



| IOTA FOR BUSINESS

# Permissionless Innovation

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How to enhance your  
business with IOTA

IOTA Foundation

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# Welcome to IOTA

Grow your business opportunities through secure and scalable distributed ledger technology.

Where will your business be in five or 10 years?

The global digital economy of the near future can seem as bewildering as it is exciting, with several technological revolutions redrawing the roadmap, presenting new challenges and creating opportunities for new business models and job creation. IOTA is here to help your business face these challenges head-on.

Let's look at some of the trends shaping tomorrow's business landscape.

A hyper-connected future is being built on top of artificial intelligence, machine learning and billions of interconnected devices that exchange data and value, enabling machines to become active economic agents and unprecedented amounts of data to be processed in real-time. Think of electric cars that store energy before selling that energy back into the grid using a charging station as a conduit, or devices that track the delivery of goods across an entire supply chain.

Meanwhile, the combination of decentralized ledger technology and cryptocurrencies is creating new token economies that open up previously undreamt-of business models and communities, such as NFTs, decentralized autonomous organizations (DAOs), tokenizing previously dormant assets and smart contracts.

And the advent of the decentralized internet, Web3 – with DeFi (decentralized finance) as its first “killer app” – promises a shift away from a centralized platform economy to an ecosystem in which all contributors can profit in value creation.

For businesses to compete in this new digital economy, they need to be on top of data security and take advantage of flexible new business models, such as monetization of data, functions on-demand and pay-per-use.

IOTA builds the technical, decentralized infrastructure for the new economy, an infrastructure that is free for you to use to empower your business.

## What is distributed ledger technology (DLT)?

Distributed ledger technology (DLT) refers to a network of nodes that replicate, share, and synchronize digital data and value spread across many different locations. Unlike with a centralized database, there is no central administrator. Famous examples include blockchain and directed acyclic graphs (DAG): see page 6 for a comparison between the two examples.

IOTA is a green, decentralized and open-source digital infrastructure. It is built on the IOTA Tangle, an open, feeless and highly scalable distributed ledger protocol, designed to support frictionless data and value transfer. IOTA is designed to be the most reliable distributed ledger technology (DLT) for Web3 applications and digital economies.

IOTA empowers businesses like yours to build solutions with its open-source tech stack. Its products and solutions solve specific industry problems and offer a broad range of functionalities to users, while its series of frameworks make it easy to tailor your solutions across different verticals. It also opens up the field for completely new, emerging verticals that benefit from Web3's qualities, such as decentralization, trustless verifiability, self-governance, new funding opportunities, native built-in payments, native token interoperability and more.

IOTA can aid your business overcome roadblocks, such as the following examples (find more details on pages 7-9):

## 1. SECURITY

In a connected economy, the security of each device is critical. Successful businesses win the trust of their audiences that they can protect data. IOTA secures data with the Tangle's state-of-the-art cryptography: all transactions are conducted using safe cryptographic encryptions.

## 2. NETWORK STABILITY

Businesses need networks that can handle an increasing amount of participants and transactions. Bottlenecks are bad for business, and network stability has to be maintained continuously across different platforms without a single point of failure. IOTA is highly scalable, with virtually no limit to the number of devices in the network, and can already process over 1000 transactions per second.

## 3. CONTROL

Businesses and individuals need to have control over their online identities and decide who gets access to their data, when and for what purpose. IOTA provides frameworks like IOTA Streams and IOTA Identity to grant access to immutable data to specific parties, and allow participants to verify data authenticity without having to go through central intermediaries.

## 4. MONETIZATION

To monetize their data, businesses need to be able to transact value and data at little or no cost, avoiding the high or volatile transaction fees that can cripple business models in the DLT space. IOTA is free of transaction fees, so it will never cost more to carry out a transaction than the actual value of that transaction.

This paper lays out how the IOTA Foundation collaborates with organizations of all sizes across industries to develop innovative solutions and business models – join us and see how your business can benefit from IOTA.

# IOTA – not just another blockchain

The IOTA protocol (known as the Tangle) is a distributed ledger technology (DLT). As such, it offers everything blockchain technology offers and more. It is built on a different technical basis, using a directed acyclic graph, which enables the parallel processing of transactions.

The original ideas and concepts behind blockchain and Bitcoin were about absolute security and decentralization, neglecting aspects such as interoperability, scalability, energy efficiency and environmental impact. Consequently, early projects face significant difficulties in remaining functional as the network grows.

Bitcoin and Ethereum, for example, have seen a high increase in their transaction fees, making them unviable for low-value transactions, as fees can easily exceed the transaction amount. More recent blockchain concepts try to work around these deficiencies, offloading some features to separate protocols, networks or centralized systems outside (“off-chain”) the distributed ledger. However, these new concepts do not fundamentally solve the negative effects but abstract them, introducing additional friction, complexity, fees and security risks.

IOTA takes a different approach to provide a generally usable, scalable, interoperable and energy-efficient network.

The Tangle consists of individually connected transactions, forming a directed acyclic graph (see the diagram on the next page). Each new transaction validates at least two previous transactions.

Whereas blockchains rely on miners to select and aggregate the transactions with the highest fees into a sequential chain of blocks, the Tangle can process transactions in parallel, scaling with growing activity in the network. As transactions are confirmed by the users of the network and can be handled on an individual level (they are not locked into blocks), the IOTA protocol offers better flexibility for conflict resolution, as well as independence from paid third-party validators and miners.

# What value does IOTA create for my business?

Its unique features make IOTA the perfect choice for a wide variety of business use cases.

Real-time data integrity at scale, combined with feeless transactions of data and value, make machine-to-machine communication and data sharing between unknown counterparties feasible. This enables companies to monetize their data by sharing it with others (e.g. along the supply chain) and devise new offerings for customers (such as energy microgrids, where prosumers trade energy locally).

