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WHITE PAPER

Blockchain

Unchaining new horizons
in technology and business.

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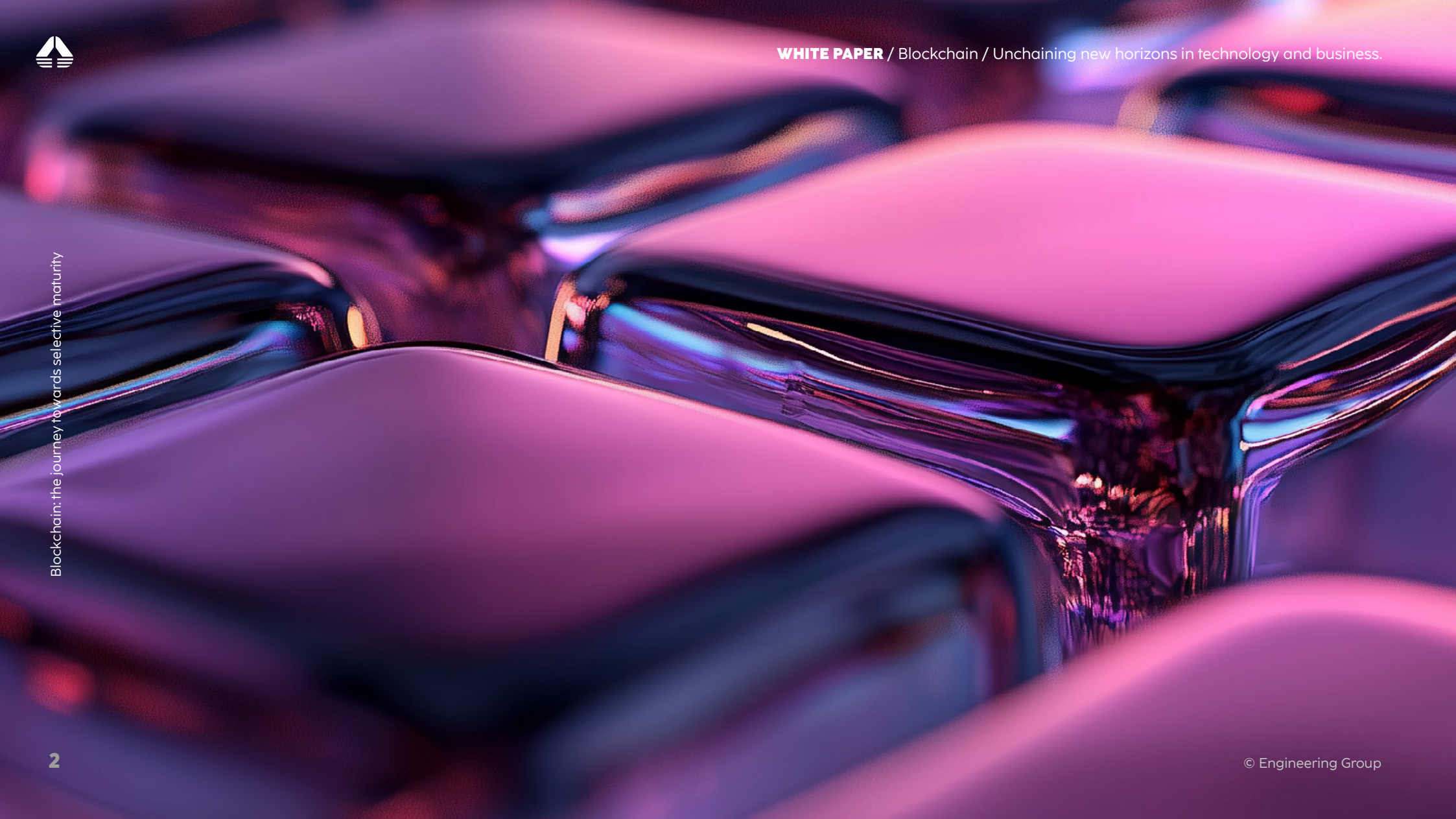
Index



01 Blockchain: the journey towards selective maturity

Blockchain technology was designed to provide greater **security, transparency, and efficiency** in processing transactions and storing crucial information.
Potentially, this technology could revolutionise the global technological infrastructure, bringing numerous advantages over previous technologies, particularly in terms of **decentralisation, privacy, security, transparency, and inclusion**.

In the current era of **Digital Transformation**, many **enabling technologies** have already experienced their peak of hype before reaching a **stage of maturity**, finding mature applications and optimal implementations. However, Blockchain stands out for the enormous expectations it carries in terms of applicability, revenue growth, and cost efficiency. Unlike other enabling technologies, Blockchain has not yet reached its full maturity. As with other frontier technologies, Blockchain is still finding its way, generating diverse opinions and definitions.
Today, Blockchain is no longer just a promise: it is entering a phase of selective maturity, where concrete applications, targeted experiments, and real value are driving the evolution of the technology beyond its initial hype.

Many sectors are interested in integrating Blockchain into their business processes, but crucial questions remain unanswered regarding its meaningful and effective use.

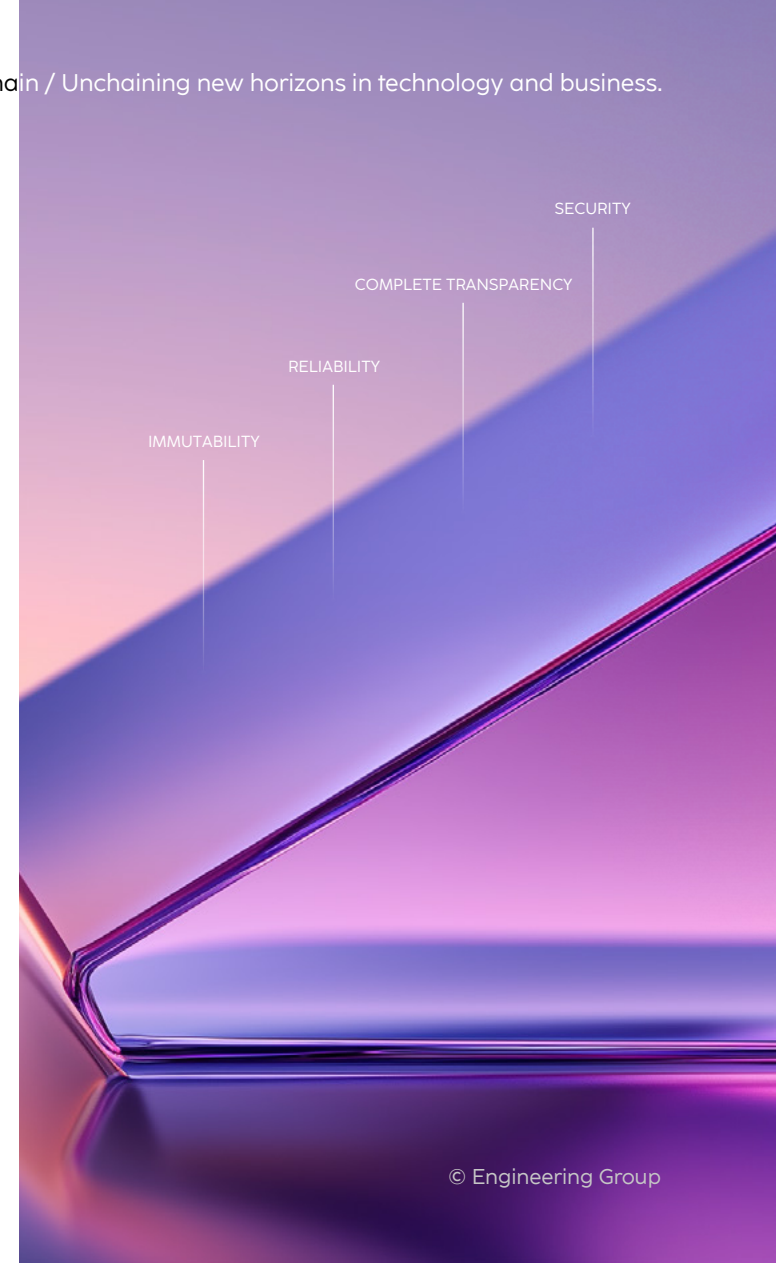
As experiments progress, new technologies raise expectations that quickly turn into hype. However, **it is essential to define concrete applications** that generate value to meet these expectations. Blockchain is precisely in this phase: having moved beyond the initial hype, it is now engaged in less widespread but more focused experimentation, which **will enable it to reach full maturity**.

