NTT DATA
Services

Upgrade. Enable. Replace. Disrupt:

Four Ways Blockchain Is Reshaping Business

DECEMBER 2018

NTT DATA

Table of Contents

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Summary

Blockchain holds great potential to impact today's businesses and future possibilities.

Around 20 years ago, when using the first generation of search engines or browsers, most of us couldn't imagine the potential of the internet or the benefits users would enjoy today — a world of information at our fingertips, and products and services available with the swipe of a finger.

In 2009 Satoshi Nakamoto invented Bitcoin, creating the first decentralized cryptocurrency. The Bitcoin network relies on blockchain, a technology that acts as a shared public ledger to record every Bitcoin transaction. Since its inception, Bitcoin has inspired new ideas and created new paradigms in many areas beyond cryptocurrency.

Blockchain holds great potential. It's a technological revolution that can impact today's businesses and future possibilities, reshaping not only the finance industry as a whole and the ways it operates, but also many other industries.

The potential of blockchain depends on a company's strategic goals: What is its business model, which services does it deliver, with what rules must it comply and what is the environment in which it operates.

At NTT DATA, we foresee four primary impacts of blockchain:

1. **Upgrade:** leveraging Blockchain in an existing paradigm (for example, incumbents that ultimately need a central authority, which in many cases is required by law)

2. **Enable:** creating new features, and new business ideas for existing players

3. **Replace:** remodeling and re-creating existing businesses and processes using distributed ledgers

4. **Disrupt:** leveraging distributed ledgers to create new systems, new processes, and new business models from the ground up

A strategic approach based on blockchain can reshape the way a business organizes and manages current services or relationships. In the media industry, for example, it can change the way artists' contracts are managed. It can also be applied to smart grids in the energy industry, changeing consumers' payment methods and their relationship with energy providers. In the healthcare sector, blockchain can store patient data and make it available whenever and wherever it's needed.

To get the most from this technology, it's important to define a strategy and find specific opportunities that blockchain could enable, exploring their feasibility and planning for the long-term viability of the strategy. The goal should be the rapid realization of prototypes that drive tangible benefits and enable continuous improvement.

> The cryptocurrency is also considered the first "digital gold" resource available on the internet.

Bitcoin has triggered the creation of other cryptocurrencies. Digital money is not created by central banks. It's entirely based on peer-to-peer networks that take advantage of distributed databases spread over a vast number of internet nodes.

Blockchain enables new, value-transfer systems, powered by smart contracts and the digitization of traditional assets. It also can be used for other purposes, such as the internet of things (IoT), digital identity and proof-of-existence.

But blockchain is not limited to Bitcoin or other cryptocurrencies.

Its most prominent functionalities include the following:

Timestamping and notarization. This function enables the storage of valuable information directly within the transactions themselves.

Smart contracts. This software runs exactly as programmed, with no possibility for downtime, censorship, fraud or third-party interference, and can implement logic into cryptocurrency transactions.

Blockchain's decentralized system has inspired a lot of many disruptive use cases in different industries that could potentially revolutionize business models or create new ones.
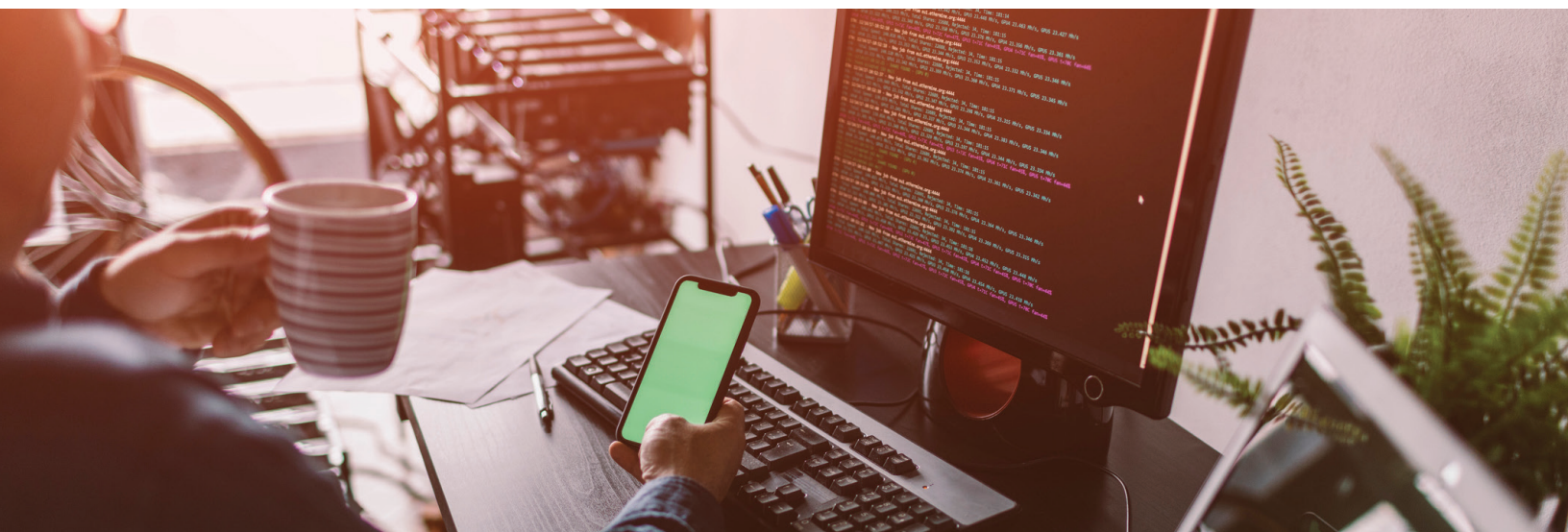
Trends