IOTA can be used for secure data transactions without having to buy or hold cryptocurrency. This distinguishes IOTA from other blockchains or DLT protocols and is a strong economic advantage for companies that want to benefit from a DLT but are concerned about cryptocurrency. Instead of a token fee, in some cases IOTA requires a deposit of tokens to secure data on the main ledger. This deposit will be returned in full when the issuer “archives” the data.

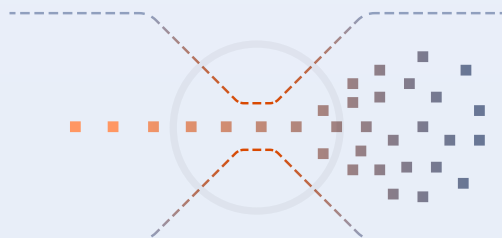
The IOTA Foundation’s contribution to the evolution of DLT is the development of open-source software for individuals and companies. This includes advancing the core protocol, but also (co)developing technology frameworks and products, making it the leader in the next generation of DLTs and a spearhead of secure, green and nonprofit software engineering.

Businesses can also derive value from IOTA frameworks, which extend the core protocol with adaptable solutions that solve overarching problems. For example, the IOTA Identity framework enables people, organizations and machines to create and have complete control of their digital identity, while IOTA Stronghold isolates digital secrets from exposure to hackers and accidental leaks. Instead of building the same functionality from scratch for every application, businesses can rely on frameworks, adapting them to their needs.

## Comparing blockchain with the IOTA Tangle (directed acyclic graph)

Connected blocks with a limited number of transactions each

Single transactions

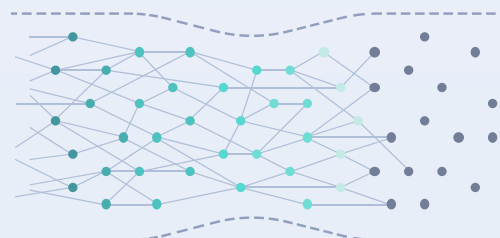


### BLOCKCHAIN

- Decentralized
- Low scalability
- (Unpredictable) transaction fees
- Low throughput
- High energy usage

Directly connected transactions

Single transactions



### IOTA

- Decentralized
- High scalability
- No transaction fees
- High throughput
- Low energy usage

# Which features are important for business and why they matter

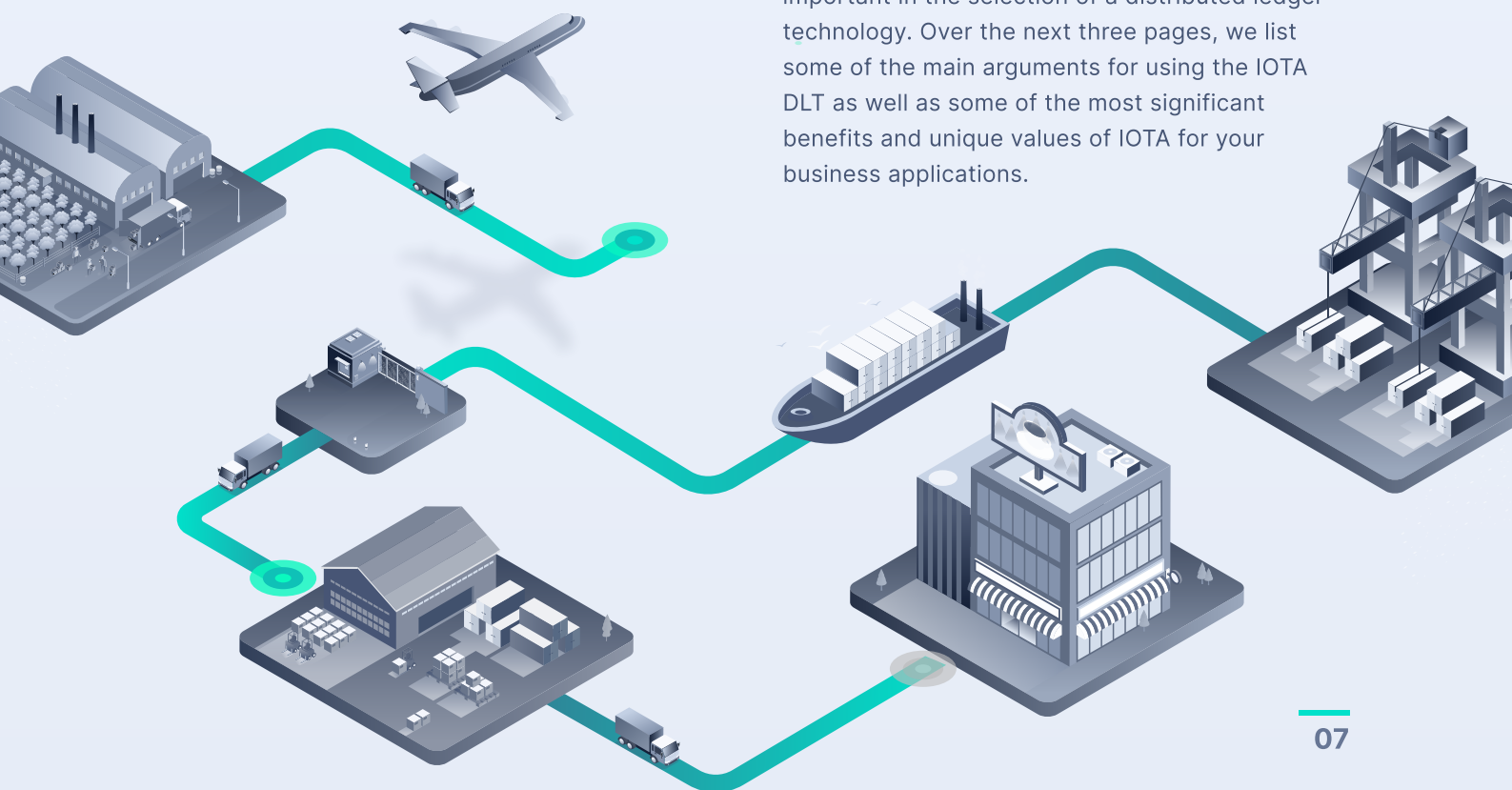
IOTA has been developed as a base layer for transactions of data and value without the drawbacks of blockchain.