Blockchain promises **immutability, reliability, complete transparency, and security of transactions** within decentralised ecosystems. This means ensuring at all times the certainty and integrity of data for all participants in that ecosystem. In a world increasingly reliant on data and real-time decision-making, **guaranteeing the security and integrity of information is crucial.**

We are actively engaged in the Blockchain domain, continuously exploring its developments through experimental projects, co-innovation initiatives, workshops, and in-depth studies. We work closely with companies and partners to design concrete solutions, test new application models, and harness the opportunities offered by this technology.

As described in this document, **in many sectors Blockchain applications are still at an experimental stage**. However, new ideas for applying this technology are rapidly emerging, and within the broad Blockchain community, there is an ongoing debate about the directions it might take and the impact it could have on society, industry, commerce, and governments.

Blockchain paves the way for numerous promising business applications, destined to significantly contribute to building a better future for everyone.



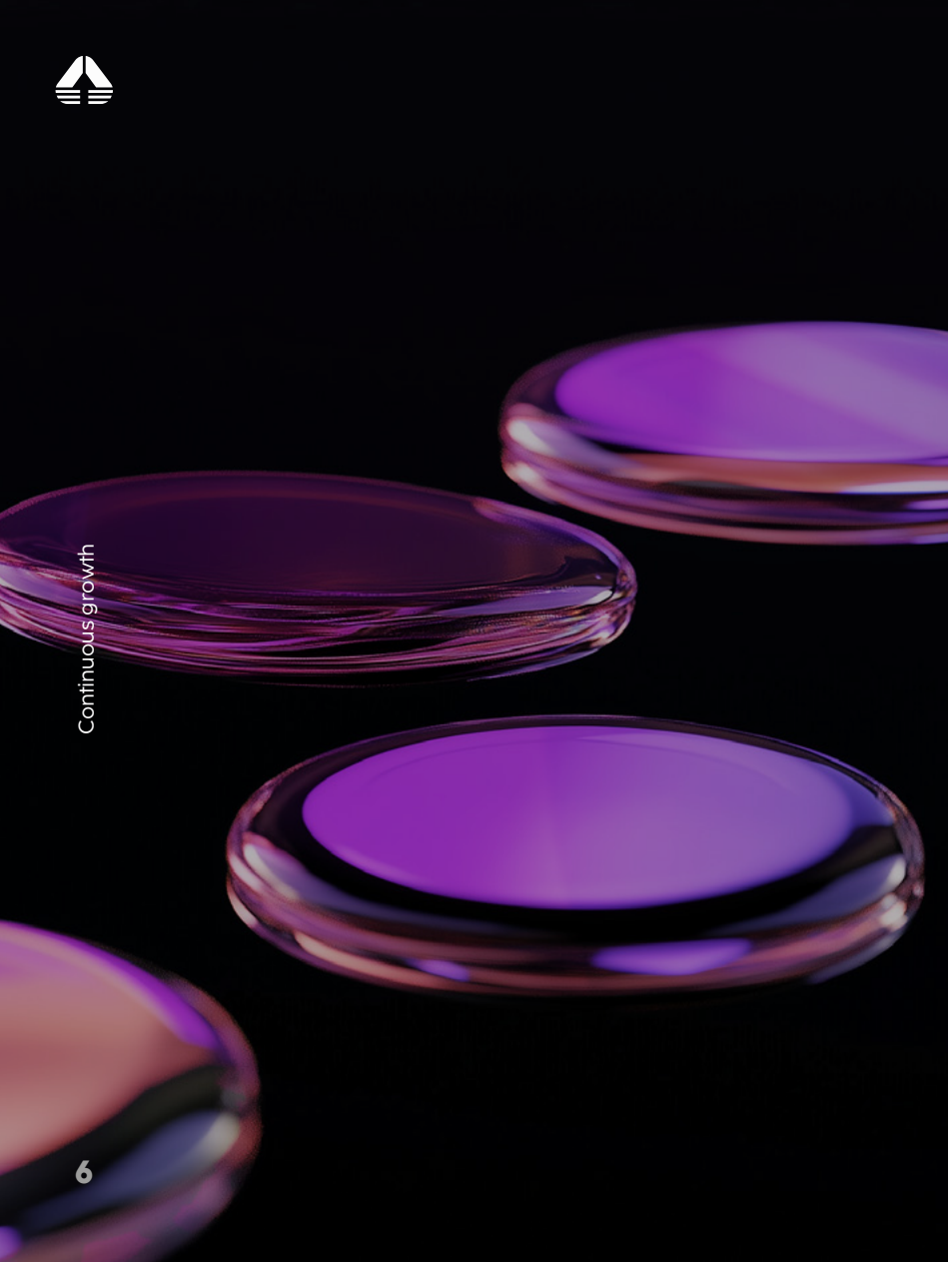
02 Continuous growth

According to Statista, the global blockchain market is expected to grow significantly in the coming years, with a forecast reaching a total value of approximately 944 billion dollars by 2032, limited to the blockchain cloud technology segment. An annual compound growth rate (CAGR) of 56.1% is estimated, confirming the strategic potential of this technology in numerous application areas.