A new transaction model inspired by Bitcoin

Financial institutions are investing in digital CX because their customers demand it. Customers are on the go more now than ever before, Today, transactions are managed by traditional institutions and validated by a central authority.

Each entity has its own centralized system, and customers trust the current monetary system and institutions to manage money on their behalf.

Bitcoin has inspired a new decentralized model that relies on a distributed computer network running algorithms which validate transactions on the basis of a common set of rules (consensus).

In a permissionless network like Bitcoin, anyone can run a node. All transactions are entirely monitored and validated by these nodes (not by regulated institutions). Many people have already embraced this concept.
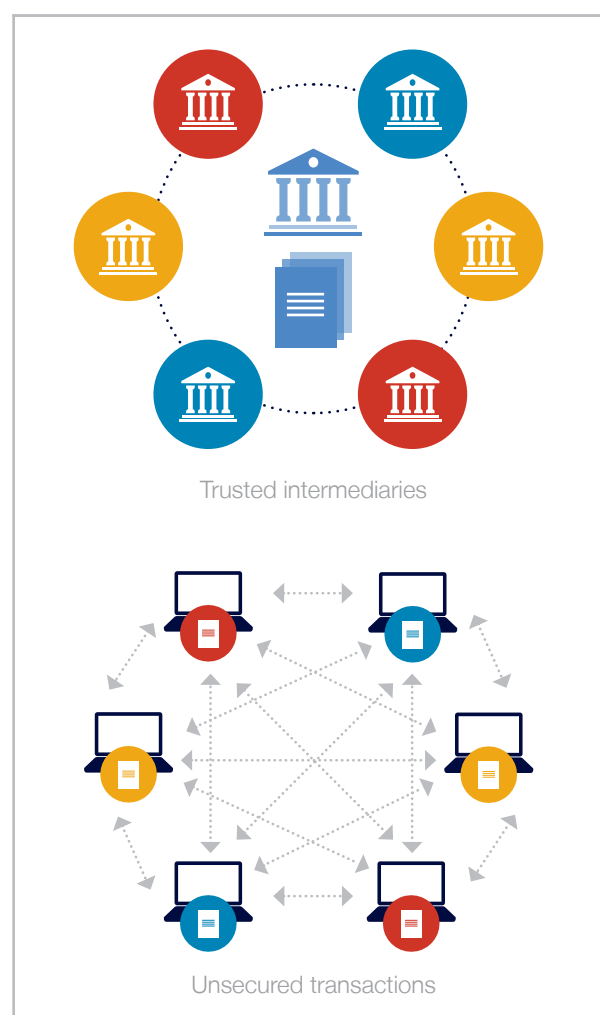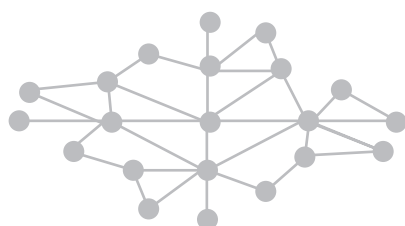
The evolution of blockchain

When consulting and technology companies became interested in blockchain, they started to work on new solutions that could be suited for enterprise needs. The new idea was to create blockchains that could serve a specific purpose other than managing a cryptocurrency and that would exclusively allow authorized members to access the network (permissioned).

This led to the differentiation between public and private blockchain, which gathered interest from financial institutions and other companies not previously comfortable with Bitcoin concepts.

Public versus private

Bitcoin, Ethereum and other cryptocurrency-based blockchains are permissionless: Anyone can run a node, and join or leave a network, and information is accessible to everyone.
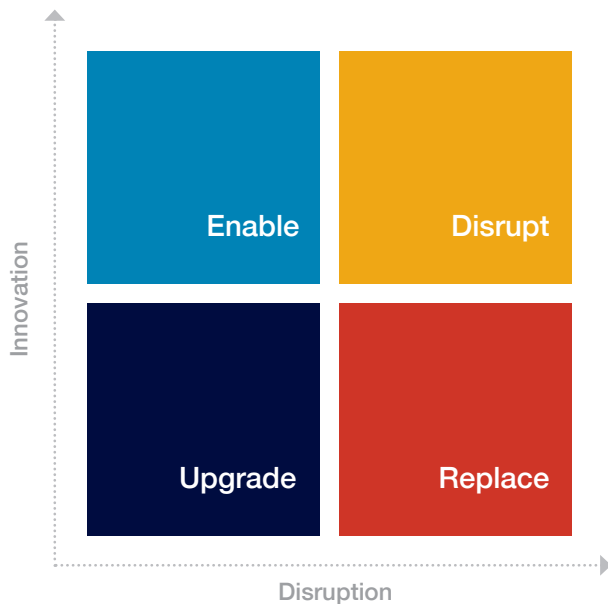

