Proofs of Concepts

Archiving & Certification

Scrypta is a decentralized digital infrastructure that simplifies and makes more efficient managing, archiving and certification processes that feature the economic, productive and social sectors. Scrypta flexible system allows creating full architectures for unlimited projects. and brand new use cases.

Version 1.0

Scrypta is a **Peer-to-Peer infrastructure** designed for new business models and public governance management. The system is based on the digital currency called "**LYRA**". Scrypta is a **blockchain,** developed on **MIT** licensed open-source protocol, with advanced decentralized features for greater scalability, flexibility and is suitable for the creation of complete architectures for unlimited projects and new use cases. The Scrypta hashing algorithm guarantees high-speed transactions and instant payments.

The monetary emission scheme, and therefore the rewards distribution, is based on **Quark** that have an energy-efficient and secure **PoS/Masternode** consent layer. Scrypta is a constant evolution project with decentralized nature that makes it particularly suitable for collaborations and contributions from developers who want to create practical solutions based on its architecture. Moreover, the Scrypta based ecosystem offers exceptional features of **archiving**, **certification** and **verification** which represent excellent tools for all those companies wishing to look at the technological innovation offered by the blockchain.

Data and Archiving

Each application, whether centralized or decentralized, requires two fundamental parts: data (***files***) and storage (***database***). With Scrypta it is possible to write data into the blockchain and to create complex and **decentralized storage systems**.

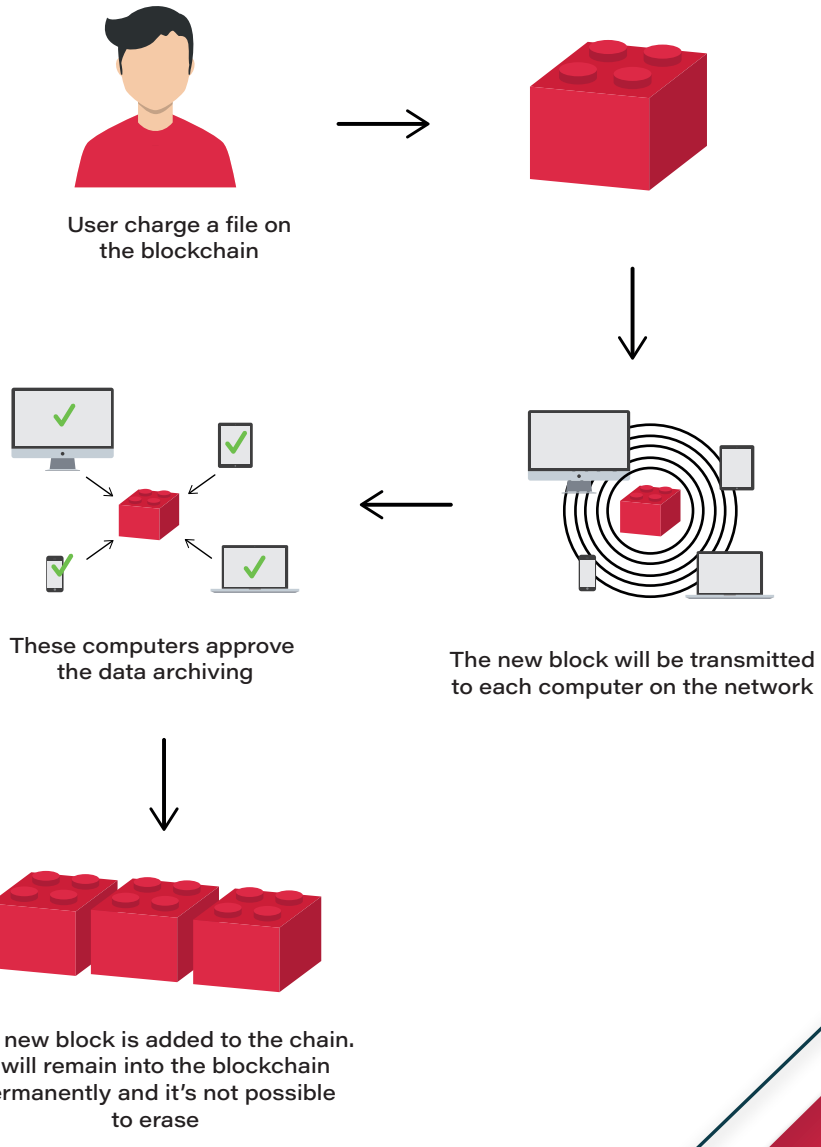
In order to better understand how the Scrypta blockchain system works in a context of common use, we use a practical example imagining that one user, utilizing a **dApp** installed on his cell phone, wants to write a file (a photograph or a document, a music or any kind of data) in the blockchain and that this file must be permanently

Steps:

1. The user accesses the dApp through an authentication process.

2. The system provides the user with a public address on the Scrypta blockchain and the respective access keys.

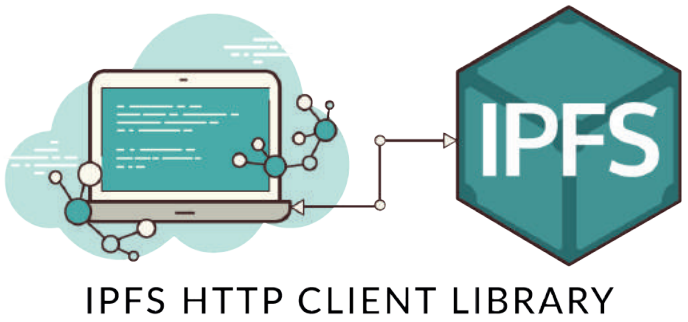
3. The user uploads a file in the blockchain (similarly to upload a picture on Whatsapp).



4. At this point the system will send two distinct commands to the interface **IdA Node**: the first command concerns loading the file on **IPFS — Inter Planetary File System** (an innovative technology to create decentralized and distributed archives capable of permanently containing large amounts of data, files and hypermedia), while the latter allows the insertion of the reference of this information (an ***identifier*** univocal of the data) inside the blockchain.