Among the main application areas, supply chain audits stand out, with their value alone expected to exceed 103 billion dollars by 2030 – an increase of over 102 billion compared to 2020. Other relevant use cases include immutable data registration, digital identity, smart contracts, and consensus mechanisms such as proof-of-work.

Meanwhile, distributed ledgers are finding increasingly significant applications in supply chain verification. This segment is expected to grow to over 103 billion dollars by 2030, showing a significant increase compared to 2020. **Blockchain applied to logistics** enables complete traceability, monitoring each stage of the supply chain and reducing fraud, inefficiencies, and counterfeiting. The transactions recorded on the network allow anyone to track each segment of the supply chain. For example, Statista estimates that the global value of **Blockchain in the food and agriculture market will reach approximately 1.5 billion dollars by 2026.** Moreover, automation through smart contracts simplifies and accelerates processes, reducing human error.

> Blockchain is no longer just a promise: with an expected annual growth of 56.1%, it is set to become a technological pillar worth nearly one trillion dollars by 2032.



Continuous growth

Blockchain stands out for its versatility, finding applications across various sectors, although its main area of use remains the **financial sector**, which dominates global spending on Blockchain, representing over 30% of the market, followed by manufacturing. Blockchain adoption is particularly widespread among financial services professionals, who consider it essential for the future of the sector and have been implementing it for several years.

In 2021, more than 300 million people owned or used cryptocurrencies, and demand continues to grow, driven by the security and efficiency of Blockchain-based transactions. The cryptocurrency market, although characterised by large fluctuations, is seeing an increase in the number of altcoins, alternative cryptocurrencies with unique characteristics. In the United States, it is estimated that the number of cryptocurrency users will reach 10.08 million by 2028, with market penetration rising from 14.74% in 2024 to 16.97% in 2028.

The **growth of cryptocurrencies is driven by various factors**: the increasing acceptance by individuals and institutions, the expansion of decentralised finance (DeFi) platforms, and the use of cryptocurrencies as a hedge against inflation and political instability. The continuous progress in Blockchain technology and the increase in international transactions contribute to this growth, although a persistent level of volatility and corrections is expected, typical of emerging and rapidly evolving markets.

03 Key concepts of security and transparency

Blockchain technology has been at the centre of attention in recent years, sparking interest, questions, and debates.

Many definitions have been proposed, some arising from different perspectives, others creating confusion amid the hype. However, having a clear and precise understanding of this innovation is essential to fully grasp its potential.

Since 2014, we have been conducting research on these topics and, by developing them, have built our own vision and definition of this technology. **What is Blockchain?** From a technical point of view, Blockchain is **a distributed, decentralised, public (or private) ledger of encrypted and irrevocable transaction blocks, shared by all participants in an ecosystem.**

The reason for interest in Blockchain lies in its basic characteristics, which guarantee security, integrity, and immutability of data, as well as a certain level of anonymity, without third parties controlling data and information transactions. This creates interesting research fields, **stimulating exploration** not only of **business applications of this new paradigm** but also the boundaries of its technological frontiers.

Blockchain is a solution characterised by distributed databases, which store ever-growing data records that are resistant to alterations and revisions, even if modified by the same nodes they reside on, and are in turn confirmed by other nodes participating in the network.

A copy of the list of records is stored on all network nodes and is always kept securely even in the presence of untrustworthy participants. The records stored in these databases can be of two types: **transactions** (e.g. the actual data) **and blocks**, registers that record the order in which transactions are indelibly entered into the database.

Within these lines and concepts lies a universe of great business opportunities. For the first time in human history, different business actors operating within a complex ecosystem are able to **share information, values, content, and responsibilities**, while directly delegating highly complex aspects such as trust, consensus, and immutability to technology.

Very similar functionalities can also be found in different architectures, which we will not consider as Blockchain, but which we will call Distributed Ledger Technologies (DLT): they are similar to Blockchain and can certainly be successfully used in various business applications.

Blockchain is only one type of DLT, in fact, a Distributed Ledger does not necessarily have to consist of a sequence of blocks; Blockchain represents only a subset of it. In general, Distributed Ledger Technology can be defined using the same concept as Blockchain, but while all Blockchains are Distributed Ledgers, not all Distributed Ledgers are Blockchains.

To clarify this subtle but important distinction, we refer to one of the most authoritative documents on the matter, published by the International Organization for Standardization (ISO/CD 23257.2), which states: “A Blockchain platform is a DLT platform in which the technology used is Blockchain.”

Blockchain & DTL

	BLOCKCHAIN	DTL
Definition	Belongs to the DLT category, where each individual node contains a copy of the ledger (master record); every time someone adds a transaction, a new copy is created.	DLT consists of a decentralised database across multiple computers or nodes. Each node contains the Distributed Ledger and each is authorised to update the other Distributed Ledgers independently, but under consensual control by other nodes.
Structure	Data and information are represented as a chain of blocks. This structure is not the actual structure of Distributed Ledger.	It is a database distributed over multiple nodes. Data is represented differently on different Ledgers.
Block Sequence	Blocks follow a defined sequence.	It is not necessary to follow the sequence of data that characterises Blockchain.
Consensus	There is extensive use of proof-of-work mechanisms in Blockchain.	There is no need for a specific type of consensus and they are relatively more scalable than Blockchain.
Implementation in real cases	Many companies and start-ups already use Blockchain.	Projects using DLT are still under development. They do not yet have many real-life implementations.
Token	Many Blockchain platforms are based on the use of tokens.	There is no need to have tokens or any type of currency on the network.

DLT and Blockchain share a set of fundamental functionalities: both operate as distributed ledgers with asymmetric cryptography, implementing consensus protocols for transaction validation, and rely on peer-to-peer networks for data dissemination.

To fully understand Blockchain's potential, we can start from **Bitcoin**, the pioneering cryptocurrency. Bitcoin is a digital asset exchangeable between different actors via Blockchain, its underlying technological infrastructure. Blockchain ensures the accuracy of transactions, prevents double-spending, and maintains the integrity of information stored within the chain. Starting from Bitcoin's original peer-to-peer exchange concept, **Blockchain has evolved into a "multipurpose technology"**, capable of enabling a wide range of use cases beyond digital currencies.

Today, thanks to the impact of these first applications, Blockchain supports a variety of technological trends and offers technical features and properties highly appreciated by users. These technologies can be used to develop and implement a wide range of innovative business solutions.

Blockchain and DLT technologies offer unprecedented transparency in transactions and guarantee maximum security because blocks cannot be altered, thus ensuring the integrity of data over time. This could revolutionise business by enabling digital ecosystems capable of providing complete, transparent, and secure information on transactions.

DLT systems can currently be classified into 3 categories:

- **Public:** open to everyone, based on a "zero-trust" model and protocols such as Proof of Work;
- **Private:** requires specific authorisations, with rules imposed by central authorities and digital identities;
- **Consortium:** governed by a group of nodes limited to a centralised entity or multiple parties. This setup does not guarantee decentralisation entirely, unlike Blockchain which makes all nodes independent of each other but subject to mutual control.