Trusted intermediaries

Unsecured transactions

Public permissionless

Private permissioned

Permission layer

The players

Enable	Disrupt
Upgrade	Replace

Innovation (vertical axis)

Disruption (horizontal axis)

Upgrade

Old players, old ideas

These are the incumbents, mainly in the finance sector, that ultimately need a central authority in many cases, this is required by law.

Blockchain's most disruptive applications are threatening the very role of traditional intermediaries. These incumbents and middlemen are trying to redesign and possibly replace the architecture of their existing technologies using distributed ledgers to improve the efficiency of their systems and save costs while keeping their roles and functions as intermediaries.

Enable

Old players, new ideas

Blockchain technology enables new features and new business ideas for existing players, even out- side the finance sector, regardless of the presence or absence of an intermediary. Existing institutions can create and add new processes to their infrastructures by integrating blockchain-based functionality like such as smart contracts and timestamping in their existing systems.

Replace

New players, old ideas

Both inside and outside finance, new players are remodelling and re-creating existing businesses and processes using distributed ledgers and achieving a dominant position. In many cases where an intermediary is still necessary or convenient, the technology provider acts as an access manager and effectively becomes a new type of intermediary, replacing traditional intermediaries.

Disrupt

New players, new ideas

New players are leveraging distributed ledgers to create new systems, new processes and new business models from scratch.

Disintermediation and decentralization are strongly pursued, as they encourage a new culture, new ways of thinking and new types of organization.

Existing institutions may become new players in a new digital frontier only if they're able to redefine their roles. Blockchain also can be foundational to other technologies (such as artificial intelligence, virtual reality, and IoT) and enable the implementation of totally new and potentially highly disruptive concepts.

Blockchain potential in current industries

Blockchain is an adaptive and innovative technology that has the potential to change current systems and businesses.

Its potential impact extends far beyond banking and financial industries. In fact, blockchain's applications range over multiple industries and fields.

Telecommunications and media
- Micropayments (music or news)
- Royalty assurance
- Cryptocurrencies portfolio & payments
- Digital identity
- Trade finance
- Digital assets
- IoT data timestamping
- Strong authentication

Energy
- Smart grids
- Charging station
- Cryptocurrencies portfolio & payments
- Digital identity
- Trade finance
- Digital assets
- IoT data timestamping
- Strong authentication

Retail and services
- Agreement with vendor
- Martketplace platform
- Supply chain
- Cryptocurrencies portfolio & payments
- Digital identity
- Trade finance
- Digital assets
- IoT Data data timestamping
- Strong authentication

Public and health
- Healthcare data
- Educational storage and verification
- Identity card as blockchain account
- Cryptocurrencies portfolio & payments
- Digital identity
- Trade finance
- Digital assets
- IoT data timestamping
- Strong authentication

Finance and insurance
- Charity platform
- Loans 2.0
- Policies automation
- Cryptocurrencies portfolio & payments
- Digital identity
- Trade finance
- Digital assets
- IoT Data data timestamping
- Strong authentication

The wide variety of blockchain's possible benefits (immutability, auditability and near real-time settlement) and use cases can't satisfy everyone's needs and sometimes can even be in stark contrast to what some participants need (Bitcoin-like blockchains provide transparency, while financial institutions need confidentiality).

This is slowly changing the idea of how blockchain is interpreted based on the varying needs of stakeholder entities: Public institutions might need transparency and auditability; financial institutions might need fast settlement and many transactions per second, but with selective disclosure of information to different transaction participants. Some use cases might need both privacy and transparency; some might not even need immutability.

To truly understand its power, let's see how blockchain could revolutionize business models in different industries.

Media
Royalty assurance

Summary

Traditionally, the media industry has traditionaliy been highly intermediated: Artists' contracts written years ago don't necessarily reflect the way music is consumed today, and royalty payments depend on airplay statistics gathered by music labels and copyright databases maintained by licensing bodies.

