appg

CONVERGENCE & SINGULARITY

BLOCKCHAIN, ARTIFICIAL INTELLIGENCE & INTERNET OF THINGS

Blockchain applications - regulation, policy & strategy

appg

LOCKCHAIN

Sponsors of APPG Blockchain

The Group supporters – Big Innovation Centre, British Standards Institution (BSI), Capita, CMS Cameron McKenna Nabarro Olswang, IOTA Foundation, MyNextMatch, Radom Network, SAP, Stratis Platform and the University of Surrey – enable us to raise the ambition of what we can achieve.

APPG Blockchain Website: https://uk.bicpavilion.com/about/appg-blockchain
Email: appg-blockchain@biginnovationcentre.com | Twitter: @appg_blockchain

Big Innovation Centre: www.biginnovationcentre.com |
Email: info@biginnovationcentre.com | Twitter: @BigInnovCentre

Table of Contents

1. APPG Blockchain Evidence Meeting on Convergence & Singularity: Blockchain, Artificial Intelligence & Internet of Things

Purpose

The purpose of the All-Party Parliamentary Group on Blockchain (APPG Blockchain) is to ensure that industry and society benefit from the full potential of Blockchain and other distributed ledger technologies (DLT), making the UK a leader in Blockchain/DLT's innovation and implementation.

This Report of the 21st Evidence Meeting explores Convergence and Singularity of Blockchain technologies, Artificial Intelligence (AI) and the Internet of Things (IoT). It provides a summary of the takeaways from the Evidence Meeting.

The Video recording of the session is available on our websites:

- APPG Blockchain https://uk.bicpavilion.com/about/appg-blockchain
- Big Innovation Centre www.biginnovationcentre.com/

Details of the Meeting

- Date, 22 February 2022
- Time, 17:30 – 19:00 GMT
- Location, Virtual House of Commons, London
- Participants, 119 attendees

Panellists: Evidence Givers, Chair & Secretariat

The evidence meeting was Chaired by the APPG Blockchain Chair Martin Docherty-Hughes, Member of Parliament. Big Innovation Centre acted as the Secretariat for the APPG on Blockchain, led by CEO Professor Birgitte Andersen and Project Manager George Farrer.

The twenty-first APPG on Blockchain Evidence Meeting aimed to inform Members of the House of Commons and House of Lords about the current developments in the Convergence and Singularity of emerging technologies such as Blockchain, Artificial Intelligence and the Internet of Things. Assuring representations from across stakeholders, The APPG meeting on digital assets had Evidence Giving from:

- *Think Tank – European Blockchain Observatory & Forum*
- *Academia – University of Cambridge*
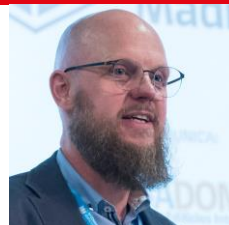- *Technology Industry – SAP UK*

Evidence givers

Dr. Alexandra Brintrup

Professor of Digital Manufactering, **University of Cambridge**

Dr. Chris Francis,

Head of Government Affairs, **SAP UK**

Dr. Stefan Junestrand
CEO **Grupo Tecma Red /** Member, **European Blockchain Observatory**

Chair   Secretariat

Martin Docherty-Hughes MP

House of Commons, **UK Parliament**

**Professor Birgitte Andersen**
CEO **BIG INNOVATION CENTRE**

Rapporteur: George Farrer
Project Manager, **BIG INNOVATION CENTRE**

2. Background

The meeting's primary goal was to understand the current developments with the Convergence of Blockchain technologies, Artificial Intelligence (AI) and the Internet of Things (IoT). The APPG on Blockchain has brought together global perspectives from different institutions, academia, and businesses.

The panel of evidence givers addressed the following questions:

- How can the convergence of Blockchain, AI, and IoT be a paradigm shift?
- What are the main benefits, barriers and risks when combining Blockchain, AI and IoT?
- What are the existing integrations across emerging technologies? What will the future look like? And when?
- How can policymakers and regulators catalyse the technology convergence?
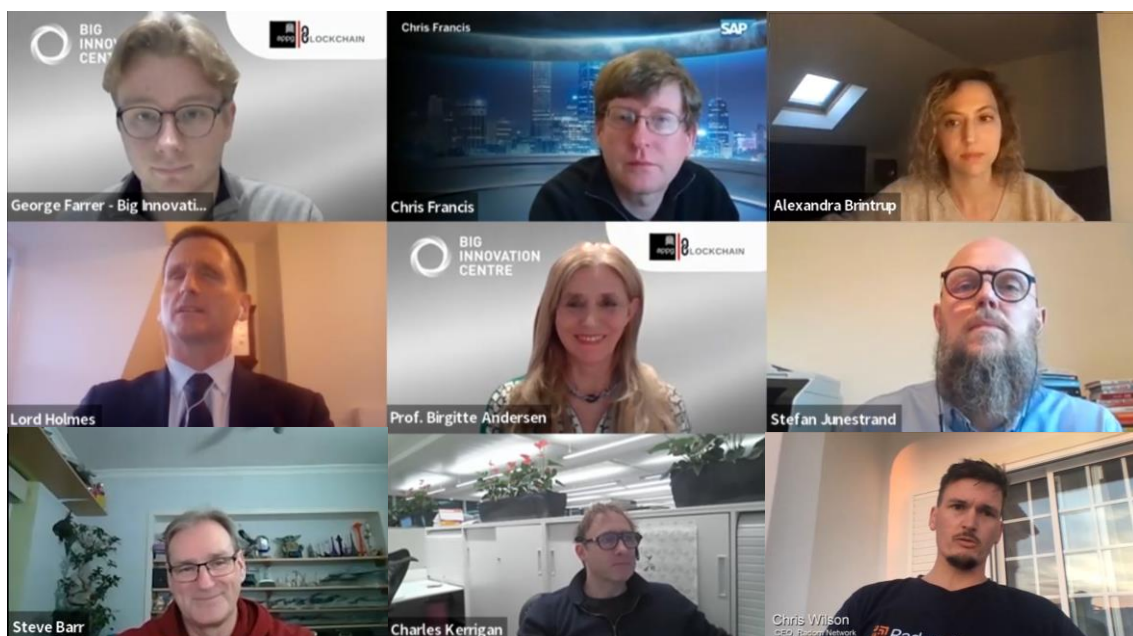
3. Meeting Takeaways

3.1. Solutions Possible Through Convergence of Blockchain, Artificial Intelligence & Internet of Things

The Convergence of Blockchain, Artificial Intelligence (AI) and the Internet of Things (IoT), allows us to alleviate problems though the autonomous sharing of information, and through real-time decision-making systems. Therefore, due to the possibilities created by the Convergence and Singularity of these emerging technologies, there is a less need of for permanent pushed-based information systems[1], which are less efficient.

Convergence would eliminate the need to develop permanent push-based information systems and allow Small and Medium-sized Enterprises (SMEs) to access this type of Technology. (A. Brintrup)

Blockchain has its place in a broad technological ecosystem and combines exceptionally well with other revolutionary technologies related to the use of data, such as IoT and AI. IoT is the technology to help us collect these large amounts of high-quality data from any device connected to the internet (S. Junestrand)

There are increasing scenarios where all three emerging technologies – Blockchain, AI and IoT – are working together, especially within physical spaces and construction projects. We should speed up the implementation of the technologies to help realise the massive potential they have when they converge. This needs to be done through political decisions to allow a more disruptive use of technology. There is great potential here – Convergence can help solve problems such as a heavy bureaucracy and fraud, and in turn making governmental decisions more effective.

You can see that AI will be doing data processing and predictive maintenance. You can use Blockchain technology to track physical devices. IoT devices are physical devices that need maintaining and produce data. (C. Francis)

First, we need to take radically more challenging political decisions, and second,

---

[1] Push technology or server push is a style of Internet-based communication where the request for a given transaction is initiated by the publisher or central server. It is contrasted with pull/get, where the request for the transmission of information is initiated by the receiver or client. (Wikipedia April 2022)

we need to make a more intense and disruptive use of the technology. (S. Junestrand)

3.2. Convergence creates Optimising Actions, which leads to increased Efficiency

The Convergence and Singularity of Blockchain, Artificial Intelligence (AI) and the Internet of Things (IoT), helps us to take optimising actions to make ourselves, and industries, more efficient in the way we go about our lives. This is especially the case in the supply chain. With the knowledge that the three technologies provide, we can 'nudge' the supply chain to work in a way that is more aligned with our goals.

Our primary focus [ed. at Cambridge] is on designing algorithmic approaches that can tackle typical challenges that we see in supply chain data. We can then reconfigure the chain, create risk mitigating actions, such as rewiring the supply chain. (A. Brintrup)

Blockchain and Distributed Ledger Technologies are extremely useful in terms of increasing efficiency. Blockchain's characteristics of being immutable and transparent, and the way it can facilitate the exchange of contracts mean that, combined with AI and IoT, it is the perfect way to make business practices more efficient.

If we want to register this [ed. large datasets] in a cybersecure, immutable and transparent database, of course as we know, Blockchain is an ideal technology (S. Junestrand)

The use of 'token economies' is a way that Convergence can offer new possibilities in public administration, making the way governments and economies work more efficient. Programmable currencies can save time and money and can be used to enhance desired behaviours in line with a good political goal. Smart contracts can execute the economy in real time without any human interaction. AI and IoT can then be applied to learn and improve services throughout the economy. Token economies should not be seen as limiting, instead as controlling the amount of money in the system, and where it is used, for optimising solutions.

Token economies are an ecosystem built up on Blockchain and AI that permits managing public services in a whole new way. It opens new possibilities for public administration to improve efficiency. (S. Junestrand)

3.3. A Digital Foundation may be required for Convergence to work wide-scale

Despite the evident benefits as a result of the Convergence between Blockchain, Artificial Intelligence (AI) and the Internet of Things (IoT), for Singularity to be a success, a strong digital foundation in the UK needs to be realised. The UK needs to make sure that everybody can access these emerging technologies at the same time, and this is so important when considering DLT specifically. Technology Readiness Levels (TRL's) need to be increased and a digital foundation required, in order to bring stakeholders inside and allow them to properly realise the benefits of these technologies – this will also make the Convergence easier.