CATEGORY

Public

Consensus	All "miners"
Permission	Public
Immutability	Almost impossible to tamper with
Efficiency	Low
Consensus Process	Without authorisation

CATEGORY

Private

Consensus	Centralised organisation
Permission	Public or private
Immutability	Can be tampered with
Efficiency	High
Consensus Process	With authorisation

CATEGORY

Consortium

Consensus	A set of nodes
Permission	Public or private
Immutability	Can be tampered with
Efficiency	High
Consensus Process	With authorisation

DLT permission-less or permissioned

The analysis dimensions of DLT technologies include access, authorisations, cryptography, consensus, network structure, block closure rules, infrastructure and computational costs, and the algorithms used.

> **"Permission-less" DLTs** (without authorisation) are systems in which anyone can operate, without authentication and without any type of authorisation. In **"permissioned" DLTs** (with authorisation), only authorised individuals can operate.

1) Public and permission-less DLTs, such as Bitcoin and Ethereum, allow anyone to access and participate without requiring authorisations, ensuring security, transparency, decentralisation, and immutability, fundamental elements of Blockchain.

2) Public and permissioned DLTs allow everyone to access recorded information, but require authorisation to perform additional operations. For example, food supply chain monitoring: consumers can read and verify independently the origin and journey of a food product, but only qualified users, such as supply chain operators, can enter new information into the system.

3) Private and permission-less DLTs limit operations to specific user groups without requiring special authorisations, often isolating the network "geographically" so as not to provide public access within an organisation.

4) Private and permissioned DLTs grant access only to selected user groups, requiring specific authorisations for operations.

Regardless of the choice, ecosystems can benefit from a Blockchain or DLT infrastructure, particularly for aspects related to trust and immutability, which opens up new opportunities both in commercial and industrial fields.

Focus On

HOW BLOCKCHAIN WORKS: SECURITY AND INTEGRITY

As the name suggests, a **Blockchain** is a chain of blocks of information. Each block is an approved storage unit containing a sequence of transactions. Each transaction, in turn, represents a single record that stores a specific quantity of data.

Thanks to its characteristics of **immutability, transparency, verifiability, data encryption, and operational resilience**, Blockchain can enable significant improvements in information defence techniques. This happens by preventing fraudulent or unauthorized data tampering through **consensus mechanisms** and **eliminating data manipulation**.

When created, a new block is connected to the last block in the chain, ensuring the resulting sequence represents the historical ledger of all transactions within the system to date. In most systems, such as Bitcoin, a **new block is added to the chain every 10 minutes**. Transactions are grouped into blocks and must be approved.

Blockchain data is not stored in a single location: each participant holds a complete copy automatically updated like all others, ensuring accessibility and information integrity. Blockchain technology was created to reach consensus on actions performed in data storage systems. This contributes to verification, atomicity, durability, and information integrity.

Unlike traditional data storage systems, **Blockchain offers the possibility of choosing various ways to reach consensus.** The metaphor of the "chain" is used to emphasise that the Distributed Ledger is immutable: once a block is written, it cannot be modified or deleted.

To apply this integrity constraint, Blockchain platforms use two techniques: cryptographic algorithms to seal the content and **full replication of the Distributed Ledger for all system members in a distributed way.** This allows the chain of blocks to be memorised and updated by all participants, increasing reliability and integrity. Since each block contains references to previous blocks, modifying one requires modifying all subsequent ones. Each participant in the chain holds a complete, synchronised copy of the information, making it almost impossible to modify data without being detected.

In public Blockchains like cryptocurrencies, there are two key principles: **consensus of network nodes and the computational power needed to verify data**.

This guarantees the accessibility and integrity of information within the Blockchain. The real difference compared to traditional architectures lies in the fact that the nodes of a Blockchain network must be owned and managed by different and autonomous entities.

Focus On

These entities, while cooperating as a set with common objectives, are bound by a conflict of interests and not by goodwill or hierarchical ties. In other words, all involved parties agree on certain common rules but at the same time remain vigilant against violations, as these would benefit the transgressor at the expense of others.

This fundamental trait of Blockchain technology is often overlooked compared to its more obvious features, such as information sharing, immutability, and resilience, but it could and should be an area to explore for the development of more mature use cases.

As a storage system that spans multiple organisations, Blockchain represents only the most basic application of a pioneering paradigm. In more advanced scenarios, the various nodes in a Blockchain network not only collaborate to maintain the Distributed Ledger but also apply **validation rules to individual transactions**, rejecting the block containing them if not compliant.

This process is a form of data tampering prevention, just like the Distributed Ledger itself, as the final decision on validity is reached by consensus: all nodes can express an opinion, and the majority prevails, preventing malfunctioning nodes or malicious actors from corrupting the process.

When the **rule set is written in the software, it is defined as "smart contracts."** With smart contracts, Blockchain technology truly enables a new era of secure but decentralised interactions. Furthermore, combining the immutability of Blockchain with the application of a specific timestamp (date and time) and a HASH algorithm to each block in the chain guarantees the existence and integrity of the information from the exact moment the timestamp is applied to the block containing it.

What type of resources do we want to "notarise" on a DLT system? Blockchain assumes the role of a "digital notary" safeguarding accuracy, acting as a digital seal.

- **Digital resources:** a digital document or set of data can be cryptographically notarised on a DLT system. The resulting HASH can then be easily published on a DLT system. In this way, their existence at the date of publication and their immutability are guaranteed over time.

- **Unique physical goods**, reproduced by unique digital representations: an example could be a photograph or the definition of a work of art, considered together with its unique digital representation. In this case, it is possible to notarise the digital representation, effectively becoming a precedent of notarisation for a digital good.

Focus On

The main blockchains, such as Ethereum and Bitcoin, operate as Layer 1, directly managing transactions and security within the main network. However, to address scalability challenges and high costs, Layer 2 solutions have been developed. These additional layers improve the speed and efficiency of transactions by processing them off the main blockchain while maintaining its security.

Layer 1 offers strong security and decentralisation, acting as the foundation for the entire blockchain ecosystem and hosting smart contracts and cryptocurrencies. Its wide network of miners and validators ensures a secure environment.

Layer 2 solves the scalability issues of Layer 1 by processing transactions faster and at lower costs, making blockchain applications more accessible. Moreover, Layer 2 introduces innovative mechanisms, such as Proof of Stake (PoS), to improve efficiency without compromising security.

Layer 2 solutions, such as Polygon on Ethereum, make Blockchain more efficient for applications such as decentralised finance (DeFi) and non-fungible tokens (NFTs). Polygon, for example, offers faster and less expensive transactions compared to the Ethereum main network, and its MATIC token is essential for transaction fees and network governance.