Description

Blockchain could resolve this challenge by connecting writers, musicians and videographers directly with consumers, as well as by making the organizations at the heart of the industry operate more efficiently. It could help identify digital rights, enabling more effective management across the industry and assuring proper compensation to artists and content owners.
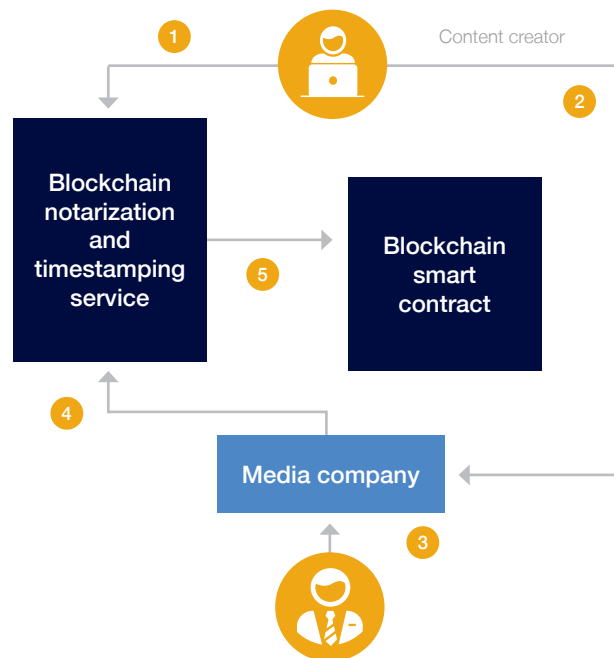
Blockchain, and in particular cryptocurrencies and smart contracts, can change the way energy is billed, paid for and managed. Smart meters can use smart contracts to store data on consumers' energy consumption and receive their payments, as well as provide energy to a customer with automatic payments in cryptocurrency made by smart contracts. Smart contracts can be also used to pay or refund customers for excess energy produced by renewable energy systems.
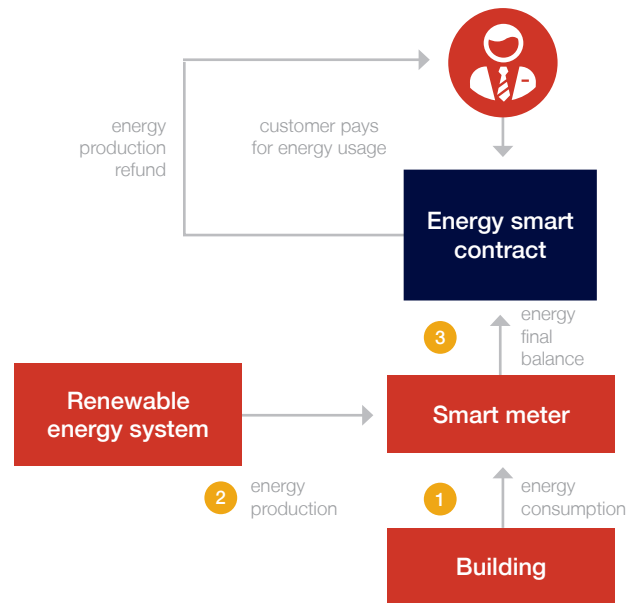
Energy, oil and gas
Smart grid

Summary
Smart grids are the evolution of electrical grids with controls, computers, automation and new technologies working together to better meet electric utility demand.

This ecosystem includes smart meters, smart appliances, renewable energy resources and communication protocols.

Description
Blockchain helps the energy sector with energy trading and risk management, distributed energy, P2P energy systems, electric vehicle charging, payment systems and asset management. Help the oil and gas commodity marketplace with transparency & compliance, cyber threat & security, efficient and automated smart contracts and reduce cost of operations. Blockchain can also help with regulatory filings and reporting by improving transparency.

energy production refund

customer pays for energy usage

Energy smart contract

3 energy final balance

Renewable energy system

Smart meter

2 energy production

1 energy consumption

Building

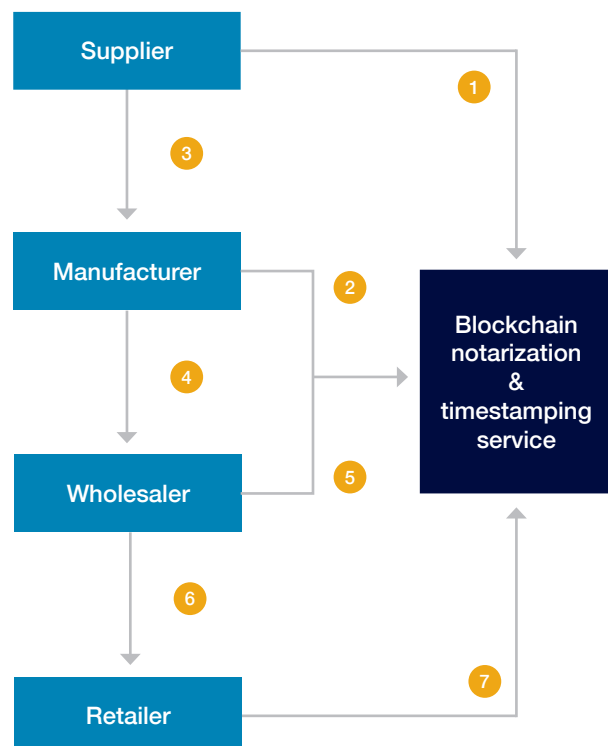# Retail & services
Supply chain traceability

Summary
Tracking and authentication, as well as understanding food provenance and condition, are critical in finding and helping address sources of contamination and unexpected incidents in the worldwide supply chain. The main challenge is setting up technology for every supply chain participant, so that data can be collected and made available along with other data from across the supply chain. For example, innovative data entry tools running on smart-phones with cloud technology back-ends are expected to enable field workers to share relevant data, thus improving supply chain efficiency, identifying bottlenecks and reducing waste.