5. The user waits for the blockchain to process its transaction (about 2 minutes).

6. Both the information and the linked file (the photo) are written forever in the Scrypta blockchain.



Consent and immutability of data

One of the reasons why it is not possible to change blocks is because the blockchain extends through a widespread network of computers, which must approve all the changes that occur on this network.

All those who are part of th e Scrypta Network have an identical copy of the register, and each change is made immediately in all available copies. This procedure is called "consensus" and it is considered one of the main advantages of blockchain in terms of security.

In our every day increasingly digitized world, one of the biggest concerns for businesses and public bodies is to **know precisely** the real identity of the users behind their computers. In the mean time it is fundamentally important to everyone to **protect** own online identity.

The common problem of all **centralized digital databases** lies in the identification methods, based primarily on an intermediary part designated to verify the authenticity of each identity. This process produces excessive **service costs** and gives the responsible body **full control** and the decision power on which service providers are authorized to utilise the verified identity. In this scenario users must rely on central agency employees that they would transfer digital identities only to the authorized parties.

The **immutable** and **distributed nature** of the Scrypta blockchain, on the other hand, can be used to identify and manage digital identity by making improvements on two fronts.

Firstly, it eliminates the need to go through a third party, because the data is stored in large **public registers** controlled by a network of users. Identity records reside redundantly in different

Each user is a certification authority for himself, deciding who to rely on basing on the objective evidence provided to him. Service costs involved are thus reduced. Furthermore, the use of cryptographic hash functions override any possibility of revealing private and sensitive information about themselves in contexts in which it is not relevant to the activity in progress.

Secondly, Scrypta's blockchain technology makes digital **identity more reliable and secure** as it can be freely integrated into any service where the identity holder and counterparty agree to use it, making online reputation a lot more **pervasive** and **meaningful** and facilitating users to trust documented credentials. As a practical example, consider a company or an entity releasing a **private** key to each user only after verifying their identity. As an outcome any user action is documented, similarlywith the certified email (PEC). The database information protection is entrusted to public key cryptography.

Public Key Crittography

Public-key cryptography works with a pair of keys, a public and a private one, used to identify users and allowing to exchange data in a protected and secure way. Users are identified in the blockchain by a string of characters, called the "address" derived from their public cryptographic key. This system allows you to keep and protect online identities allowing users to access their accounts without using their passwords.

Scrypta is developing an **identity card** with **NFC** technology, which integrates the public key system described above containing the user's identity. Through NFC you can **quickly synchronize data** between two devices, even if completely different from each other

If you think that the automation process is now unstoppable and more and more businesses and economic sectors are moving from analogic to digital, then we can guess that NFC technology combined with the blockchain can open up many **possibilities** and many application scenarios.

Copyright, patents and contracts

Despite major technological advances, people still rely on certification documents printed on paper for legal, business, and artistic matters. **Security** issues in new technologies discourage documents **authentication** and broader digital adoption. In fact, present technology processes are usually so complicated that they delay **valid** commercial and legal transactions.

With internet broader adoption, artistic productions, patents and digital documents are suffering even more scams, counterfeits, piracy and plagiarism than in the past. Just think about how the digital audio **peer-to-peer** file sharing services or photographs published on the web do not usually respect the copyrights. Along with several gaps in the law, unauthorized file sharing and the unlawful use of copyrighted content are a significant problem to date.

Thankfully, the Blockchain can solve many of the problems already highlighted. Permissionless Blockchains are **open source ledgers** accessible to everyone. They can act as a tamper-proof intellectual property deposit. In addition to keeping the invention safe, the blockchain could also be used to track ownership of digital assets using **public-key cryptography**.

Patents can be **stored** on the blockchain and transmitted securely. In addition to providing complete control of the intellectual property to the inventor, it also ensures that the data can not be manipulated.

The possible use cases include: proof of creation and authentication of origin, registration of **intellectual property** rights; control and tracking of the distribution of an IP (not) registered; proof of genuine and/or first use in commerce; digital rights management (eg online music sites); establish and enforce agreements, licenses or exclusive distribution networks through smart contracts and transmission of payments in real time to IP owners.

Scrypta and data certification

Thanks to Scrypta's blockchain, it is possible to store documents as supporting evidence during legal disputes that unequivocally demonstrate ownership of a work or document. There are three features that make Scrypta particularly relevant for the certification system: "***Hashing***", "***Proof of Existence***" and **IPFS** (Interplanetary File System). Hashing is a process by which a document is transformed into a fixed length code that is defined with a fingerprint. Every hash is unique. *"Proof of Existence"* shows that a certain hash existed at a given time. Demonstrating its existence means providing proof that a single document existed at a fixed time: this process is called "***timestamping"***. The IPFS system is a peer-to-peer protocol in which each node stores a set of hash files. A client that wants to retrieve one of these files only needs to call the hash of the desired file.

This is not just an idea: Scrypta has developed a new platform which, offers new use cases that would not be possible without blockchain.

Healtcare sector is **changing** at great speed thanks to real-time data collection and new and increasingly smart devices. Because of that, the urgency of its technological development is a priority.

The health system must focus on **patient-centered** quality services. This means ensuring health management at a higher level, at any time and wherever the patient is. However, national rules and regulations make **processes** more complex and time—consuming.

In the health sector, patient data and information are scattered across different departments and usually still depend on **obsolete local registers** for data retention. This could cause crucial information not to be accessible and readily available in case of need, making doctor's diagnosis complex. Because of this, time and cost to maintain a patient—oriented business are very high. The existing health care ecosystem can not be considered **adequate** since many of its actors do not have an infrastructure for a **uniform process** management. The problems in the current health sector are many and always growing in number.

The exchange of information is another time consuming and critical process that translates into high costs in the health sector. Since patients have no **control** over their data, the likelihood of identity theft, financial crimes and spamming increases every day.