Smart contracts developed for Ethereum can be easily deployed and executed on the Polygon network as well. The latter has gained a prominent role in the blockchain ecosystem thanks to its versatility and its ability to support a wide range of use cases. Among its most important applications are:

- **Decentralised Finance (DeFi):** DeFi platforms, which enable financial services and exchanges without traditional intermediaries, benefit from Polygon's scalability and cost efficiency. Users can interact with DeFi protocols on Polygon with significantly lower transaction fees compared to the Ethereum main network.
- **Non-Fungible Tokens (NFTs):** unique digital resources, often used for digital art, collectibles, and gaming, have seen exponential growth. The low transaction costs on Polygon make it an attractive choice for NFT creators and buyers, making NFT trading more accessible.
- **Gaming:** Blockchain-based gaming platforms have embraced Polygon thanks to its ability to guarantee fast and efficient transactions. Players can interact with Blockchain games without delays and without the high transaction costs that could otherwise hinder the user experience on other networks.

04 The benefits of Blockchain

Blockchain can be used to **develop more effective, efficient, and secure platforms** to meet various business needs, such as identity and access management, supply chain management, implementation of smart contracts, and document management and verification. Its **versatility** allows for exploring applications in sectors such as **multimedia (gaming), telecommunications, healthcare, industry, and retail**, even though the main focus remains on the financial sector.

Blockchain technology was designed to provide greater security, transparency, and efficiency in processing transactions and storing crucial information.

Potentially, Blockchain could **revolutionise technological infrastructure**, offering numerous advantages over existing technologies, especially in terms of **decentralisation, privacy, security, transparency, and inclusion.**

Greater efficiency and transparency for processes

By leveraging Blockchain in the logistics sector, it is possible to monitor supply chain processes end-to-end, reducing fraud, inefficiencies, and product counterfeiting. Recorded transactions are secure and allow anyone to track each segment of the supply chain.

Greater financial inclusion

Blockchain technology offers innovative solutions to promote financial inclusion on a global scale. Thanks to its ability to provide access to financial services, reduce transaction costs, ensure security and advanced encryption, Blockchain revolutionises traditional systems, making them more inclusive and accessible even in developing countries. Through microfinance services, peer-to-peer lending, and other financial instruments based on digital platforms, even those without access to traditional banking services can obtain credit and improve their living conditions.

Additionally, Blockchain facilitates the transfer of money across borders, allowing people to send funds to their families quickly, securely, and cost-effectively. In this way, Blockchain technology is helping create a more inclusive and accessible financial system for all.

Trust and responsibility

One of the most important aspects of commercial relationships and partnerships is the concept of trust among various stakeholders in the business ecosystem.

Lack of trust often represents an obstacle to building effective and lasting business relationships. In the digital ecosystem, organisations struggle to maintain the balance between innovation, process efficiency, and the need to address the issue of verifying data integrity and counterparty trustworthiness. Being able to guarantee reliable, accessible, and secure data integrity and operability within any system could prove crucial for the success of any corporate ecosystem.

Digital trends are changing stakeholder expectations, and the use of technology is influencing how individuals and organisations are evaluated. There is an expectation that this information will be more reliable, but even when this requirement is met, not all stakeholders grant their trust automatically. For stakeholders, within a certain domain and throughout their activities, it is essential to guarantee the integrity of data and the operability of the system to ensure process effectiveness.

In Blockchain, it is not necessary to rely on third parties to guarantee stakeholder responsibility, as all participants in the ecosystem can verify each other's activities and at the same time ensure compliance with rights.

Any violation can be detected by other network participants, who therefore have the ability to decide not to validate the work of unreliable or malicious actors, because all operations occur transparently and are visible to everyone, following a consensus algorithm or previously established common rules. In this scenario, the concept of trust is intrinsic, and validation does not need to come from third parties.

High availability and flexibility

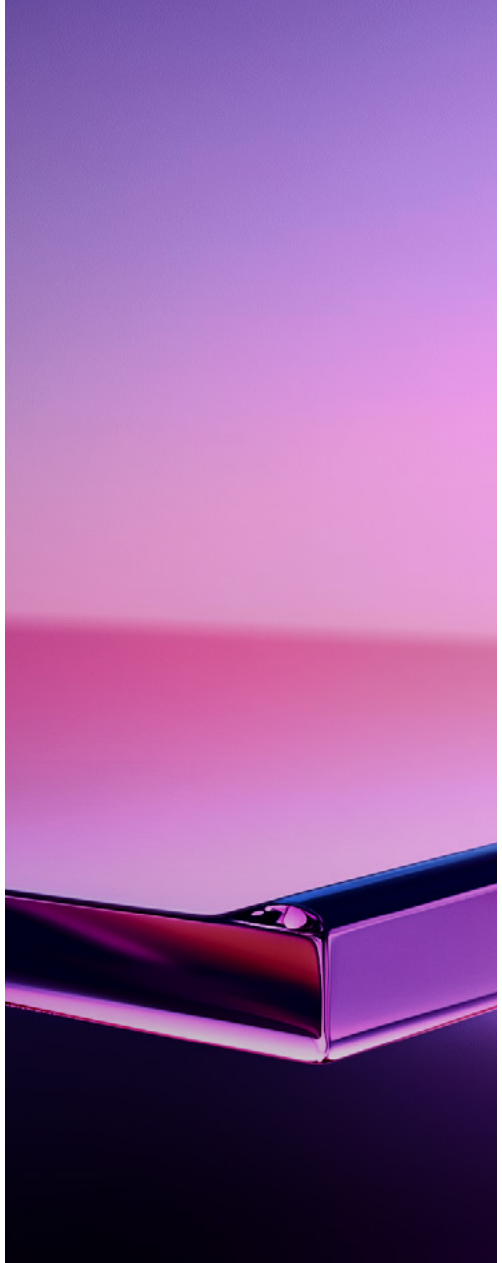
Consensus on data accuracy and immutability ensures the resilience of the system, which is designed to withstand any type of attack in various contexts.

Long-established IT technologies, such as encryption and HASH algorithms, are integrated into Blockchain technology and ensure that the network is immune to any kind of attack, including data corruption and tampering. This high resilience naturally results in the great availability of data on Blockchain and DLT-based systems.
Any tampering attempt is automatically inhibited, and any damaged data is restored thanks to network redundancy. This guarantees the integrity and continuity of the processes based on it.

Single Point of Truth

Establishing a Single Point of Truth is one of the fundamental factors to ensure data consistency within companies. Implementing it through DLT or Blockchain is easier because both allow for a distributed database, where data is stored redundantly across the nodes participating in the network. Through this multitude of synchronised nodes, which constitute a single point of truth, data integrity is preserved, and any legitimate update from one node is automatically received by all other network participants.