There is a danger in focusing public policy on the Convergence of Blockchain, AI and IoT, instead of a levelling up stye agenda, and ensuring everybody starts achieving the levels of productivity of our best companies (C. Francis)

We have a massive skills gap in digital and net-zero, and many other areas. The area that is not well addresses is the in-work skills development and training. (C. Francis)

Many small companies are digital natives from the get-go, particularly in the FinTech sector, they can deal with this level of complexity. However, many of our existing companies are not. I want to make this path as easy as possible. (C. Francis)

In order to create this digital foundation, and accelerate the adoption of these emerging technologies, incentivisation needs to be built into the system. It is suggested that 'nudge theory' can improve training and digital adoption in small companies; the incentivisation of digital technologies needs to be aimed at SMEs. This allows you to start small-scale through the tax system, in order to understand how companies can make the leap to wide-scale Convergence, and truly realise the full benefits of these technologies. Nudge theory is a concept that proposes positive reinforcement and indirect suggestions as ways to influence the decision-making of

groups or individuals.

Over the years, what we have realised that helps, and I think there is a drive for it, is that the incentivisation needs to be built into the tax system. Government needs to incentivise the use of AI and digital technology to SMEs (A. Brintrup)

I would start small with nudge-style taxation incentives to improve training and digital adoption in small companies, particularly those that haven't made any jump there at all. (C. Francis)

Using nudge theory could be a perfect way to start with the token economy. You need nudges and you need to learn. (S. Junestrand)

3.4.   Convergence will help the Environment

Perhaps the biggest challenge facing the world today is the problem of preserving the environment. The Convergence of Blockchain, Artificial Intelligence (AI) and the Internet of Things (IoT) can help, and play a huge role in, preserving the existing environment and creating a smart environment. For the Convergence of these emerging technologies to be a success, Government's need quick wins and a proof of work. Therefore, they can test these technologies on helping the environment, an area which needs drastic assistance. They can train the AI and IoT devices, and prove they've done something, learn from it and then take steps within more complex areas. For the Convergence of emerging technologies to be a success, Government's need quick wins and a proof of work.

IoT Devices collect the data, the Blockchain registers the data, smart contracts then can execute according to the data (limit traffic, re-route water, etc.). The data can be extracted and used by AI to find new patterns and make better decisions. (S. Junestrand)

On the other hand, the use of these technologies, especially Blockchain, can be highly energy consuming. Yet, when using them on the environment, we can use Blockchain technologies with very low energy consumption and efficiency. We need to find a way to work that uses less energy, otherwise using DLT on the environment could be counterproductive. However, the Convergence of Blockchain, AI and IoT can help to optimise the supply chain, which can increase efficiency and reduce waste, a positive for the environment; there is a trade-off here.

Ethereum is now moving to a new, less consumptive proof-of-work – but this is a multi-faceted solution that we must find. (A. Brintrup)

If you're looking at allowing Blockchain type technologies to optimize supply chain, so that waste is being minimized, there is a trade-off between the energy being consumed. (A. Brintrup)

4. Evidence Giving

4.1. Dr. Alexandra Brintrup, Professor of Digital Manufacturing, University of Cambridge

Dr Alexandra Brintrup
Associate Professor of Digital Manufacturing, University of Cambridge

4.1.1. Introductory Remarks

I'll speak about the Convergence effect on supply chains. I'm part of the research group at Cambridge's Engineering Department, which focuses on how Artificial Intelligence (AI) can be developed and applied to make supply chains more efficient, more transparent, and sustainable. What we do is we analyse patterns in data to predict disruptions, delays, quality issues, prices, who is involved in parts of the supply chain that companies do not have visibility over. What do those companies produce what ingredients or components, they might be using and what they might be producing?

With such knowledge, what we can do is take optimizing actions to nudge the supply chain to a state that is more in line with our goals. That may involve reconfiguring the chain, creating risk mitigating actions such as increasing inventories, rewiring the supply chain, and even finding the best prices or strategy for negotiation. Our primary focus is on designing algorithmic approaches that can tackle typical challenges that we see in supply chain data. These are generally characterized by uncertainties data imbalance and the need for highly scalable, explainable, and

optimal solutions.

4.1.2. Convergence

As a digital manufacturing group, we also make heavy use of Internet of Things (IoT) technology, and increasingly Blockchain for facilitating autonomous interactions that can take place between self-interested parties – and that's really what a supply chain is. They are consisted of what we call selfish agents: individual companies aiming to maximize their own goals with limited information over their environment – this often results in systemic inefficiencies.

Our goal, by using the Convergence effect, is to alleviate some of those problems, like systematic inefficiencies, though autonomous information sharing and decision-making systems.