While centralized IT and payment systems can be cost-efficient, secure and fast, they lack the main advantages of DLT, which is to be decentralized and trustworthy across unknown entities. Traditional blockchain, meanwhile, can present challenges in terms of cost-efficiency and scalability.

Centralized platforms have ultimate control over your data while securing data is costly and data corruption, fraud and error can threaten the strongest network. By removing a central point of control, DLT removes the single point of vulnerability for your data.

For example, PayPal is centralized and only transfers value; Bitcoin transfers data and value but sets significant barriers in terms of high transaction costs, slow speed, and heavy energy consumption. IOTA, on the other hand, combines a secure and sustainable solution for the transfer of both value and data.

IOTA's architecture is designed to be suitable for many different use cases, which is why the highest industry requirements were taken into account in the development of the IOTA protocol. When companies choose a technology on which to build their solutions and products, it is vital to ensure that the technology is future-proof to minimize the risk of investment. Therefore, companies need to understand which criteria are important in the selection of a distributed ledger technology. Over the next three pages, we list some of the main arguments for using the IOTA DLT as well as some of the most significant benefits and unique values of IOTA for your business applications.



# IOTA is...



01

## IOTA is secure

The whole system is distributed across many network participants and validators and therefore has no single point of failure or single point of attack. Attackers will be recognized and circumvented by the network, which ensures the functionality of the distributed ledger. Unlike vulnerable centralized systems, data stored on IOTA cannot be compromised unless all network participants are compromised at the same time. IOTA comes with in-built security through its Stronghold framework. IOTA Stronghold can be used for privacy-critical functions of IOTA clients (i.e., private/public keys management) and provides state-of-the-art cryptography (i.e. noise protocol) enabling devices to safely work together.



03

## IOTA is feeless

IOTA's protocol is free of transaction fees. Consequently, the fees of a transaction will at no point exceed its value. The protocol also allows the separate transfer of data and value, so that network participants can execute data transactions without needing to attach a value to it. On-ledger data transactions require a deposit of IOTA tokens which will be returned when the data is declared obsolete and is no longer kept in the ledger state. Where other DLTs decrease the stack of cryptocurrency tokens through transactions, the IOTA token can be considered an opportunity cost instead. The number of held IOTA tokens will not decrease; instead, by holding IOTA tokens the owner secures prioritized transactions in case the network reaches capacity limits in the future.



02

## IOTA is lightweight

The hardware/processor requirements for the nodes are very modest. On the client side, we offer libraries down to the C-language. This enables a broad range of device types to connect to the Tangle. IOTA does not rely on Proof of Work consensus, hence the energy consumption of each device is very low, which enables the protocol to run on small single-board computers and edge devices. As an example, IOTA can implement a wallet on the devices such as the [ESP32](#) or the [ST X-CUBE-IOTA1](#).



04

## IOTA is frictionless

The absence of transaction fees means that data and value can be transacted for low to no costs. Data-related functions of the IOTA network are accessible to everyone. For example, when using the IOTA Identity framework, a decentralized identity can be created and verified through a small storage deposit. In the case of complex smart contract ecosystems, IOTA enables a native interconnectivity of those systems and their tokens, without the need to pay for risky bridge services.





## 05 IOTA is scalable

There is virtually no limit to the number of devices communicating on the Tangle. Unlike other architectures that process transactions one after the other in packages/blocks, IOTA's Tangle technology provides parallel processing where transactions can be processed simultaneously. This enables IOTA to process over 1000 transactions per second, while Bitcoin can process seven and Ethereum is currently able to process 15 transactions per second, respectively. Adding more connected devices does not automatically incur additional costs for having to scale the related decentralized server infrastructure. To facilitate this scalability, IOTA is the only DLT that utilizes the principles of the Nakamoto Consensus in combination with the DAG, whereas most other DLT projects are forced to sacrifice decentralization (=number of validators) in order to improve scalability.



## 06 IOTA is being standardized

The IOTA Foundation works with the Object Management Group and other standards bodies like [EPICS 2.0](#) to provide a high level of interoperability to other ecosystems. This is important to ensure that all network users and devices can understand and communicate with each other and to avoid any lock-in effect due to a closed system.



## 07 IOTA is permissionless and leaderless

IOTA's permissionless solution means there are no gatekeeping third parties paid to validate transactions and secure the integrity of the ledger. Anyone can use the infrastructure without having to pay someone for it or asking for permission from gatekeepers. IOTA is also leaderless: its consensus doesn't rely on a single or a few selected network participants. Instead, every node in the network reviews passing transactions and raises a flag in case of an anomaly, triggering other participants to vote on the potential conflict.



## 08 IOTA is open source

There is no requirement to enter into any dependency with the IOTA Foundation to benefit from the capabilities of IOTA technology and to contribute to the IOTA network. The network and related frameworks can be used free of charge and without the consent of anybody. All software by the IOTA Foundation is open source, to be reviewed and improved by a community of developers. In addition, about 180,000 community members contribute on various platforms by writing code, testing software, providing ideas and discussing the development of our projects.



