letters of credit, freight & customs documents, hotel & flight bookings, and so on and so forth.

Everything will become transparent and immutable. There will be no more room for error, no more room for corruption. Society will change into a blockchain-based purpose-economy, where people subscribe to global peer-to-peer networks to find divergent micro-jobs they like doing, paying them cryptocurrencies by

the minute. Work will feel like a hobby. Mutual ratings will ensure trustworthiness and reliability between client (employer) and contractor (employee). Smart (automated) contracts will allow for the right type of insurance and paperwork for the job, matching with contractor's fundamental criteria. Contractors will be paid instantly upon completion of the job, again via smart contract, which will show at their fee-less Blockchain smartphone.

> "Society will change into a blockchain-based purpose-economy, where people subscribe to global peer-to-peer networks to find divergent micro-jobs they like doing, paying them cryptocurrencies by the minute."

Effect on jobs

All digital technologies combined are expected to automate up to 80% of all current business processes, resulting in many millions losing their jobs. The key issue is if digital technologies will be able to provide for enough new jobs in time for us all to survive. It is paramount digital technology is accommodated, facilitated, and utilised in an intelligent fashion. The genie is out of the bottle: slowing down the process due to loss of 'old power', would potentially be harmful to an economy's global market position. Keep up with these modern times, that is the message.

Stiff competition from major international players such as Dubai, Estonia, Singapore, and Switzerland is keeping everyone at the tip of their toes. Dubai is very much aware of its fossil fuels ending and is anticipating on its future by means of digital technologies. All its government documents will be on the blockchain before 2020 – that's within a little over 2 years from now.

Dubai also recently announced 'emCash', the first state issued Blockchain-based digital currency, enabling its citizens to pay for various items such as their daily coffee, children's school fees, utility charges, and money transfers. Their digital currency provides for faster processing, improved delivery time, less complexity and cost, peer-to-peer lending, and credit rating to name a few.

What's more, Microsoft recently unveiled 'CoCo': technology to speed up blockchain and address scalability issues. CoCo, short for Confidential Consortium, will be ready and made Open Source by 2018. It involves commitment of Intel, R3, and JP Morgan aiming to make blockchain roughly one hundred times faster, targeting to create the foundation for Blockchain for enterprises.

The future of Blockchain, Cryptocurrencies, and related digital technologies is not in the hands of governments though and can easily spiral into riots or even civil war if not guided or addressed properly. It is imperative to balance the interests of those involved so it seems only logical to join the Digital Embassy or one of its 16 federations.

Each federation has its own small group of C-level decision makers, operational staff, and technical staff. Also, each federation has several special interest groups, allowing for cross-federation and cross-market interaction. This enables for example a UK insurance company in the Blockchain Federation to learn from a Dutch contact-centre's experience with Chatbots in the AI Federation. Sharing knowledge and learning from each other is the peer-to-peer model how to move forward in the digital future. ■

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Blockchain for sensitive and personal data

Returning control over our personal data to us through the Blockchain – explored by experts from Swiss Re and IBM Research

- **Restoring customer control, trust and transparency over the use of personal sensitive data.**
- **Easing the burden of data ownership for the insurance industry.**

A joint initiative by Swiss Re & the IBM Research Lab.

We hate getting insurance. It's such an impossibly convoluted process. With all the personal data we put out there on the net, why can't we have a smart app on the mobile that tells us what we need and lets us buy cover the same way we buy train tickets or books on Amazon?

As an insurance IT professional, I know that dealing with personal sensitive data can be a colossal headache. As an industry, we put a lot into gathering and harmonising such things as policy and claims data – and as soon as we have it, we fret over protecting it from ourselves in accordance with ethical principles and multivariate, fast-evolving legislative frameworks. Tap into other sources like fitness trackers or buying behaviour to drive "Insurance made Simple"? Challenging. Social media? Unthinkable. Or is it?

Trust and transparency

Let's look at the underlying problem. It all comes down to trust and transparency. Data modellers know that when a model causes inordinate pain it is usually because it does not represent reality quite right. So, where is the flaw in how we deal with personal sensitive data? Well, insurers act as guardians of individuals' personal sensitive data. And they shouldn't. The power to decide on who can see my personal data should be with me. Is that possible?

Traditionally, the answer has always been no. There simply wasn't a way to ask consumers in real time, nor a way to analyse large amounts of highly distributed data. So, we have become accustomed to hoarding that data on our premises, and managing it as best we can. But with the advent of truly distributed technologies, that is changing. If Blockchain can distribute ledgers and even the execution of code snippets that power in-block calculations for smart contracts, why shouldn't it allow us to distribute decisions on access to distributed data? Even distribute its analytic processing?

Power to the people

With that idea, a small group of curious minds from Swiss Re's IT innovation teams and IBM's Rüschlikon research lab set out to prove or disprove the feasibility of a platform that cleanly separates regulating access to personal sensitive data from storing and analysing that data. A platform that places decision power on access to personal sensitive data in the hands of the individual that data is about, and ensures full transparency on what that data is used for, by whom, when, and under what specific consent. We call it "Blockchain for Sensitive Data", or "B4S".

Traditional implementations of this vision are likely to fall short when it comes to their security and privacy guarantees. Indeed, users might not feel comfortable to hand over their sensitive medical data to a single entity: they might (legitimately) feel that they have lost control of where, when and how their data is used, and that they cannot fully exercise their right to opt out or revoke data access. Fortunately, it's Blockchain to the rescue.

A Blockchain primer

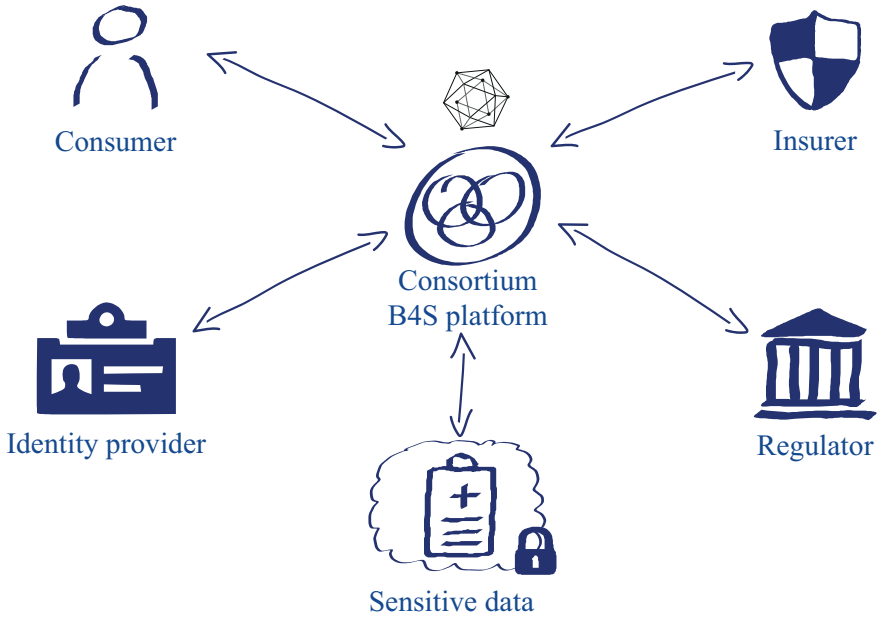
Technically speaking, Blockchain is a distributed operating system that provides an environment to execute so-called smart contracts, and to maintain all the data structures they require (a.k.a. world state).