Although we have tools such as computers and smartphones in every **healthcare facility**, most systems are not able to collect, analyze, protect and exchange data without problems, yet. Therefore, healthcare does not only need an advanced infrastracture, but it also requires a system that is fluid, transparent, economically efficient and easily usable.

Blockchain Solutions

Blockchain technology has the potential to take a huge step forward in the healthcare ecosystem. Blockchain technology has the ability to improve the quality of patient care by keeping costs to a reasonable level. All the challenges and obstacles that occur in **multi-level authentication** can be eliminated.

Imagine a healthcare system where all informations are easily accessible to doctors, patients and pharmacists anywhere, anytime. The Blockchain allows the creation and sharing of a **single common database** of health information.

This system would be accessible to all entities involved in the process, regardless of the electronic medical system they use. This would provide greater **security** and **transparency**, allowing doctors to have more time to care for patients and their treatments. In addition, it would also allow sharing research statistics that could would facilitate clinical trials and treatment therapies for rare disease. In a healthcare system, a fluid **sharing** of **health data** can lead to higher diagnosis accuracy, effective treatments and a cost—effective system

The Healthcare Blockchain would allow multiple entities in the healthcare ecosystem to stay in sync and share data on a **distributed ledger**. Participants can share and track their data and other activities that occur in the system without having to look for additional options for data **integrity** and **security**.

With features like **immutability**, **reliability** and **decentralization**, the distributed blockchain technology offers the healthcare industry the opportunity to detect fraud, reduce operational costs, streamline processes, limit labor growth and apply transparency in the health ecosystem.

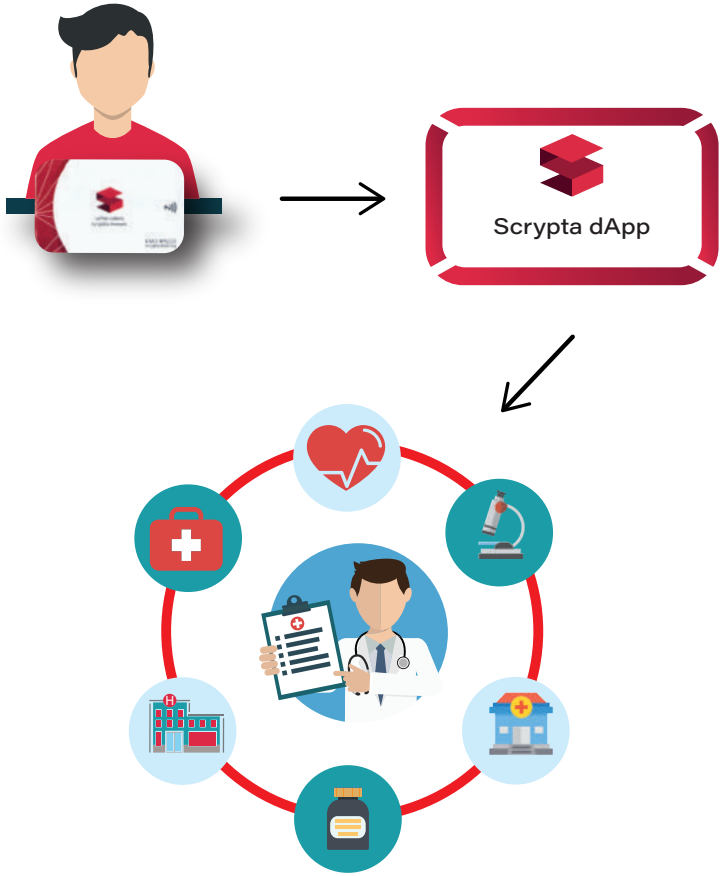
Scrypta as a standard for health care

Managing patients' medical data through Scrypta's blockchain will allow to **share safely** and fast. Therefore, it could greatly help medicine and healthcare to improve offered services, with the chance of acceeding to patient's medical data and then get to know their medical records and story in advance in order to give **better** care and **faster**.

Scrypta can also help managing complex scenarios related to interaction between interregional health systems or between private subjects such as analysis laboratories, private health facilities or even insurance.

Use Example

As a practical example we can consider the case in which patients must share their medical records with third parties such as pharmacies when they need to buy specific medicines or with legal advisors, etc.



Scrypta's Blockchain creates a **hash** for each sensitive data block and, at the same time, creates a **patient ID** that will act as a collector. Using an **API**, the authorized entities will be able to receive the necessary information **without revealing** the identity of the patient but utilise only the **ID generated**. Likewise, a patient can decide who to provide access to and whether this access will be complete or partial. In addition, a patient can set specific usage authorizations to third parties, who should also give their permission to share data with other parties.

Scrypta's blockchain technology can also help to speed up hospitals control procedures and operational mechanisms and can bring significant efficiencies to **secure document management**.

In the health sector, Scrypta could be a useful technology for various tasks such as:

- **Verify** patients digital identity (read the article *"Scrypta and Digital Identity"*
- **Keep track** of medical prescriptions history;
- **Monitor** the progress of treatments and drug delivery;
- **Manage** and archive documents such as medical records, invoices, medical researches result and tests;
- **Addressing IT security** problems through its immutability;
- **Solve the problem** of counterfeit drugs, ensuring the traceability of drugs;
- **Prevent** fraudulent modification of clinical trial data.

Below we analyze some of these use cases that can take advantage of Scrypta technology and which could make the healthcare industry more accessible, secure and reliable.

In the current digital transformation scenario, Public Administrations must interoperate and cooperate to exchange information such as individual and organizations reliable data, license, assets and activities. This process is very complex and subjected to many errors. The fact that many documents are still only in paper format and contain sensitive data adds complexity to this issue. These documents should be jealously guarded and protected from unauthorized access or manipulation but often this does not happen.