Description
Blockchain can transparently track the provenance of goods as they pass from one organization to the next, building trust and awareness in the process.

Blockchain provides a permanent record of transactions, which are then grouped in blocks that can't be altered. When applied to the supply chain, product information is digitally tied to each item and then inserted in the blockchain.

Supplier

1

3

Manufacturer

2

4

Blockchain notarization & timestamping service

Wholesaler

5

6

7

**Retailer**

Public & health

Healthcare data management

Summary

Patients' medications are frequently prescribed and filled by different entities (such as hospitals, provider offices and pharmacies, etc.). Each maintains its own records of patients' medications, frequently with outdated or incorrect information. As a result, providers in different networks, may not have complete visibility of prescriptions. Additionally, electronic prescriptions must be directed to specific pharmacies and paper prescriptions can be duplicated or lost.

Description

Blockchain technology has the potential to transform healthcare, placing the patient at the center of the healthcare ecosystem and increasing the security, privacy, and interoperability of health data. This technology could provide a new model for health information exchanges by making electronic medical records more efficient, disintermediated and secure.

Patient

1

Hospital

2

Blockchain notarization & timestamping service

3

4

Pharmacist
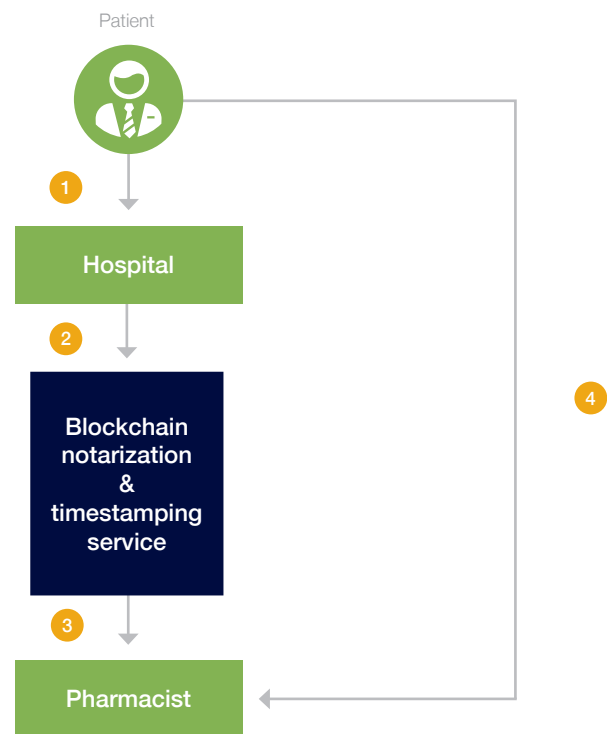
Finance & insurance

Policy automation

Summary

Insurance policies are contracts between the insurance company and the insured (policyholder). The contract determines the conditions where the policyholder has financial coverage in case of a specific event.

Today, policies are created and managed through the use of insurance companies' proprietary platforms and through detailed analysis of conditions and events to make payment decisions in the claims process.

Description

Smart contracts and oracles can improve insurance policies. Smart contracts can encode the logic of the policy, and oracles can provide trigger event data from reliable information sources.

Policy holder   **Oracle**

3   **Policy smart contract**   2

Payment   Trigger event

1   Create policy smart contract

Insurance company
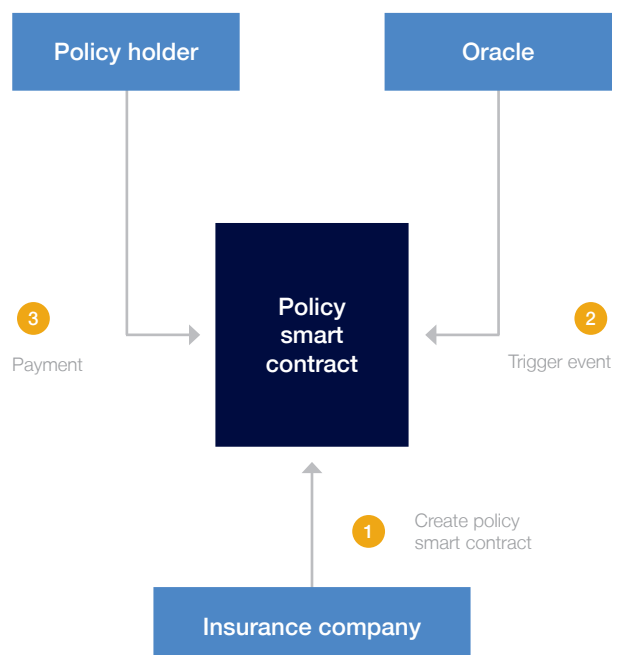
Cross market trade finance
### Trade finance

Summary

Trade finance is the process of financing trade activities between exporters and importers, reducing the risks for the participants. These activities involve third-party intermediaries such as banks, insurers and others.