The novelty with respect to other, more traditional, solutions to the problem is that Blockchain maintains its properties even in presence of buggy/malicious computing nodes.

Let's use an analogy to understand what this means: we can equate a Blockchain environment to a set of players playing a board game. The board game welcomes more than one player (and so the system is distributed). The players are free to interact with each other (and so they can execute bilateral or multi-lateral transactions).

Each player only needs to look at the board and its pieces to understand the state of the game – who's winning, who's losing etc. (and so there is a commonly agreed-upon world state). Crucially, the game may be designed in such a way that the players are forced to behave honestly, or be caught cheating and banned from playing on.

Blockchain for Sensitive Data



Why blockchain?
Among other things, Blockchain is great at the following scenario: a set of entities would benefit in doing business together but – because of security and trust concerns – one of two things happen: either they don't do any business, or they do it inefficiently. Blockchain creates the technical foundations so that mistrusting participants can do business together in a way that their actions are limited to what they have previously agreed.

This use case fits perfectly: today medical data isn't being shared as much as it could. Blockchain creates the technical foundations for this to happen in a way that is acceptable to all.

More specifically:

1) Blockchain helps us create a new virtual entity that is trusted to access medical data on behalf of end consumers; for instance, this entity is trusted to access private healthcare data stored on Dropbox and Fitbit.

Why a virtual entity? Because we have already established that there is no real one (person, people or company) who is trusted by all to centrally handle such data, and so we need one that is created by the Blockchain and whose actions are constrained by the rules of the smart contract.

2) Blockchain enforces this very simple, yet powerful rule: medical data can be accessed if and only if two entities agree: the requester (e.g. an insurer) and the owner (i.e. the consumer); otherwise the request is denied.

Next: Build a community
So, yes, it can be done quite nicely on Blockchain. Next, we need to think about how it can be owned and managed so that end customers and regulators can fully trust it, and we can leverage it to provide value-adding services. We are beginning to reach out into the insurance industry, with the intention of forming a consortium that can build and operate an open industry-wide platform. Later, a foundation or the like could be set up, sharing control with consumer protection experts and regulators.

Under the best of circumstances, this will take a while. By then, distributed analytics (sending the algorithm to the data instead of pulling the data to the algorithm), will have taken hold and we will be able to run analyses on whole risk portfolios, with specific consent by individual consumers, without having to own the data.

And what will all that mean for us?
We will be able to have a smart app on our mobiles that walks us through covering our insurance needs in ten minutes every January. And we will know what of our data powers it, that we allowed it, and that the data won't be (mis)used elsewhere.

And in my insurance job life, I can get on with my work without being afraid of stumbling into non-compliance because of a legal change somewhere that I just had the misfortune to miss. I might even get an easier time with regulators. Because, with full transparency and control for the consumer, they might just find they can relax a bit, too.

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Blockchain insurance set to change the industry

Open Access Government's Jonathan Miles explores the tremendous potential of Blockchain in the European insurance industry

In the view of the European Insurance and Occupational Pensions Authority (EIOPA), "all stages of the insurance value chain are being impacted by InsurTech and more broadly digitalisation. In a roundtable organised by EIOPA during April 2017, we find out that, "insurance products are increasingly capable of being purchased online, including through smartphones that allow such purchases at any time and from any place."

For example, we find out that Artificial Intelligence is a technology with tremendous potential in insurance, especially concerning the areas of fraud detection and claims management. In addition, we discover that Blockchain in the world of insurance is constantly growing and therefore also has much potential, particularly in commercial lines, the re-insurance business and around intra-group transactions.

> "Blockchain is likely to be first implemented in commercial lines than in personal lines, since the former are not affected by privacy issues such as the right to be forgotten recognised in the GDPR, which is at odds with the immutability of Blockchain."

New technologies, including Peer-to-peer (P2P) insurance, have the potential to significantly reshape the insurance landscape in the future. As part of this roundtable, the second break-out session underlined both Blockchain and smart contracts. Blockchain is a type of distributed ledger technology we find out, that is "characterised as a digital, chronologically updated, distributed and cryptographically sealed ledger of transactions."

Financial services

We also learn that Blockchain technology could significantly disrupt the financial services sector (and other

sectors), as it might remove some "middle men", as well as by reducing data redundancy, given that all the data would be stored in a single distributed database. The session also detailed examples of new use cases for Blockchain, such as European insurance and reinsurance undertakings, as the extracts below explain.

"New use cases for Blockchains are constantly emerging, underlining the nascent state of this field. During the break-out sessions, other use cases discussed included examples around identity or document management, where Blockchain could enable the automation of complex verification processes allowing the precise identification of an entity, person or document in the Blockchain. Blockchain could also be used in the area of regulatory reporting (RegTech), as well as for improving the recognition of claims history statements (which are used to calculate no-claims bonuses). It may offer innovative ways to complement or replace paper-based workflows.

"Blockchain is likely to be first implemented in commercial lines than in personal lines, since the former

are not affected by privacy issues such as the right to be forgotten recognised in the GDPR, which is at odds with the immutability of Blockchain. Blockchain has also great potential in the re-insurance business and for risk transfers in intra-group transactions; this is the approach that is being tested by a private Blockchain consortium of large European insurance and reinsurance undertakings."[1]

> "Insurance products are increasingly capable of being purchased online, including through smartphones that allow such purchases at any time and from any place."

Finally, the session explored the role that regulatory authorities could play in the world Blockchain. "In public Blockchains, supervisors may need to focus on a range of different issues, such as the role of miners and nodes, or security and privacy challenges. Some participants also noted that regulatory authorities could also consider addressing some of the legislative barriers preventing the implementation of Blockchain" we find out.

