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Briefing

Introduction to the Blockchain Innovation Center

Version 03/2019

Distributed Ledger Technology Research

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Agenda

Setting the scene

A number of key perceived elements

The Blockchain and Ledger Technology market

What is the current Market look like?

The Blockchain Innovation Center

The Blockchain Innovation Center in the wider Fujitsu

Legal Context

Legal, Commercial and Intellectual Property

Proof of Business

Innovating the approach

DLT as a Service

InvoiceFlow Use Case

Use Case Examples

Selection of concrete Use Cases Fujitsu is working on

Setting the Scene

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The base definition

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Distributed Ledger Technology Definition

A Distributed Ledger can be described as a ledger of transactions of value and digitized or tokenized assets which are maintained in **decentralized formfactor** across different systems, locations and people (nodes), reducing or eliminating the need of a central authority to keep a check against manipulation.

The information is **securely, immutably and accurately stored** using cryptography and can be accessed using keys and cryptographic signatures. It doesn't proof the accuracy of the data itself, it proofs what happens with the data. Underlying the distributed ledger technology is the blockchain, which is the technology that finds its origin in bitcoin. The technology has **ventured far beyond** its original intent.

Once the information is stored, it becomes an immutable database, which the rules of the network govern. As such it enables **trust** in untrusted environments between an **unknown number of parties (permissionless)** or **known number (permissioned)** by digitally creating, storing and transferring value and assets.

In Enterprise context, Distributed Ledger and Blockchain technologies are today a **supplementary platform** not an end-to-end solution in a business ecosystems, unless working with a greenfield.

Blockchain and Distributed Ledger Technology are **forcing us all to question orthodoxies and conventions** that are the foundation of today's business execution

During Ideation, stop thinking outside the box, throw away the box and **think again**

During Realization, ensure proper **integration** with existing systems as it is today a supplementary platform in most circumstances

Kaizen
(incremental change)

改善

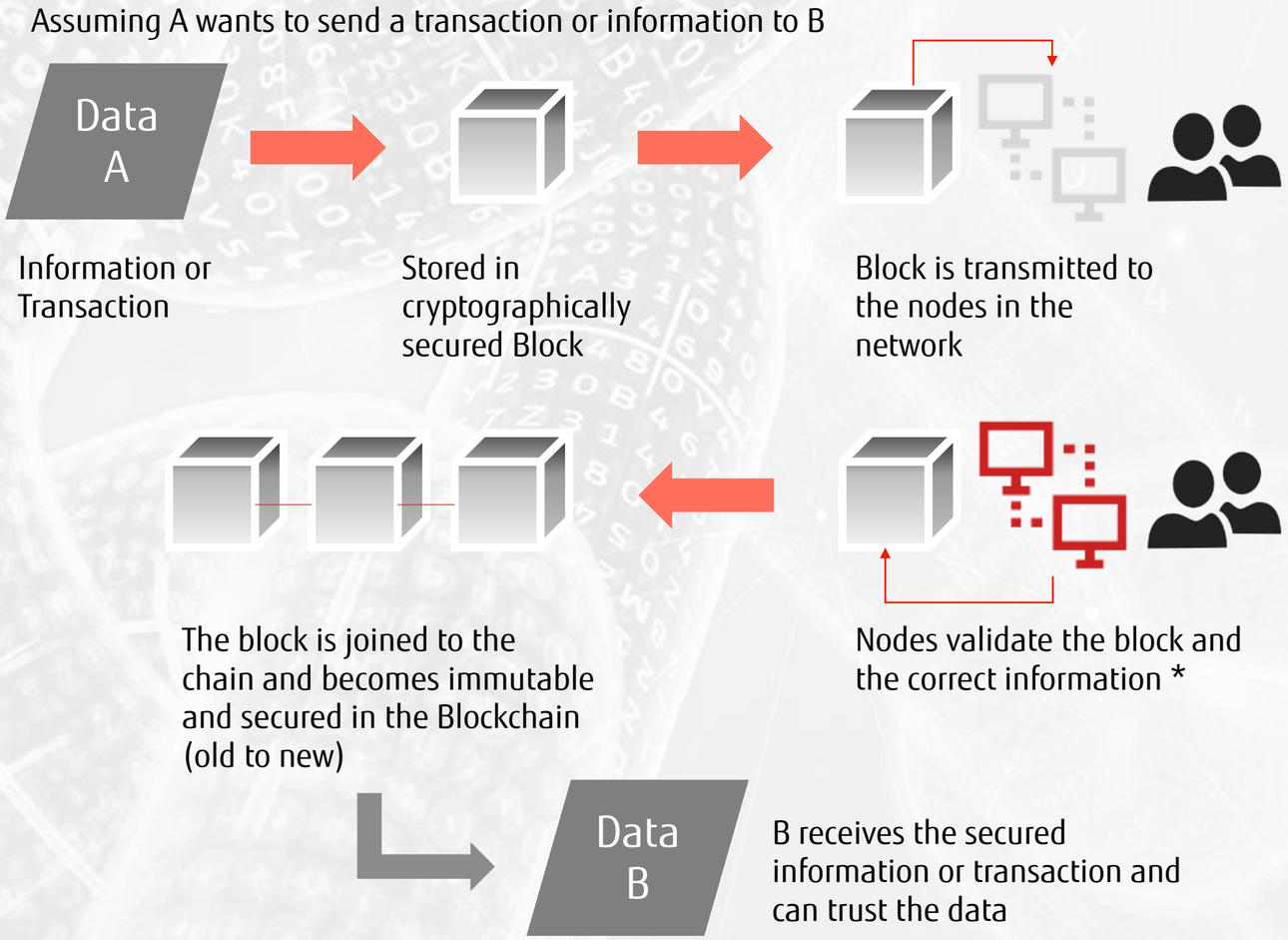
Kaikaku
(radical change)

改革

We call on our Japanese heritage to help accelerate **digital transformation** – moving from incremental to radical change

Blockchain on a page

- In essence it is a ledger
- DLT operates without the presence of an '**enforcer of trust**'
- It creates an **immutable record** of significant events and actions
- Its about **transfer of relevant data, information and value**
- It uses **cryptographic trust** and assurance mechanisms
- Types:
  - Private ('permissioned')
  - Public ('permissionless')
- It is hindered by an **incomplete understanding** of its capabilities



* Number of different consensus algorithms that are existing: Proof of Work, Proof of Stake, Proof of Activity, Proof of Burn, Proof of Capacity, Practical Byzantine Fault Tolerance, etc.

What is Blockchain for Fujitsu?

Basic Concepts

- Primary question driving Blockchain and Ledger Technology is **'do I trust that the data I am using is good and I can rely on it to assess my risk?'**
- Blockchain is essentially a **distributed ledger** that allows for potentially **complex trust relationships** between users (and nodes)
- Collective transactions are stored in a **ledger, distributed peer-to-peer** (private or public)
  - Validation is typically done by the majority of nodes (consensus algorithms)
  - Ledger with shared control over what and how data is added.
  - The reconciliation comes *before* data is stored, rather than after (confirm as you go <> confirm after the fact)
- By design **doesn't require intermediate party** ('authority') or facilitator to authenticate or to settle and confirm transactions
- It is a prelude for more to come and it goes far beyond its original intent

The Blockchain and Ledger Technology market

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The Blockchain Projects in the Market Sectors – Background Information

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9/10

Companies start a Blockchain project

only 20%

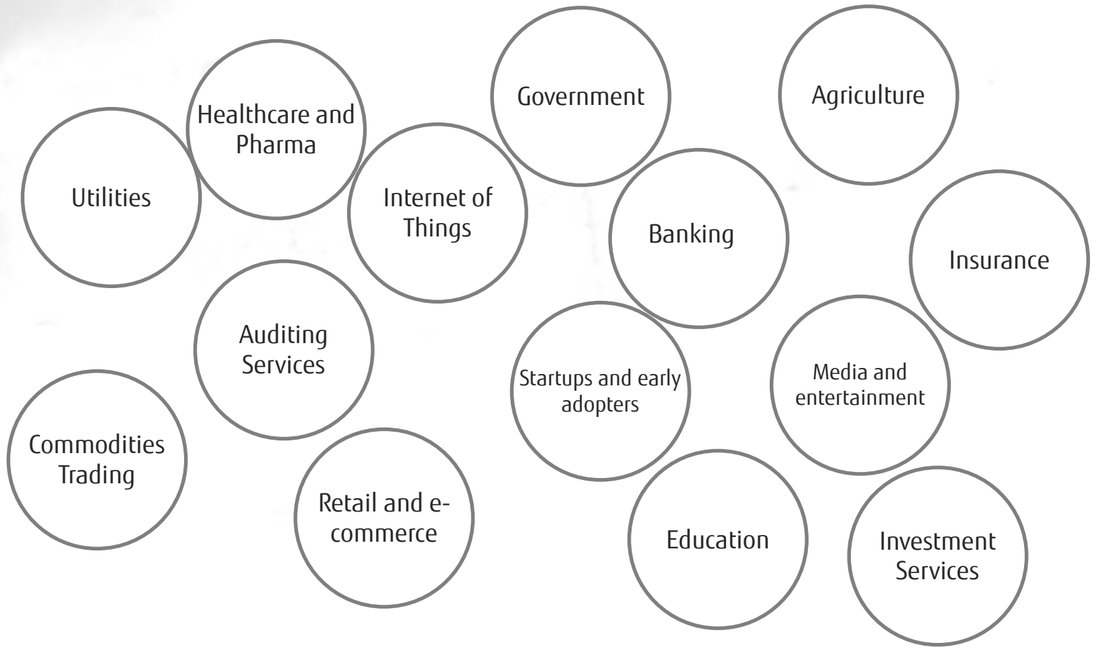
end up with Blockchain technology

All sectors

are starting projects

key takeaway

Blockchains are as much a social / business experiment as they are a technical one



datasource: Gartner Research / MarketsandMarkets / Fujitsu Research

The Overall Market

61%

Compound Annual Growth Rate expected

2,3B EURO

Value by pure Blockchain Technology by 2021

172B EURO

Business Value-add by Blockchain by 2025

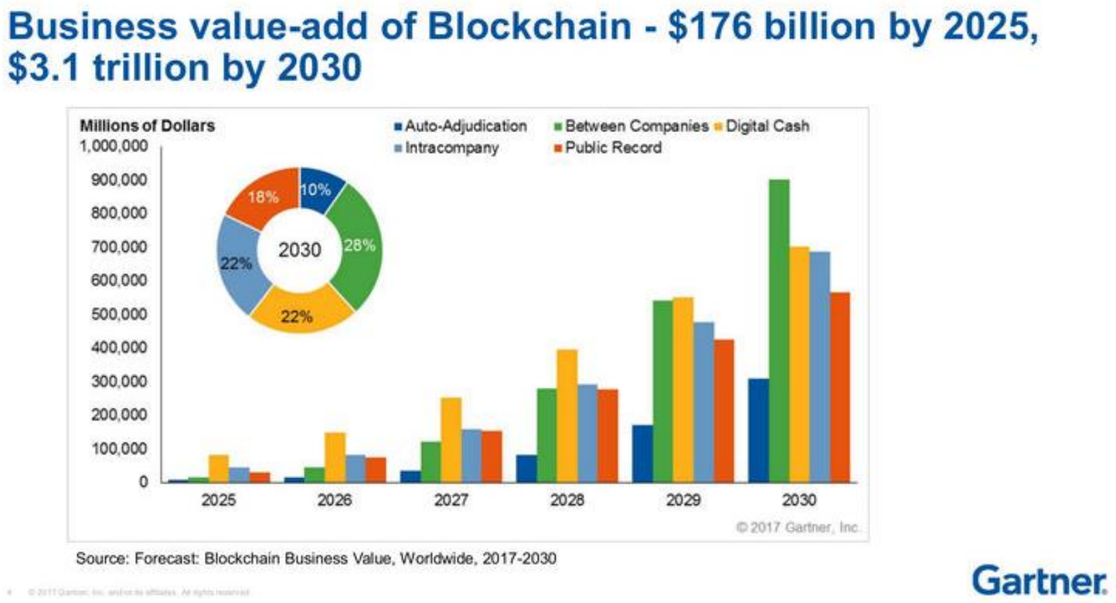
datasource: Gartner Research / MarketsandMarkets / Fujitsu Research

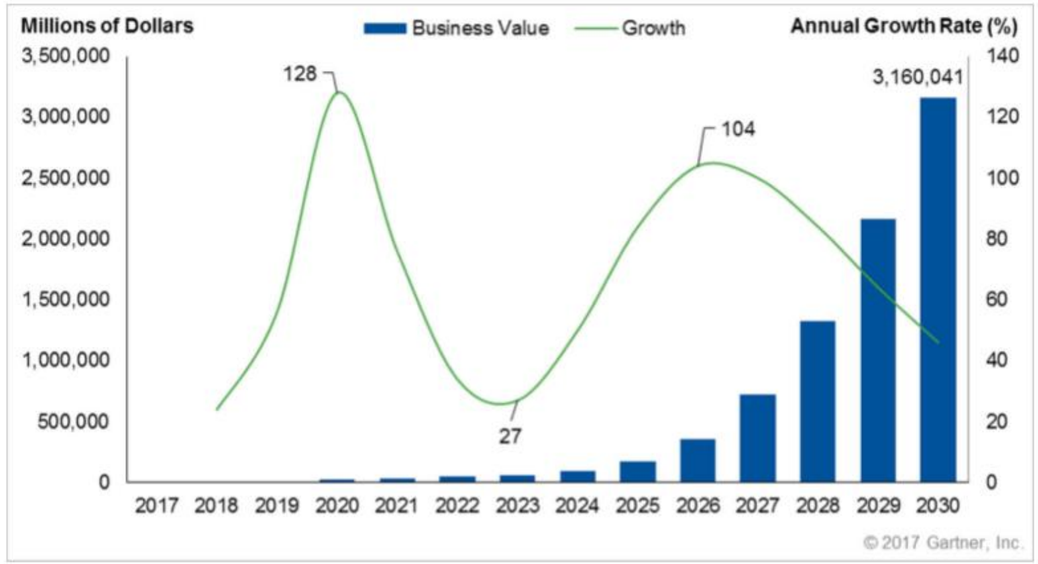
key takeaway

The true value of Blockchain and DLT is not purely technical, it sits in telling businesses how and why they should use it and helping them to digitally transform.