## 09 IOTA is flexible

While many DLTs can be used as either a public ledger (permissionless) or a private ledger (permissioned), IOTA enables both. In a typical public blockchain, everyone can participate, whereas in a permissioned ledger every node that participates is pre-selected. But this solution is less decentralized and usually excludes the possibility of interaction with third parties. IOTA provides flexibility by offering both a public and a private Tangle, in which each transaction takes place in its own consortium or on-premise environment.

# Why and when your organization should use IOTA

The benefits of IOTA differ from company to company. In essence, it must be evaluated whether a trust mechanism can save money and time, or whether feeless value transactions can replace an existing payment model in a way that creates value.

## DO YOU NEED A DLT? YES, IF:

- Your organization shares and views shared data with multiple parties.
- The integrity and origin of data (audit trail) are crucial.
- Your organization and other parties do not trust each other and/or your consortium has high costs related to third-party governance and intermediaries.

## DO YOU NEED IOTA'S FLEXIBLE DATA SHARING? YES, IF:

- You need each actor to rely on secure and private sharing and/or control of data access across many parties

## DO YOU NEED IOTA'S FEELESS CRYPTOCURRENCY AS A MEDIUM OF EXCHANGE? YES, IF:

- Speed of execution and automation is important for your business case, e.g. short settlement and interaction times.
- You have a business model with very small value increments (micropayments).
- Your current business has a high percentage of costs resulting from transaction fees.

## DO YOU NEED IOTA AS AN OPEN DLT? YES, IF:

- You are looking for a globally available data infrastructure to which you and your partners can directly connect in order to share data and payments.
- You are looking for a layer of trust between unknown parties.

## WHEN DO YOU NOT NEED A DLT?

- If your data is meant to be kept on central systems, such as databases.
- If all the participants are known and trusted.

**If some of these points apply to your business, then you should consider using IOTA. We can support you to make it happen.**

**Get in touch with IOTA for Business at [contact@iota.org](mailto:contact@iota.org)**

# Which use cases can be built with IOTA?

**In principle, any industry can benefit from the advantages of IOTA.**

Whenever it comes to securely sharing or exchanging data and assets, IOTA can be used as the trust layer and underlying protocol. To verify data sources, documents, contracts, identities and official certificates, the IOTA protocol automatically provides the security and trust that would otherwise rely on third parties.

DLT also offers transparency in the origin of materials or products. The fact that every step in a chain can be documented in a non-manipulable way creates trust in a company's products. The entire supply and manufacturing chain of products can be tracked and traced without gaps. Thanks to its architecture, IOTA also offers many other use cases and new business opportunities: unique identification of people and machines, micropayments, secure globally available transactions in real-time, and more.

Organizations across different industries are already seizing the advantages of DLT, applying it to various use cases, including the Internet of Things, Industry 4.0, smart homes, smart cities, transport, mobility, global trade and supply chains, eHealth, to name just a few.

IOTA is the underlying technology for many ground-breaking use cases. Over the next pages, we highlight some recent use cases involving IOTA technology: businesses, nonprofits and government/EU-funded organizations have adapted different facets of IOTA for their specific needs. We hope this inspires you to picture how IOTA can innovate your business.





## INDUSTRY 4.0

# Increasing high reliability in data for business-critical decision making through the Data Confidence Fabric

### USE CASE

Dell Technologies and Intel

Modern industries rely on automated algorithms to make business-critical decisions. These algorithms can improve the speed and quality of decision-making, but only if the underlying data is trustworthy – which becomes more difficult to ascertain as data sets grow. Together with Dell Technologies and Intel, the IOTA Foundation is working on Project Alvarium. The project develops unprecedented methods for evaluating and guaranteeing the reliability of ever-growing data sets, collected from various sources including intercompany data transactions. This will increase reliability and efficiency in decision-making processes and can reduce costs.

### FURTHER INFORMATION

For more information on IOTA's engagement with the Data Confidence Fabric concept, access the [Project Alvarium announcement](#) and [webinar](#).

Other IoT use cases that can be enabled through IOTA include:

- Digital Twins: see [our blog post about the eClass whitepaper](#)
- Digital signature for validating digital rights.
- Over-the-air updates for IoT devices.
- Protecting industrial facilities from cyber attacks and occurring faults through Digital Ghost, a real-time, active cyber-defense system for industrial control systems.
- Enabling the machine economy through [autonomous agents](#). To learn more about IOTA-powered Industry 4.0 use cases, see also: [Industrial IoT in the IOTA Foundation blog](#)



**Steve Todd**

*Vice President Data Innovation and Strategy, Dell Technologies*

*"Data confidence is needed to manage data at scale, creating systems of trust in this data so users at all levels understand the terms of use. Our latest Data Confidence Fabric prototype and white paper with IOTA and Intel emphasize this privacy; now we are looking for more partners via Project Alvarium and the LINUX Foundation."*



**Thorsten Kroke**

*General Manager, eCI@ss*

*"IOTA's vision regarding autonomous machine-to-machine communication, where secure data exchange takes place without the loss of key information for decision making, are fundamental requirements for Industry 4.0. Together with IOTA's Tangle and the ECLASS standard, we are happy to help develop secure and reliable data transmission in Industry 4.0."*