In conclusion, the key findings around Blockchain from the EIOPA InsurTech Roundtable were that its use in insurance is still limited, but is showing potential. It is likely that Blockchain will be implemented first of all in commercial lines, in the reinsurance business and for intra-group transactions. ■

1 https://eiopa.europa.eu/Publications/Reports/08.0_EIOPA-BoS17-165_EIOPA_InsurTech_Roundtable_summary.pdf

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Linking consumption and production

James Lomax from the Economy Division at UN Environment offers his thoughts on the policy priorities for global food systems

The 10-year framework of 6 programmes on sustainable consumption and production patterns (10YFP) is a global framework of action to enhance international cooperation and to accelerate the shift towards sustainable consumption and production (SCP), in both developed and developing countries.

At the United Nations Conference on Sustainable Development (Rio+20) in 2012, heads of state adopted the 10-Year Framework of Programmes on sustainable consumption and production patterns (10YFP), a global framework for action to accelerate the shift towards SCP in both developed and developing countries.

One of the programmes within 10YFP is the sustainable food systems programme (SFS), for which James Lomax is a focal point, who starts the interview by revealing that this aspect of the UN's work was very much aimed at bringing these ideas into policy-making. He then tells us about the concrete activities of the SFS programme, in his own words.

"The SFS programme is there to address the fact that current food and agriculture systems – from production to consumption are failing in many ways. For example, in some parts of the world they are leaving people hungry whereas in some places, obese and everything in between. At the same time, the food system causes much environmental degradation so within that brief, UN Environment is working on the activities within the SFS programme's 5 themes.

"The first theme is around getting people to eat better, which could be described as sustainable nutrition. But what does that mean? It means more balanced diets and with less animal protein, – how to encourage people to move away from consuming processed foods and also to choose sustainably grown foods. Together this would mean more sustainable diets that are good for people and for planet. The second point is around reducing food losses and waste, indeed as you know 30% of food produced it not eaten.

"The third point is about sustainable supply chains and value, so how can they be more efficient and how can we bring in more sustainable markets to farmers? The fourth theme which is linked to the third, is around agriculture and how can we make this sector more sustainable and encourage farmers to adopt more sustainable practices.

"The fifth is a more overarching theme, which concerns enabling conditions and how to make food and agriculture policy-making more integrated. How can we bring in health practitioners into discussions about food production? How do we make food sector governance better from a sustainability angle? While it is all-encompassing – if all these things are done in the right way – then we can create a more transformative agenda."

> "The SFS programme is there to address the fact that current food and agriculture systems – from production to consumption are failing in many ways. For example, in some parts of the world they are leaving people hungry whereas in some places, obese and everything in between."

Agriculture

Elaborating on sustainability in terms of the process from farm to fork, Lomax explains that policy makers at local and national level are not thinking in a cross-cutting way. For example, there is much silo thinking between agriculture and food policy makers, that prevent the development of holistic solutions and activities that positively impact agriculture, environment, business and human health.

Lomax then offers his thoughts on the need for multi-stakeholder action and feeding this into policy making by the public and private sectors. For example, how can farmers be brought into discussions, but also with the private sector and NGOs convened by governments?

Looking back to the five themes, Lomax then underlines that if consumers can demand more diverse and balanced food, then that will have an impact on the supply chain. He goes on tell us more about this.

"It will change the way retailers produce and market their food to consumers, so from the food waste point of view for example, retailers have a great influence on the way consumers value food and how it is consumed at home.

"Therefore, at UN Environment, we want there to be a positive influence from the food supply chain to consumers, so they understand that bad diets and food waste is bad for them, the planet and when it comes to food waste is bad for their pocket too."

In closing, the conversation moves towards the technology angle in global supply chains, indeed Lomax is keen to expand this interesting point.

"Technology can play a very positive role and when it comes to efficiencies and food waste, it's very important. However sometimes supply chains can be over complicated, and technology plays a part in that – the horsemeat scandal is a good example where the distance between the consumer and production became too far to be traceable."

"The connection between the way food is both consumed and produced therefore becomes too far removed. This make it difficult for people to understand the inherent value it has. I think if we address the values we have around food, then things would change dramatically.

"There are a lot of technologies out there which are very good when it comes to efficiencies and price, but I think we have to look at quality over quantity and if food is priced correctly." ■

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Ambrosus: Digitalising the Global Trade with Blockchain

Angel Versetti, CEO of Ambrosus discusses the world's first blockchain ecosystem for supply chains and global trade

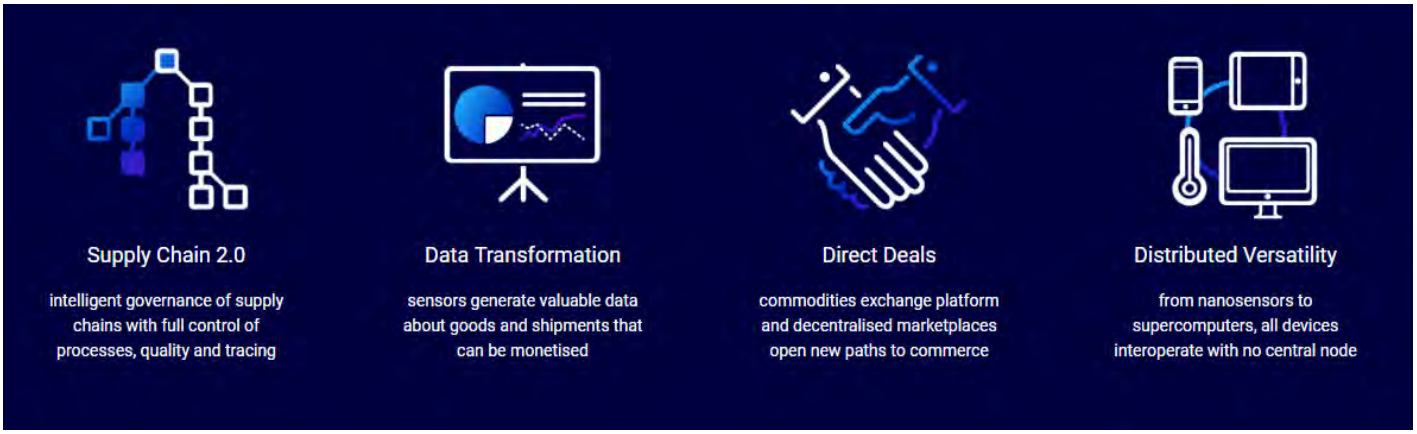
Blockchain is the new internet. 2017 has been explosive for the blockchain sector, with the technology permeating every possible industry, with every country and every corporation talking about it. Cryptocurrencies have taken financial markets by storm, with no institutional investor without sharp feelings about them: some calling them the future, others a scam. With countless Initial Coin Offerings (ICO) bootstrapping start-ups, blockchains and protocols overtaking Venture Capital by a factor of 3 within only months of reaching its volume. The market capitalisation of the industry grew from $16 to $160 billion USD just this year alone. Following the explosive growth in the first half of 2017, the regulations started coming in from all parts of the world in the second half of 2017 to try and reign in the booming sector.