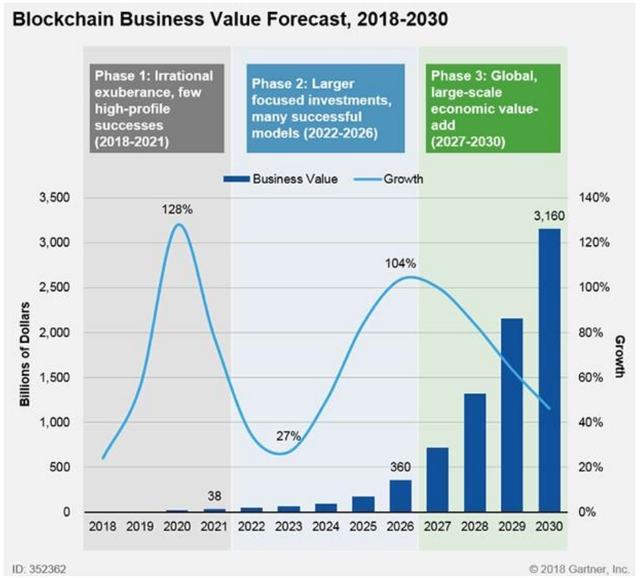
- **Maturity** is growing and a lot of evolution is predicted in the next 6 to 12 months (acceleration)
- This leads to **unintuitive and surprising emergence** as things play out in the real world
- Smart Contracts, IoT and Autonomous Organizations are something to look forward to

Business Value Add of Blockchain





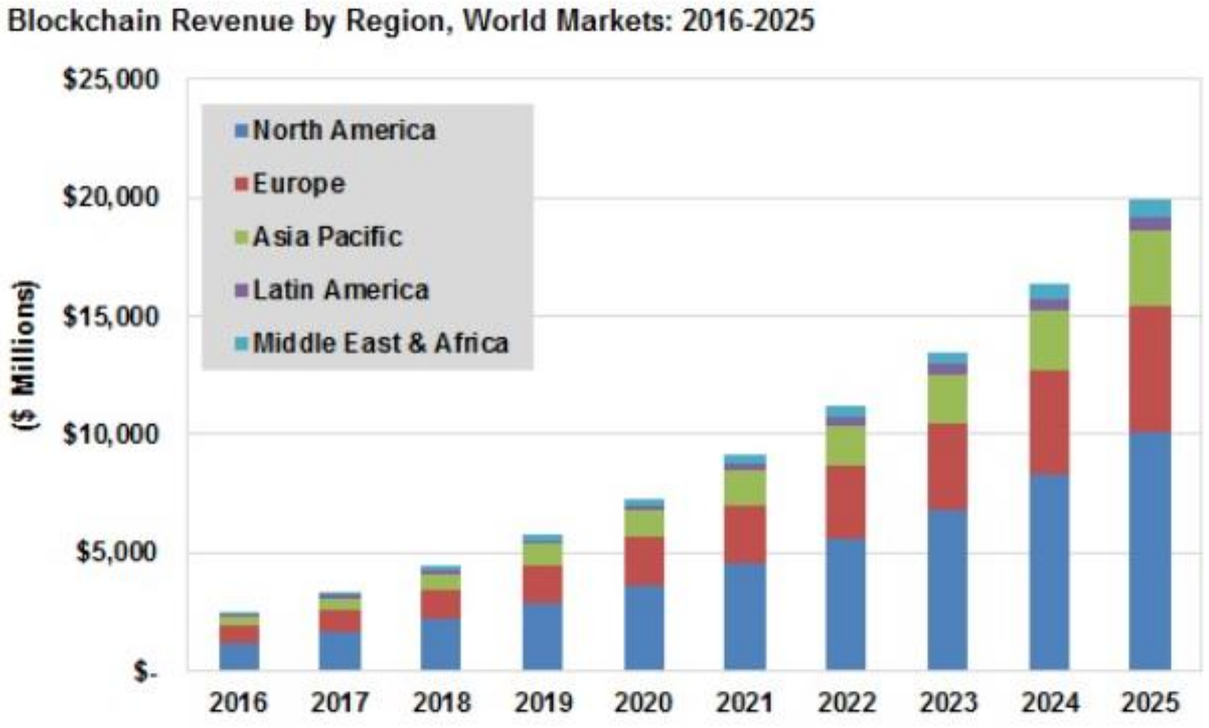
Source: Gartner (March 2017)



Worldwide spending on blockchain solutions is forecasted to reach $2.1 billion in 2018, more than double the $945 million spent in 2017, according to the inaugural Worldwide Semiannual Blockchain Spending Guide from International Data Corporation (IDC). IDC expects blockchain spending to grow at a robust pace over the 2016-2021 forecast period with a five-year compound annual growth rate (CAGR) of 81.2% and total spending of $9.2 billion in 2021.

datasource: Gartner Research / IDC / Fujitsu Research

Revenue by Region



- According to a new report from Tractica, annual revenue for enterprise applications of blockchain will increase from $2.5 billion worldwide in 2016 to $19.9 billion by 2025
- The market intelligence firm's analysis indicates that this market will be composed of 29 key use cases that will touch at least 19 different industry sectors.

datasource: Tractica

Some Use Cases Fujitsu is working on

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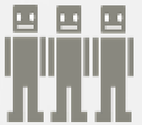
Virtual Currency	International Money transfer	Stock exchange	Asset Management	Contract Management	Insurance Contract
					

Trade Financing	Supply chain Management	IoT	Identity Verification	Autonomous Dec. Processing	Smart Grid
					

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The Road ahead

Convergence

Public and Private blockchain products are Converging towards Hybrid

Interoperability

Global adoption will be stifled without cross product protocols and connectivity

IoT and AI

Emerging real-world problems will be solved through integrating blockchain with Cognitive services

Intermediate conclusion

Blockchain and Distributed Ledger Technology

- have great potential to **drive simplicity and efficiency** via new services infrastructure and processes
- Are **not a fix-it-all**; instead it should be viewed as one of many technologies that will form the foundation of next-generation digital services
- Have applications that will **differ by use case**, each leveraging the technology in different ways for a diverse range of benefits
- Combined with **Digital Identity** are critical enablers to broaden applications to new verticals, along with other emerging capabilities, have the ability to amplify benefits (GDPR – end user enforcement)
- have applications that will **require continuous deep collaboration** between incumbents, innovators and regulators, adding complexity and delaying implementation. It's **co-creation** by default

key takeaway

Blockchain and Distributed Ledger Technology will **force us all to question orthodoxies and conventions** that are the foundation of today's business execution

key takeaway

Blockchains are as much a social / business experiment as they are a technical one

The Blockchain Innovation Center

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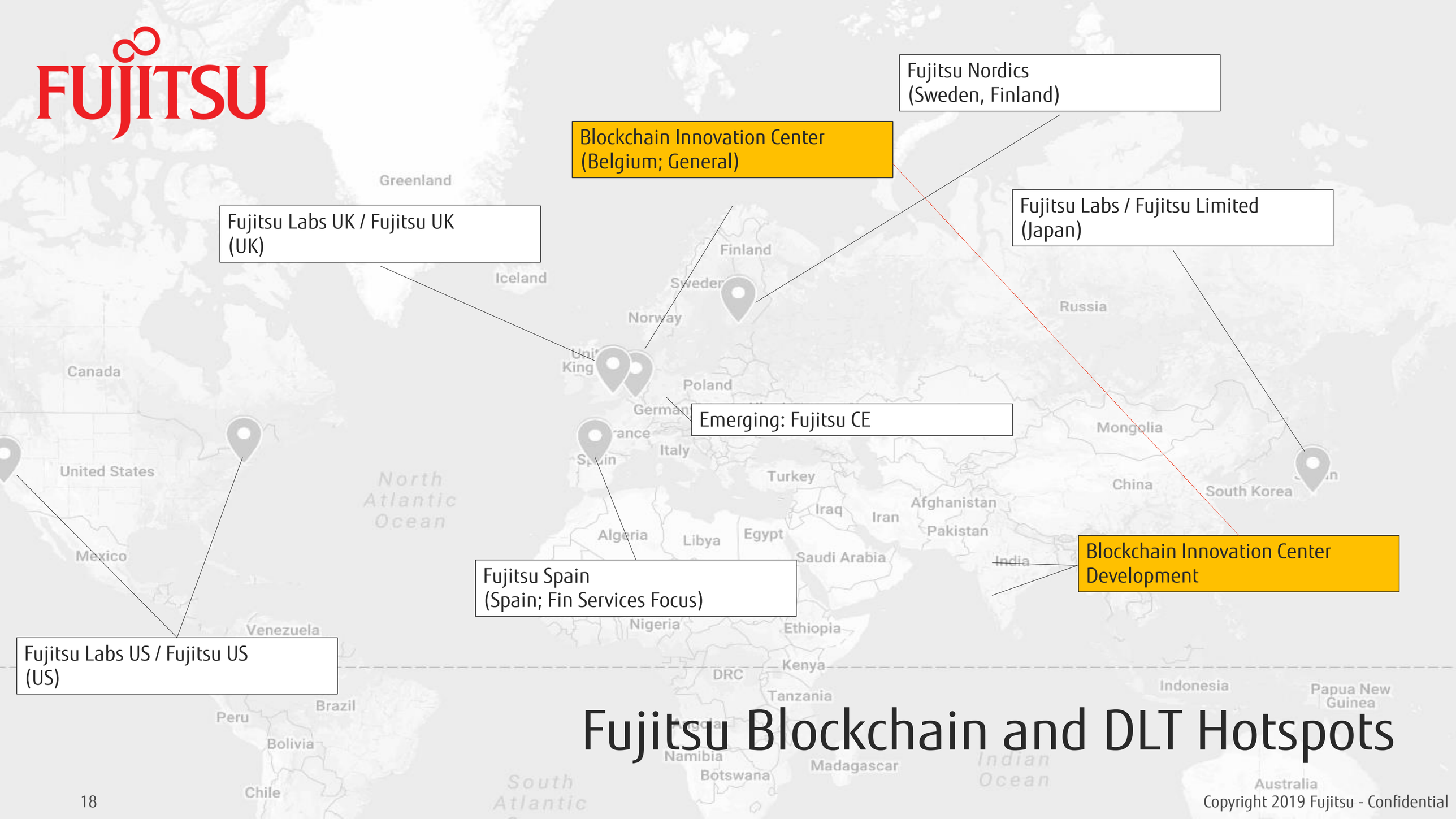

Fujitsu Blockchain and DLT Hotspots

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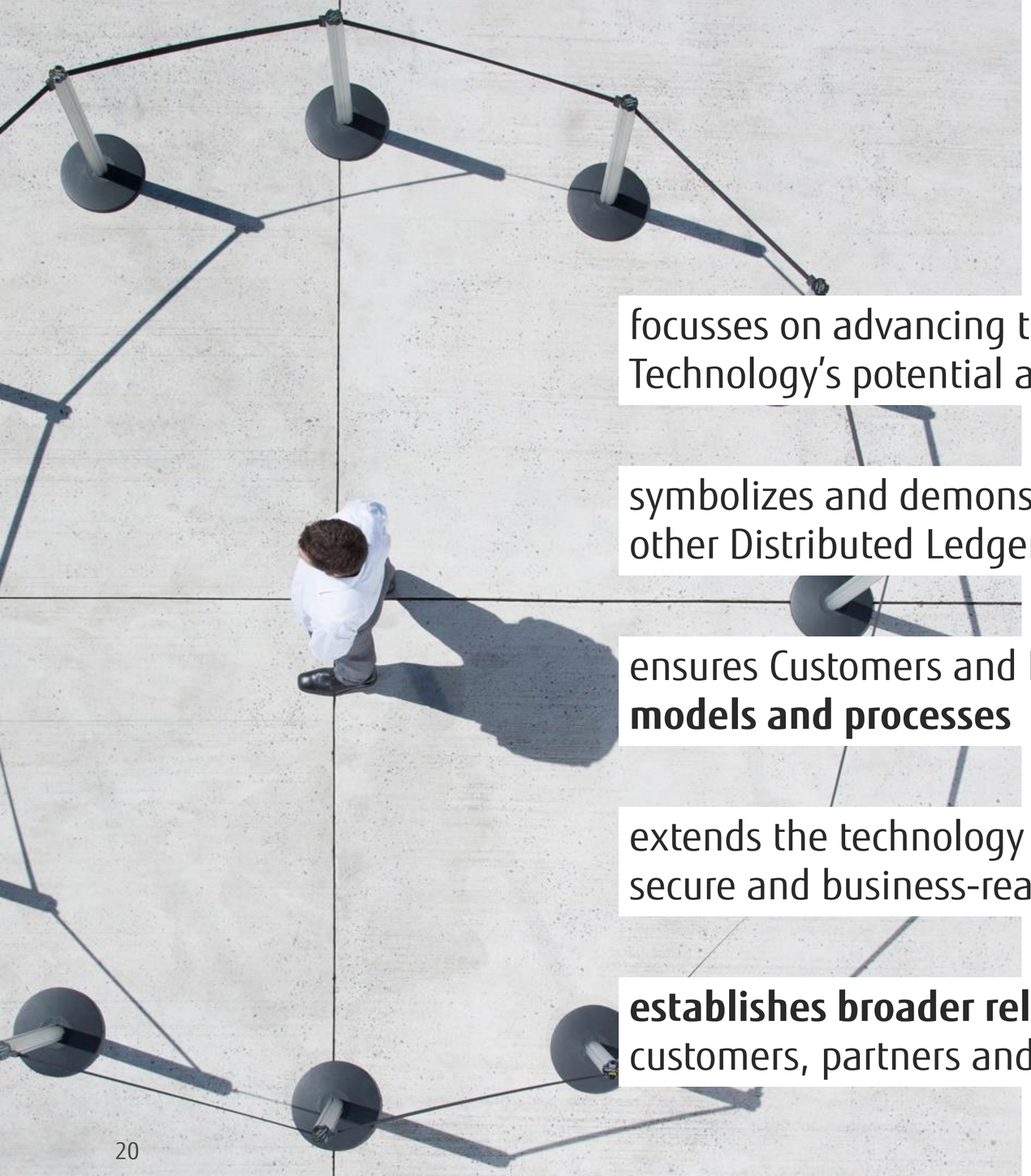
Fujitsu Belgium: Blockchain Initiatives

- With the cooperation of Fujitsu Group entities, Fujitsu Belgium is enlarging **further (local) R&D to bring key technologies to market**
- Fujitsu Belgium has requested a subsidy from the Brussels government based on market research in June 2017
- Project is called "**Blockchain as enabler of services in the context of Smart Cities**"
  - Subsidy has been granted for the 24-months project, starting retroactively from 01/08/2017 (50% on total estimated project cost)
  - Project is focused on technical and non-technical elements with regards to Blockchain, including:
    - Decision and process modelling
    - Business engineering
    - Enterprise Ontology
    - Use cases (City of Brussels and Citizen Participation)
    - Technical baseline (Hyperledger Fabric)
- The Project has been key to start the **EMEIA Blockchain Innovation Center in Brussels** as announced on March 21st 2018 – activities ramping up fast

key takeaway

- The true value of Blockchain and DLT is not (only) providing customers a Blockchain or DLT but in telling how and why they should use it and **helping them to digitally transform**
- The approach and business engineering developed will be **useable in a broad spectrum of sectors** (manufacturing, government, Financial, services, etc.)