Some of the most exciting research projects that we are currently working on combine AI-based methods with some other digital technologies, such as IoT and Blockchain, which are examples of the Convergence effect.

IoT and Blockchain Technology help make supply chain intelligence real-time and autonomous by closing the loop between sensing, analysing data, helping your collective decisions, and activating them in real time.

Let me give you a couple of examples of increasing complexity here to put all of that into context:

Example 1 – Information Sharing in Supply Chains
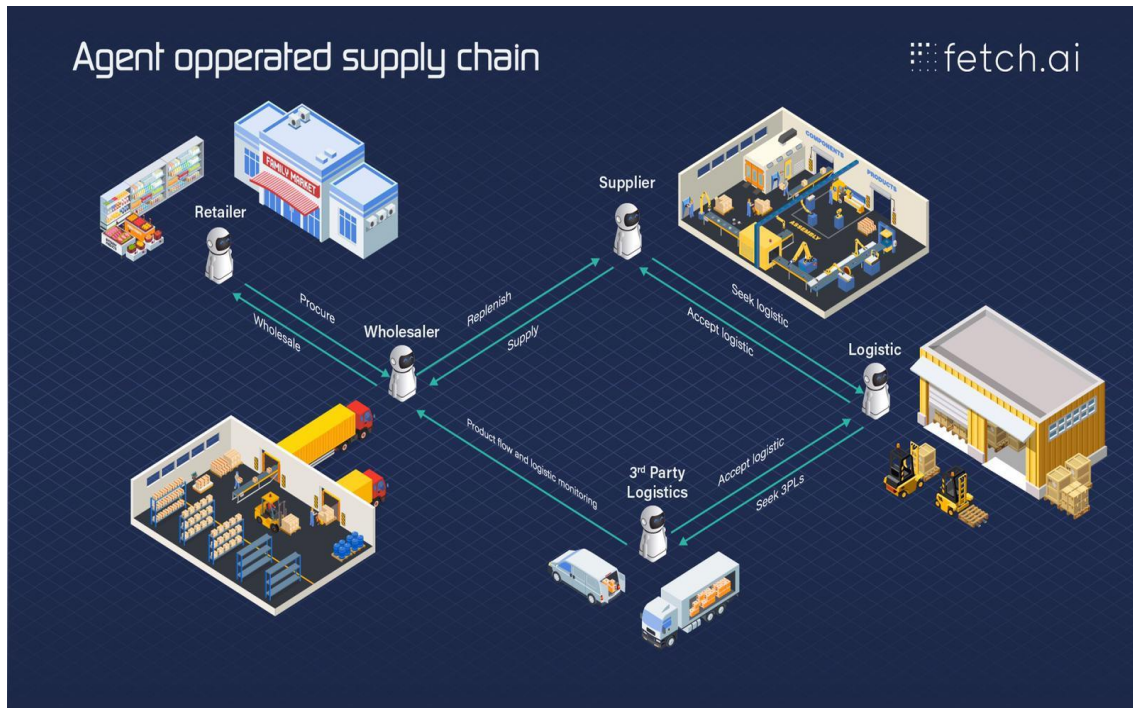
The first one, was a scenario that we developed in collaboration with a local start-up called Fetch.AI (https://fetch.ai/), a Blockchain company based in Cambridge. This enables information sharing in real-time on supply chains that do not necessarily have a costly interoperable platform. In our scenario, what we have is a perishable goods delivery chain that is formed on an ad hoc basis, so companies involved could include wholesalers, third-party logistics providers, and retailers.

The retailer, here, would like to be assured of the quality of the perishable product. By accessing information on the conditions such as temperature and humidity that the product has been kept in before it arrived at the retailer's store. The retailer may choose to apply pricing algorithms based on this information, for example. Normally setting this up would often require a costly push-based information transfer system to be in place, which each party in an ad hoc chain would not want to pay for. The relationship would not be long term enough so transaction fees will not then be justified.

What we can do here is couple individual companies, vehicles, and warehouses, with IoT sensors, and then couple the AI system itself with an AI system called software agents. The agents here would be representing each organization, and they can find and interact, with other software agents through a sort of social media search engine. They can establish that they are indeed a part of a transaction using the Blockchain and then they can then access the sensor data, using a unique product or an order identifier.