Financial institutions cover issues of liquidity, currency fluctuations, political instability, and non-payment. Current solutions are letters of credit and bank guarantees that have a cost and rely on contracts.

Description

Smart contracts and cryptocurrency can change this process completely. Trading rules can be encoded in a smart contract that manages the payment process in a transparent and immutable way when certain trigger events occur (such as delivery, customs check and goods inspection, etc). If lack of liquidity is a problem, financial institutions can subsidize it by providing loans based in cryptocurrencies and smart contracts in a transparent way, connecting financing to the smart contract.
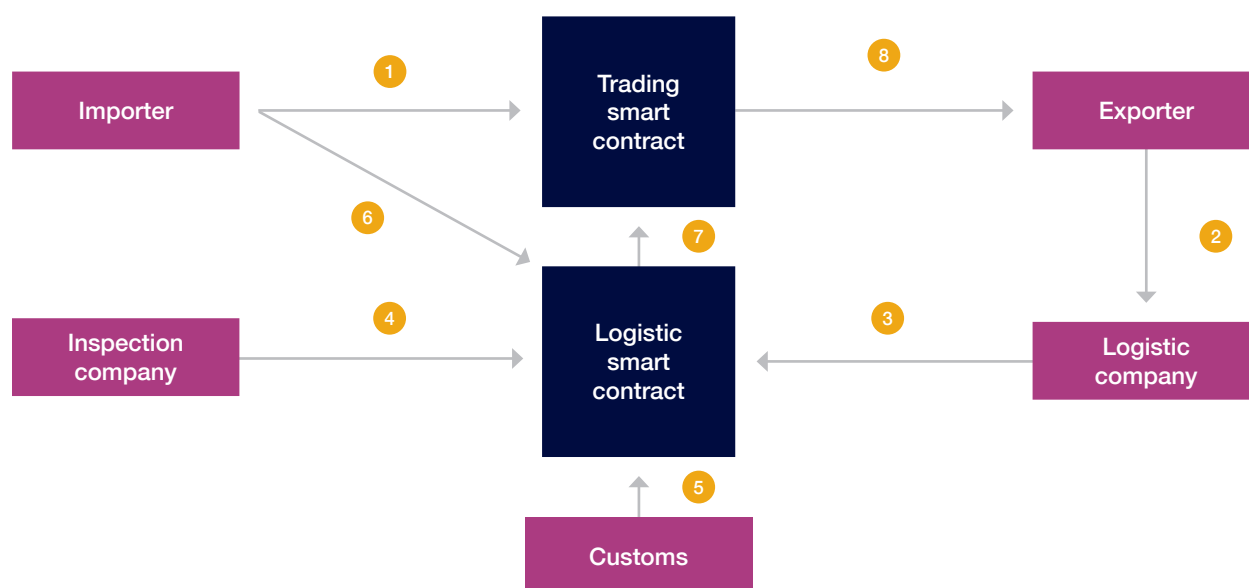
Regulatory

Regulators all over the world are struggling to define the nature of virtual currencies and the appropriate set of rules to be applied. Not surprisingly, laws vary considerably depending on the country and the context. Among the main issues policy makers face are the following:

- **The definition of cryptocurrency.** Is it a currency, a commodity, a payment meth- od, a technology, a security or something else completely?
- **The reference laws.** Which tax regulation should be applied? How should anti-money laundering (AML), know your customer (KYC) and counter-terrorist financing (CTF) be applied?
- **The differentiation of rules applied to individuals and companies** (like digital currency exchanges and custodial wallet providers). To what type of regulation should digital currencies be subject? How do we deal with noncustodial and multi-signature wallets?

11

The European Union started legislating on cryptocurrencies in February 2017:

The European Parliament proposed banning the geo-blocking of digital currency users.