Since one of the main features of the **blockchain technology** is the very nature of its language that can provide transparent, accessible, non-manipulable and secure information, implementing it could offer solutions for the improvement of many of these aspects and favor the **process of digitization** of the PA. Compared to the traditional centralized logic this would represent a very important step for Public Administrations.

Scrypta—Standard infrastructure for PA

The architecture of Scrypta fits easily into this context and could radically change the ways in which citizens and the **PA interact**.

The infrastructure and tools offered by Scrypta can **facilitate** interoperability between the various administrations, due to a decentralized and distributed logic that leads to greater transparency, security and accessibility.

Scrypta is based on open source software, allowing anyone to **verify** the genuineness of the code. The publication of the source code is aimed, first of all, at creating trust in public opinion and consolidating it in the long term.

Structuring a new PA platform on the Scrypta blockchain would lead to the introduction of some unique elements such as digital IDs, cryptography, dApps, etc. that are not present in other governance models. The first step is therefore to ensure that the main components that will interact with the system are structured and organized in a relevant way. People and organizations would have their relevant **data stored** in a dedicated ledger within an encrypted blockchain database. People or companies could access these ledgers through any device. Users could authorize the public administrations to **read** or **modify** specific elements of their ledger using public and private key cryptography.

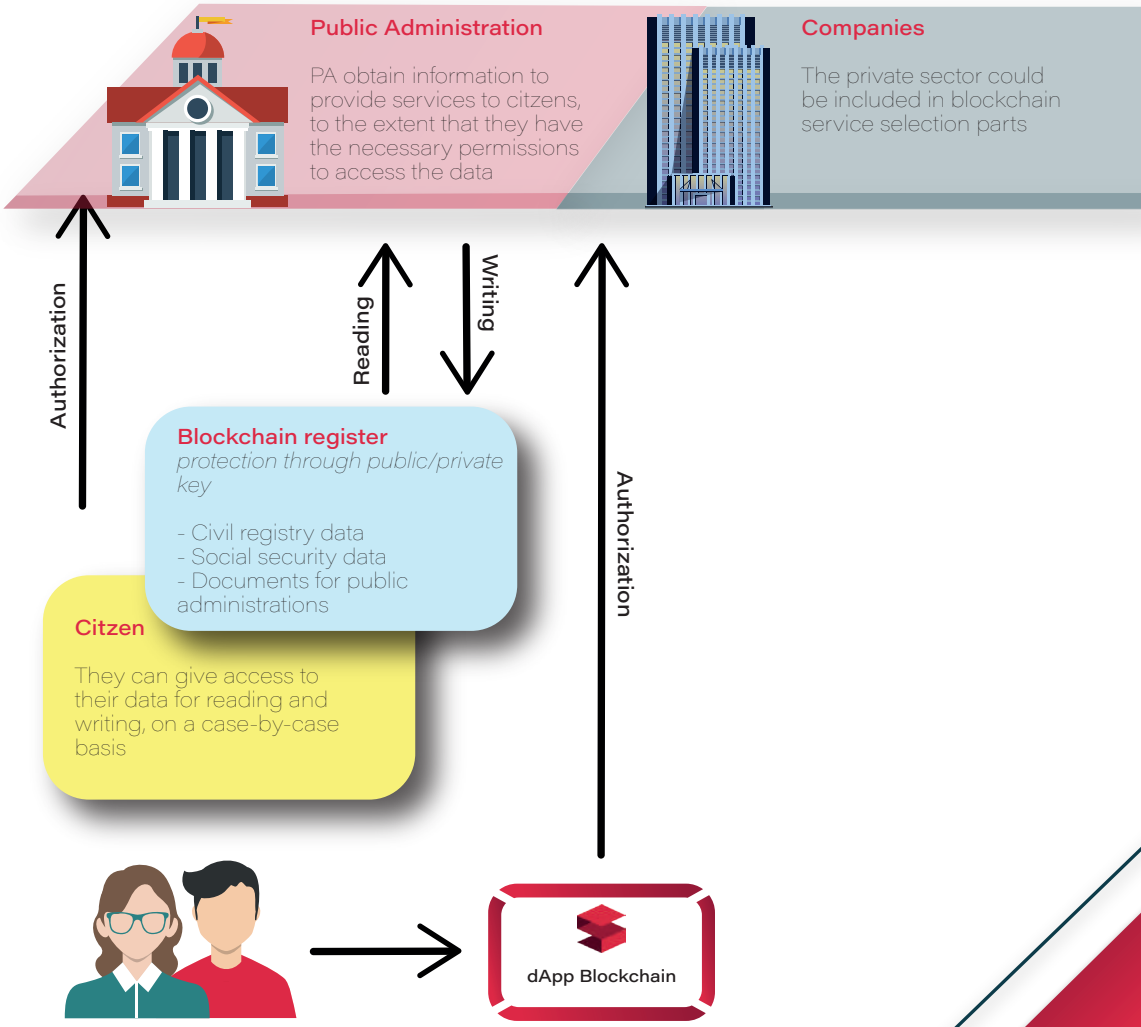
Public Administration

Users could also **selectively** use their public keys, sharing some of their information related to a particular transaction with administrative agencies. They could issue one-off private keys to agencies to *"write"* access to their data.

This agencies would be able to use **specific information** for a single purpose but would not have unlimited access to all user data not specifically needed.

The use of Scrypta blockchain registers would reduce the risk of unauthorized access and data manipulation thanks to **tamper-proof** control paths. In fact, public services could connect to the network without unfairly infringing on citizens **privacy rights**. The agencies could customize their services to respond more efficiently to the needs of the community.

We believe that PAs would have a lot to gain by experimenting with Scrypta technology, even gradually implementing it through pilot projects.



Democratic countries around the world are starting to adopt technology to improve the **efficiency** of the **electoral process**. Almost all of the current voting systems, however, are based on proprietary and centralized design of a single organization that controls the system database and in the same time provides monitoring tools. Often, these systems do not have an open source and independently verifiable production to gain the trust required by voters and election organizers. In fact, in the electoral sessions there is frequent talk of fraud and illegitimacy and the existing mechanisms have proved to be **vulnerable**.