14

Example 2 – Eliminating Inefficiencies in Logistics
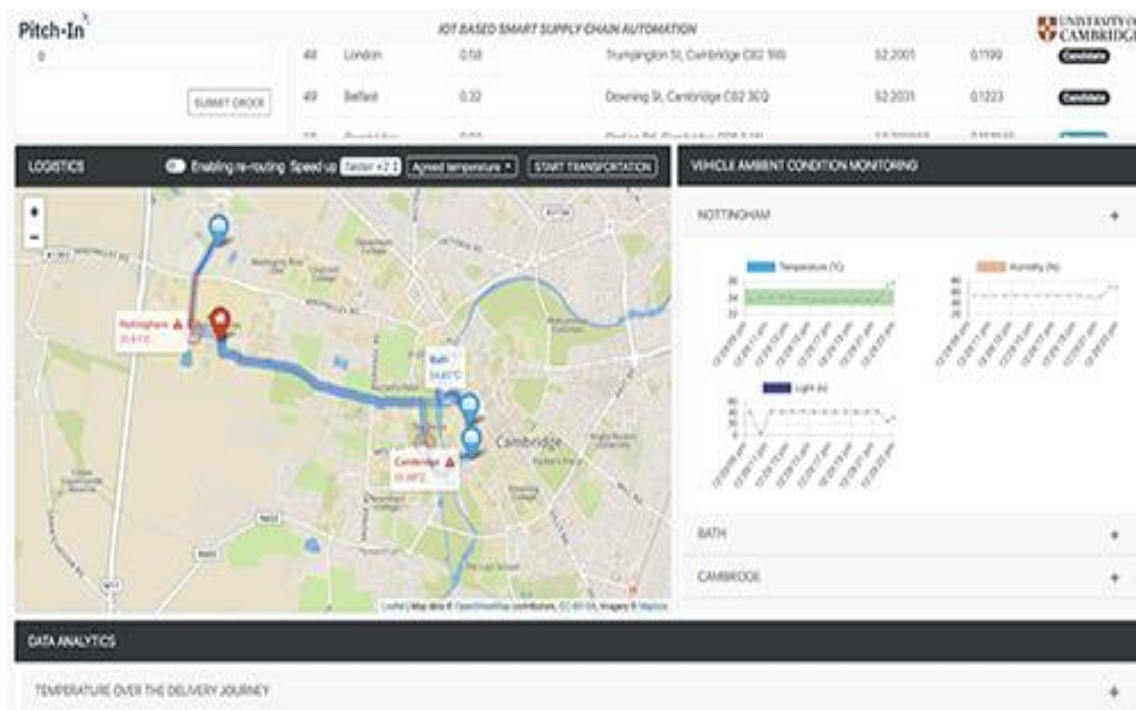
The next, is a slightly more complex example. This has been built on a similar coupling mechanism, to eliminate inefficiencies in logistics. I'm not sure whether most people are aware, but in the UK, 63% of heavy goods vehicles that we see on the roads only share very useful load, and the average vehicle optimisation remains under 60% so that obviously leads to congestion and unnecessary carbon footprint. Sharing vehicles for deliveries would be an obvious answer, to eliminate at least partially some of those inefficiencies, but this does not get implemented due to an incentives problem. Suppliers wouldn't know that they are sending things to similar locations. Buyers would not want to spend the manual effort in orchestrating vehicle sharing. A decentralized orchestration providers such as a mediator could be helpful, but suppliers wouldn't want to pay unless they see a benefit so here.

This coupling can help because software agents alleviate manual orchestration by automating the search for information and are optimising the route that needs to be taken for vehicle sharing.

What was implemented here was an IoT-based mechanism that sensors where vehicles are and how much available space they have. Then we coupled this with an AI algorithm, called reinforcement learning, which is then embedded into software agents that can then help dynamically optimize router location. Once more, we can then incentivize individual organizations to work with one another by sharing the value that has gained from increased vehicle utility, so the unit cost of delivery decreases, and that excess saving is shared between the individual parties. It is indeed a complex problem, which involves solving multiple communitarian problems such as, 3D container packing, route optimization and automated negotiation.

Blockchain can facilitate the exchange of contracts and keep a record of transactions.

So, we are still working on it. I won't say that you know this solution is up there yet, but it is possible, and it is only made possible by a combination of these multiple technologies. I hope this gives you a flavour of what we mean by a Convergence effect in digital technology and how it might affect today's complex supply chain systems.

4.2. Dr. Chris Francis, Head of Government Affairs, SAP UK

4.2.1. Introductory Remarks

I'm going to be slightly contrarian. I think it's worth thinking about very carefully what we mean here, and why it is important. I think there are absolutely scenarios, where all three technologies are in play at once and there's some good reasons for this.

The digital foundation, i.e., the ability to support some form of digital automation at the interface of your organization is common. There are many scenarios, normally when Internet of Things (IoT) is involved in the physical spaces, construction projects will be another relatively obvious one. You can easily see Artificial Intelligence (AI) will be doing data processing, predictive maintenance, you can use Distributed Ledger Technology (DLT) to track physical devices and IoT are physical devices that need maintaining and produce data. So absolutely there are scenarios when all three are in play.

4.2.2. Convergence

However, is this Convergence in the way upon which computing has converged with the mobile telephone to produce the smartphone, to the point where you almost can't buy the individual items anymore? No, I don't think so, that's where I really differ in that sense.

The market will inherently work out what are the best economic solutions over time. There may be the market failures, where this becomes important policy, but now, this is development work

by and large, and it's very premature to start thinking about market failure and policy interventions. Therefore, that's where I think the danger is. The UK is great at leading edge adoption – we're already good at that. The UK is a brilliant place to try things for the first time - we're already good at that.