The characteristics of Blockchain, such as real-time transactions and fault tolerance, improve business processes, especially when integrated into a decentralised infrastructure. Blockchain offers transparency through a public ledger accessible to all, and guarantees data security and immutability. Thanks to data redundancy on each network node, it ensures high availability. With Blockchain, there is no trade-off between disintermediation and trust, as both are guaranteed by its integrated mechanisms.



05 Our approach

At Engineering, we are not only studying the evolution of DLT and Blockchain technologies, but we are also actively contributing to their advancement through participation in the most important international working groups on DLT and Blockchain, such as the **Focus Group on Application of Distributed Ledger Technology** promoted by the United Nations, and the **Blockchain and Distributed Ledger Technologies** working group promoted by ISO / TC 307 technical committee.These globally relevant groups are focused on designing and developing the best Blockchain strategy at all levels. Blockchain is a key technology we use to develop and provide innovative digital solutions to our customers. Through the use of innovative platforms, we leverage Blockchain to gain significant advantages in various vertical sectors.

ChainPro – Blockchain for everyone is our flagship framework that enables:

1) Facilitating the creation of decentralised applications (DApps) based on Blockchain technology and the development of specific Smart Contracts.

2) Making interaction easy and fast with the main Layer 1 (Ethereum) and Layer 2 (Polygon) Blockchain platforms.

3) Providing a standard-based interface layer through APIs for the implementation of core functionalities based on Blockchain technology (creation of NFTs, registration and use of Smart Contracts, network monitoring, etc.).

ChainPro is an innovative solution that integrates different interoperability mechanisms by adopting a modular approach, allowing connection between different data sources through standardised and interoperable models.

vIt is based on a modular and extendable Blockchain microservices architecture, offering predefined and configurable smart contract structures and Blockchain functionalities. Furthermore, its architecture is designed to be flexible, scalable, and easily integrable into existing systems, suitable for various contexts such as energy and smart cities.

How ChainPro works

ChainPro supports both Layer 1 (Ethereum) and Layer 2 (Polygon) and implements a set of configurable tools for creating Blockchain-based DApps.

- **Economic transactions:** Smart Contracts for payments between two or more actors. Fungible tokens as representations of value and to implement incentive mechanisms.
- **Automated process control:** Smart Contracts used to manage business activities and processes in an automated way to guarantee execution (self-execution) without involving third parties.
- **Data notarisation:** hybrid approach of on / off-chain storage and Blockchain notarisation for data archiving, minimising costs and ensuring necessary scalability.
- **Digital Asset Management (via NFTs):** for the unique identification of digital assets and their virtual commercialisation, as well as to guarantee asset ownership and manage revenue mechanisms.
- **Access Management (via NFTs):** NFTs are used to manage access to communities, events, and memberships, both in the digital and physical world. An example is participation in Decentralised Autonomous Organizations (DAOs) and token-based management, including decision-making and governance mechanisms.

From our innovation observatory, it is expected that Blockchain will reach its full maturity only when **concrete and well-targeted applications have been developed**.

Our challenge, like that of a vibrant global community of users and researchers, is to transform the current enthusiasm for Blockchain into tangible results. At Engineering, we are constantly committed to staying ahead, pushing, and expanding the boundaries of this technology.

In various sectors – from retail to agriculture, healthcare to production – new use cases are emerging that indicate the imminent arrival of a promising future for Blockchain. For this reason, we are enhancing our skills and developing new applications, both internally and through investments and collaborations with innovative start-ups in the field. Our commitment is not only to simply monitor the progress of Distributed Ledger Technology (DLT) and Blockchain: we are actively involved in developing strategies at a global level. We participate in major international working groups, including the Focus Group on Application of Distributed Ledger Technology of the United Nations and ISO / TC 307 on Blockchain and distributed ledger technologies.

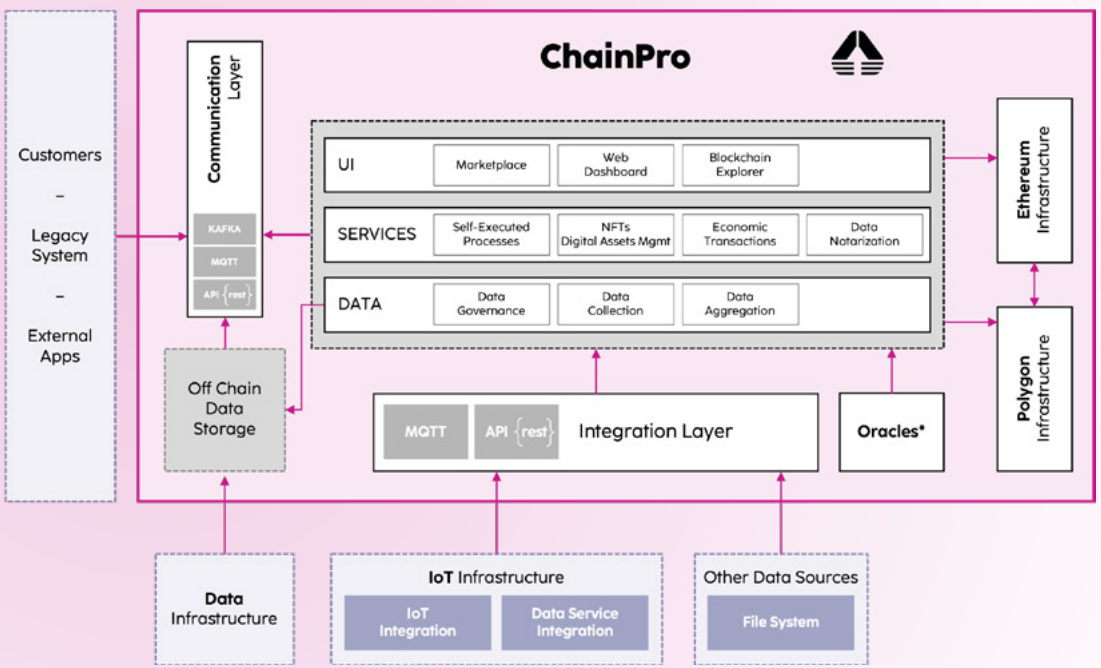
ChainPro Architecture

The solution adopts a modular approach that **simplifies the development of blockchain-based applications,** making it easier to implement trust-based environments within complex ecosystems where stakeholders require independence from centralised authorities.

It natively **supports the deployment and integration of smart contracts**, offering APIs to access core functionalities such as NFTs, fungible tokens, and smart contracts.

It **ensures transparent and secure management** of stakeholders and their data, enabling the democratisation of processes by migrating business logic onto the blockchain.

It is also possible to define and use tokens as incentive and remuneration tools for prosumers who contribute services within the ecosystem.



* Blockchain oracles are services or systems that provide smart contracts with data from external sources, such as APIs, websites, or databases. This information can include any type of data, from exchange rates to weather conditions, and even sports results.