The EMEIA Blockchain Innovation Center …

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focusses on advancing the **research and collaboration** with partners to further the Technology's potential and understand the possibilities and limitations

symbolizes and demonstrates **Fujitsu's enterprise commitment** to blockchain and other Distributed Ledger Technologies (DLT)

ensures Customers and Fujitsu are better prepared to **rethink existing business models and processes**

extends the technology **beyond the current focus of proof of concepts** into scalable, secure and business-ready DLT solutions.

establishes broader relations with European and Belgian public instances, customers, partners and the Hyperledger Project in full co-creation mode

Portfolio scope of the EMEIA Blockchain Innovation Center

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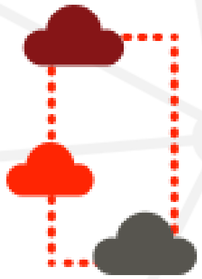
Consulting

- Availability EMEIA-wide & Global
- Assessment of Blockchain potential
- (Co-)Creation of possible frameworks
- Drafting of white papers, research papers



Development

- Based on Hyperledger, Ethereum
- Integration into existing IT landscapes
- Rapid development / DevOps
- Maintenance

Standalone solutions

- Several projects in the pipeline and ongoing internal projects
- As a Service (InvoiceFlow, DocumentFlow, etc.)

Speciality Offerings

- Proof of Business in 5 days
- Proof of Business Use Case Deepdive

Blockchain at Fujitsu: a multidisciplinary approach

Blockchain and Distributed Ledger Technology

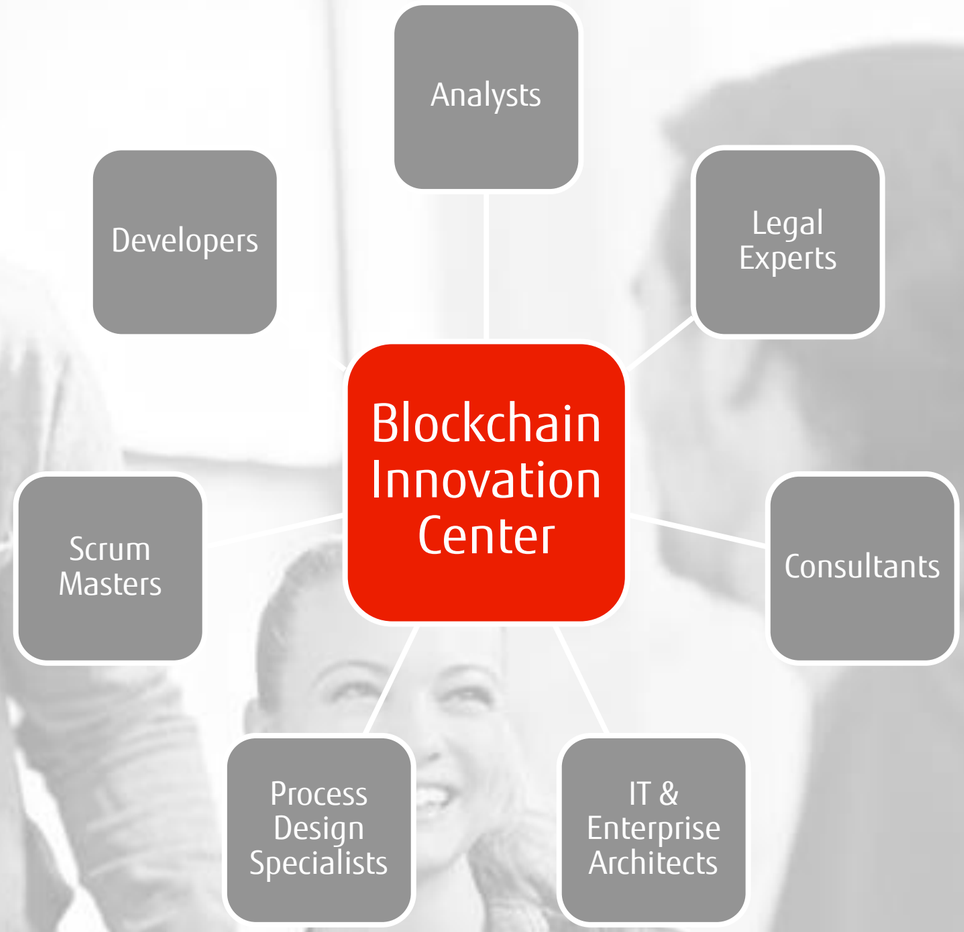
Blockchain and Distributed Ledger Technology are a suite of technologies

The implementation of Blockchain requires a multidisciplinary approach involving domains of science and know-how beyond technology

Fujitsu's Approach

The Fujitsu Blockchain Innovation Center (BIC) is a multidisciplinary team employing not only IT-developers and technology specialists, but also business engineers and analysts, process engineers, Consultants, Scrum Masters, Enterprise & IT Architects and legal experts.

If appropriate, Fujitsu BIC will partner with external parties to source specialized knowledge and know-how (e.g.: universities, research institutes, Fujitsu Labs, etc.)



Fujitsu at the heart of Blockchain technology

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Fujitsu is actively involved as a founding member and 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 is also a member of the Blockchain Research Institute, led by management thinker Don Tapscott, and has joined INATBA (EU) and the Alastria network (Alastria.io) in Spain alongside the country's 70 largest companies

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BLOCKCHAIN TECHNOLOGIES FOR BUSINESS

BLOCKCHAIN RESEARCH INSTITUTE

INATBA = International Association for Trusted Blockchain Applications

Legal context

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The Blockchain Universe: The Lawless No Man's Land

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How do regulators behave?

More background and details on

https://www.linkedin.com/pulse/blockchain-universe-lawless-mans-land-frederik-de-breuck

http://blog.global.fujitsu.com/index.php/blockchain-universe-lawless-no-mans-land/

- Still 'edgy' technology, but certainly on the radar of the different **regulators and institutions**
  - On agenda of the most recent World Economic Forum in Davos
  - Analyzing and investigating ongoig (FINRA, UK Gov, ECB, EU Parliament, etc.)
  - No law or regulation in place that specifically addresses the use of Distributed Ledger Technologies
  - Now often determined by the underpinning assets
  - Regulatory activities are increasing
- Every project should **consider prior to proceeding**:
  - Accountability/responsibility/liability/taxation
  - Transfer of Assets and Ownership / consumer protection laws
  - Regulating bodies
  - Governance of the Blockchain consortiums
  - Contract law
  - Privacy and Security
  - Competition/anti-trust law

Questions to ask on IP

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Open Questions and discussion topics

- How to protect R&D and Intellectual Property?
- What about shared IP?
- Necessary steps regarding Name and copyright protection
- How to tackle
  - Copyright law
  - Patent law (local, EU, US, Japan, Global)
- Open Source Software base software (GPL, Gnu Public License)
  - Hyperledger Agreement
  - General Principles
- Standard contracts and license agreements
  - As a Service
  - Part of Proof of Business

Proof of Business

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Proof of Business vs Proof of Concept Offering Ready

- Proof of Concept is a technical exercise to demonstrate that your idea is operationally feasible
- Proof of Concept (POC) is mostly used to garner support from internal stakeholders
- Proof of Business focuses on the business value including possible external stakeholders and enterprise fabric of a company
- Proof of Business additionally includes the Enterprise Ontology and the impact on the organization structure
- Proof of Business further demonstrates a Minimum Viable Product geared towards a specific business process

Proof of Business

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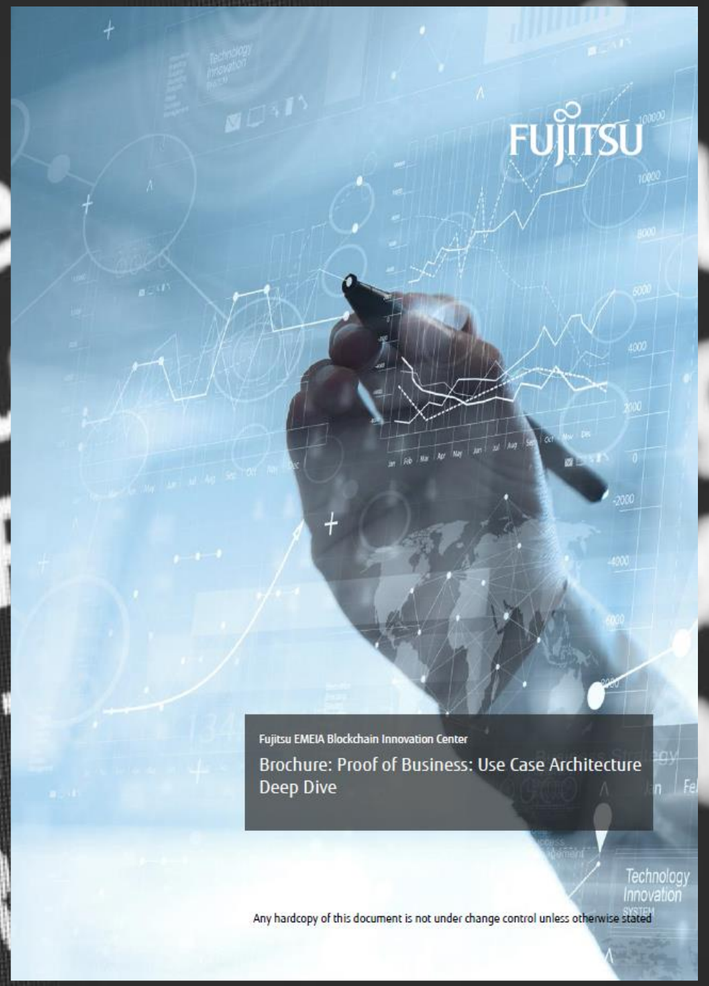
Use Case Deep Dive

- The ‘Proof of Business: Use Case Architecture Deep Dive’ goes deeper in the assessment of a Use Case than the ‘Proof of Business Assessment in a week’
- Gather insights on the created and developed Use Case (in the various stages)
- Give customers the confidence to take the next steps
- It contains an Application Architecture Assessment, Business Architecture Assessment, Smart Contract and Frontend Code Assessment
- Optionally an Accelerator Advisory Service is provided



Use Case Deep Dive

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The six golden elements driving the enterprise applicability of DLT

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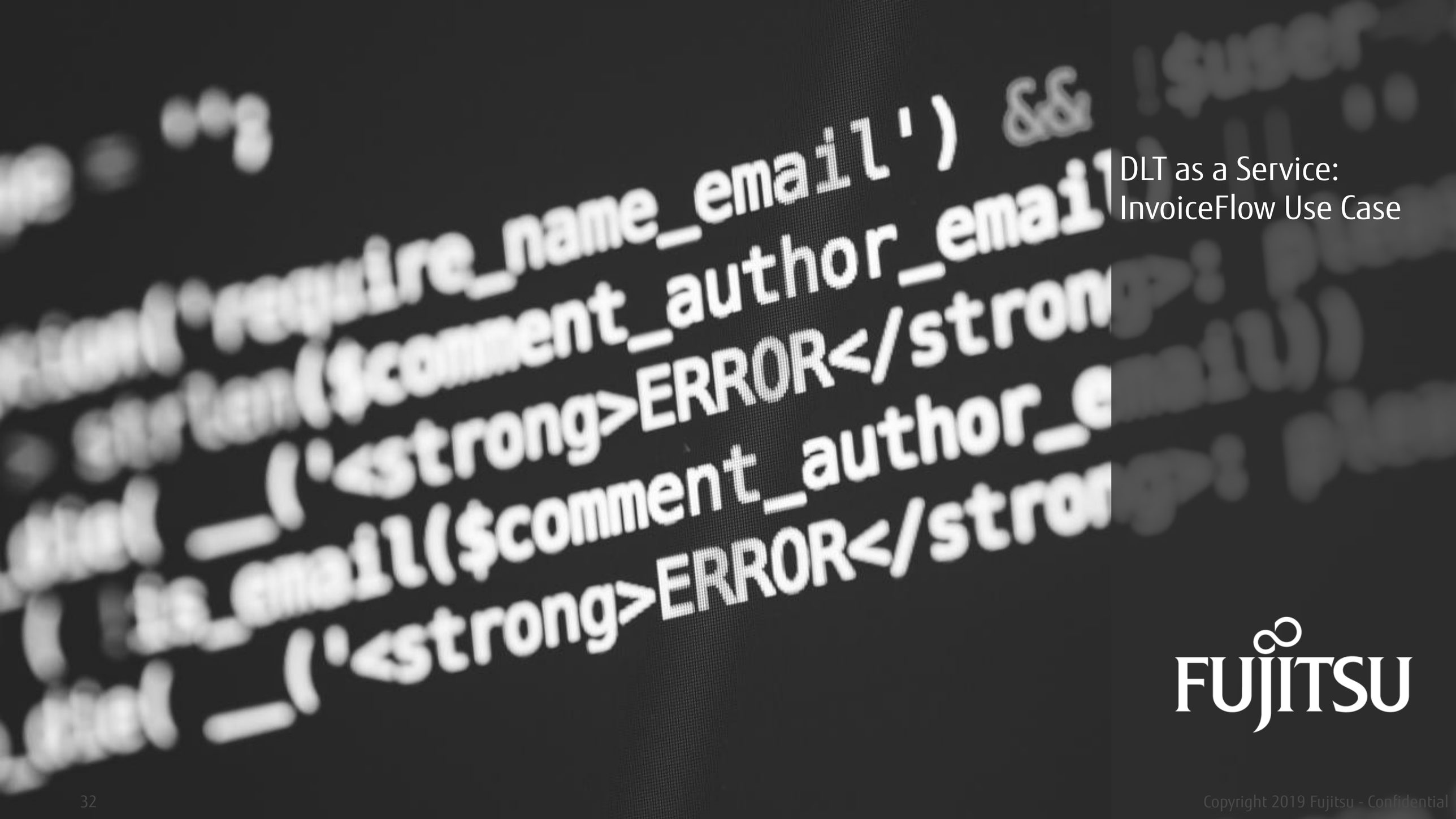
01 Identity	Enterprise and Personal Identity are key to enable enterprise class applications on distributed ledgers. In permissioned networks **you want to know who does what**
02 Data Content Value	It is **all about the data and value transactions** and how you can use that to mitigate a certain risk. What information do you share and how can you use the transaction?
03 Sequence	Who does what when, the notion old-to-new, **sequence, is a key factor** driving trust and proof on distributed ledgers
04 Immutable	**Records cannot be altered** nor can they be updated. CRUD vs CRAB principle applies. An event creates a new appended block (Create-Read-Update-Delete vs Create-Retrieve-Append-Burn)
05 Repeatable	An action or event in an enterprise and its ecosystem that is executed only once is not the first choice for distributed ledger technology
06 Automate	**Events and actions that can be automated** are considered prime candidates. Smart Contracts (Smart Transaction; Chaincode) are used to implement the automation even in combination with AI

What did we experience as pitfalls during enterprise projects?

