# FUJITSU

# Media Backgrounder
# Blockchain Innovation Center, Brussels

**Brussels / Munich, March 2018**

**The Blockchain Innovation Center, Brussels, Belgium**
Fujitsu is opening a new international Blockchain Innovation Center in Brussels on March 21, 2018. The center will undertake research with external partners, collaborating on specific projects to explore the technology's potential and limitations. Fujitsu's aim is to develop the potential of blockchain beyond financial services as a new architecture for information systems and sectors of all kinds.

Brussels was selected by Fujitsu for the geographical, political, technological and linguistic advantages it offers to international organizations considering applications of blockchain technology, making it an attractive testing-ground for novel co-creation initiatives. The center has an international remit. Alongside local projects in Belgium, Fujitsu's co-creation model has resulted in a number of international projects, including projects in Germany, UK, the Netherlands and participation EU Horizon 2020 projects.

One particular area of expertise that Fujitsu plans to develop in the Blockchain Innovation Center is the use of blockchain for the design and implementation of Smart City services, focusing not only on technology, but also on important aspects of the city of the future, such as sociological and demographic factors, societal organization, economic functioning and ecological challenges. The center will support and encourage research, development and innovation, both for Brussels and for other cities, through the funding of innovative projects by companies, research organizations and the non-commercial sector. Although the initial focus is on Smart Cities, the goal is to deliver scalable, secure, business-ready blockchain and Distributed Ledger Technology (DLT) solutions in a wide variety of industries.

The first blockchain R&D project being developed at the center is called "Blockchain as enabler of services in the context of Smart Cities", and is being conducted in collaboration with Innoviris, the Brussels institute for the encouragement of scientific research and innovation. The 24-month project is focused on establishing blockchain knowledge and expertise for the design and implementation of services in the context of Smart Cities, in areas such as citizen participation and elections, and the interaction between smart devices, the Internet of Things (IoT) and a multimodal supply chain. It consists of two main tracks: to build fundamental knowledge about the use of blockchain for Smart City applications, and then to apply this knowledge to specific use cases, with the aim of creating meaningful business solutions.

Fujitsu has already identified more than ten projects and multiple European cities aiming to fulfill their ambitions to become Smart Cities have also expressed interest in collaboration with Fujitsu. The Blockchain Innovation Center it is expected to lead to co-creation relationships with international and Belgian public bodies, customers, partners and the Hyperledger Project (see **Alternative Blockchain platforms** below) to extend the technology beyond the current focus of proof of concepts into scalable, secure and business-ready DLT solutions.

## What is blockchain?

Blockchain is essentially a database infrastructure, originally designed for the crypto-currency Bitcoin as an alternative to traditional government-guaranteed money and bank-controlled payments. What makes this technology special is the fact that the data is multiplied and stored across a network of nodes. This data distribution is the foundation and strength of blockchain technology, as it enables trusted information storage without a central controlling body (or trusted third party often referred to as an 'authority') by means of a network of computers (nodes). New transactions are sent to the blockchain, where they are encrypted before being sent to every node for validation and, once validated, stored in blockchain building blocks. Every new block is linked by cryptography (hash tree) to the previous block (which, in turn, is securely attached to its predecessor block). This makes the chain immutable: every change in one block entails change in every subsequent block on every node. Blockchain is said to provide trustworthiness like traditional ledgers. Therefore, it is usually referred to as Distribution Ledger Technology.

Its benefits include:
- Accessibility: As many nodes store the whole history of transactions, it is most likely that information access is guaranteed at any time
- Transparency: No single organization can control access to data, which increases transparency significantly
- Data privacy: Blockchain solutions use cryptography to secure information. This is usually a public key infrastructure
- Security/trustworthiness: From the outset, blockchain has been designed to meet the highest security standards, based on the general assumption that untrustworthy participants will attempt to join the network. DDoS or similar attacks are unlikely as no single point of attack exists. The fact that every node stores part of any transaction guarantees reliability of data, which inevitably leads to a high degree of trust in the information stored in a blockchain

Blockchain technology operates in two different modes depending on its planned application. This can be permissionless (or public), which assumes no trust between the participants and where anyone can participate. On the other hand, permissioned blockchains restrict who can perform various actions on the blockchain, assume some levels of trust and are potentially more useful for many business applications. The choice of permissionless or permissioned blockchains governs every aspect of their constitution – from liabilities, operational risk, cost, and speed to business processes.