## TRAVEL AND E-HEALTH

# Developing a secure global vaccine verification system

### USE CASE

Zebra Technologies

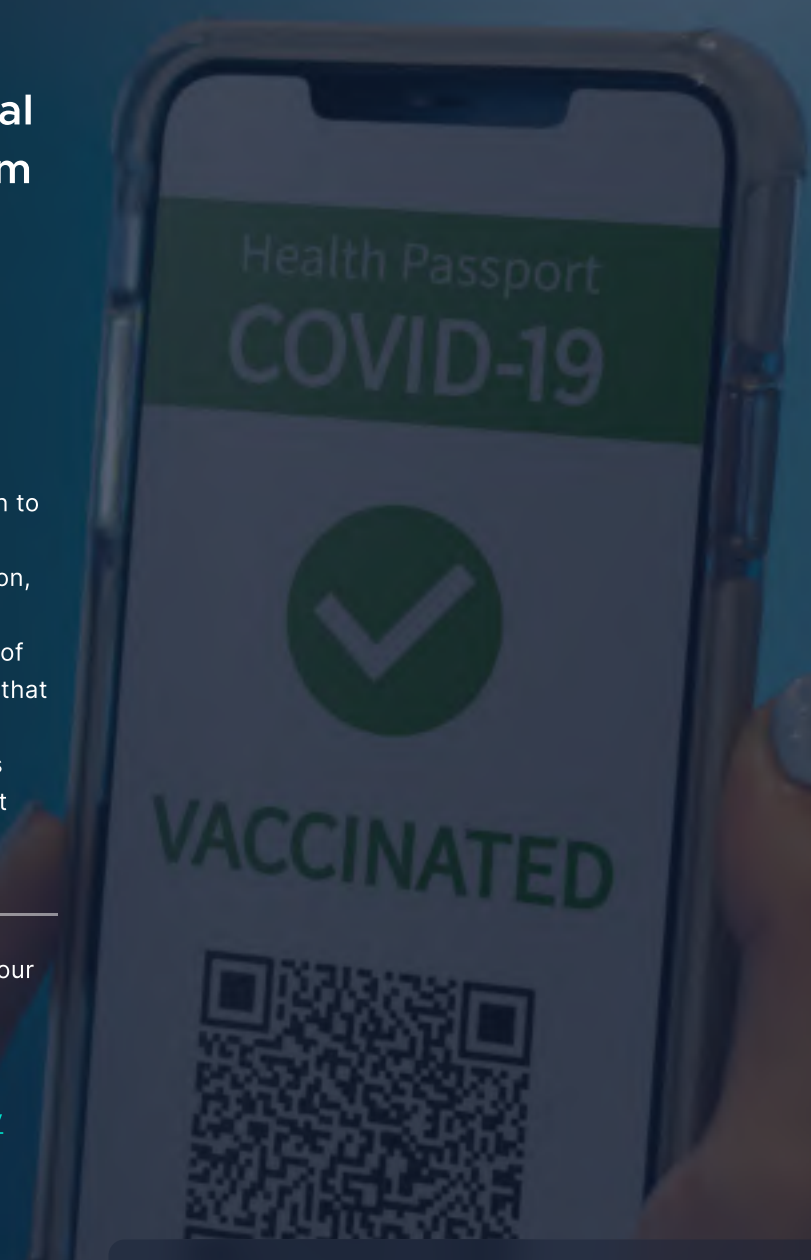
The restrictions imposed by the COVID-19 pandemic have given rise to the challenge of allowing people to travel safely. Zebra Technologies worked with the IOTA Foundation to overcome this challenge and facilitate the free movement of citizens within the European Union, to provide an open, secure and interoperable infrastructure for the creation and verification of digital green certificates. Certificates validate that a traveler has been vaccinated against, tested negative for, or recovered from COVID-19. This helps create a safer, more flexible and efficient travel process.

### FURTHER INFORMATION

For more insights into travel and eHealth, see our [blog post on Digital Green Certificates](#).

For more impressions on eHealth, see also:

- [Video on Selv – A digital health passport by Dentons and IOTA](#)
- [Selv demo](#)
- [Blog post on Selv Digital Health Passport](#)
- [IOTA FutureProof #4: Digital Identities](#)



**Alex Fryer**

EMEA Regional Product Manager,  
Zebra Technologies

*“With IOTA we are aiming to help free society from COVID-19 restrictions. Together, we have created the building blocks of a solution to combine Zebra Technologies and IOTA technologies to develop a secure global vaccine verification system that is accessible to all.”*



## SMART CITIES

# Using traffic data in public infrastructure securely and in real-time

### USE CASE

ETO Gruppe

To facilitate smart traffic infrastructure, ETO Gruppe uses IOTA for a sensor module embedded in intelligent delineators. The delineators exchange with each other data essential for safe autonomous driving, such as information about traffic or weather. Low power consumption and processing requirements enable the creation of a secure end-to-end history of the urban environment's safety conditions. This will also allow the general population to optimize their route based on the current state of traffic, enabling individuals and businesses to save time and, consequently, costs, without fear of critical data potentially being tampered with.

### FURTHER INFORMATION

For further information, see the [video](#) and [article](#) from ETO Gruppe on traffic infrastructure sensors.



## NEW MOBILITY

# Enabling tiny amounts of data worth fractions of a cent to be monetized

### USE CASE

Jaguar Land Rover

Microtransactions are a key element of the Internet of Things. Cars, for example, acquire vast amounts of weather, road and traffic data. However, because of current data monetization models, it is unfeasible for the car to sell the data it collects; the third party facilitating data collection and processing receives a merchant fee, and if the merchant fee exceeds the value of the collected data, the car can not sell it. IOTA eradicates the problem of merchant fees, so even small amounts of data (worth fractions of a cent) can be sold. Together with Jaguar Land Rover, the IOTA Foundation is working to embed IOTA in vehicles, enabling drivers to share information about traffic or road conditions and earn money in return.