Being a victim of its own success, blockchain also attracted a large number of opportunists and fraudsters, who abuse the unregulated markets and the powerful technology, as a result leading to a lot of public and financial sector stakeholders taking a very careful approach when it comes to using the blockchain. Most of them simply united into large consortia to build their own private distributed databases, which they call blockchains. When it comes to community-driven, public blockchains, they have to constantly prove themselves to be legitimate stakeholders in order to interact with the established industrial and financial players.

Ambrosus: Pioneering legitimacy and rejecting tens of millions of dollars

In the flurry of Initial Coin Offerings in 2017, most of which were conducted with little else than a white paper and a flashy website, and many of which broke countless regulations and practices, Ambrosus was different from the very outset. Emerging from the two leading Swiss technology clusters, the Crypto Valley in Zug and EPFL Innovation Park in Lausanne, Ambrosus secured both the financial backing and operational support from the public-sector entities in Switzerland; it boasted an official partnership with the United Nations 10YFP, responsible for implementation of Sustainable Development Goals, and an endorsement from EIT Food.

The team includes the ex-Director of the biggest public sector R&D cluster on food and nutrition in Switzerland, a former project lead at the UN, an ex-Vice President at JP Morgan and



several world-prominent professors and researchers from Harvard, MIT, EPFL and ETH Zurich, working together with Parity Technologies, a pioneer in the blockchain development, led by the Founder of Ethereum, Dr Gavin Wood. The advisory board includes such prominent people as ex-CIO of UBS and President of the Crypto Valley, Oliver Bussmann, Chairman of LDJ Capital David Drake, Managing Partner at Kenetic Capital Jehan Chu, and many other leading forces in the finance and technology sector.

With such a line-up, partnerships and real technology, Ambrosus already differentiated itself from any other ICO or TGE in 2017. The way it conducted its Token Generation Event was also remarkable, with over €32 million collected at the time of writing. Ambrosus was the first major blockchain to introduce a comprehensive Know-Your-Customer (KYC) policy.

With anonymity being treasured by many parts of the community, many members did not pass the stringent requirements. Ambrosus had to reject over €35 million, something that was met with shock and disbelief in the crypto-industry, which wondered why would anyone raising funds, give up such a big amount just to stay compliant. This is the price Ambrosus was paying in order to stay compliant and signal to other players in the industry – that this is the way the process would have to be done.

And soon enough, under the regulatory pressure, the compliant way to conduct ICOs, paved by Ambrosus, became the new norm in the industry, although implemented by many half-heartedly, to allow as much money as possible to pour in. The compliance and legitimacy of Ambrosus is what resulted in a big

outreach from various policymakers, both in Europe and in other regions to reach out and see how Ambrosus could help transform supply chains and trade in those regions. Witnessing the way Ambrosus stands by its values gave them confidence to choose Ambrosus as partner for their pilot projects.

Why connecting tiny sensors to blockchain is a huge deal

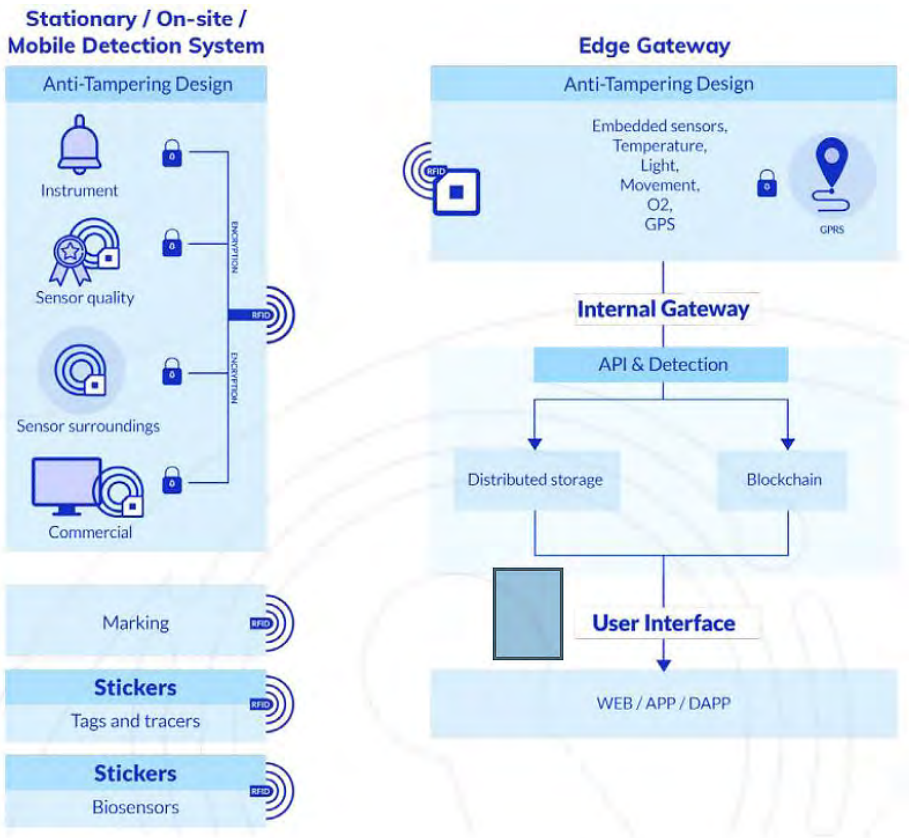
Ambrosus combines high-tech sensors, blockchain and distributed open-source software to build a universally verifiable, community-driven ecosystem to assure the quality, safety & origins of products. Located in Switzerland, the most innovative country in the world for 6 years running, Ambrosus innovates within the innovation space of blockchain. It introduced Amber, the world's first data-bonded token, to which sensor-generated readings are assigned through an immutable ledger. It created an architecture that permits compliance, quality control and audits to be automated by smart contracts, creating value for both the private sector and the governments.

If integrated in the supply chains, Ambrosus can monitor the flows of goods, payments and storage conditions, bringing transparency and accountability to the global commerce. It can also ensure that imports and exports do correspond to norms and regulations by serving as an independent verification mechanism.