It released draft legislation outlining the plan to monitor cryp- tocurrency users by assigning virtual currency 'addresses' to the identities of virtual currency owners. In addition, it's evaluating the possibility of allowing users to voluntarily self-declare to proper authorities.
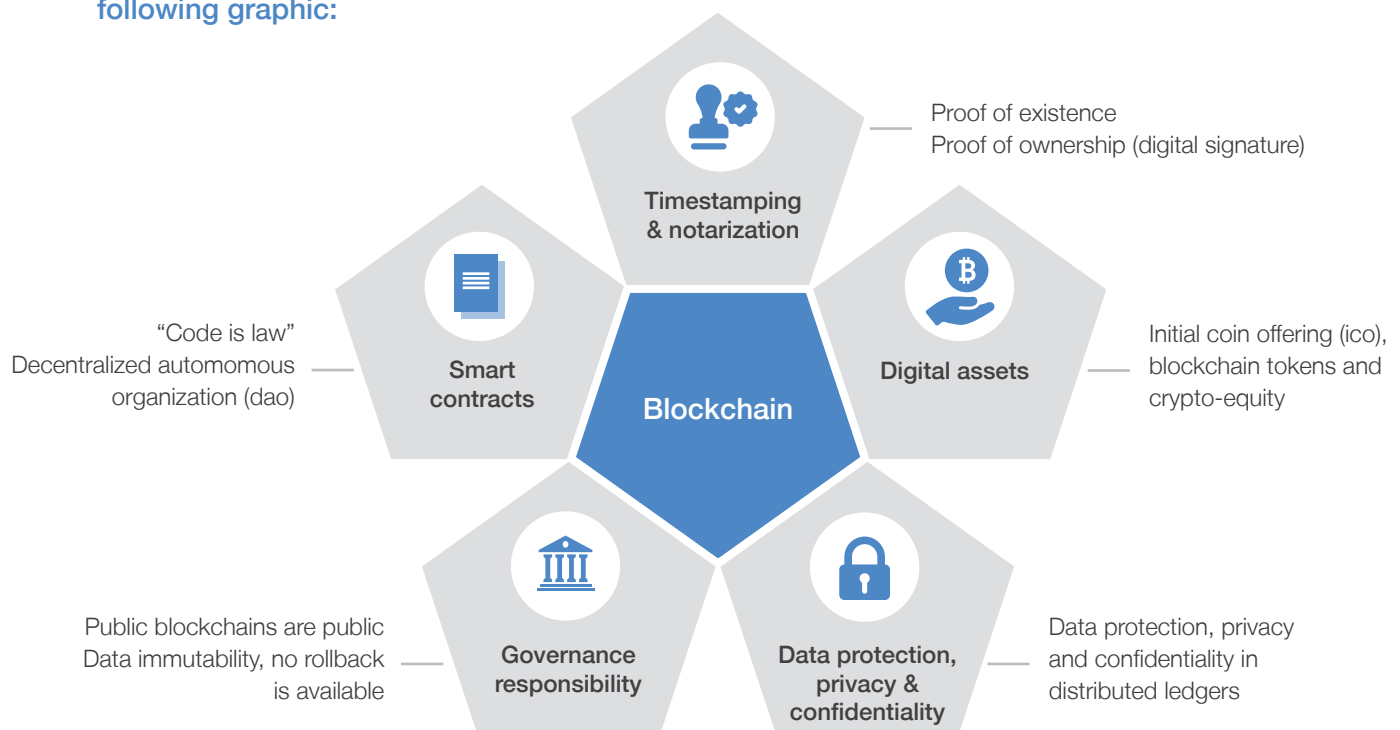
Japan began recognizing Bitcoin as a legal method of payment on April 1, 2017. The country's legislature passed a law following months of debate that brought Bitcoin exchanges under AML and KYC rules while also categorizing Bitcoin as a type of prepaid payment instrument.

Regulation isn't only for cryptocurrencies. Blockchain is far more than a ledger for cryptocurrencies, yet lawmakers have been unable to keep up with this fast-evolving technology. Authorities will soon begin to look beyond cryptocurrencies to understand the legal implications of other applications of blockchain technology. There must be a dedicated effort to identify gaps in current regulations and determine how to fill those gaps without premature or overly burden-some regulation.

Lawmakers may even see opportunities to use blockchain in regulatory work, rather than just seeing it as something to be regulated. The key factors that make this technology so interesting for lawmakers are the following:
- Decentralized proof of validity
- Improved speed
- Reduced friction
- Immutable public ledger with all relevant history

The main open issues that must be addressed by regulators are highlighted in the following graphic:

Proof of existence
Proof of ownership (digital signature)

Timestamping & notarization

"Code is law"
Decentralized automomous organization (dao)

Smart contracts

Blockchain

Digital assets

Initial coin offering (ico), blockchain tokens and crypto-equity

Public blockchains are public
Data immutability, no rollback is available

Governance responsibility

Data protection, privacy & confidentiality

Data protection, privacy and confidentiality in distributed ledgers

Recommendations

The results that can be expected from the adoption of blockchain technology depend on the adopted approach.

A range of blockchain adoption approaches are available

Strategy definition: Find specific opportunities for use, where technology can make a difference, emphasizing the distinction of the company against the competition.

Feasibility, analysis and plan: Explore the feasibility and availability, with a practical hypothesis. Consider how much technology is apparent to end users. Respect regulatory mandates and legislation. Consider the competitive scenario, its capacity for innovation and the need for regulatory compliance.

Build and release: Achieve good prototypes, with a view to continuous improvement. Measure immediate results and try to assess how to release new services, calibrating efforts and objectives with appropriate scale. Consider how to make fair returns and what are the most likely cooperation scenarios.