> *What the UK is not good at, is building the digital foundation, ensuring everybody can play at the same time, which is increasingly important when you start looking at DLT specifically.*

So, I think if you're a venture capitalist getting excited about this and spending your own, or indeed other people's money that's fine. However, I do think there is a danger in focusing public policy on these areas, when I think it's much more important that the levelling up style agenda and ensuring everybody starts achieving the level of productivity of our best companies and getting that digital foundation sorted – this is much more important.

> *I think it's much more important that the levelling up style agenda and ensuring everybody starts achieving the level of productivity of our best companies is focused upon. We must get that digital foundation sorted.*
>
> *In the UK we know that our top performing companies are playing with these emerging technologies all the time, and that is great! Yet, there's the other three quarters of companies that aren't doing any of that because they don't have the digital foundation in place*

In the UK we know that our top performing companies are playing with all these technologies, all the time and that's great. But then there's the other three quarters of companies that aren't doing any of that because they don't have the digital foundation in place. I think that's why I think it's a seductive term and people get very excited about it, but I do think there are dangers in the public policy space.

We have a fantastic record of venture capital investment, we have a fantastic set of start-up companies, we have a fantastic set of highly productive world class companies across almost every sector, we have some of the best and most advanced construction projects going.

However, we also have, for example in that sector, a very long tail of very old fashioned very unmodernised approaches as well. So, I think that's care, and I do think it's important to separate projects where all these things are operating and available, because their application areas overlap, yet this is not the same as them becoming indistinguishable and inseparable over time,

as we would normally in the tech sector, think about Convergence.

We don't want to stop thinking about AI as an analytics tool, as a video processing tool in the virtual spaces, where there is rarely any IoT element. We don't want to stop thinking about DLT, where it applies, without AI because it's doing relatively simple supply chains, but still actually highly fragmented supply chains where it's a great element. Some IoT devices are simply sensors with a common owner that are just reporting data into the public – air quality ones come to mind. I'd greatly like to see them improved, as it happens, but nonetheless that's where they are now and we could do with more of them as they are, without overcomplicating them and creating a too high target, for public policy interventions for some of these things.

We could do with more IoT devices as they are, without overcomplicating them and creating a too high target for public policy intervention.

4.2.3. Concluding Remarks

I'm not actually convinced that there is Convergence as we would normally describe it. I would be aware of the seduction of these kind of things, when we start thinking that we can wire all our policy interventions and policy priorities into one lovely well defined perfect project. I really don't think we can, and I think it would be dangerous to do so.

4.3. Dr. Stefan Junestrand, Co-Founder, Grupo Tecma Red & member of the European Blockchain Observatory & Forum

Dr Stefan Junestrand
Co-founder Grupo Tecma Red
Member, European Blockchain Observatory

4.3.1. Introductory Remarks

My interest and research about Blockchain, circles around what can be applied in smart cities and specifically how it can be applied to reach the Sustainable Development Goals (SGDs)

4.3.2. Sustainable Development Goals

The Sustainable Development Goals (SDGs) are a list of 17 global goals and 169 targets set by the United Nations in 2015 for the year and to be combined in 2030. Reaching most of these goals is a question of life and death for big part of the world's population also in developed countries. The problem is that we are currently very far away from achieving most of the goals and, in many cases, we are in even worse situation than 2015 when the goals were established.

So, what we can do to accelerate the fulfilment of the goals?

- First, we need to take radically more challenging political decisions.
- Second, we need to make a more intense and disruptive the use of technology.

With the speed, we are developing and implementing technology today, we're never going to reach these goals. So let me share some reflections and ideas about how Blockchain, Artificial Intelligence (AI) and Internet of Things (IoT) can contribute to reaching this SDGs.

4.3.3. Convergence

Blockchain has its place in a broad technological ecosystem and combines exceptionally well with other revolutionary technologies, related to the use of data such as IoT and AI. IoT is the technology to help us really to collect these large amounts and high-quality data from any device connected to the Internet.

> *If we want to register this in a cybersecure, immutable and transparent database, we know that Blockchain is an ideal technology.*

These large and well-structured data sets let us then apply AI and trainer algorithms, etc.

