

Media Backgrounder Blockchain

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Many industries have already been disrupted by digitalization, which has created new business models and ways of working. However, there's another transformation that is just around the corner – as blockchain and Distributed Ledger Technology (DLT) based transactions shake up many industries and redefine how information is shared. Financial services will see great changes, as intermediaries and third parties will become redundant. Those that succeed will benefit from new client services and offerings, in addition to the enhanced speed, security and flexibility that blockchain offers.

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 presupposition 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 has no governance, assumes no trust between the participants and where anyone can participate at any time. On the other hand, 'permissioned' blockchains include governance, restrict who can perform various actions on the blockchain, assume some level 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 permissionless 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 compliance 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.

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, for example Switzerland, 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, often significantly longer, to be verified. And even without this bottleneck, the maximum transaction rate achievable with Bitcoin would be 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. 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.

The combination of advantages inherent with Hyperledger Fabric, including greater intrinsic trust, additional security, the possibility of smart contract automation, machine-to-machine communication and self-executing code, to name just some, makes it a more viable basis for building new, monetizable business models.

There are also other so-called 'next generation blockchain' approaches being taken in DLTs with adaptations of the core blockchain concept, such as IOTA, which is based on a network of nodes (as opposed to a chain) known as the 'Tangle'.

Fujitsu and Blockchain-as-a-Service: 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.

Fujitsu is already working on several co-creation proof of concept (PoC) projects based on Hyperledger Fabric for enterprise customers (see Key Fujitsu blockchain achievements, below), to ensure that use cases deliver business value and to provide the capability to progress rapidly beyond PoCs. It has also recently launched [\[link to release when published\]](#) a new, extremely rapid blockchain productization framework aimed at organizations wanting to jump-start new blockchain development or de-risk existing blockchain projects. The framework enables the development of a Minimum Viable Product (MVP) in just five days by identifying and proving a specific business process that has the potential

to become a full-scale implementation. This Proof of Business (PoB) approach, before committing to a Proof of Concept (PoC), avoids many common pitfalls of blockchain projects and focuses on creating business value. With the blockchain PoB assessment, stakeholders can create and validate the potential of an initial Hyperledger Fabric application while testing how it could work in an enterprise environment.

The Fujitsu vision for blockchain goes much further than this, however, and Fujitsu is focused on building on the advantages of Hyperledger Fabric to create an enterprise-class blockchain framework. Rather than expecting enterprises to build their own end-to-end blockchain capability, Fujitsu now provides the Fujitsu Enterprise Blockchain Service (FEBS), a ready-to-use "Blockchain as a Service", on the Fujitsu Cloud Service K5. Unlike solutions being put in place by other vendors, which require the user to develop their own smart contract capability and to ensure data security before they can develop any apps, the Fujitsu architecture builds-in these aspects, allowing users to focus immediately on the differentiation of their offering via app development. The FEBS is also based on OpenStack, therefore avoiding vendor lock-in, a market approach that gives Fujitsu's clients the highest possible transparency and flexibility.

To help users adapt easily to Hyperledger, the FEBS offers functions, such as a data management, to control user and business access to the service, plus a member management function to register participants on to the service and form a permissioned network. Fujitsu has also enhanced the native security in Hyperledger Fabric with a data-concealing function and a restriction technology. The data-concealing function ensures data privacy and security by enabling some or all data from other participants to be hidden, while the restriction technology allows restriction policies over which transactions are allowed. For example, when a pre-established restriction policy allows remittance only to specific businesses, then multiple peer nodes will check all the transactions and log any violations.

The FEBS, which is now available to EMEA customers, also provides a set of digital asset management APIs called Smart Wallet APIs. These enable users to create assets like virtual currencies, vouchers, tickets, coupons, stamps and loyalty points, and manipulate these pre-defined assets to be increased, decreased, deleted, transferred or exchanged.