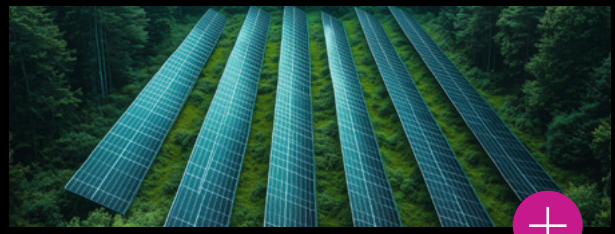
Our challenge is to harness the enthusiasm for Blockchain and transform it into concrete results.

06 Our projects

CLIENT STORIES / ENERGY & UTILITIES

Enegan: betting on renewable energy

Leveraging our expertise in the Green Energy sector and Blockchain technology, we created the “Energy Bank,” a solution that allows Enegan not only to guarantee economic savings for users, by making their homes or businesses more efficient, but also to respect the environment and the ecosystem we all live in. Using Blockchain technology, the “Energy Bank” is able to manage and record the Smart Contracts related to energy transactions carried out in compliance with CO_2 emission standards. In this way, it is possible to effectively account for the flows between those who provide energy and those who use it, obtaining reliable information from the nodes that make up the user network.
The solution includes a platform that today represents a unique tool for Enegan to manage its transactions, as it optimises and manages the exchange of energy from renewable sources and guarantees additional services related to payments.



USE CASE / MEDIA & COMMUNICATION

Blockchain for the creativity industry

Web 3.0 is gaining attention with its promise of a decentralised web, where control shifts from big tech companies to users themselves. Unlike Web 2.0, dominated by social media and prosumer content, Web 3.0 leverages blockchain and NFTs to guarantee ownership and direct control of digital assets. NFTs play a central role in the metaverse and DAOs (Decentralised Autonomous Organisations). In the metaverse, they represent unique digital assets like avatars or collectibles, enabling personalised experiences and exclusive access. In DAOs, they serve governance functions, providing access to shared resources and defining operational roles.

RESEARCH PROJECT / DEFENSE, AEROSPACE & HOMELAND SECURITY

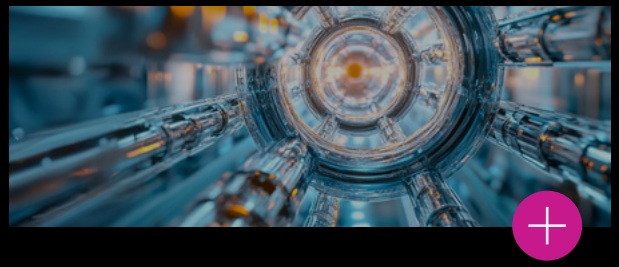
InterSTORE: open-source tool for flexibility, hybridisation, and storage monetisation

We have developed an advanced traceability solution based on Polygon, a Layer 2 blockchain, for ecosystems aiming to enhance the data economy through Data Spaces. By notarising data on the blockchain, it is possible to verify at any time that data relating to transactions, values, or services – such as energy – have not been altered, thus guaranteeing their immutability. Thanks to this system, ecosystem stakeholders can be certain that no transaction denials occur within individual data exchange processes. Furthermore, the solution enables the management of DAOs and the implementation of governance logics within the Association, supporting decision-making processes. This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No. 101096511.

RESEARCH PROJECT / AGRICULTURE

SOFIE: Blockchain for the Agri-food Supply Chain

The SOFIE research project aimed to improve traceability and transparency within the agri-food supply chain through an IoT platform integrated with blockchain technology. This solution ensured the security and speed of product delivery to the end consumer, while also guaranteeing the immutability and integrity of transaction data. Farmers, livestock breeders, distributors, and retailers were able to monitor every phase of the supply chain in real time, while consumers had access to clear and verifiable information about the history and origin of food products. This contributed to strengthening trust and enhancing the perceived quality of the final product. The project received co-funding from the European Union's Horizon 2020 programme – Contract No. 779984.



07 A look to the future

When technology and business meet

The key to a better future lies in the combination of advanced technologies and a solid understanding of fundamental processes. Will Blockchain mature to become a concrete transformative force, or will it continue to drive our efforts towards constant evolution, refining our approach to revolutionise the way we live and work?

At Engineering, we work closely with clients and partners to explore how this technology can improve daily operations and quality of life, aiming to overcome current limitations.

For 40 years, we have been at the forefront of promoting agility and resilience through technological innovation.

Maturation of the Ethereum ecosystem

Ethereum's scalability solutions, such as Layer 2, will continue to evolve, improving transaction speed and efficiency. Polygon offers a framework to process transactions more quickly and at a lower cost compared to Ethereum's main network.

Polygon's native token, MATIC, is central to its ecosystem, used to pay transaction fees and participate in network governance.

At Engineering, we are exploring the potential of Polygon, Ethereum's main Layer 2, which has gained significance in the blockchain landscape thanks to its advantages and wide range of use cases.

Towards greater security

Blockchain has the potential to develop more secure and efficient platforms in crucial areas such as identity management, supply chains, smart contracts, and document verification.

Although the initial enthusiasm is waning, Blockchain remains a promising technology for ensuring transparency and trust in transactions, with applications extending beyond cryptocurrencies. Persistent challenges, such as scalability and energy consumption, require attention, as do social and economic implications compared to traditional business models. However, Blockchain has the potential to transform global transactions, becoming a key technology for digital transformation.

The Internet of Value and CBDCs

The concept of the Internet of Value is expanding with Central Bank Digital Currencies (CBDCs), digital currencies issued and regulated by central banks.

One continuously evolving aspect is financial inclusion. CBDCs could significantly expand it, providing access to banking services for a larger number of users. Additionally, these digital currencies promise to improve transaction efficiency, reduce costs, and speed up processing. CBDCs could also improve payment control, making tax evasion and illicit financing more difficult. Furthermore, they can strengthen financial stability by allowing for more precise and immediate economic regulation, protecting transactions from fraud and theft. CBDCs will stimulate digital innovation, encouraging the development of new Blockchain-based financial solutions.

Traceability and advanced functionalities

Blockchain can support transactions with CBDCs, offering traceability and security through its immutable ledger.

Additionally, it can enable advanced functionalities such as smart contracts, improving efficiency and reducing operational costs. However, not all CBDCs are based on Blockchain; central banks can choose between different technologies, such as centralised databases or distributed ledgers, depending on their priorities. For example, the European Union is moving forward with its digital euro project. In October 2023, the ECB launched the first phase of the digital euro, which includes two years of experimentation starting from November 1st.