The blockchain definitively prevents the malevolent subjects to *"tamper"* in a decisive way the system: for example it could forbid to vote twice, since the registration of each vote would be **immutable** and **indelible** as well as connected to a single identity. Moreover, the scrutineers and the voters themselves would be able to verify the correct recording of votes at any time.

Everything is **verifiable** on public blockchains. It is important to remember that voting results would be **encrypted**, in order to encourage transparency without compromising the **privacy**

The blockchain would consent **faster election** results. In fact, the results entered and stored on the blockchain would be immediately available. This means that relying on the blockchain for holding elections will not only be safer, but also more efficient. In fact, several countries are already **testing** blockchain technology for more efficient voting processes

Scrypta's hypothesis

With the infrastructure of Scrypta we imagined how a secure online voting platform could be built, allowing greater electoral **transparency**.

Scrypta's blockchain could also be used to improve voting processes within companies and organizations.

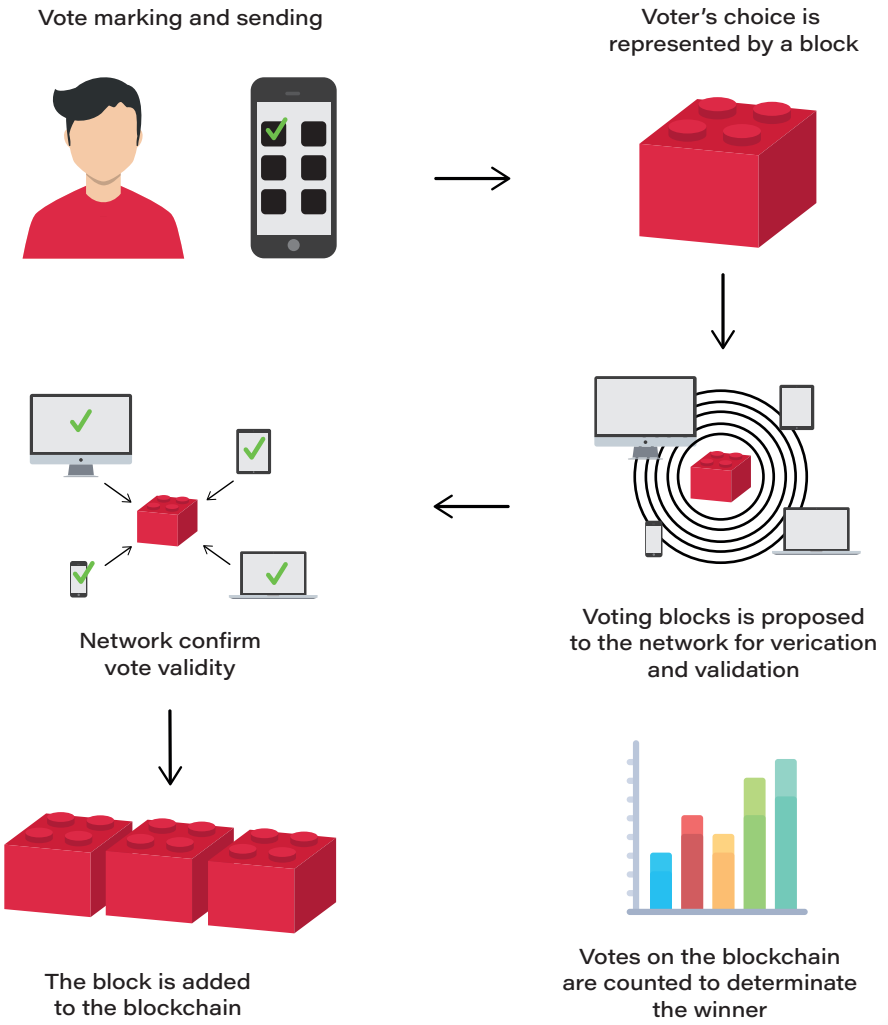
Scrypta uses **peer-to-peer** technology and activates transactions that do not require central authorities or institutions to act as controllers. The technology is based on an **open source** software that will allow anyone to control the source code..

Voting System

The heart of the Scrypta blockchain system is represented by an open ledger that stores all encrypted information sent between users (***nodes***). The data is certified and stored inside **cryptographic blocks**, which are connected to each other and are unalterable, thus contributing to the creation of an infinite chain. One of the main features is the **certification** of transactions. When it comes to the inviolability of data, Scrypta provides substancial guarantees: within each block we can find encryption data that has been linked to the previous block as well as a **timestamp** that certifies the date and time when the transaction took place.

The authentication could be designed and integrated in order to provide the possibility of using multi-factor authentication methods.

- *"Something"* you know, such as the **password**;
- *"Something"* you have, such as a **number generator** whose algorithm is linked to the user;
- *"Something"* related to yourself, such as your retina, the fingerprint, or other unique characteristics of the human body, a **biometric method**.



Voting System

Scrypta would allow voters to cast their vote online and **verify independently** that their vote was correctly assigned without alterations. Voters could even revise each ballot in order to verify that election results are accurate, maintaining privacy and maximum security.