01	Business Model	It is not a complete solution for business problems. Seek the impact on your business model. **No is also a valid answer** when searching for a use case or adding another technology might be required (AI, Analytics, etc.)
02	ROI	A sensible business and market case over a reasonable period is important including the **stakeholder buy-in**. Try to address external dependencies upfront and create an **ecosystem** or limit the scope accordingly
03	Enterprise Ontology	Projects fail because of **misunderstanding of the technology or misunderstanding of non-technical elements** including: Decision and Process Modelling, Business (re-)engineering, Use Cases Interaction, Enterprise Ontology, Adoption, etc.
04	Platform Evolution	Mitigate the risk of rapidly **evolving standards** (technical and non-technical). Given the somewhat volatile state of DLT, the introduction of abstraction layers can support this mitigation
05	Integration	Consider **modifications to existing systems and processes** and integration work essential. It is iterative. Well-designed **API layers** to facility business integration and interoperability have proven to be key
06	Legal & Compliancy	This still 'edgy' technology is certainly **on the radar of the different regulators** and institutions however legal context can heavily impact projects and ambitions. It must be kept high on the agenda as it is a **potential blocker**
07	Scale to Production	The technical, business and operational **scalability and performance** requirements must be understood and managed. **Cloud native and containerization solutions** can support moving to production in a faster and scalable way
08	Security and Trust	It makes sense to define **the security and trust model** early in the project as it will impact the roadmap and the protocols that are needed to ensure highest possible level of security and compliancy.



DLT as a Service: InvoiceFlow Use Case

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Use Case: InvoiceFlow – in final testing

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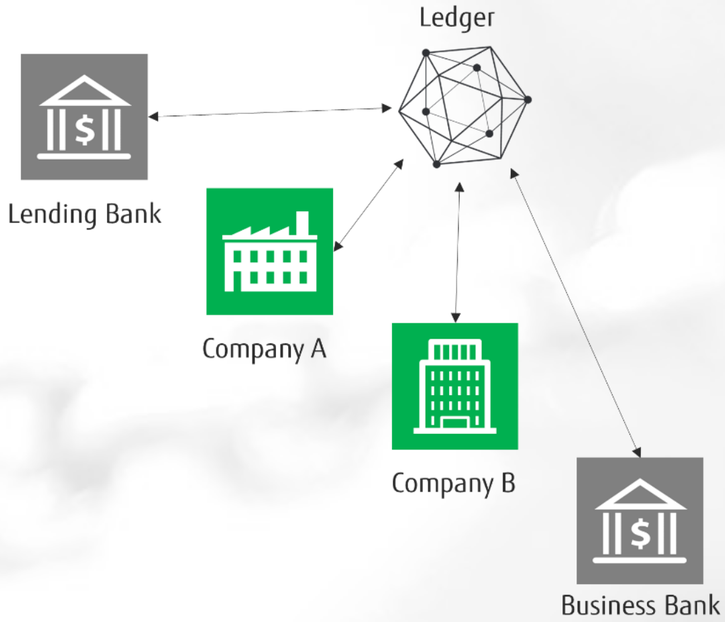
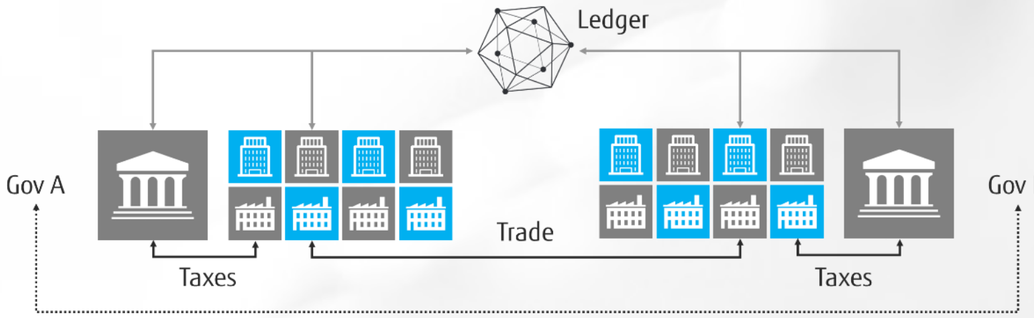
Fujitsu Belgium Blockchain Innovation Center

- **InvoiceFlow** allows businesses to **manage invoices** in a way **existing technology can't.**
- Reduced cost of managing invoice flows
- Reduce risk associated with late, part or non-payments
- Reduce costs incurred in reporting and compliance for internal and external bodies



It achieves this by **increasing** the speed, accuracy and quality of **decision making** based on near **real-time** data.

InvoiceFlow exploits Distributed Ledger Technology (Smart Contracts, Consensus algorithms and **Blockchain**).



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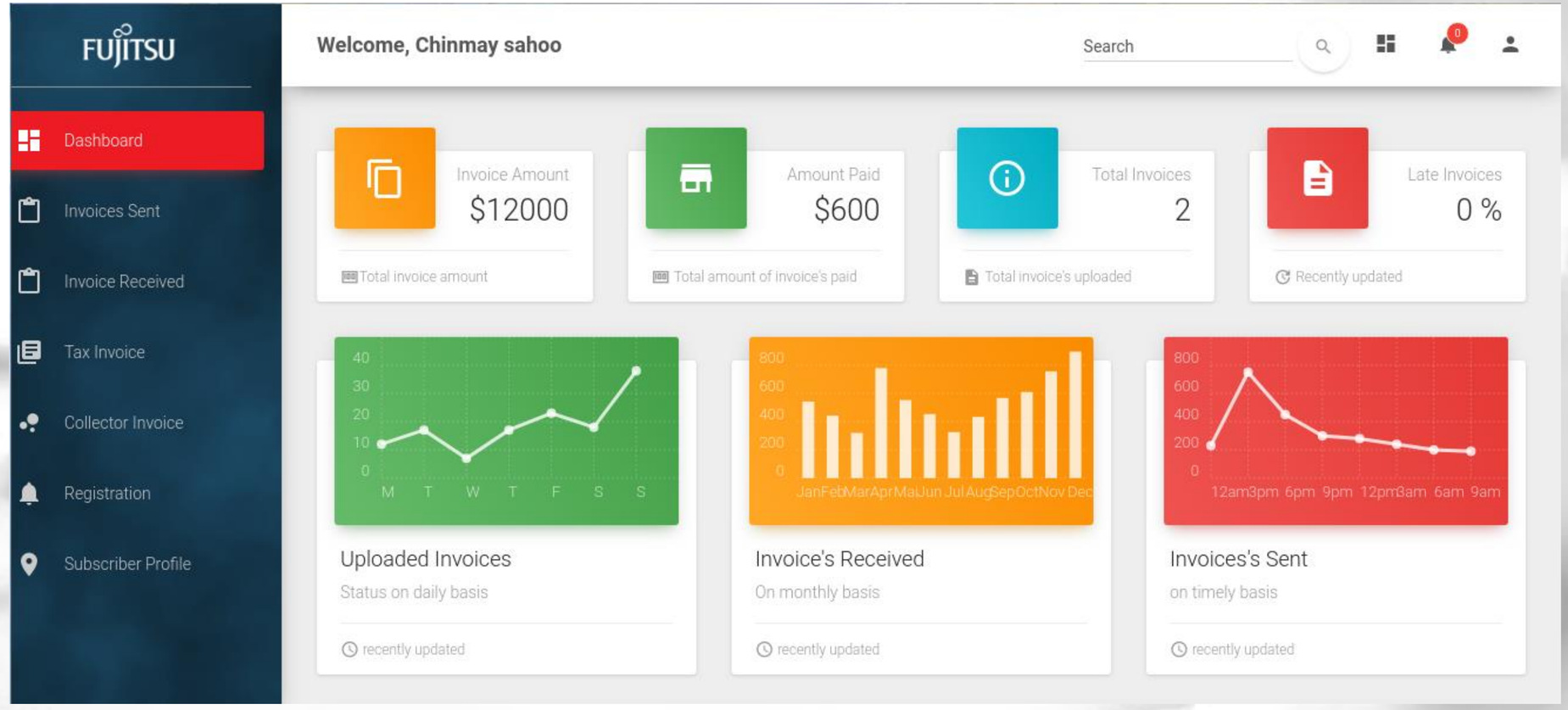
Other applications in EMEIA BIC in development: TimeReg, Document Management, Blockchat, etc.

InvoiceFlow – in final testing

Tackling invoice fraud & rethinking business processes



HYPERLEDGER

InvoiceFlow – in final testing

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Tackling invoice fraud & rethinking business processes

HYPERLEDGER

InvoiceFlow

HYPERLEDGER
BLOCKCHAIN TECHNOLOGIES FOR BUSINESS

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Key characteristics

1. Cryptographically join PO number and all related Invoice data for an enhanced and more secure finance lifecycle
2. Big Buyers can incentivise suppliers to use InvoiceFlow and get paid with increased speed and accuracy through automation of invoice validation
3. In reverse, groups of suppliers can incentivise Big Buyers to use InvoiceFlow to encourage the Big Buyer to pay quicker based on automated invoice validation
4. Make reporting compliance changes easier through having a simple format of invoices to download and manipulate
5. Automatically fix problems with multiple suppliers using multiple and arbitrary data formats for invoicing
6. Use this cryptographic material for scenarios when payment problems arise – i.e. give your Bank visibility and evidence that you have not been paid
7. Reduce/eliminate opportunity for fraudulent activity – insider fraud, external fraud, invoice redirection, genuine human mistake and non-malicious system errors

Key characteristics

8. Prevent paying invoices more than once
9. Prevent paying an expected Invoice grand total which is actually made up of incorrect line items
10. Pre-authorize payment via Tokenization, this could be for internal or 3rd parties to pay from your bank accounts (in development
11. Leverage API to automate validation of received invoice against immutable blockchain ledger populated by your Sellers
12. Move towards Trade Finance automation and simplification possibilities leveraging InvoiceFlow APIs
13. Automate numerous aspects of Invoice management and processing in the knowledge that mistakes and errors will be caught through blockchain which humans typically miss
14. Assess your insurance liability costs against Financial Fraud based on being able to trap very small and easy to miss invoice errors with large commercial threat – i.e. adding a zero to the total payable

InvoiceFlow

Key characteristics

15. Step towards AI capability of InvoiceFlow coming soon to see who is most likely to not pay, late pay, object to terms and even try to falsify records and events
16. For firms impacted by Anti-Money-Laundering and Combatting Financing of Terrorism, InvoiceFlow can simplify aspects of managing liability and responsibilities around company reporting and even Suspicious Activity Reporting to Financial Intelligence Units
17. More and more Designated Non-Financial Based Professions are being brought into scope for EU legislation around AML/CFT and evidencing payments received and made by invoicing are not a means of disguising criminal intent, i.e. Real Estate companies, Accountants, Auditors, Certain commodities traders, family owned businesses
18. Easily link Supply Chain operations to Invoice events such as ordering, dispatching, accounts and stock reconciling, stock management and licensing audit and compliance, trade documents, dispatch notes, proof of receipt and safe receipt of goods and materials

Supported Charging Models

- Number of Invoices uploaded per month – with a minimum commit and threshold on Invoice total amount
- Number of Invoice validations per month – with a minimum commit and threshold on invoice total amount
- Unlimited use with threshold totals
- Unlimited use no threshold on invoice totals
- Minimum length of term – long term bigger discount
- Minimum notice to terminate – i.e. for 1 months notice = X for 3 months notice = Y
  - NOTE Fujitsu reserves the right to charge based on invoice amount percentage – e.g. 1 invoice for £10 Million may be charged differently by Fujitsu depending on the agreement
  - Refer a friend scheme/bring-a-network discount

Use Case Examples

Example: Use Case for Pharma

Based on current insight and investigation the following use case groups are worth investigation in the context of Blockchain and Distributed Ledger Technology for Biopharmaceutical and Pharmaceutical companies.

From general use cases

Digital Identity and Enterprise ID

Supply Chain, Inventory Management, Provenance and Traceability

Data Management including Clinical Trial and Genome Related Data

From general use cases

Payments, Value Flows, Transactions, Invoicing Exchanges, Transfers, Assets Follow-up, Claims, etc.

Collaboration Activities, Licensing and Research

Security, Audit, Regulatory and Compliancy Activities

Data and Activities Related to Intellectual Property and Patents

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Industry Specific Use Case: Supply Chain, Inventory Management, provenance and traceability

DLT immutability and provenance capability provides the basis for traceability of pharmaceuticals from manufacturing to end consumer

01

What? – examples

- Provenance – tracking of assets across a supply chain on a specialized digital distributed ledger internally and externally
- The traceability of active pharmaceutical ingredients during the manufacturing and beyond
- Detection of fraudulent batches and counterfeit (micro-dotting, validation mechanisms, etc.)
- Improve marketing alliances, involving rebates, co-paid ads, coupons and other costs to boost exposure for a product

02

How? – examples

- Secured and specialized Distributed Ledger with known and trusted nodes (participants)
- Shared immutable ledger to provide proof of origin
- Link with existing inventory systems
- Association of labelling with data on the Blockchain
- Blockchain can hold complete provenance details of each constituent components
- Smart contracts to manage the flows and validate where required

03

Benefits? – examples

- Track and trace capabilities through immutability with trust increased, no authority to drive provenance
- Greater visibility into inventory demand Quickly trace and address batches in error or counterfeit
- Better insight in basic usage data
- Reduced 3rd party cost to research pharmaceuticals movement in the market
- Insight where the value chain breaks
- Facilitate audits and Proof of Content and Proof of Existence
- Manage the Chain of Custody of specific data

Example: Use Case for Oil and Gas Industry

Based on current insight and investigation the following use case groups are worth investigation in the context of Blockchain and Distributed Ledger Technology for Oil and Gas Production and Processing companies.