Example 1 – Token Economy for Smart Governance
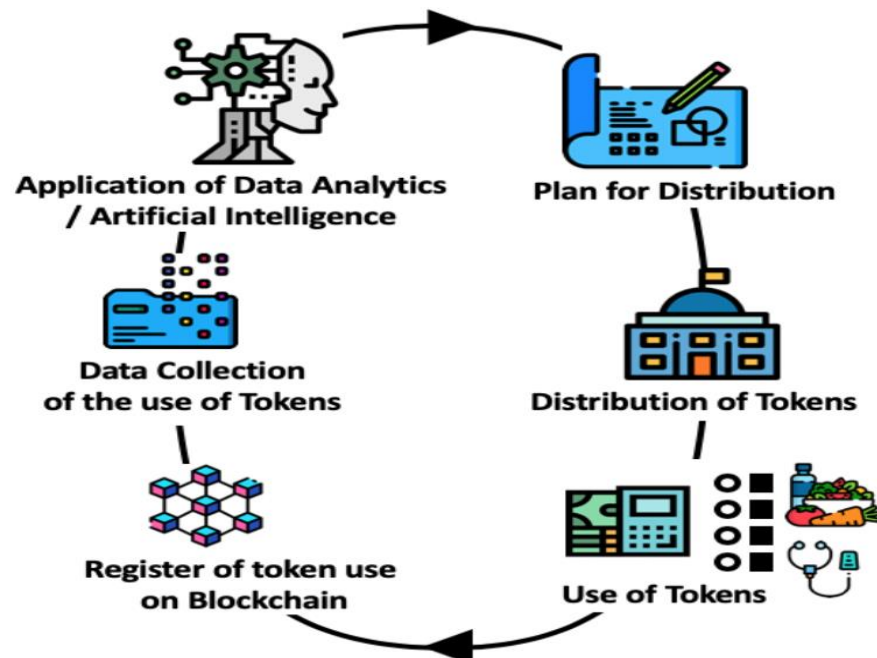
This solution focuses on the social and economic aspects of the SDGs, such as and poverty and hunger, increasing health and well-being, fighting corruption, and creating strong trust with institutions. Public services such as health care, education and our social welfare are incredibly costly are suffer from a heavy bureaucracy, fraud, etc., and it's also very complicated to evaluate the results of the spending within the current systems.

The token economies are an ecosystem built up on Blockchain and AI that permits managing public services in a whole new way.

The token economy uses programmable currencies that provide several additional functionalities compared to current currencies and opens new possibilities for the public administration to improve efficiency, saves time and money, provide other services. It can also be used to enhance desired behaviours in line with a good political goal, the so-called nudge economy. The token economy should use a stable coin tied to a fiat as the currency to avoid fluctuation in its value, of course, and the token in the digital currency currencies are given properties for conditional use defining where, when, how and during which circumstances they can be used.

Smart contracts can execute the economy in real time without any human interaction and data analytics and AI are applied to learn and improve services and strategies throughout the system.

The functionality of the system is relatively simple, a Blockchain platform provides a system to register services, providers, uses and payments, etc. The first step of the process is that the government decides the budget for the different areas and specific use. The exact number of tokens or coins is generated, given the properties for what, where, when, how, by who, and during which circumstances they can be used. The tokens are distributed to the digital wallets of the citizens, the citizens can use the tokens they are assigned as a payment method for the public finance services and products that they are entitled to according to the program conditions for the use.

A purchase would simply look like this:

- Social tokens with different permissions are sent from the public administration to the digital wallets of the family.
- The family can then use the tokens to buy food, according to the program conditions.
- When they pay for the food a payment gateway with the smart contract automatically in real time checks that the tokens are valid for the payments of the purchased food, registers the payment and withdraws the tokens from the family's wallet.
- The social token is then transferred back to the government and sends the equivalent payment in fiat currency to the store the store that gives or delivers the food to the family.

1. Tokens are sent to the Family's Digital Wallet
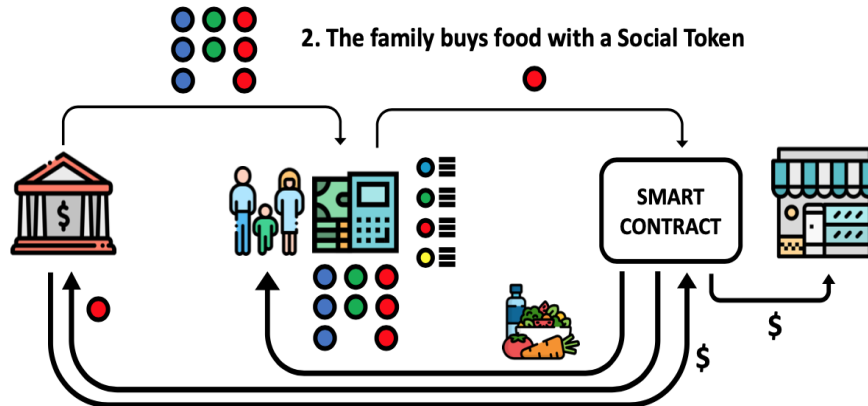
2. The family buys food with a Social Token

SMART CONTRACT

3. **The Smart Contract automatically:**
   a. Check that the tokens are valid for the payment of the purchased food.
   b. Register the payment and withdraws the tokens from the family's wallet.
   c. Transfer the Social Token back to the Government.
   d. Sends an equivalent payment in FIAT currency to the Store.
4. **Deliver the food to the family**

Applying a token economy to public services is probably the most interesting application of Blockchain in public governance.

Example 2 – Solution for the Smart Environment

This solution focuses on the environmental aspects of the sustainable development goals, such as clean water, air quality, biodiversity, etc. Environmental issues are probably the biggest challenge for today's society. Measuring, registering, giving access, managing, and analysing data is a key for the successful fighting of climate change and achieving clean water, air, and biodiversity.