The key to making this vision work is to turn sensors into oracles, the trusted source of information for the blockchain. Coupling the integrity of sensor-generated data with the blockchain consensus mechanism results in the ability to create the truthful digital reflection of the real world on the blockchain. The implications are significant for the economy, because to build distributed economy, blockchain alone will not be enough. Linking it to billions of Internet of things (IoT) devices and sensors producing quadrillions of readings will be key for any smart city or any economy that wants to run on the blockchain. Ambrosus already works on integration of various third-party sensors into its blockchain - through APIs and gateways and is applying all its collective brainpower to the ultimate quest for the scalability of its network and seamless integration into IoT protocols.

Applications and Use-Cases of Ambrosus ecosystem

Ambrosus is a general-purpose solution, providing a trusted backbone to link products to data. On top of this backbone various layers and protocols can be built, enabling functionalities derived from Ambrosus blockchain, such as data analytics, data visualisation, decentralised storage, payment settlements mechanisms, real-time audits and process management and traceability. By keeping the blockchain open-source, having various APIs and developer tools in place and leveraging



the digital token Amber, Ambrosus creates opportunities for developers to integrate existing software or build new one, instantly monetising the traction through a digital token, Amber, which serves as the unit of exchange and as fuel on Ambrosus blockchain. Amber enables participants to derive value from the early adoption of the network, given the fixed limited supply of Amber. The value of adoption of Ambrosus protocol is thus threefold: short-term marketing boost, medium-term value from rising value from adoption of the network, long-term value from creating a public good, a universal repository of data for the global commerce and intelligent supply chains.

The initial applications that were launched in Ambrosus ecosystem, include a peer-to-peer marketplace for quality assured products, where any two parties can enter a commercial deal, with quality parameters for products stipulated within the self-executable contract. Another application has been the supply chain management software, where all the processes from sourcing to processing to distribution could be monitored and managed through smart contracts, permitting automation of the processes. We are currently working on commodities barter platform, where tokenised commodities with assured quality can be exchanged securely.

Early success and adoption of Ambrosus

Ambrosus has developed use-cases for a wide variety of markets: food & beverages, pharmaceuticals, commodities and luxury items. For each market, the supply chain will have unique features, which can be reflected in customised smart contracts and distributed software. We have published detailed reports on protecting labels of products, assuring quality and tracing origins. The sensor system can monitor external environment (e.g. temperature, humidity, pressure, location) and internal parameters (structure of tissue, composition, presence of foreign bodies, chemical analysis, DNA analysis).

Ambrosus has become the most popular blockchain in the supply chain domain, with participants in its Token Generating Event hailing from over 100 countries and contributing over €32 million. Worldwide community of developers, engineers, enthusiasts and supporters of Ambrosus exceeds 50 thousand people, creating a lively and dynamic ecosystem.

Ambrosus has been invited to over 30 top-tier events this year, including being selected by Pioneers Festival, Start Summit, Hello Tomorrow and many others; it has been featured in over 100 media articles including Nasdaq, Vice Media, Finance Magnates and Food Navigator. Ambrosus has over 25 existing partnerships and over 100 in negotiation, with the goal to create a multi-stakeholder consortium for its public blockchain for supply chains and global commerce.

We welcome any partners and collaborators in our quest to transform the global trade.

Ambrosus

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Blockchain: what is in it for the European economy?

Benoît Abeloos, Policy Officer at the European Commission gives a compelling glimpse into how virtual currency could affect the economy

The publication of the white paper, "Bitcoin: a peer to peer cash system"[1] in October 2008 by the mysterious Satoshi Nakamoto (a fake identity), will be seen in the history of technologies as a disruptive milestone. By combining technologies which were known for years, the author created the first virtual currency, and a technology – blockchain – which enabled exchange of e-money without the usual unavoidable intermediaries: banks.

Developers and entrepreneurs then saw numerous new opportunities in the financial sector, especially as new regulations opened new possibilities and business models: RegTech, peer to peer payments, peer to peer lending, exchange of securities, crowdfunding, initial coin offerings, debt trading, etc.

People soon realised that the broader family of technologies called 'distributed ledger technologies' (of which blockchains are a subset) could be used not only to build virtual currencies or offer new financial services, but by exploiting their characteristics, explore new possibilities in many different areas and industries, such as the Internet of Things, energy, health, identity management, taxation, e-government, management of intellectual property and copyright, smart homes and cities. These technologies provide immutability, security and privacy of the data through encryption, while offering their ubiquitous distribution to all nodes.

The European Research and Innovation community didn't wait long to propose, in the frame of the EU Horizon 2020[2] programme, blockchain based research projects. D-Cent[3] (Decentralised Citizens ENgagement Technologies) project, which was the first of its kind, was established as early as October 2013. The aim was

to actively foster open source and distributed platforms to encourage direct democracy and economic empowerment.

In the same vein, Decode[4] provides tools that put individuals in control of whether they keep their personal data private or share it for the public good. MyHealthMyData[5] explores the very important political objective to empower patients to manage their health data. Bloomen[6] provides an innovative way for content creation, sharing, monetisation and copyrighting, and symbIoTe[7] a single mobile application to interact with different IoT platforms. The next Horizon 2020 framework programme will, from 2018 to 2020, provide more opportunities, through calls for proposals, to innovate with blockchain, for example, in e-government, FinTech, Next Generation Internet, IoT, Smart Homes or Media.

New policies

The Commission is also exploring the use of distributed ledger technologies in relation to its policies. The first investigations concern the possible creation of a financial transparency gateway, with a pilot being tested, to improve the efficiency of financial data reporting, or tax and customs data collection. Application of blockchain to the CO_2 emission trading system, or the circular economy, could also be considered.

In this new reality and a digital market where the stance 'the winner takes it all' has too often become a standard, it is important for the European Commission to put in place policies avoiding the emergence of de facto standards, which may limit competition and keep customers, (public and private) locked with single vendors. Moreover, it will be very difficult for service providers to develop applications and services which can seamlessly operate on different platforms if they are proprietary.

These are the reasons why the European Commission, as part of the Digital Single Market strategy, is active in fostering the development and the adoption of international standards. It has established a liaison with the ISO Technical Committee 307 on Blockchain and Distributed Ledger Technologies, which has been set up recently. The Commission organised a policy and standardisation workshop[8] on 13 September 2017 with European stakeholders representing the industry, governments, standards development organisations, citizens, and NGOs. European Standardisation Organisations[9] have been approached to take a leadership role to identify EU specificities with regards to Blockchain, and produce a white paper.

Is blockchain going to deliver on its promises? Is "blockchain going to help to end hunger" as I saw on a slide recently? Is it going to be the new internet? Is a bubble being formed, with the frenzy of ICOs reaching summits of capital raising? Aren't we on the top of a hype cycle where inflated expectations are culminating? Are we going to soon reach the trough of disillusion?