Specific

Supply Chain, Inventory Management, 3rd Party Tracing and Management, Provenance and Traceability

From general use cases

Digital Identity and Enterprise ID

Specific

Cyber threats and security, ensuring that critical information remains safe

From general use cases

Payments, Value Flows, Transactions, Invoicing Exchanges, Transfers, Assets Follow-up, Claims, etc.

Specific

Trading and third party interactions addressing reconciliation and tracking issues

Specific

Security, Audit, Regulatory and Compliancy Activities

Use Case Ideas Transport

Based on current insight and investigation the following use case groups are worth investigation in the context of Blockchain and Distributed Ledger Technology for Transportation companies.

Specific

Supply Chain, Inventory Management, 3rd Party Tracing and Management, Provenance and Traceability

From general use cases

Digital Identity and Enterprise ID

Specific

Cyber threats and security, ensuring that critical information remains safe

From general use cases

Payments, Value Flows, Transactions, Invoicing Exchanges, Transfers, Assets Follow-up, Claims, etc.

Specific

Trading and third party interactions addressing reconciliation and tracking issues

Specific

Mobility as a Service in a networked and meshed world

Specific

Security, Audit, Regulatory and Compliancy Activities

Example: Use Case for Chemical Industry

Based on current insight and investigation the following use case groups are worth investigation in the context of Blockchain and Distributed Ledger Technology for Chemical companies.

From general use cases

Digital Identity and Enterprise ID

Enhanced value chain visibility and facilitation (Provenance, efficiency and Traceability)

Cyber threats and security, ensuring that critical information remains safe

From general use cases

Payments, Value Flows, Transactions, Invoicing Exchanges, Transfers, Assets Follow-up, Claims, etc.

Trading and third party interactions addressing reconciliation and tracking issues

Security, Audit, Regulatory and Compliancy Activities

Use Case: InvoiceFlow – in dev

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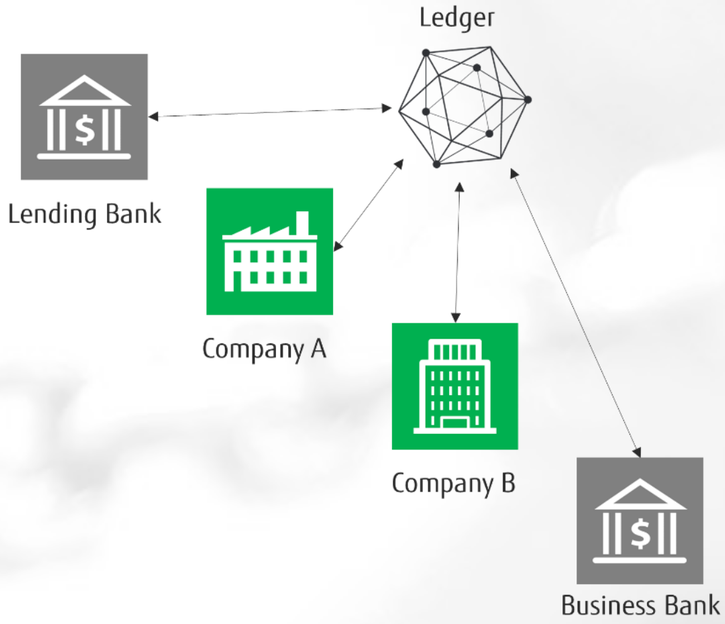
Fujitsu Belgium Blockchain Innovation Center

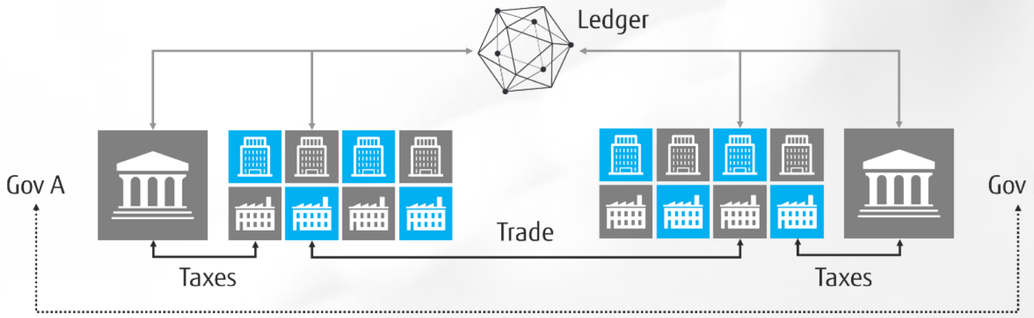
- **InvoiceFlow** allows businesses to **manage invoices** in a way **existing technology can't.**
- Reduced cost of managing invoice flows
- Reduce risk associated with late, part or non-payments
- Reduce costs incurred in reporting and compliance for internal and external bodies



It achieves this by **increasing** the speed, accuracy and quality of **decision making** based on near **real-time** data.

InvoiceFlow exploits Distributed Ledger Technology (Smart Contracts, Consensus algorithms and **Blockchain**).

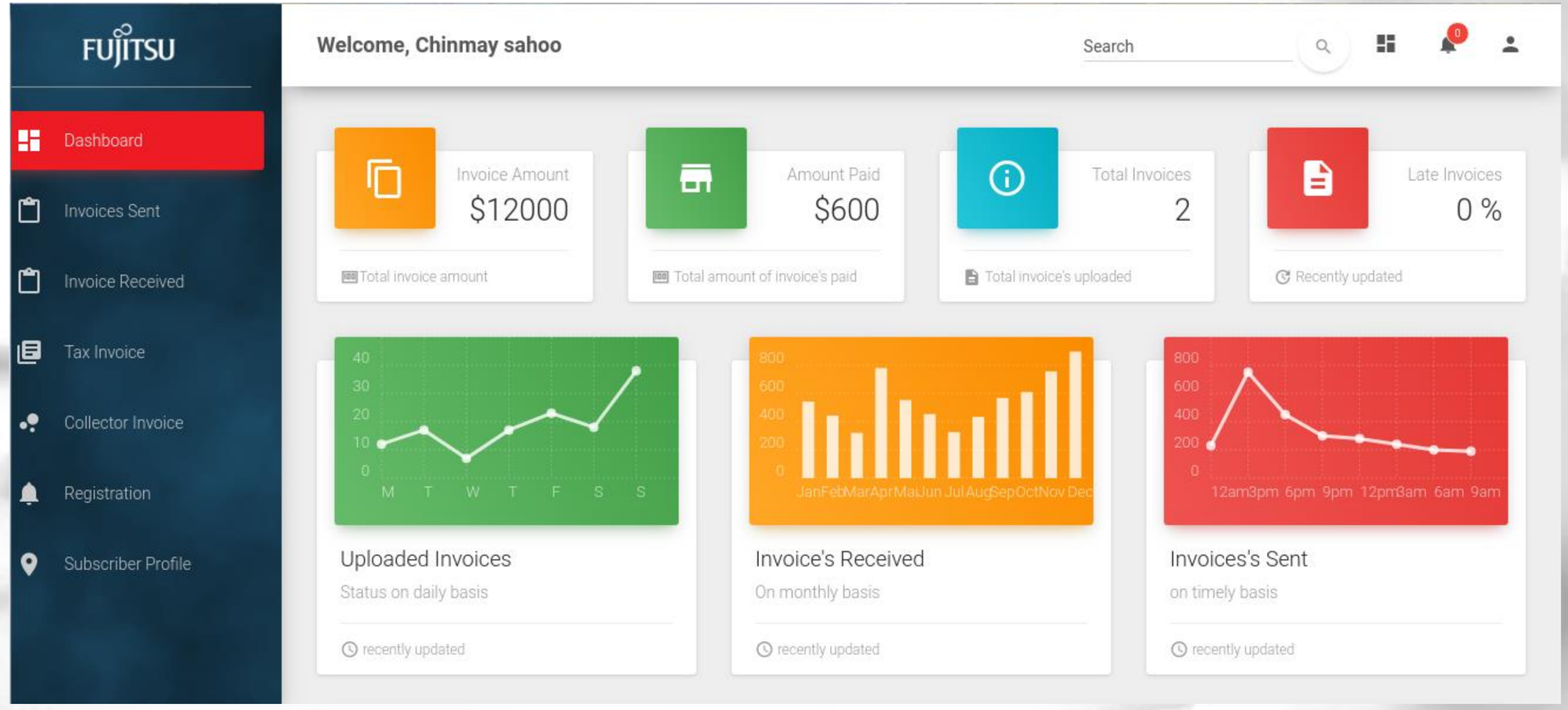
HYPERLEDGER



Other applications in EMEIA BIC in development: TimeReg, Document Management, Blockchat, etc.