Key Fujitsu Blockchain achievements

- In March, 2018, [Fujitsu opened a Blockchain Innovation Center in Brussels](#), Belgium with the aim of developing the potential of blockchain beyond financial services as a new architecture for information systems and sectors of all kinds. To do this the Center will undertake research with external partners and collaborate on specific projects to explore the technology's potential and limitations.
 - The first blockchain R&D project being developed at the center focuses on "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.
 - Although the initial focus is on Smart Cities, the goal is to deliver scalable, secure, business-ready blockchain and DLT solutions in a wide variety of industries.
- A delegation of the Blockchain Innovation Center in Brussels, focusing on financial service customers, operates also in Spain. It provides access to skilled developers and solution architects for co-creation projects.
- Fujitsu Laboratories have developed [software designed to create secure data exchange networks](#). With the proprietary data access control technology it has developed, Fujitsu aims to promote data exchange between organizations and across industries
- Fujitsu has developed technology that automates risk detection in order to [improve the safety of smart contracts](#)
- Fujitsu Laboratories have also developed two technologies that [enable secure transactions on blockchain](#)
- Fujitsu has also been engaged to deliver a pilot project with three major Japanese banks (Mizuho Financial Group, Sumitomo Mitsui Financial Group and Mitsubishi UFJ Financial Group) to field trial a cloud-based blockchain platform for sending funds between individuals, as well as a smartphone app to increase the usability of the system
- The pilot builds on a successful joint trial held in March 2016 by Fujitsu and Mizuho bank to test a blockchain based cross-border securities transactions solution – the result of this trial was a significant reduction in post-trade processing times.
- The pilot also extends a [partnership with the Japanese Bankers Association](#) (JBA) that will see Fujitsu build a blockchain platform, built on the open-source Hyperledger Fabric code base that individual banks within the JBA's ranks can then use to test various business use cases
- Fujitsu is actively involved as a [founding member](#) and contributor to the open source blockchain framework Hyperledger Fabric, one of the Hyperledger blockchain frameworks hosted by The Linux Foundation. This collaborative effort aims to advance blockchain technology by identifying and addressing important features for a cross-industry open standard for distributed ledgers that can transform the way business transactions are conducted globally
- Fujitsu Spain is a member of the [Alastria consortium](#), the world's first regulated national network based on blockchain, made up of about 70 of Spain's largest companies and institutions. This non-profit consortium is developing a DLT to become the new data exchange ecosystem in Spain by providing a common collaborative platform. Among its founders are notaries and lawyers who will ensure the security and veracity of information.

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- Fujitsu is also a member of the Blockchain Research Institute, led by management thinker Don Tapscott, and has joined the Alastria network (Alastria.io) in Spain alongside the country's 70 largest companies
- In July 2017, Fujitsu [announced the development of technology that accelerates the framework's transaction processing](#)
- Fujitsu is a board member of the Bitkom (German Federal Association for Information Technology) working group on blockchain, which is investigating blockchain technology and its impact on digital business processes. The working group is cross-sectoral, looking at technological, legal, social and business perspective, including the potential impact of technology on contracts, how organizations operate in markets, and how transaction mechanisms evolve.

Online resources

- [Fujitsu Whitepaper: Blockchain – The Opportunity Beyond The Hype](#)
- Read the Fujitsu blog: <http://blog.ts.fujitsu.com/>
- Follow Fujitsu on Twitter: http://www.twitter.com/Fujitsu_Global
- Follow us on LinkedIn: <http://www.linkedin.com/company/fujitsu>
- Find Fujitsu on Facebook: <http://www.facebook.com/FujitsuICT>
- Fujitsu pictures and media server: <http://mediaportal.ts.fujitsu.com/pages/portal.php>
- For regular news updates, bookmark the Fujitsu newsroom: <http://ts.fujitsu.com/ps2/nr/index.aspx>

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About Fujitsu

Fujitsu is the leading Japanese information and communication technology (ICT) company, offering a full range of technology products, solutions, and services. Approximately 140,000 Fujitsu people support customers in more than 100 countries. We use our experience and the power of ICT to shape the future of society with our customers. Fujitsu Limited (TSE: 6702) reported consolidated revenues of 4.1 trillion yen (US \$39 billion) for the fiscal year ended March 31, 2018. For more information, please see <http://www.fujitsu.com>.

About Fujitsu EMEA

Fujitsu promotes a Human Centric Intelligent Society, in which innovation is driven by the integration of people, information and infrastructure. In the Europe, Middle East, India and Africa region (EMEA), our 27,000-strong workforce is committed to Digital Co-creation, blending business expertise with digital technology and creating new value with ecosystem partners and customers. We enable our customers to digitally transform with connected technology services, focused on Artificial Intelligence, the Internet of Things, and Cloud - all underpinned by Security. For more information, please visit <http://www.fujitsu.com/fts/about/>