### FURTHER INFORMATION

For more information, see:

- [Blog post: Earn as you drive with Jaguar Land Rover and IOTA](#)
- [Video: Earn As You Drive with Smart Wallet Technology](#)
- [Video: Cities of the future](#)





## NEW MOBILITY

# Enhancing interoperable and smart vehicle charging systems

### USE CASE

#### Mobility Open Blockchain Initiative

Charging electric vehicles is time-consuming and complex. Enabling digitized, automated payments from the vehicle directly to the supplier can reduce the complexity. Using IOTA, cars can pay autonomously for electricity through wallets embedded directly into the car's operating system and charged with money earned by selling weather data, for example (see the case on previous page).

Zero transaction fees further reduce costs. Once embedded, the wallet can also serve additional use cases, such as parking (see next case) or sharing. As part of the Mobility Open Blockchain Initiative (MOBI) and together with companies such as Honda and General Motors, IOTA is developing a global standard for decentralized vehicle charging systems.

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#### FURTHER INFORMATION

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For more impressions, take a look at:

- [Blog post on IOTA joining MOBI](#)
- [MOBI – Electric Vehicle Grid Integration Paper](#)

To learn more on IOTA in Mobility, see also:

- [Video on IOTA in Automotive & Mobility](#)
- [Mobility in the IOTA Foundation blog](#)





## NEW MOBILITY AND SMART CITIES

# Making smart parking possible as a new business model

### USE CASE

#### EDAG

Many parking solutions are still paper-based, with little to no transparency regarding pricing. When there are digital solutions, these are often regionally restricted so that apps cannot be used across different locations. Overall, paying for parking remains time-consuming and costly. Engineering service provider EDAG is working together with the IOTA Foundation on various mobility topics, including smart parking. Here, cars use embedded IOTA wallets to pay autonomously for the time they spend in a parking spot. This reduces the complexity of the payment process for consumers, but it also enables dynamic pricing options for parking providers which in turn can lead to entirely new business models.

### FURTHER INFORMATION

To learn more, see the [EDAG CityBot and IOTA](#) blog post.



#### Alexander Süssmilch

Product Owner, *trive.me* –  
a brand by EDAG

*"In this proof of concept, we are able to show the advantages of IOTA for *trive.park*. Innovative technologies like IOTA's Tangle are an important step for applications in the mobility industry establishing automated driving and other mobility services. The technology will gradually relieve the driver and infrastructure operators of tedious tasks such as payment, registration and data protection, thus enhancing the driving experience."*



## SUPPLY CHAINS

# Creating transparency and reliability in supply chains

### USE CASE

#### TradeMark East Africa

Global supply chains require the secure and efficient exchange of information between many independent actors. Today's trade is still largely paper-based, and outdated processes often involve many actors. Relying on immutable records, IOTA's platform can provide shared immutable digital records, thereby solving the trade-off between lack of trust and audit disintermediation within a supply chain.

The increase in transparency and control in operations improves ecosystem efficiency and profit margins. Together with TradeMark East Africa, the IOTA Foundation is testing a system that connects border agencies with overseas customs and local traders for a smarter and more efficient experience.

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### FURTHER INFORMATION

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For more impressions, take a look at:

- [Video about IOTA and TradeMark East Africa](#)
- [Blog post about IOTA and TradeMark East Africa](#)



## SUPPLY CHAINS

# Tracking the origin and authenticity of materials and products

### USE CASE

#### EVERYTHNG

The management of supply chains is extremely complex. Obtaining a unified view of every step of the supply chain, when multiple parties are involved, is often a significant challenge. Here, real-time tracking and tracing can be the solution. Through credible timestamps, the IOTA protocol enables track and trace solutions that are not only real-time but also trustworthy and secure. EVERYTHNG, for example, uses IOTA for anchoring real-time supply chain events. This enhances data integrity and trust and can reduce time and money spent.

### FURTHER INFORMATION

Watch the [video about IOTA and EVERYTHNG](#), a new collaboration for supply chain transparency, and learn more in this [blog post about how IOTA and EVERYTHNG make product supply chains transparent](#). You can also try our [Trade Demo](#).

If you want to learn more about IOTA in global trade and supply chains, see also:

- [Video: IOTA in global trade and supply chains](#)
- [Supply chains on the IOTA Foundation blog](#)
- [Video: How IOTA Tangle technology will impact the future of the global supply chain](#)
- [Video: IOTA and Zebra Technologies webinar: DLT for traceability in supply chains](#)
- [Blog post: Simply track the provenance and authenticity of your shirt](#)



## TELCO AND INFRASTRUCTURE

# Increasing e-commerce security with decentralized identities and immutable audit trails

### USE CASE

#### ENSURESEC Project

In e-commerce, preventing fraud and other cyber-physical threats depends on the secure and verifiable identities of involved parties, as well as the ability to detect, monitor and securely communicate and process threats and incident information. With its partners at ENSURESEC (End-to-end Security of the Digital Single Market's E-commerce and Delivery Service Ecosystem), the IOTA Foundation has developed, deployed and tested an immutable audit trail and an IOTA SSI (Self-Sovereign Identity) Bridge.

The audit trail offers a multi-stakeholder channel for fast communication among e-commerce systems. The Bridge enables e-commerce actors, such as sellers, buyers and payment providers (e.g. banks), to register de-centralized identities and issue verifiable credentials, for individuals and products. Buyers can be securely authenticated by providing unforgeable credentials, preventing identity theft. At the same time, buyers can directly verify seller identity and product authenticity, minimizing the risk of buying counterfeits. This guarantees security while removing the single point of failure and integration complexity of traditional identity systems.

IOTA also provides an immutable audit trail for e-commerce threat intelligence tools to acquire and share information for risk prevention and mitigation.