InvoiceFlow – in dev

Tackling invoice fraud & rethinking business processes



HYPERLEDGER

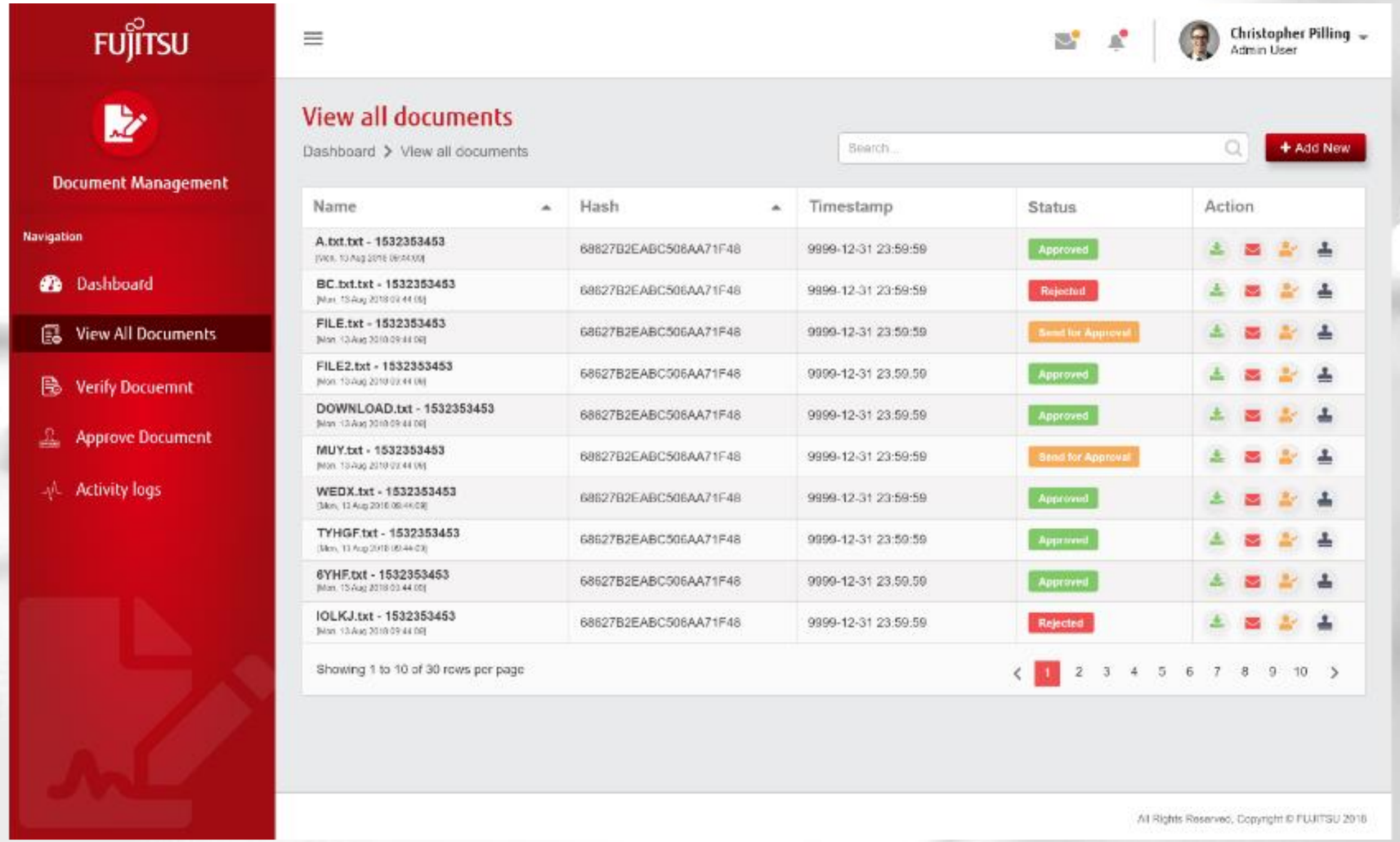
InvoiceFlow – in dev

Tackling invoice fraud & rethinking business processes

HYPERLEDGER

Task Management – in dev

Document Tracing



HYPERLEDGER

Task Management – in dev

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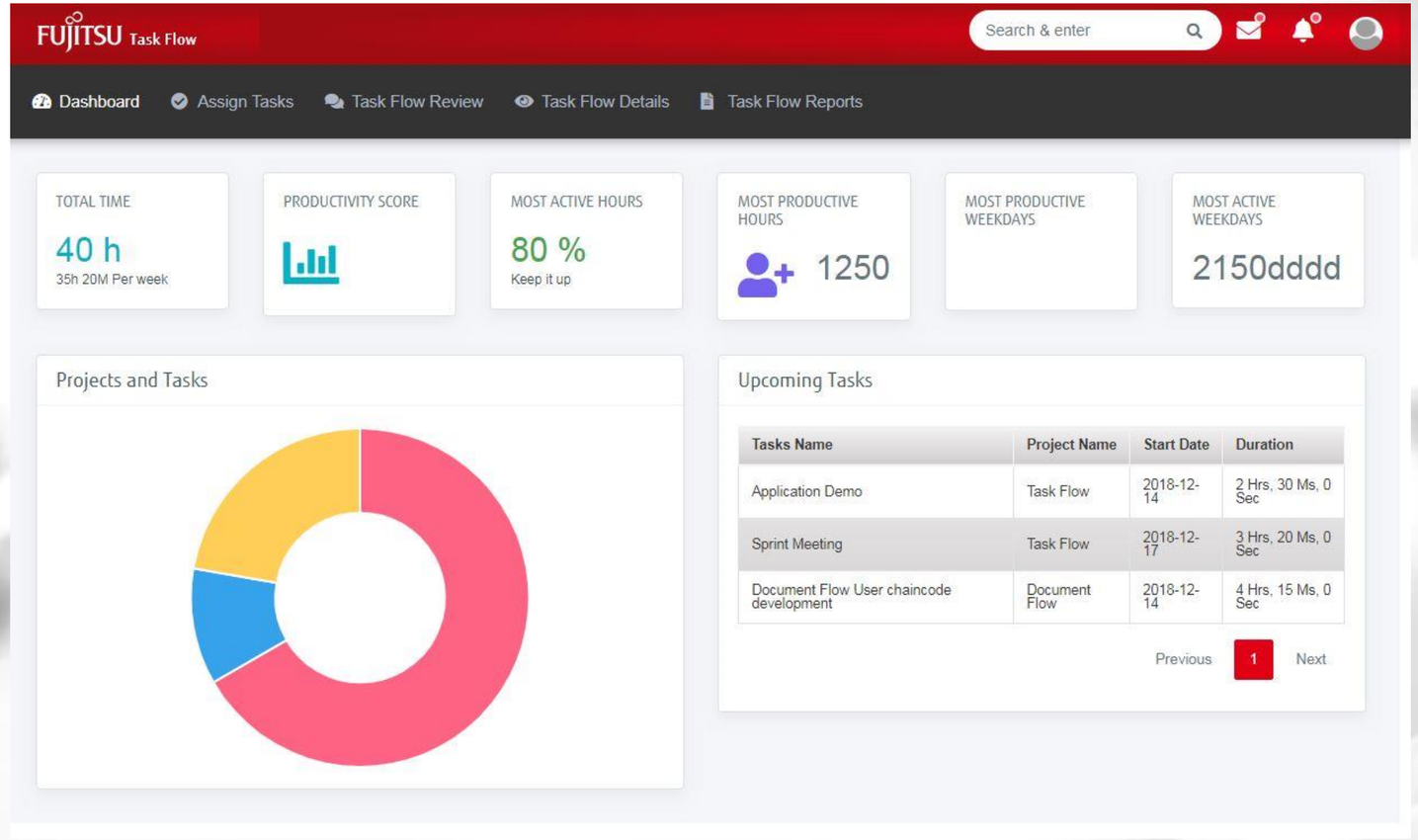
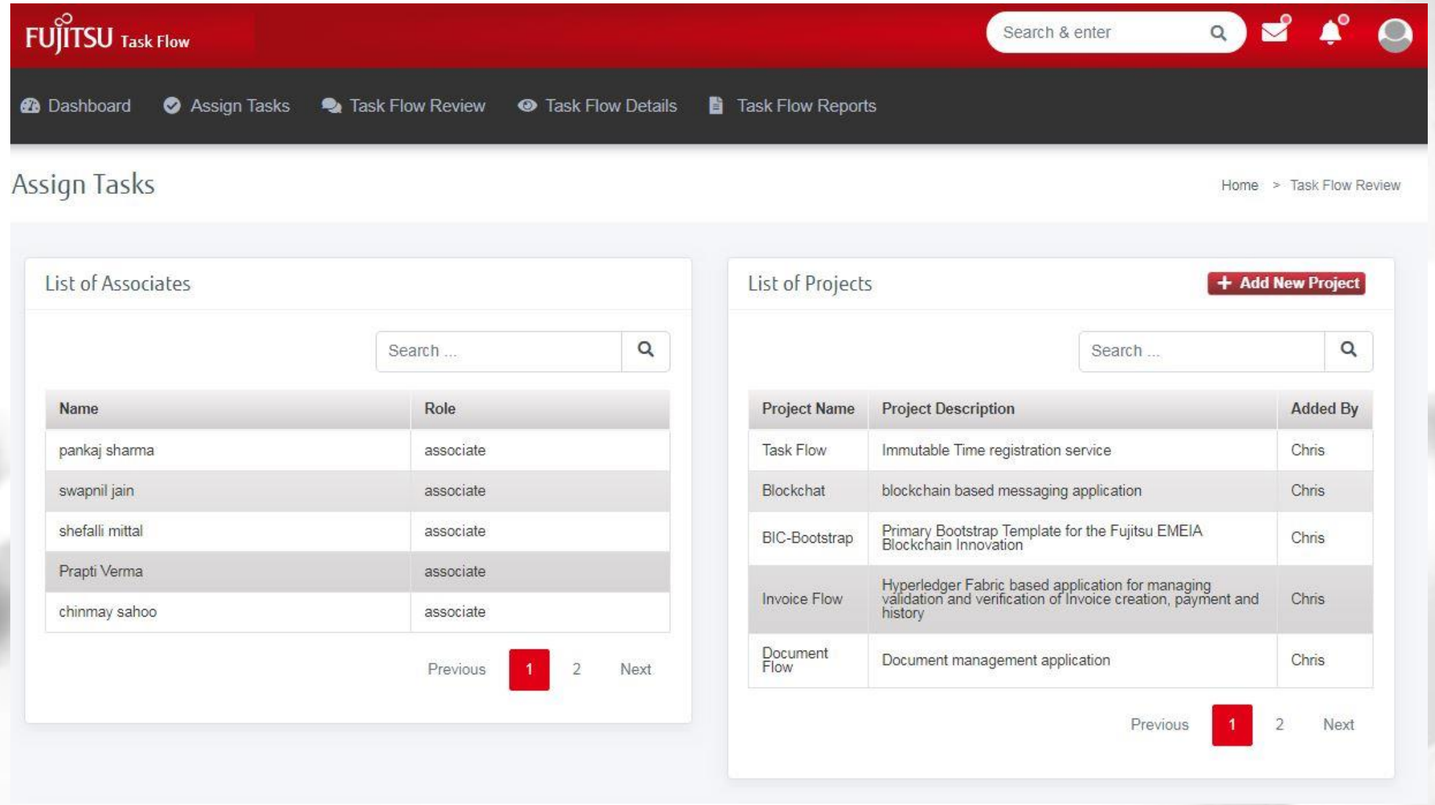
Task and Time Managment



HYPERLEDGER

Task Management – in dev

Task and Time Managment



HYPERLEDGER

Task Management – in dev

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Task and Time Managment

List of Assigned tasks to Chris

+ Add New Task

Search ...

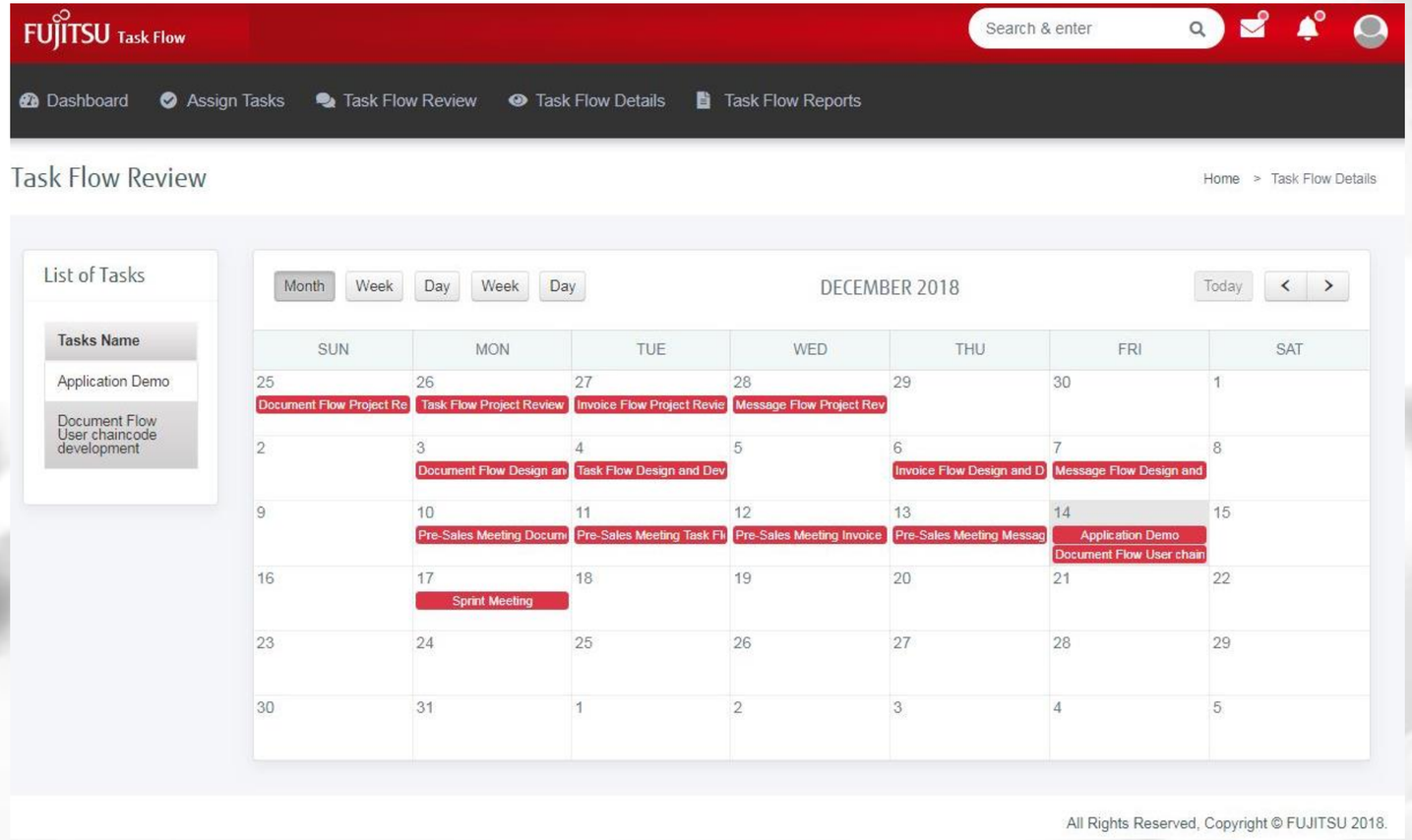
Action	Status	Project Name	Task Priority	Task Name	Task Description	Estimated Start Date	Due Date	Estimated Time	Started On	Completion Date	Co
	Pending	Task Flow	Low	Sprint Meeting	Sprint Meeting with product owners and scrum master	2018-12-17	2018-12-17	3 Hrs, 20 Ms, 0 Sec			0 I Se
	Finished	Task Flow	High	Application Demo	Task-Flow Application Demo	2018-12-14	2018-12-14	2 Hrs, 30 Ms, 0 Sec	2018-12-14	2018-12-14	0 I Se
	Pending	Document Flow	High	Document Flow User chaincode development	Document Flow User chaincode development	2018-12-14	2018-12-14	4 Hrs, 15 Ms, 0 Sec			0 I Se
	Finished	Message Flow	High	Pre-Sales Meeting Message Flow	Pre-sales meeting with digital marketing team and product owners to plan out product marketing strategies	2018-12-13	2018-12-13	8 Hrs, 30 Ms, 60 Sec	2018-12-14	2018-12-14	0 I Se
	Pending	Invoice Flow	High	Pre-Sales Meeting Invoice Flow	Pre-sales meeting with digital marketing team and product owners to plan out product marketing strategies	2018-12-12	2018-12-12	8 Hrs, 30 Ms, 60 Sec			0 I Se

Previous 1 2 3 Next

HYPERLEDGER

Task Management – in dev

Task and Time Managment



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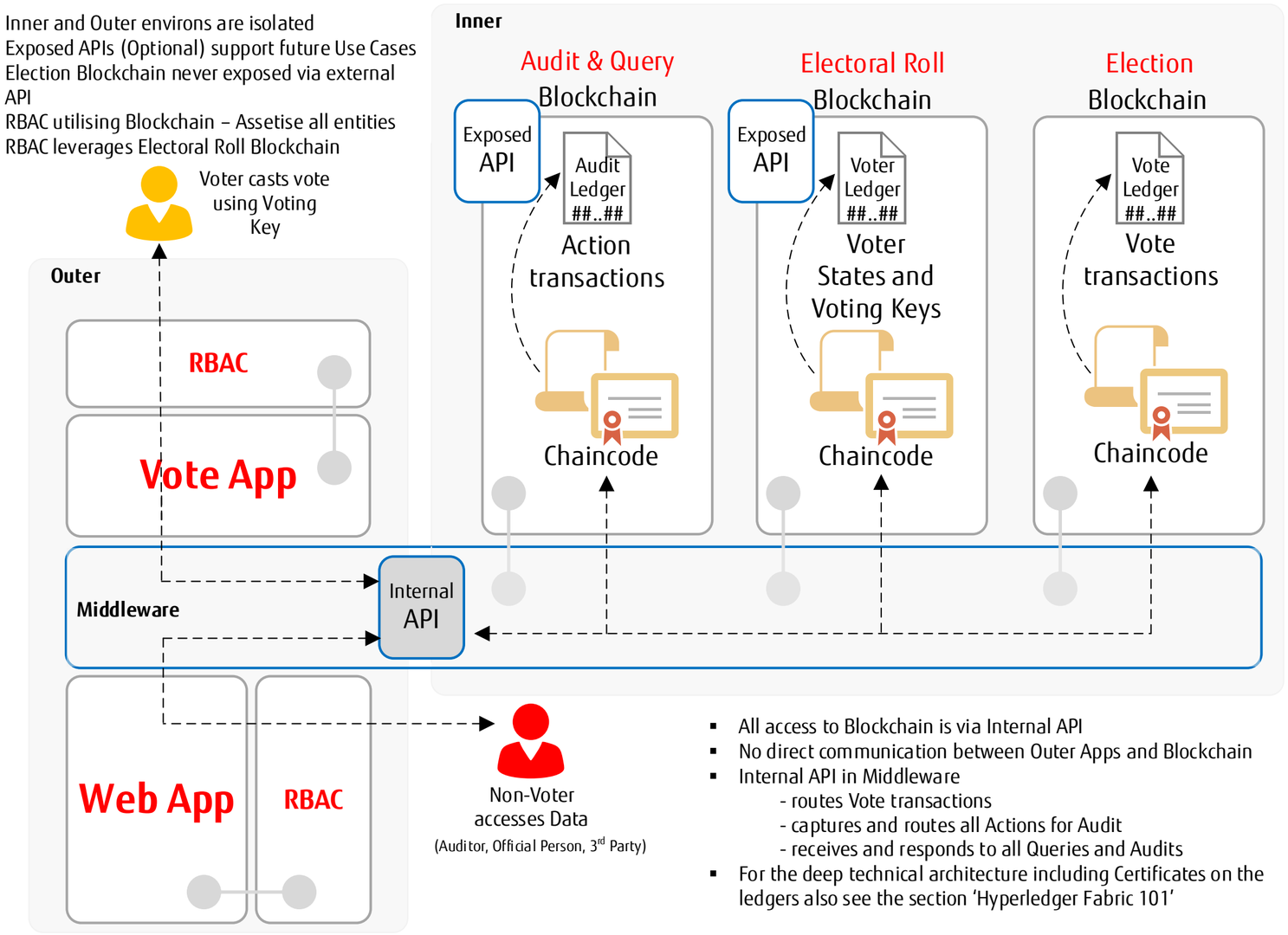
Initial Architecture View Electronic Election System BIC