All these statements probably have their part of veracity. The truth is that we need to validate the pertinence of blockchain for every kind of use we can envisage, compared to existing technologies. New business models need to be validated by real businesses and pilot projects. Lawyers and policy makers need to carefully assess several legal questions. Is the apparent contradiction between blockchain immutability and the right to be forgotten a real issue? Is the solution technical or in the interpretation of law? Can smart contracts be legally enforced, stopped, or reversed without changing the laws and/or the technology? What is the appropriate governance for blockchain?

The Commission will launch a European Blockchain Observatory and Forum[10] (early 2018) to help answer these questions and explore the unknowns of this fascinating domain. It will also prepare policy initiatives to help EU start-ups and established companies to seize the opportunities. And grow. ■

1 https://bitcoin.org/bitcoin.pdf
2 http://ec.europa.eu/programmes/horizon2020/
3 https://dcentproject.eu/
4 https://www.decodeproject.eu/
5 http://www.myhealthmydata.eu/
6 http://cordis.europa.eu/project/rcn/211092_en.html
7 https://www.symbiote-h2020.eu/
8 https://ec.europa.eu/digital-single-market/en/news/blockchain-and-distributed-ledger-technology-policy-and-standardisation-workshop
9 CEN, CENELEC and ETSI
10 https://ec.europa.eu/digital-single-market/en/news/eu-blockchain-observatory-and-forum

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The outlook of the Finnish economy

Finland's Ministry of Finance lifts the lid on the current phase of rapid growth of the Finnish economy and their expectations for the same in 2018

The Finnish economy is in a phase of rapid growth. In 2017 the rate of economic growth will reach 3% after which the projected growth rate slows down. In 2018 and 2019 GDP is expected to grow 2.1% and 1.8% respectively, which are above the estimated potential growth rate. Economic growth based on a strong increase in labour productivity will keep the improvement in the employment moderate. Rapid growth increases tax revenues and strengthens public finances, which remains still in a deficit because of structural factors and general government debt to GDP ratio lowers but only temporary.

Over the next few years, economic activity will be driven by both domestic and foreign demand. The patterns differ clearly, however. Private consumption and to some extent investment demand growth will slow, but exports will pick up. Improving global demand and business cost competitiveness will boost growth prospects for exports.

Household consumption demand will be hampered by subdued purchasing power. Investment growth will be held back by a slowdown in housing construction growth but accelerated by major production-related investment projects.

Globalisation and specialisation have led to a fragmentation of value chains, which means that the manufacture of individual end products is distributed across several countries. Intermediates exports as a proportion of total exports have consequently increased. The globalisation of value chains is directly reflected in trade structures.

Project ReCon

Project ReCon is essentially a research project that concerns the implications and applications of (primarily) non-currency blockchain technologies, as well as raising awareness of the possibilities of blockchain technology, especially in Finland.

It started its life in September 2016, with a view to explore strange new technologies, to seek out new ideas and applications, and to explore where very few have gone before. The team consists of 4 researchers, 4 companies and the Ministry of Finance in Finland, the latter of which has set up a group of experts to enhance and monitor the conditions in which financial services technologies can evolve. The group's coordinator is ministerial adviser, Miki Kuusinen.

Back in December 2016, the Bank of Finland cooperated with the Ministry of Finance in Finland, a seminar to discuss the possibilities that blockchain and distributed ledger technologies in different sectors of society.

At this event, 10 projects were presented, with a view of developing applications to harness blockchain technology for the needs of public administration, the financial sector and the needs of industry. In his introductory remarks, Governor Erkki Liikanen highlighted the Bank of Finland's vital role as catalyst and overseer of payment and financial systems.

"Our task is to ensure the reliability and efficiency of the payment system and the overall financial system and to participate in their development. Research into, and support of, new innovations shaping the financial sector constitute part of this work, Liikanen said."

The aims of the project include demystifying the blockchain. Producing actionable, understandable knowledge about blockchain technologies and their applications for entrepreneurs, decision-makers and the public is a key aim of the project. It also aims to demonstrate how blockchain technologies might be fruitfully used both for the betterment of society, as well as business applications.

In addition, the project also aims to spark discussion, which includes raising public awareness concerning the impacts of new technologies and their development. The project also intends to educate, train and connect interested people and parties in Finland and further afield.

Finally, the project also emphasizes producing quality academic research to find out more about the implications of blockchain from organisational, business, management and societal perspectives.

Finnish exports consist predominantly of intermediates, which are processed into final products or integrated as part of larger installations in some other country. Intermediates exports account for around two-thirds of total Finnish exports. This is a common feature; intermediates are an important component of exports in other advanced economies, too.

The growth of foreign value added in exports is indicative of a more specialised and internationally more interconnected production structure. The increased share of foreign value added undermines the potential for export-driven GDP growth: not all streams of export revenue contribute to GDP growth in the same way.

In the medium term economic growth is projected to return to the level of potential output growth, that is, a little over 1%. The slowness of potential growth is due to structural factors in the economy. On the one hand, the shrinking of the working-age population and the persistence of relatively high structural unemployment maintain zero growth in labour input despite the more active participation of older age cohorts in particular in the labour market.

On the other hand, productivity growth has slowed as the output of high-productivity sectors has declined significantly and the overall structure of the economy has shifted towards services. In addition, the low investment rate that has continued for several years has slowed the generation of new productive capital.

> "In 2018 and 2019 GDP is expected to grow 2.1% and 1.8% respectively, which are above the estimated potential growth rate. Economic growth based on a strong increase in labour productivity will keep the improvement in the employment moderate."

Growth and effects

The continuing reasonably rapid rate of GDP growth will have a positive effect on employment and at the same time the number of unemployed persons will decrease. The number of employed persons is projected to increase by average 0.7% p.a. and will bring the employment rate to 70.5% in 2019.

The activation of persons outside the labour force to become jobseekers is likely to slow the decline in the unemployment rate. This indicates a rather high rate of unemployment throughout the forecast period, despite stronger economic growth. The unemployment rate is expected to fall to 7.8% in 2019.

The number of the long-term unemployed decreased rapidly in early 2017 across all age groups. Due to strengthening economic growth, the number of the long-term and the structurally unemployed can be expected to decrease further in the next few years, albeit more slowly than in recent months. The number of the structurally unemployed is still high, almost 200,000 persons according to the employment service statistics of the Ministry of Economic Affairs and Employment, which will contribute to slow the reduction in the unemployment rate in the next few years.

The economic growth outlook for the 2017–2019 is far more positive than in previous years, but the general conditions for economic growth and the structures determining these have not, however, changed to increase the economy's growth potential.