Currently, there is much debate about the validity of permission-less and permissioned applications. Some people refuse to recognize permissioned models as blockchains since they consider them to be just shared or common ledgers. However, the reality is that permissioned models are much more likely to find their way into the overall business landscape quickly. This is not only a consequence of regulators and compliancy requirements in the financial sector, where there are obligations related to Anti-Money Laundering and Know Your Customer. It is also because business operators must know who they are working with in the event of liability claims.

Many applications of blockchain and DLT are still in their infancy and it will be some time before they are advanced enough to enter real-world use. In particular, as well as the technological and business implications of blockchain, there are important legal and regulatory aspects that have to be carefully investigated before the technology can be considered mainstream. These aspects are currently so fundamental to economic life that courts and governments may refuse to enforce otherwise valid contracts if their principles are not met. Businesses, regulators and governments need more time to evaluate the consequence of the transformational applications that are currently in experimental trials and to reach agreement about the underlying legal principles.

## Where next for Blockchain?

Initially North America and Greater China are expected to be the largest regions for business value derived from blockchain. Globally, there is generally a positive outlook about blockchain, nevertheless views are highly polarized about cryptocurrency adoption and regulation, with countries such as India and China creating strong regulations to control it, while others are taking a more liberal approach.

While blockchain technology is usually associated with Bitcoin and other cryptocurrencies, what is less expected is that it also has the potential to deliver a new kind of trust implementation to a wide range of services in financial markets, consumer and

business-to-business services, publicly-held registers and the IoT. Fujitsu believes that financial services and Government institutions will have the fastest adoption rate of blockchain, which will have a more transformational impact on these sectors than elsewhere. Even so, many processes across practically all private and public sectors are likely to be transformed eventually by the ability to manage transactions and ownership using blockchain, such as buying and selling real estate, Robotic Process Automation (RPA), Smart City services, chain of custody, voting, digital ID, self-sovereign Identity, and many others.

This can be attributed to the key characteristic of a blockchain - that it enables information sharing with high transparency and reliability. With the proliferation of technologies such as IoT, businesses of all types are generating large volumes of data, some of which need to be shared outside the business – a trend which will only grow as companies increasingly work closely within entire ecosystems. The exchange of information brings with it security concerns, however the nature of blockchain makes it well suited to handling these types of transactions. By using a blockchain distributed network and software with appropriate algorithms, it is possible to build a data exchange network across multiple organizations that enables all participants to share data safely and rapidly.

As well as greater trust and security, blockchain transactions also hold the potential to include a high degree of process automation and to produce an automated, trustworthy audit trail. If implemented, this will improve business process efficiency and drive simplicity for new client services. However, not all blockchain technologies have been created with automation capabilities.

## Alternative Blockchain platforms
There is a trend away from the specific use of blockchain as currencies towards generalization and a diversification of the objects handled by blockchain into areas such as real estate and supply chains, where automation and wholly reliable audit trails are crucial.

The other key trend in the evolution of blockchain is towards faster processing of transactions. Because Bitcoin is permissionless and the consensus of anonymous transactions is based on the Proof of Work (PoW), each transaction takes at least 10 minutes to be verified. Even without this bottleneck, the maximum transaction rate achievable with Bitcoin is around seven transactions per second.

This limitation of Bitcoin has spurred numerous developments of new blockchain technologies, such as Ethereum and Ripple, where faster transaction rates, as well as more diversified applications, have been key drivers. Fujitsu participates as a premium member of the Governing Board and as a technical steering committee member of a new blockchain technology called Hyperledger Fabric, managed by the Linux Foundation. Because Hyperledger is a permissioned network, all the participants are known and trusted. This simplifies the consensus mechanism significantly, allowing the maximum transaction rate to go beyond 1,000 per second, which makes it more suitable for enterprise use.

The aim of Hyperledger Fabric is to build a blockchain platform for all industries with functions for enterprise use. It incorporates automation through flexible smart contracts and has been designed to work with multiple utilities and tools, the programming languages Go and Java for example, for high efficiency development and subsequent ease of maintenance. Automation, which is a key differentiator in Hyperledger Fabric, is effected through Chaincode, a smart contract written in Go that typically handles business logic agreed to by members of the network.

## Fujitsu and blockchain - the Fujitsu Enterprise Blockchain Service (FEBS)
Blockchain or DLT technology can only reach its full potential if it is combined with smart contracts (i.e. chaincode in Hyperledger) and automation (artificial intelligence, robotic process automation, etc.). This is where Fujitsu's expertise comes to the fore, working alongside customers to co-create solutions that deliver the most business value and contribute to their ongoing digital transformation.

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