- Inner and Outer environs are isolated
- Exposed APIs (Optional) support future Use Cases
- Election Blockchain never exposed via external API
- RBAC utilising Blockchain – Assetise all entities
- RBAC leverages Electoral Roll Blockchain

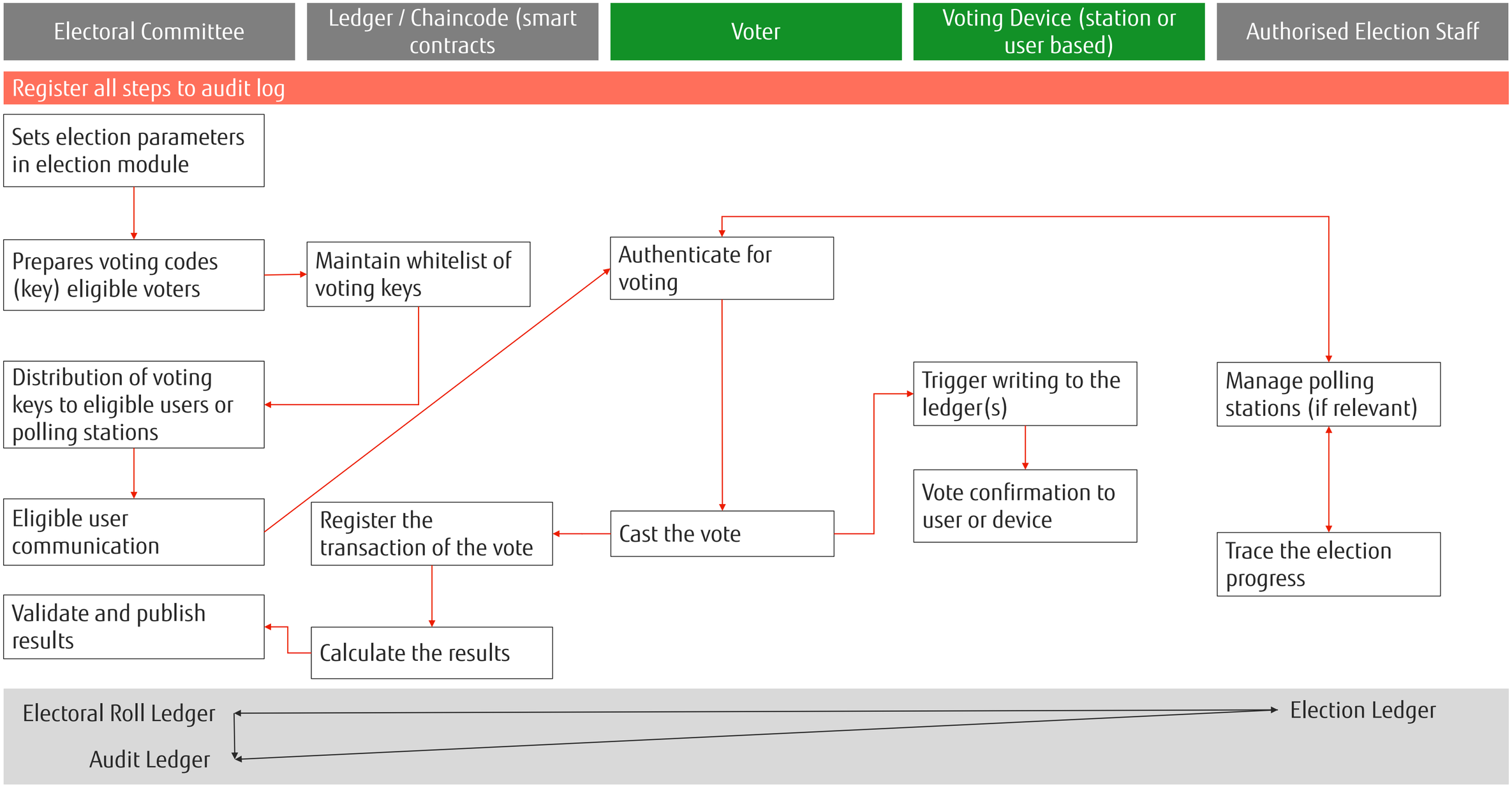


- All access to Blockchain is via Internal API
- No direct communication between Outer Apps and Blockchain
- Internal API in Middleware
  - routes Vote transactions
  - captures and routes all Actions for Audit
  - receives and responds to all Queries and Audits
- For the deep technical architecture including Certificates on the ledgers also see the section 'Hyperledger Fabric 101'

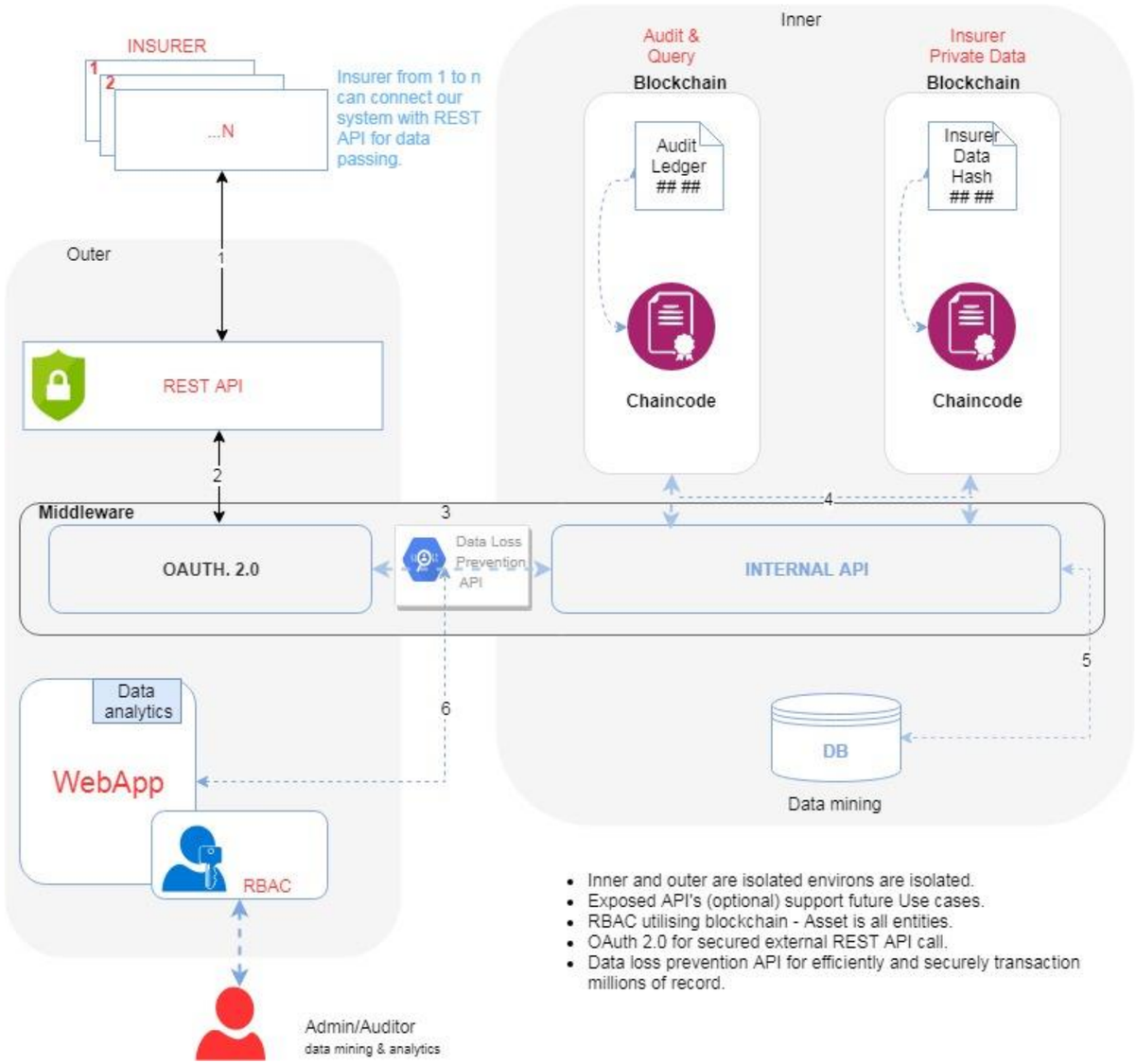
key takeaway

- Voting key is used to remove the link between the voter and their vote; managed via the Electoral Roll
- Inner: where the nodes running the blockchain belong
- Outer: where the applications communicating with the blockchain reside
- Voting devices cannot write nor read to the blockchain directly
- Voting devices query to network through an endpoint to send or receive information they are allowed to
- For the deep technical architecture including Certificates on the ledgers also see the section 'Hyperledger Fabric 101'
- Fujitsu recommends working based on Hyperledger Fabric (version 1.3) installed on the Private Cloud (FMPCS) or Public Cloud plus selected safety nodes on designated locations

Initial flow Design for the Electronic Election System BIC



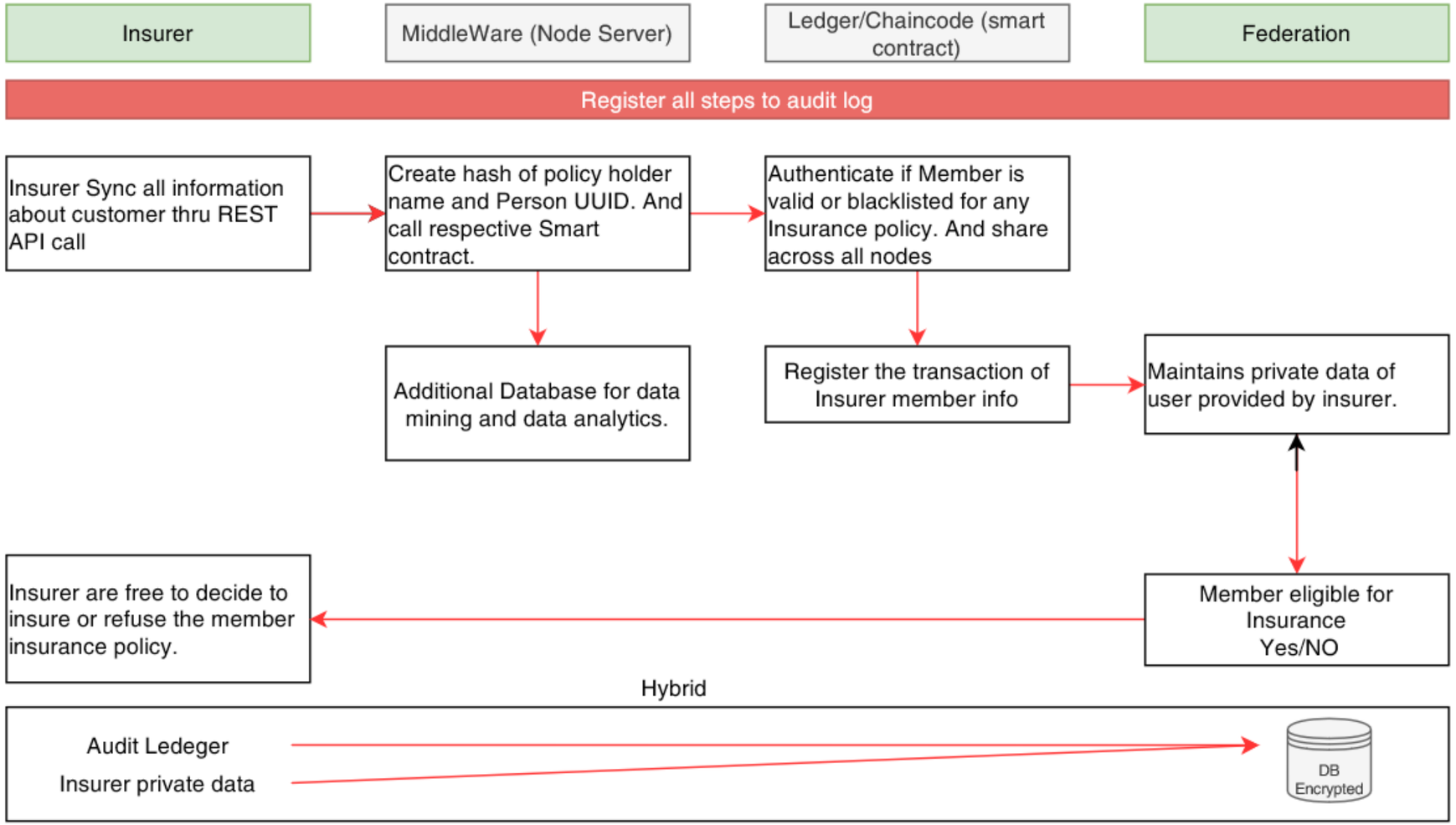
Initial Architecture View National Federation of Insurance BIC



key takeaway

- Inner: where the nodes running the blockchain belong
- Outer: where the applications communicating with the blockchain reside
- Insurer connect application via secured REST API.
- REST API call will be secured by OAUTH 2.0 web token,
- Insurer REST API will be of content-type : JSON and Authorization will userid + password converted in base64 encoding.
- Once secured connection established between application and insurer system the data sync starts on basis of insurer hash Id & member hash Id .To prevent data loss for millions of record we implement Data loss prevention API using Node Express.
- Insurer cannot directly read or write to BlockChain directly.
- Federation will have Webapp to query to network through an end point to send and receive information they are allowed to.
- MSQL/Oracle data base to do data mining and data analytics.
- Fujitsu recommends working based on HyperLedger fabric (version - 1.4) installed on the private cloud (FMPCS) plus selected safety nodes on designated location.
- Authorized Third parties access via secure API gateway (e.g. current system of federation to evaluate Insurer data)