New regulations and standards

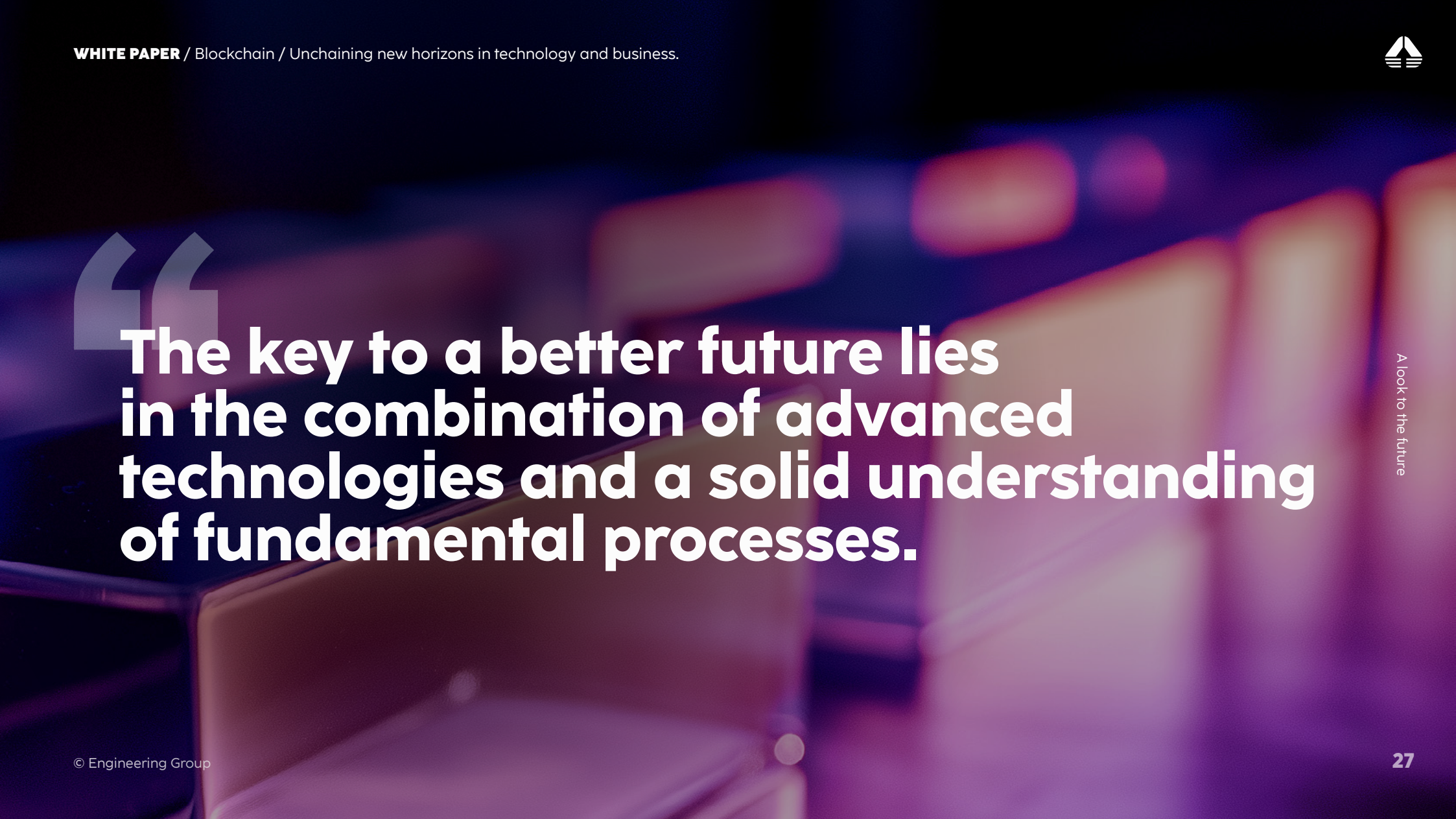
With the continuous evolution of Blockchain, regulatory frameworks are being developed to ensure its safe and ethical use.

On December 16, 2022, the Basel Committee published new rules for the prudential treatment of cryptocurrencies, which will come into force in 2025. Banks will have to detail their crypto activities and provide information on capital and liquidity requirements, ensuring security and stability in the global financial system.

Tokenisation of real assets

Blockchain will increasingly be used to tokenise real-world assets, such as real estate and artworks, as well as digital assets in the metaverse, enabling access to communities and events, simplifying ownership, and facilitating management.

Engineering is implementing the use of NFTs and smart contracts for the governance of Decentralised Autonomous Organisations (DAOs) and for managing copyright and royalty rights, allowing the exploitation of assets in terms of ownership or derivatives resulting from the processing and aggregation of pre-existing assets.



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Key Tak

Blockchain is an emerging technology that has generated significant expectations, offering greater security, transparency, and efficiency in transactions.

Blockchain technology has now reached a stage of selective maturity, where its use is no longer the subject of widespread experimentation but is instead focused on specific areas where it has demonstrated real added value in terms of efficiency, security, and traceability. Attention has shifted towards the implementation of concrete, sustainable, and high-value applications, accompanied by a clearer and more pragmatic assessment of its opportunities and operational challenges.

This maturation is not uniform but is concentrating in specific sectors such as finance, supply chain management, digital identity, and asset tokenisation, where blockchain is demonstrating greater utility and adoption potential.

Blockchain stands out for its versatility, finding applications across various sectors. In finance, it facilitates secure transactions and cryptocurrency management.In logistics, it enables complete supply chain traceability, reducing fraud and inefficiencies. In the energy sector, it optimises the exchange of renewable energy and improves transaction efficiency. The creative industry also benefits from Blockchain through the management of digital assets via NFTs.

Its ability to automate processes through smart contracts and ensure data integrity enables the development of innovative new business solutions, enhancing efficiency and reducing operational costs.

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Security and transparency as the foundations of Blockchain: designed as a distributed and immutable ledger, Blockchain guarantees data security and integrity without the need for intermediaries. Its decentralised structure, combined with the use of cryptography, prevents tampering and ensures transaction transparency, making it ideal for applications requiring trust and accountability among multiple actors. Layer 2 solutions improve scalability, functionality, and cost-efficiency of the network.

Commitment to Blockchain innovation and development: Engineering is actively involved in the development and advancement of Blockchain technologies, participating in international working groups and developing innovative solutions such as ChainPro. This platform facilitates the creation of decentralised applications and the implementation of smart contracts, demonstrating the company's commitment to pushing the boundaries of Blockchain technology towards new application frontiers.

Blockchain beyond cryptocurrencies: towards an integrated digital infrastructure: in the coming years, Blockchain is set to become a fundamental infrastructure for numerous digital systems, expanding its use beyond cryptocurrencies. Increasing integration with emerging technologies such as AI and the Internet of Things is expected, to develop more powerful and efficient solutions. At the same time, the decentralised applications (dApp) model and the Web3 ecosystem will continue to evolve, offering new ways to interact with digital services and create value.

In this scenario, hybrid Blockchain solutions, combining public and private chains, will play a strategic role in adapting the technology to specific use cases and regulatory requirements.

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