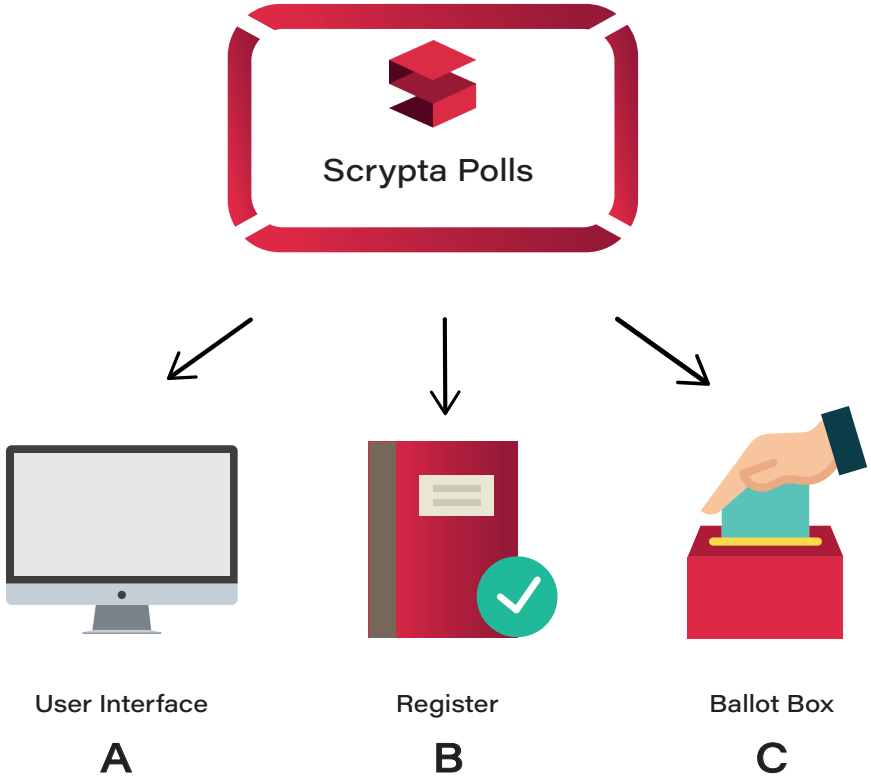
Voters will register himself using the **NFC ID card** for self-authentication; the dApp of Scrypta on his personal device will send the identity information. Once identity will be verified voters will be allowed to vote.

Scrypta's dApp, or the voting platform, could be divided into three sections:

- **User interface**, accessed through multi-factor authentication methods.

- **Register**, which certifies the eligibility to vote and enables the "ballot paper"

- **Voting**, the digital version of the ballot box, where the polls take place



In order to add an additional level of security, the path from **A** to **B** and from **B** to **C** could be managed by what Scrypta calls ***"Trustlink"***, i.e. voluntary trust lines established by two or more users. Trustlinks are in fact addresses of the Scrypta network,voluntarely generated by the union of two or more single addresses (***Legacy***). The creation of an account called ***"Multisignature"*** will allow the creation of transactions of a common type, whose transmission and validity takes place only if both parties voluntarily affix their **digital signature**.

In the particular case of the electoral consultation, the Trustlink to be used would be of the second type.

This methodology can be utilised for traditional voting (a person who goes to the polling station) by writing in the register using a Trustlink generated by the verification of identities. In case of **distance voting**, the citizen should be verified through an additional factor, such as a biometric data.

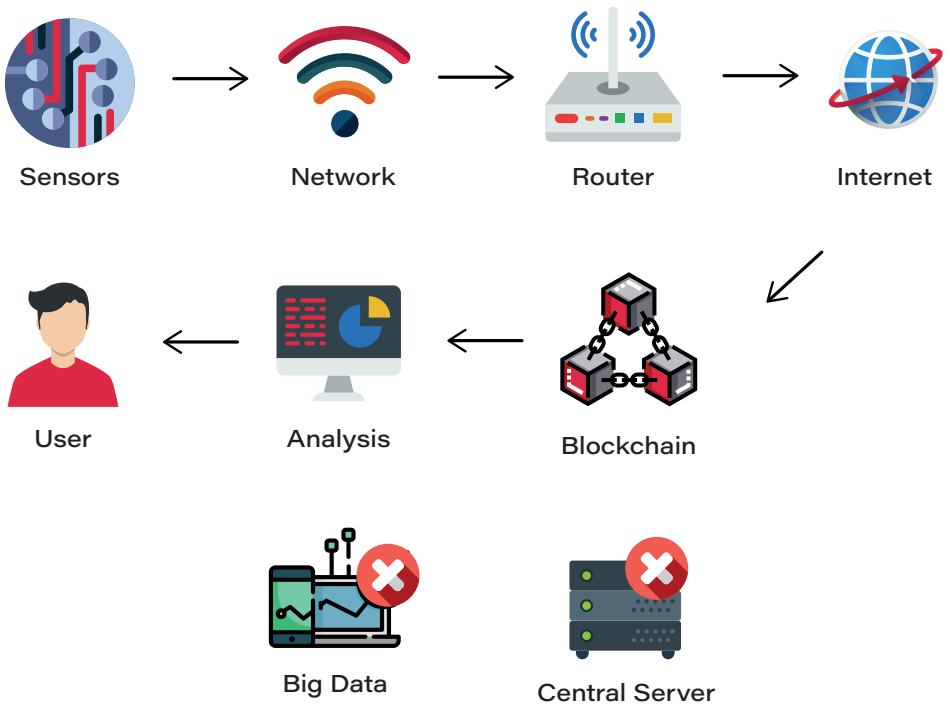
In this phase, Scrypta intends to test the blockchain system on a smaller scale, for example for the elections in universities, for private companies, small municipalities, autonomous organizations, etc.

We strongly believe that when we will be able to transmit the profound meaning of the fundamental motto *"Do not trust, verify"*, and to respond to this request thanks to the implementation of effective tools, then we will have brought down the problem itself.

The **Industrial Internet of Things** (IIoT) is creating new opportunities and providing competitive advantages for companies who engage with new technologies in current and new markets. The IoT is the process of creating new way to connect different tools, production environments, production workers and products through digital technologies (smart technologies).

We can easily imagine a near future in which the blockchain will drive toa **sharing economy** for Internet of Things (IoT) devices in a decentralized and **energy-efficient** environment, while producing a large amount of valuable data that could be useful for the development of the AI and while the users will be rewarded for providing this data.