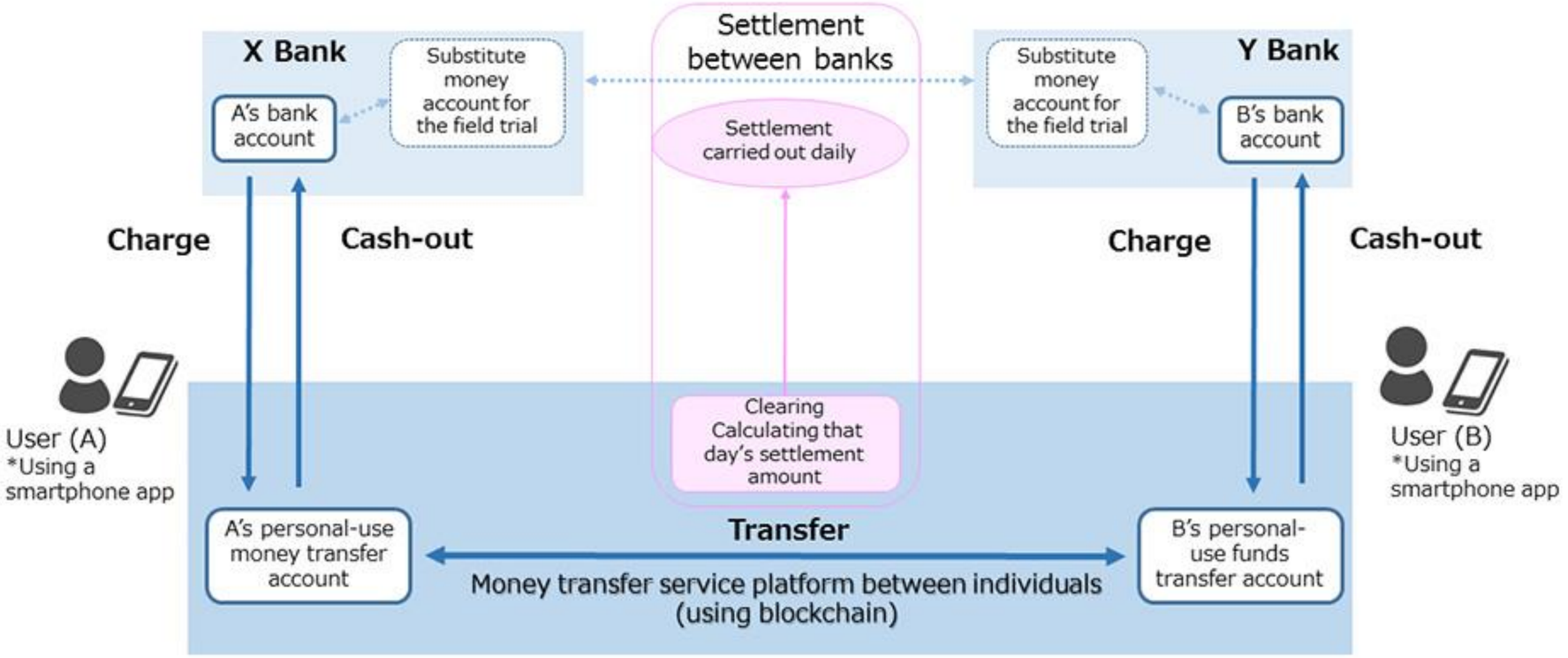
Possible flow BIC



- Possible flow
- Both ingestion of data and retrieve is done via APIs
- All events and transactions are traceable in the audit ledger
- Dashboard to manage and monitor

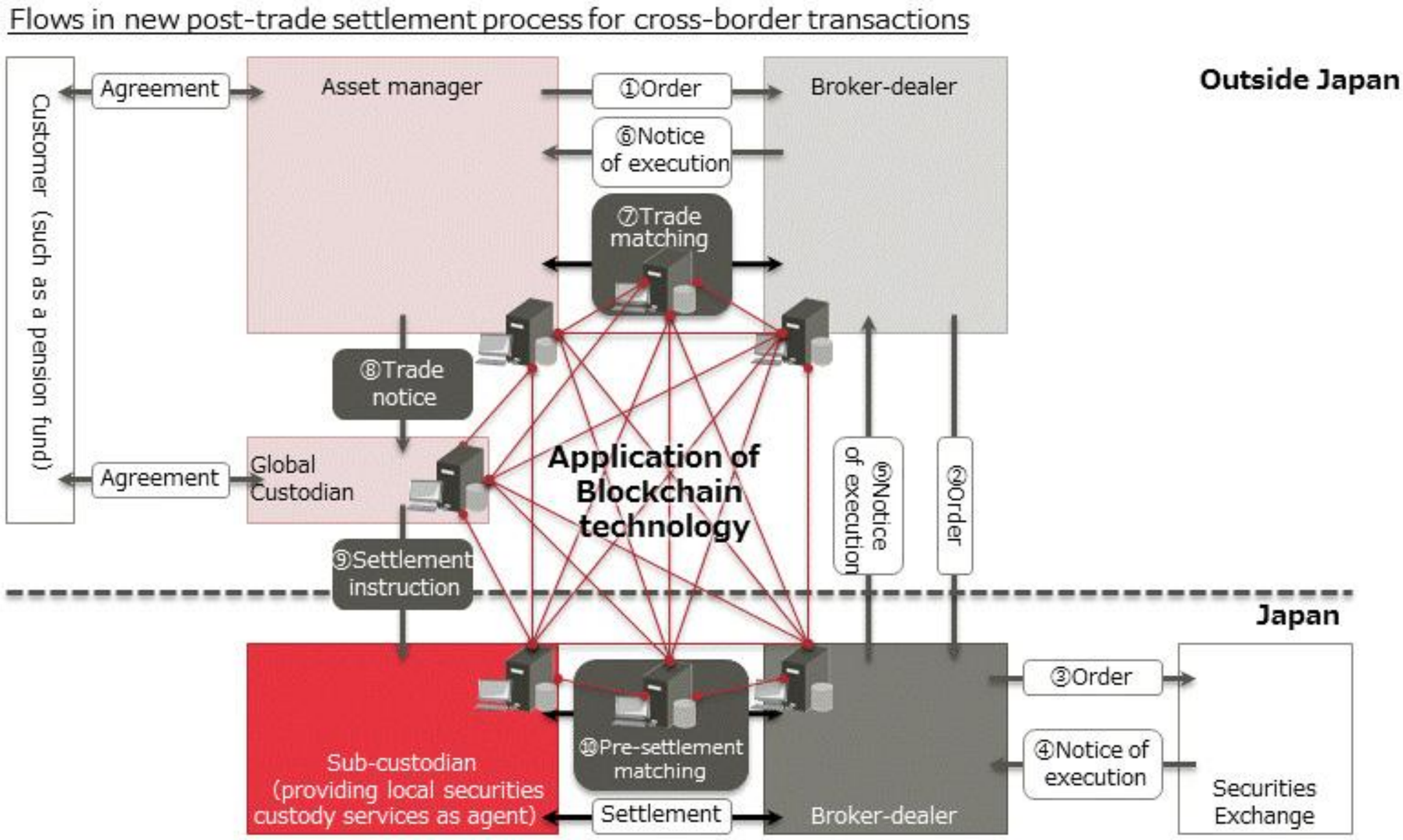
Money transfer Proof of Concept / Proof of Business

Cloud-based blockchain platform for money transfers between individuals that can be jointly used by three major banks, as well as a smartphone application that allows users to easily handle the different steps for sending money and for making deposits and withdrawals.



- The system is constructed with Hyperledger Fabric V1.0 as the core.
- Verification by loosely coupling the current systems at the 3 megabanks without changing them

Cross-border Securities trading

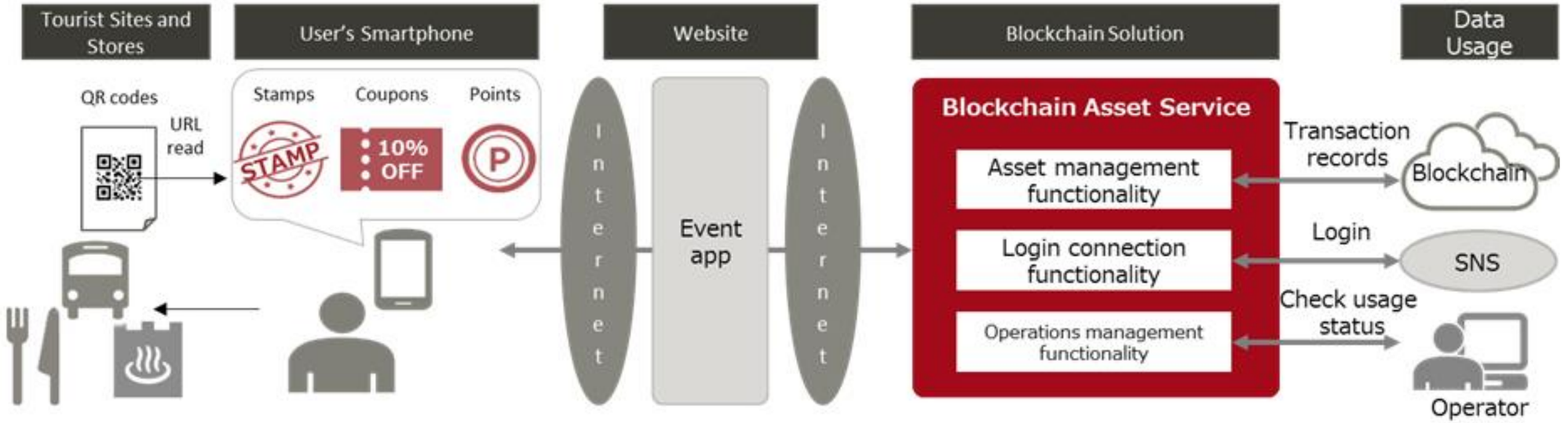


Blockchain Asset Service

Blockchain Asset Service

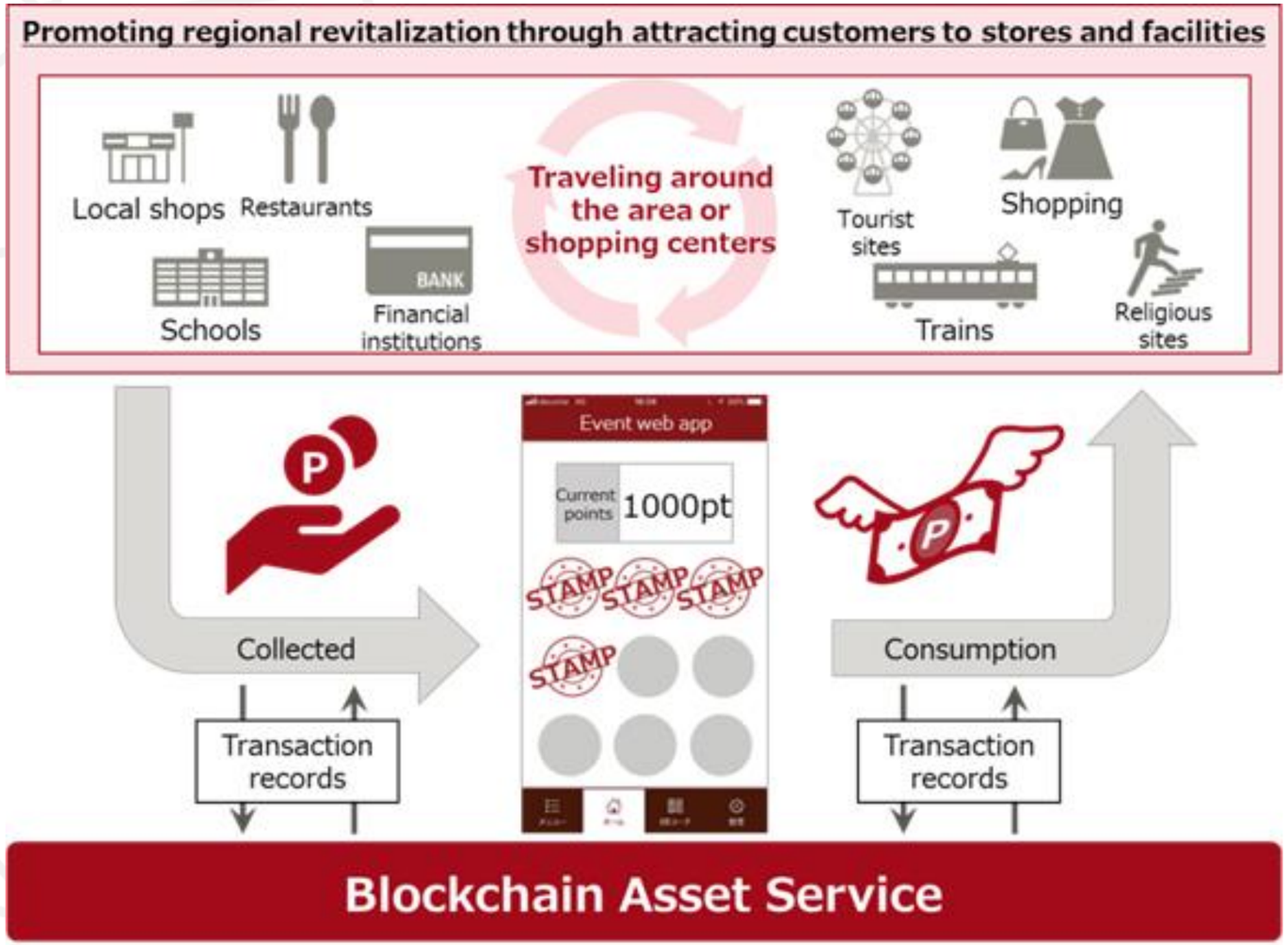
A blockchain asset service is a service that connects customer applications with blockchain networks

This service provides interfaces for setting value “assets” such as points or stamps managed on the blockchain network and transaction rules, especially for point or stamp rally use cases. By using this service, customers can easily build applications utilizing blockchains.



Stamp rally system Example

- The point / stamp rally using this service is provided for end users by a combination of customer applications and our blockchain asset services.
  - Customer: Host the point / stamp rally event and prepare the event application
  - Fujitsu: Provide the blockchain asset services



Key Fujitsu Blockchain achievements

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Achievements – Part 1

- In March, 2018, Fujitsu opened a The 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.
- 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
- 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

Key Fujitsu Blockchain achievements

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Achievements – Part 2

- 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

Key Fujitsu Blockchain achievements

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Achievements – Part 3

- Fujitsu is actively involved as a founding member and 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 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
- http://blog.global.fujitsu.com/tag/blockchain/

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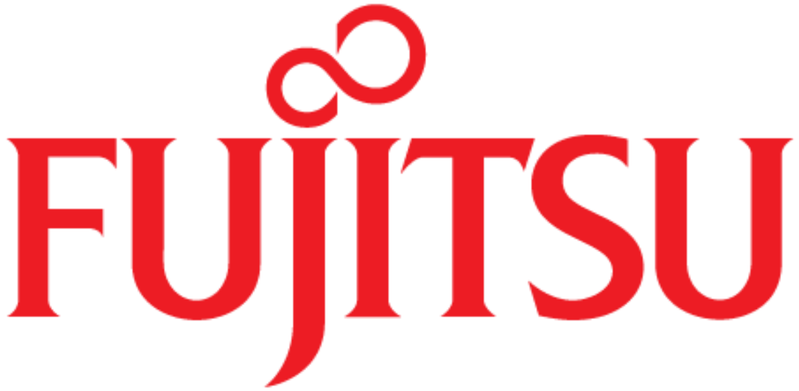

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