The way it works is also simple:

- The IoT devices collects the data, the Blockchain registers the data – Blockchains are immutable, public, and secure.
- Smart contracts that can execute according to the data: limit traffic, re-route water, etc.
- The data can be viewed for verification and can also be extracted and use for AI to find new patterns, make better decisions, etc.

4.3.4. Concluding Remarks

As a conclusion the SDGs are the most significant challenge social, economic, environmental, on global and national and city level. We need to take more challenging political decisions and make more intense and disruptive use of technology to tackle this.

> *The token economy for services or wealth distribution is a comple model with many challenges, but incredible opportunities to help us reach the Sustainable Development Goals.*

The environmental data application is simple to set up and has enormous benefits. We can apply Blockchain technologies with very low energy consumption and efficiency in both these use cases, so it's not an environmental problem either.

5. Speaker Bios

APPG BLOCKCHAIN EVIDENCE MEETING
CONVERGENCE & SINGULARITY
BLOCKCHAIN, ARTIFICIAL INTELLIGENCE & INTERNET OF THINGS
TUESDAY 22 FEBRUARY 17:30 - 18:45 PM LONDON-TIME - GLOBAL WEBINAR

EVIDENCE GIVERS FROM LEFT TO RIGHT + Chair

- **Dr. Stefan Junestrand** - Co-founder, Grupo Tecma Red / Member, **European Blockchain Observatory**
- **Dr. Alexandra Brintrup** - Associate Professor of Digital Manufacturing, University of Cambridge
- **Dr. Chris Francis** - Director of Government Affairs, **SAP UK**
- *Chair: Martin Docherty-Hughes MP, UK Parliament*

@appg_blockchain | https://uk.bicpavilion.com/about/appg-blockchain

Dr. Stefan Junestrand,

Co-Founder, Grupo Tecma Red & Member, European Blockchain Observatory & Forum

Stefan Junestrand holds a Ph.D. in Architecture and is an expert in Smart Cities, Intelligent Buildings, Sustainability, and Blockchain. He is the CEO and co-founder of Grupo Tecma Red, Spain's leading Editorial Company about Sustainability, Energy, and New Technologies for the Built Environment. Stefan is also a Strategic Advisor for the Public Administration and Private Companies, teaches at several Universities, and has published hundreds of articles and scientific papers about these subjects. Stefan is a member of the "European Blockchain Observatory" and a Main Contributor to the report "Blockchain4Cities" by the United Nations. More of Stefan's work can be found on his website: http://www.stefanjunestrand.com.

Publications:

- 'Blockchain Revolution in the Governance of Nations and Cities' (Published in Openledger Insights) (2019) - https://openledger.info/insights/blockchain-public-governance/
- 'A Blockchain-based Governance Model for Public Services in Smart Cities' (Published in Open Access Government) (2018) - https://www.openaccessgovernment.org/a-blockchain-based-governance-model/52928/

Dr. Alexandra Brintrup,

Professor in Digital Manufacturing, University of Cambridge

Dr. Alexandra Brintrup is an associate professor in Digital Manufacturing and is leading the Manufacturing Analytics Research Group within the Department of Engineering at Cambridge. She is a fellow of Darwin College. Her research focuses on the intersection of Artificial Intelligence (AI) and Manufacturing and Supply Chains.

Alexandra obtained her PhD from Cranfield University for her work in Genetic Algorithms. She then worked at the ABN AMRO Bank as a quantitative analyst, before joining DIAL for her postdoctoral studies in multi-agent systems in manufacturing. She was later appointed as research fellow at the Complex Agent Based Dynamic Networks (CABDyN) research centre at the University of Oxford, where she studied supply chains from a complex networks perspective. Between 2012-2015 she was a University Lecturer at Cranfield University. She joined the Institute for Manufacturing in 2015.

Over the past decade Alexandra has advised policy makers, served in a number of scientific committees, and worked with Boeing, Rolls Royce, Jaguar Land Rover, Suzuki and Procter and Gamble on a variety of projects in these areas. She is a member of the All-Party Parliamentary Group in Data Analytics, CASN-RA, and IEEE

Dr. Chris Francis,

Head of Government Affairs, SAP UK

Dr. Chris Francis is a technology policy expert focusing on UK government and public policy issues affecting the technology sector as well a portfolio of EU and global policy interests.

Alongside his role in SAP, Chris serves as TechUK board member. Chris previously served as DigitalEurope's representative on the SWIPO executive, two terms on the Government Digital Services Open Standards Board and several roles at the British Standards Institute as our National Standards body acting variously as Chair of a UK International mirror, Head of Delegation or Principal UK Expert.

Chris has worked in the private sector covering government affairs and technical regulatory affairs for over 15 years after a career in the UK Civil Service with a background in mathematics, computer science and engineering

Publications:

- SAP: 'What is Blockchain?' - https://www.sap.com/uk/insights/what-is-blockchain.html (website accessed February 2022)

6. Contact details

APPG Blockchain Secretariat

Big Innovation Centre

14-16 Dowgate Hill

London EC4R 2SU

United Kingdom

info@biginnovationcentre.com

www.biginnovationcentre.com