**Luís Júdice Sousa**

ENSURESEC Project Coordinator,  
INOV

*"The implementation of a complete audit trail of cyber and physical security incidents establishes unprecedented transparency of e-commerce operations to its users and business partners by showing what exactly has been compromised, and by transparently recording interactions in the e-commerce ecosystem, thus promoting accountability."*



**Emiliano Anzellotti**

ENSURESEC Partner, Advisory  
Board Coordinator, ABI Lab

*"The Bridge allows e-commerce ecosystem actors including sellers, buyers, and payment providers to register decentralized identities and issue verifiable credentials leveraging the eIDAS Regulatory framework, increasing trust and legal certainty."*

### FURTHER INFORMATION

For more, read our [blog post about ENSURESEC](#).



## SMART MINING

# Bringing transparency and sustainability to the mining industry

### USE CASE

#### Dig\_it Project

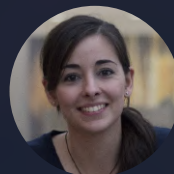
The mining industry leverages complex supply chains while still relying on centralized systems, with low trust across stakeholders and the public. There is an urgent need within the mining industry for a trust infrastructure that allows the sharing of data, the provenance of which is verifiable, both between stakeholders and with the public. This is especially clear when considering three major innovations that the industry is currently looking into 1) increasing mining efficiency and reducing costs through connected machines and predictive maintenance; 2) increasing safety of workers using wearable technologies; 3) improving mining sustainability, using environmental sensor monitoring technologies.

IOTA provides Dig\_it stakeholders with Oracles that implement industry protocols (like OPC UA) to connect centralized industrial IoT platforms and allow them to securely exchange trusted data across stakeholders and share it with the public. IOTA Streams is used to manage and guarantee access to immutable data to specific beneficiaries, including public authorities, the general public and others. IOTA Identities allow stakeholders to verify data authenticity.

#### FURTHER INFORMATION

To learn more visit:

- [Blog post: IOTA joins Dig\\_it](#)
- [Why is the new IOTA upgrade the key for a trusted mining industry?](#)



**Maria Garcia Camprubi**

*Dig\_IT Project Coordinator,  
ITAINNOVA*

*"IOTA is a ledger technology that is greener than other ledger technologies. This is a big advantage for industries like the mining industry, which lean on distributed ledgers to improve their overall efficiency, security and sustainability."*



## SMART BUILDINGS

# Empowering holistic systems for a smart city

### USE CASE

#### PeerOS

In today's cities, large amounts of data are already being collected, and a wide variety of things are measured, checked and evaluated. A considerable roadblock to using the collected data is that it is managed on different, isolated systems and thus cannot be analyzed holistically. With the help of IOTA, PeerOS aims to unify existing isolated applications into a holistic system solution. All data flows in a city will be bundled securely and efficiently, which will open up the door to new business models. One example PeerOS is working on is using IOTA for smart metering.

### FURTHER INFORMATION

To learn more, see the

- [PeerOS and IOTA webinar \(in German\)](#)
- [Blog post: The IOTA Tangle selected as core technology for SUSEE to enable large scale sensor networks](#)



**Andreas Baumgartner**

Co-Founder, PeerOS

*"The combination of cutting-edge IoT technologies and protocols enables an unprecedented level of confidence in the wireless transmission of information. Together with the IOTA Foundation and our collaborative partners, we are working on a technical solution that provides a secure and scalable foundation for infrastructure applications through state-of-the-art communications technology"*



## REAL ESTATE

# Building a reliable maintenance history for technical assets and property managers

### USE CASE

#### PropOps

There is a decades-old, systemic lack of transparency between real estate owners and their service contractors. The lack of data sovereignty prevents real estate companies from scaling their operations when portfolios grow, keeps them dependent on existing partners, and prevents them from keeping up with the ever-increasing demands of compliance and risk management. PropOps uses the IOTA Tangle to offer institutional and corporate property owners a checkbook-maintained real estate portfolio.

With PropOps, service providers are required to show that they have fulfilled their tasks successfully – a fingerprint of the information is then recorded on the IOTA Tangle. The result is a decentralized, tamper-proof and indisputable maintenance history. This reduces friction and increases the efficiency of property management and compliance. It is also the foundation for future digitization efforts. As of now, PropOps has signed contracts to manage assets worth 1.4 billion USD.

#### FURTHER INFORMATION

For more information, visit the [PropOps website](#).



### Alexander Feil

Managing Director,  
PropOps

*"We are super happy with the progress of the IOTA Tangle and the constant support we have gotten. We are convinced of the concept behind the product, the professional approach of IOTA in the last year, and, for its industry, a relatively long, proven track record."*



## SOCIAL IMPACT

# Enhancing climate protection through effective monitoring and reporting of carbon emissions

### USE CASE

#### ClimateCHECK

When it comes to climate protection, effective measurement, reporting and verification (MRV) is essential. DLT eliminates the need for intermediaries to verify data and creates a reliable, immutable and traceable energy monitoring system. Promoting Digital MRV with DLT could be one of the biggest drivers of climate change mitigation and new sustainable business models, as it opens up opportunities for a new carbon market with better emissions certification, trading and accounting. With Environment & Climate Change Canada, IOTA has enabled real-time monitoring of emissions from a landfill gas site in Copiulemu, Chile.

### FURTHER INFORMATION

For more information, see [IOTA and ClimateCHECK launch new Digital MRV solution and strategic partnership technology](#).