The long-awaited economic growth is also improving the state of general government finances. Tax revenue is increasing and the decline in unemployment is reducing unemployment expenditure. The economic rebound does not, however, eliminate the structural factors weakening general government finances, with the most important of these being population ageing, which increases growth in pension, care and nursing expenditure and therefore slows down improvements in general government finances.

Despite the economic recovery, general government expenditure clearly exceeds revenue. While robust GDP growth will set the debt ratio on a downward trajectory in the next few years, central government indebtedness will still continue in 2021.

To complement the debt objective, the target of the GDP-to-debt ratio levelling off by the end of the government term 2019 and living on debt coming to an end in 2021, the government has set specific targets for the general government budgetary position. For the targets to be reached, general government finances will need to be more or less in balance at the end of the government term.

To achieve the targets and to ensure the long-term stability of general government finances, it is important that the revenue generated by economic recovery be used to balance general government finances and reduce central government borrowing. ■

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Human-centred approach to data leads the way to a smarter digital age

Markus Hautala and Antti Kettunen at Tieto reveal how Blockchain has rapidly emerged as one of the disrupting technologies of the digital age

Trust in the digital age is broken. Can you remember the last time you got insurance or bought something from a private person from another EU country to yours? Or when was the last time you signed a contract or gave a power of attorney online? The chances are that you rarely have. Although our private and business lives have become increasingly digital, we still seem to lack mechanisms to conduct these common interactions online. The underlying reason of course is that the internet was not built with trusted interactions in mind. Online nobody can verify what you say or the information you share is true.

As the amount of data generated by people, organisations and devices continues to grow at an exponential pace – the IDC predicts a ten-fold increase in data generated from now to 2025 – it is becoming essential that we have practical means to manage and share our data. The regulators in Europe have also reacted to this need by launching regulatory initiatives such as Payment Services Directive (PSD2), General Data Protection Regulation (GDPR) and ePrivacy directive, which share the common ambition of empowering citizens to have access to their data as well as being able to control and share it. Through these initiatives, the EU aims to actively enforce data protection rules and create a fairer platform for data protection, that supports consumers and businesses whilst promoting innovation.

Data verifiability remains an issue in digital interactions

GDPR and PSD2 regulations are significant steps to the right direction of providing identity holders access and control over their data. Both focus on enabling data portability, with the goal of enabling new digital business innovations. As such, they will fuel disruption in the digital industry by opening existing data silos by allowing customers to migrate their data to a new service provider. As Erkki Poutiainen, chairman of the EBA Clearing Board mentions, PSD2 together with new technology can revolutionise the payment landscape and even banking as we know it.

While gaining access to data is a necessity for opening up competition, more is required. The key issue in data portability is not only that data is shareable, but also that the data retains its verifiability. Just imagine receiving a power of attorney digitally but not being able to prove its validity. Clearly verifiability is the crucial element that retains the value of data and as such is of critical importance.

Digital identities for people and organisations, as well as verifiable data are the fundamentals needed for digital trust interactions. Portable digital identity and data will enable us to create more equal and inclusive society by allowing anyone to participate in the new economy.

MyData and the new decentralised internet hold promise for solving the trust problem

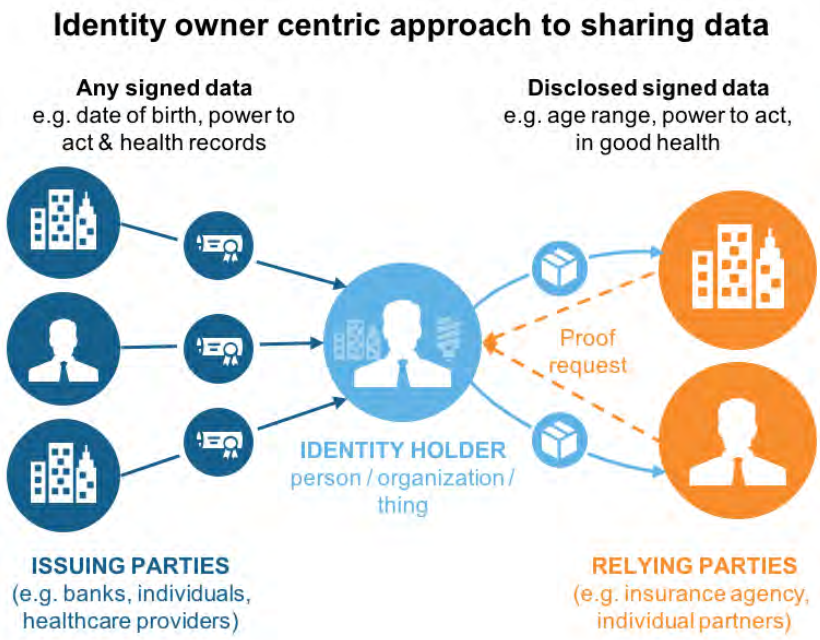
Recently, a Nordic model for human-centred personal data management and processing called MyData has raised thoughts about how data could be managed with identity owner at the centre. MyData brings a fundamental change in how we view and use data. It is an ideology, driven by three main principles of:

1) Identity owner centric control and privacy;

2) Usable data. Data must be technically easy to access in a machine readable open format accessible via standardised interfaces and;

3) Open business environment. MyData proposes a new identity owner centric approach in exchanging data. In this concept the identity owner has a single hub for data management. Via the hub the identity owner can give services the authority to access and use data.

A key prerequisite for all the regulations and models to become truly effective – is that a new infrastructure paradigm for managing identities and sharing verifiable data is needed. Even if every person and organisation has an identity, we still fail to replicate this online. This is mainly due to identities being fragmented over various data



silos. MyData and the regulations aim to remove the silos, but this is still not enough, since they don't provide the infrastructure which would foster true collaboration and competition, that are needed for the market to grow.

The rise of decentralised solutions, such as blockchain and other distributed ledger technologies (DLT), have given rise to new types of ecosystems where businesses, public organisations and individuals can form trust relationships without involving middlemen. These decentralised solutions hold also great promise for solving the identity and integrity issues prevalent in sharing and trusting on data.

Decentralised identity network can deliver the internet's missing identity layer

One of the most promising initiatives aiming to solve the challenge of being able to trust information exchanged online is Sovrin. Sovrin is a global, decentralised identity network that delivers the Internet's missing identity layer. Sovrin allows people and organisations to create portable, digital identities which they control.

In Sovrin, the identity holder forms secure digital connections with entities (organisations, individuals or things) that can provide information about the identity holder. This information can literally be anything such as a personal identification number, home address, power of attorney or – in the context of GDPR and PSD2 – customers consent to a service provider. This information can then be shared forward by the identity holder to a party that requires these proofs. This provides for all kinds of rich digital interactions: Know-Your-Customer, contract and transaction signing (B2B, B2C, G2C), permits, asset ownership, and so on.