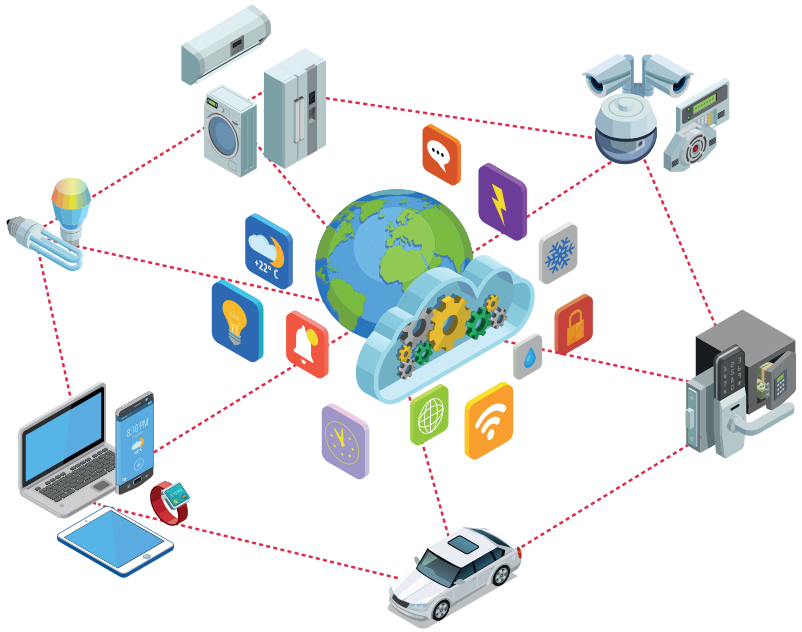
Scrypta's Blockchain can be used to track a countless of connected devices, allowing to process resulting data transactions and to coordinate different physical devices. Scrypta represents the missing link to solve problems of **scalability**,



In this scenario example, we imagine intelligent devices in a production plant that can place repair orders of some their parts without needing human or centralized interventions. Likewise, intelligent vehicles in a fleet of trucks will be able to **provide** a complete report of the most important parts that would need replacement after their arrival at the workshop. Differently, we can detect a sensor from afar, communicating directly with the irrigation system to control the flow of water according to the conditions detected on the crops.

Scrypta remove cumbersome and expensive subscription models. We envisage a new model in which **micro-transaction** payments will be paid selling **own data** to anyone who would be considered suitable. Individuals and machines will pay for what they consume and when they consume it. Moving to a market where consumers would pay for use rather than pay for property, producers will be encouraged to make their products longer lasting and easily recyclable.

The implementation of this technology is not just an abstract concept, it will bring incredibly innovative real applications in the near future: Scrypta's blockchain wants to be its **key application**.



The "Distributed Ledger" function

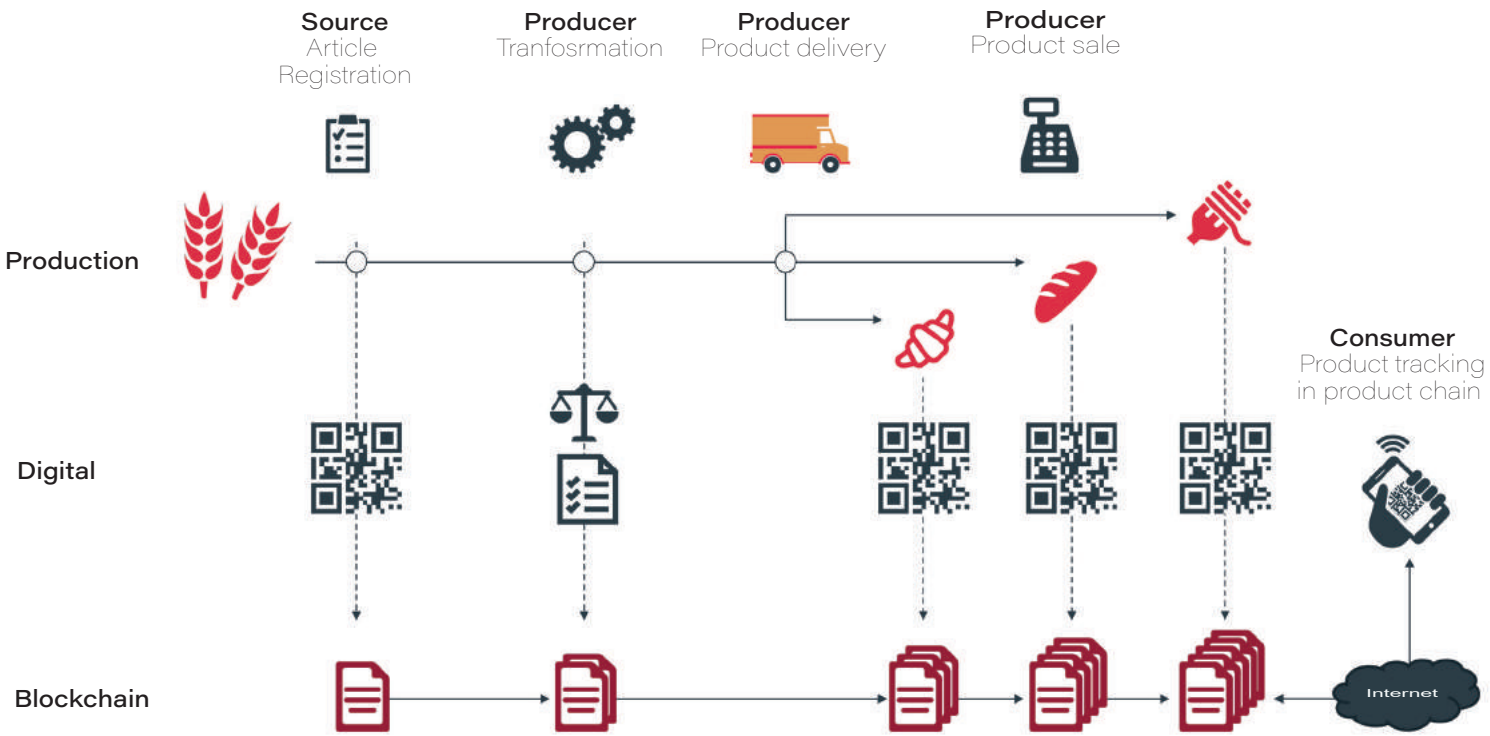
Due to the complexity and opacity of the current supply chain, there is a great interest in blockchain solutions for the supply chain and logistics sectors. Applying blockchain solutions to supply chains, every products ownership tranfer transaction can be documented, originating a **permanent product history** from production to sale. This could drastically reduce time delays, costs and human error. Let's see how blockchain technology could improve thefollowing tasks:

- **Verification** of product certification: for example to verifythe biological or correct origin of food products
- **Record** of goods shipment details such as pallets, trailers, containers, etc., while moving between the supply chain nodes.
- **Track** purchase orders, change orders, receipts, shipping notifications or other trade related documents.
- **Linking** physical assets to serial numbers, barcodes, digital tags, etc.
- **Sharing** information on products manufacture, assembly, delivery and maintenance among suppliers and sellers.

Scrypta's blockchain allows to build open supply chains in which all actors can provide data and information and verify all supply chain participants data with **maximum transparency**. Finally, product data can be shared for the benefit of consumers.

Scrypta **guarantees** a clear information flow free from irregularities. And we can imagine a near future where a product label scan will show its path from **origin** to **consumers**.

Supply chains



Through the **automatic recording** of information in the network it is possible to create a **permanent product history** and track its production chain. Each information acquired is validated by the network of companies that form a consensus. After each *"block"* (registration of each transaction) has been **validated**, it is added to a *"chain"* of transactions, becoming a permanent record of the whole process.

Therefore, it is possible to record continuosly all the data on the quality of a production batch.

The data will remain **indeleblely** recorded and it will not be possible to manipulate and / or alter it. Our technological proposal has the potential to allow both producers and their customers to start an **innovative path** of **traceability** in their supply chain.

Naval Logistic

The maritime industry is the backbone of globalization and international trade. Transport by sea plays an important and central role in the production chain. On the other hand, the entire supply chain has to face various problems, directly related to its **complexity**, because it is composed of a large number of subjects.

In a simple import operation, the following may be involved: the seller, the exporter, the buyer, the importer, the shipper, the logistics service provider, the handling company, the port authorities and the customs, insurers, financiers of the operation, etc.

Most of the goods are transported by container ships, but overcapacity, obsolete systems, human errors, missing and inaccurate documents and even shoddy goods have an important impact on the prospects of the sector. These challenges, along with higher demands from the company for **transparency** and **accountability** in the supply chain, drive the industry to explore **new solutions**.

The naval industry is facing high administrative management burdens, and therefore having to manage **many documents** that require **more signatures**.

All this leads to limitations of the service or insufficient capacity, causing delays in shipping, higher costs or incorrect deliveries.

With the growth of cross-border e-commerce and the imminent revolution of **Industry 4.0**, it is now clear that the maritime sector must increase efficiency, improve processes and perform a fundamental digital transformation.

The Blockchain can help reduce many of the frictions in global trade logistics, including procurement, transport management, goods traceability, customs cooperation, commercial finance. In addition, the Blockchain could allow you to optimize the **costs** and **time** associated with documentation and administrative processing for shipments, streamlining and automating payment.

In this context, in order to solve the critical problems of the sector, Scrypta is working on a **distributed platform**, based on blockchain, intended for all interested parties in the sector.

Naval Logistic

Through the Scrypta infrastructure and its distributed database, the data is recorded and visible to the interested parties, with the possibility of sharing them in **full security**, guaranteeing the visibility of all stages of the supply chain process to allow the parties involved to **exchange** the **information** on each event **safely**, without interruption and in real time.

Scrypta will make possible to arrange and store data in a decentralized way, providing protection with the combined strength of the nodes within the network. In fact, the solution proposed by Scrypta will maintain **privacy** and **security** by offering forms of validation and consent for transactions. Thanks to the Scrypta infrastructure, multiple partners such as freight forwarders, shipping companies, transport, couriers and customs could **simultaneously** access data in real time.

Ports could **collaborate digitally** with clients such as importers / exporters and other government agencies such as customs, immigration, non-governmental organizations and other entities, allowing them to work together on business processes and exchange information on documents.

These blockchain documents will be **traceable** and **verifiable**.

Scrypta could improve logistics and help create paperless ports and reduce maintenance time.

Social Link and News

Twitter: https://twitter.com/scryptachain

Facebook: https://www.facebook.com/scryptablockchain

Medium: https://medium.com/@scryptachain

Discord: https://discord.io/scrypta

Instagram: https://www.instagram.com/scryptachain/

dApp & Scrypta Infrastructure

Scrypta Polls System (Beta): https://polls.scryptachain.org

Light Wallet (Beta): https://lightwallet.scryptachain.org/#/

Official Github: https://github.com/scryptachain

Road Map: https://github.com/scryptachain/roadmap/projects/1

Wiki Scrypta: https://scryptachain.gitbook.io/documentation/

Light Paper: https://scryptachain.org/scrypta_light_paper_en.pdf

Exchange & Masternode Activation

Mercatox Exchange: https://mercatox.com/exchange/LYRA/BTC

Scrypta Masternodes Platform: https://masternodes.scryptachain.org

Easy MN Deployment & StakingVBox by Kalkulus Team: https://hub.kalkul.us

Masternodes & LYRA Stats

Block Explorer: https://chainz.cryptoid.info/lyra/

Coingecko: https://www.coingecko.com/en/coins/scrypta#panel

Masternodes Online: https://masternodes.online/currencies/LYRA/

Masternodes Buzz: https://coins.masternode.buzz/LYRA