For more about social impact use cases, see:

- [Social impact and green tech on the IOTA Foundation blog](#)
- [Video on the role of IOTA's distributed ledger technology in protecting our rainforests](#)



**Tom Baumann**

Chief Executive Officer,  
ClimateCHECK

*"ClimateCHECK is deeply committed to the strategic partnership with IOTA to advance a robust digital ecosystem to support sustainable development. Starting with our collaboration on DigitalMRV, we are aiming to set the standard for next-generation digital solutions to enable the transformational change necessary to achieve global goals for climate change, cleantech and sustainability."*





## SMART CITIES AND ENERGY TRADING

# An architecture for peer-to-peer energy trading

### USE CASE

+CityxChange

Renewable energies are an essential part of a sustainable future. With DLT, sustainable concepts such as PV panels, solar energy and peer-to-peer energy trading can become a reality for everyone. This demands for a trusted transacting layer that allows to share information (demand and offer of renewable energy) as well as value. Bitcoin and other blockchain protocols are often associated with high energy expenditure arising from the mining process. This hinders the actual benefit of using DLT as this trusted transactional layer. IOTA's lightweight technology can underpin sustainable energy models in the most sustainable way possible, further helping to reduce waste and save costs. As part of the +CityxChange project, IOTA is driving peer-to-peer energy trading applications, where consumers can buy and also sell renewable energy, either to the grid or to neighbors, while also being able to verify and trust that energy was produced sustainably.

### FURTHER INFORMATION

To learn more, read our [blog post on IOTA-powered smart grid infrastructure \(CityxChange\)](#).

For more information, see also:

- [Blog post on the Powerhouse building in Trondheim, ENGIE Lab CRIGEN, and the IOTA Foundation to drive DLT innovation in the smart energy ecosystem](#)
- [Smart cities on the IOTA Foundation blog](#)
- [Video: IOTA FutureProof #2: Smart Energy](#)



## PREDICTIVE MAINTENANCE

# Optimizing the maintenance and protection of social infrastructure

### USE CASE

NEDO in cooperation with Fujisoft America Inc

Damage prediction assessments for machinery and infrastructure are still largely performed manually by field workers, leaving room for improvement in efficiency and security. The IOTA Foundation was invited to join a project by Japan's New Energy and Industrial Technology Development Organization (NEDO) to enhance the protection of critical infrastructure with artificial intelligence and DLT. Maintenance data is digitized and processed by an artificial intelligence system to predict which parts in a plant need maintenance, and when. This reduces unplanned downtime, improves plant availability and lowers costs by reducing unnecessary inspections and repairs.

### FURTHER INFORMATION

To learn more, read our [blog post about the partnership with NEDO](#).

### What are other industries using DLT for?

The top three industry use cases for DLT revolve around:

- Data validation (43%)
- Data access and sharing (40%)
- Identity protection (39%)

#### SOURCE

*"Deloitte Blockchain Trends 2020"*

### More about IOTA

For more information about IOTA and DLT, please look through IOTA Foundation blog posts [sorted by tags \(iota.org\)](#).

To learn more about IOTA's partnerships, see: [Video on building digital trust together – IOTA's partnerships](#)  
[Partnerships on the IOTA Foundation blog](#)

# Conclusion

The use cases showcased in this paper prove that a more equitable, self-determined, feeless, transparent, sustainable and permissionless future is upon us, and IOTA is the ideal underlying infrastructure to ensure your business is future-proof.

But we are not stopping here: IOTA is a foundational layer on which different networks and decentralized token economies can be built, secured and connected, and in 2022 two major new IOTA networks deepen our commitment to innovation and sustainability:

## shimmer

In 2022, IOTA's new Shimmer network (<https://shimmer.network>) empowers the developer community to grow and accelerate the adoption of new technologies. Shimmer is the official incentivized staging and validation network of the IOTA distributed ledger technology (DLT). It is a rapid innovation playground with short development cycles, allowing developers to build applications and use features that are not yet available on the IOTA mainnet, before moving their applications onto the main IOTA network (though it is envisioned that Shimmer will evolve into its own community-governed network after the launch of IOTA 2.0, and several projects will choose to remain on Shimmer).

## assembly

Meanwhile, IOTA's smart contract network, Assembly (<https://assembly.sc>), adds fully decentralized and scalable smart contract capabilities to the IOTA ecosystem and allows anyone to create a decentralized smart contract chain without asking for permission or paying anyone a fee.

Assembly will be a decentralized, scalable multi-chain network for smart contracts to build global ecosystems and accelerate the decentralized revolution.

Assembly is specifically designed for the Metaverse and Web3, offering fast and cheap dApp execution tailored to your needs, trustless and native smart contract and token interoperability, no MEV (miner extractable value) weakness, asset transfers across smart contracts and full EVM compatibility. This means that all Solidity smart contracts and all innovations built on Ethereum today can be easily ported over to the Assembly network.

Whatever your business, industry or sector, we invite you to join us and create new opportunities, markets and ecosystems with IOTA. Connect with us at [contact@iota.org](mailto:contact@iota.org).

# About the IOTA Foundation

The IOTA Foundation is a global non-profit foundation that develops next-generation decentralized technologies for a new digital economy in a connected world. It redesigns the way people and devices connect to share information and value, removing middlemen. The Foundation collaborates with a global ecosystem and partners to research and develop technologies that deliver sustainable, real-world impact. Together, they are shaping a new digital economy, removing unnecessary friction and unlocking human potential.

At the heart of the Foundation's mission is the Tangle, its open, feeless and highly scalable distributed ledger. Designed to support frictionless value and data transfer, the Tangle is a DLT infrastructure for Web3 applications and digital economies. Unlike blockchain alternatives, the Tangle allows transactions to be added in parallel; it also boasts low resource requirements, as well as zero-fee and fast transactions with finality within seconds. The IOTA token is the native currency on the IOTA network. It is used to transfer value and data and enable feeless micro-payments.

## Registered address

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If you want to realize your own idea or need support in building on IOTA, please get in touch with IOTA for Business:

[contact@iota.org](mailto:contact@iota.org)

Visit our website [iota.org](https://iota.org) for more information