Blockchain is an innovative concept, but it should not be hailed as a cure-all. We encourage research and development teams to first envision a logical idea of how blockchain could be used and then go through the steps for its technological implementation.
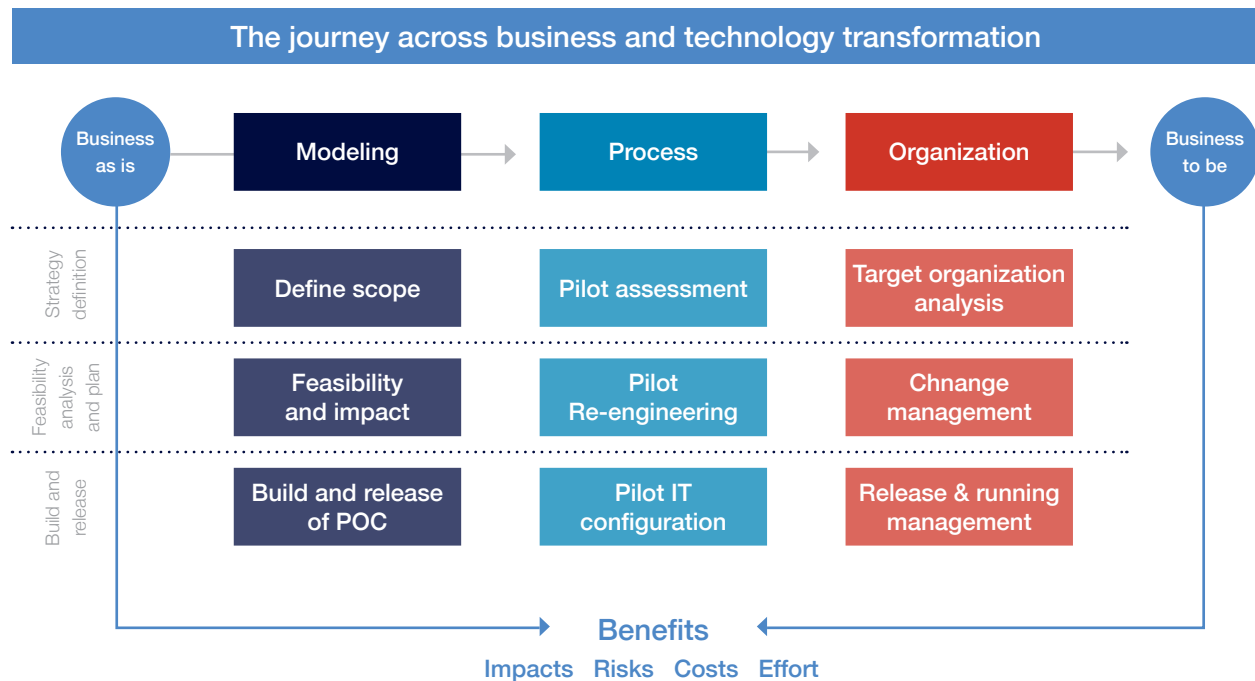
Through solid know-how, skills and core competencies, NTT DATA Services tracks where technology is heading and helps our clients foresee future problems and prepare solutions.

NTT DATA's approach is to apply a comprehensive framework, identifying innovative solutions that emphasize competitive advantage, meeting and possibly exceeding current market demands by leveraging efficient business solutions.

Blockchain is an innovative concept, but it should not be hailed as a cure-all. We encourage research and development teams to first envision a logical idea of how blockchain could be used and then go through the steps for its technological implementation.

A methodological approach is needed to rethink processes, redesign architectures and core applications, and question methods and compare them with existing solutions. It's important to understand how to adopt, adapt and harness blockchain to benefit business, as well as understand the cost for its adoption.

"The transformation has to make sense." The key word is "trade-off," between costs and benefits. , and between business and technology choices. It i's important to fully comprehend actorsparticipants, their roles, and goals when identifying use cases.

The journey across business and technology transformation

	Business as is	Modeling	Process	Organization	Business to be
Strategy definition		Define scope	Pilot assessment	Target organization analysis	
Feasibility analysis and plan		Feasibility and impact	Pilot Re-engineering	Chnange management	
Build and release		Build and release of POC	Pilot IT configuration	Release & running management	

Benefits

Impacts   Risks   Costs   Effort

In the context of continuous evolution, NTT DATA proposes an end-to-end modeling solution, starting with gathering business requirements and then, defining and analyzing impacts and finally implementing use-cases.

For those solutions with a positive business case, rationalization and solution implementation will occur in the mid-term, with robust transformation of processes and business models.

For both for startups and established companies, NTT DATA can assess the benefits of adopting new technology with a practical approach across the innovation process and scaling solutions to fit the business need.

NTT DATA can help you:

Define scope
Evaluate what blockchain technology means to your business and propose ideas that would leverage it to the fullest while avoiding potential problems. Understanding your business's market differentiation is important to making the right business and technology choices.

Explore feasibility and impact
Evaluate potential solutions against specific business issues. For example, if a solution effectively addresses a business need by automating and speeding up a process and reducing cost, it has a greater potential to succeed. However, interesting technology-focused experiments without a clear link to business problems will encounter difficulties and probably won't succeed.

Build and release proof of concept
Illustrate solutions that NTT DATA can provide for defined proof of concept enablers.

Visit **nttdataservices.com/blockchain** to learn more.

NTT DATA
Trusted Global Innovator