Towards a smarter society created with new technology

Blockchain has rapidly emerged as one of the disrupting technologies of the 21st century. We at Tieto believe that it will be one of the key ingredients of success for our customers' future business and that it can be harnessed to build more equal, inclusive and smarter societies. With this in mind, Tieto is working on various fronts to open up current data silos for the benefit of Nordic organisations and citizens.

- Tieto is currently looking into how to utilise blockchain technology within healthcare. Together with California-based company Gem, the company is working on how to link genetic data stored in biobanks, personal health records at hospitals and individual citizens to bring the benefit of panomics to diagnostics and treatment scenarios.

- Tieto and Evernym, the leading developer of self-sovereign identity technologies in October 2017 launched a Sovrin Pilot Program, aiming to introduce the Sovrin identity platform to Nordic customers. The helps businesses and public organisations better manage digital interactions, by increasing trust and reducing costs with the help of the distributed identity network. The multi-party initiative aims to rapidly validate and implement commercially viable solutions that leverage this global network.

By its design distributed ledger technology introduces a new trust model for ecosystem collaboration. To this end, Tieto is excited to explore new use cases utilising the technology in close collaboration with its customers and partners.

Read more about our thoughts on blockchain:

Self-sovereign identity delivers MyData in practice

It's your data. Take it back. Unlocking your health data with blockchain

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The future of blockchain: Learning from things yet to happen

Disruption, pivot, 10X change – these words describe current strategic interest in everything new, but how do we decide the future of blockchain?

In a forward-looking research project at Aalto University's Business School in Helsinki, together with partner companies and public organisations such as the Finance Ministry of Finland, we are studying one of the future change drivers, blockchain technology. While high on the hypecurve, the business and societal implications are not yet visible despite a lot of ongoing experimentation ranging from health care, finance, and logistics.

The members of the ReCon research project, or "Blockchain: Disruption of Business Systems and Reconfiguration of Trust" are particularly interested in questions such as how distributed, open technologies may transform the ways in which people interact. Socially constituted, comparative trust scores are familiar from internet sites ranging from amazon.com to the dark net. We rely on our fellow people's evaluations. Historically, or before the Internet, we relied on institutional sources of trust – the government license to operate or the family network. Or we took the risk.

Trust in cryptocurrency

A cryptocurrency like a bitcoin requires no trust: confidential buying and selling is possible without knowing the other parties at all. This is the unique characteristic behind the blockchain technology – it is a way of operating an economic system without the necessity to have trust among the parties, something that has been considered essential for all economic activity. A lack of trust adds substantially to the transaction costs. Therein lies the blockchain revolution.

The Economist magazine called it "the trust machine", yet the writers were also concerned about the large societal implications: "The idea of making trust a matter of coding, rather than of democratic politics, legitimacy and accountability, is not necessarily an appealing or empowering one." (October 31, 2015, p. 24).

When states, governments, central banks become irrelevant, what happens to societies and their foundational legitimacy? Any political vacuum is likely filled with other interests. Prof. Lawrence Lessig from Harvard Law School in Code and the Commons, 1999, p.10, has warned: "To push the anti-government button is not to teleport us to Eden. When the interests of government are gone, other interests take their place. Do we know what those interests are? And are we so certain they are anything better?" So blockchain could have some significant societal implications, all the way down to the foundations of our societies that we need to think through.

Nevertheless, blockchain has very useful applications. Trusting blockchain with our health data has its advantages: In the era of data breaches, blockchain appears secure but also transparent in terms who has accessed the data. And of course, there is no need to carry documents from one health care provider to another by hand (as has happened to this author several times)! No wonder many think

that it is better to have the data on a blockchain, rather than in a national health institution's (hackable) servers.

Similarly, blockchain applications could save mountains of documents and hundreds of hours required to process the transport logistics of shipping companies. The origins of sensitive goods, such as diamonds can be recorded on a blockchain, and the integrity of the supply chains, for example whether food has been stored properly, can be shown.

And blockchain could save significant costs in financial transactions. According to a McKinsey&Company (see International Monetary Fund, The Internet of Trust, Finance & Development, June 2016, 53:2), banks extract an astonishing $1.7 trillion a year, 40% of their revenue, from global payment services. Banks and financial institutions are currently developing their own blockchain applications.

However, many issues remain to be worked on. Here are some we at the ReCon research project are thinking about.

1. The problem of interference:
Establish the linkage between a digital trade and its value is what blockchain is very good at. However, when the non-digital world intrudes there is the human touch with the messiness of the physical world around us. Someone records a value at a particular time. Perhaps a sensor will report it. How can we trust that the person, or the sensoring device, has the right measurement and is honest, or accurate, about reporting it? Can we be sure there are no vested interests interfering with the recording?

2. Blockchain applications ('use cases'):
We are surrounded by technologies that perform adequately or even superbly solving business and life problems. When is blockchain at its strongest? What boundary conditions are there for using the technology purposefully and effectively?

> "A cryptocurrency like a bitcoin requires no trust: confidential buying and selling is possible without knowing the other parties at all. This is the unique characteristic behind the blockchain technology – it is a way of operating an economic system without the necessity to have trust among the parties, something that has been considered essential for all economic activity."

For example, blockchain has implications for the Internet of Things- or Industrie 4.0 - infrastructures through its smart contract capacities. A coupling with machine learning might make these capacities particularly potent, as the system could learn or be teachable. As a thought experiment: Why could cars not only drive themselves autonomously but also act as separate legal units – 'own' themselves and sell their services as de centralised autonomous organisations? A car might then insure itself against any traffic accidents. Over time, it might even learn to negotiate better priced insurance contracts based on its stellar driving record!

3. Beyond business:
A blockchain-like technology offers a promise for a more inclusive, open, and democratic society. It is a promise that many feel the Internet failed us and that the blockchain is the new hope for the future. How can we use blockchain in a way that respects the legitimacy of our societies and institutions, while giving the technology a chance to serve its citizen-admirers with the unique features? Disruption is excellent, provided the transformation allows for a renewal of our societal constitution in both a respectable and inviting way.

These are examples of the questions we at the ReCon research project are thinking and experimenting on. We engage in pilot projects, hackathons, studies, workshops and keynotes. Our mission is to describe, analyse and experiment on the potential of blockchain-like technologies.

Outliers Wanted!
We are seeking outliers, people and organisations that are in the forefront of learning from things yet to happen, to connect and think with. More information regarding the ReCon research team and our partner organisations can be found at recon.site.

ReCon

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