Smart Insights

Blockchain: versatility by means of transparency

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WHITE PAPER

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1. Overview. Blockchain – what and why?

The start of the blockchain technology was mostly linked with the creation of cryptocurrencies. A cryptocurrency is a medium of exchange using cryptography to secure the transactions and to control the creation of additional units of the currency. Cryptocurrencies are a subset of alternative currencies, or specifically of digital currencies.

Bitcoin became the first decentralized cryptocurrency in 2009. Since then, numerous cryptocurrencies have been created. These are frequently called altcoins, as a blend of Bitcoin alternative.

Cryptocurrencies use decentralized control as opposed to centralized electronic money/centralized banking systems. The decentralized control is related to the use of blockchain transaction database in the role of a distributed ledger.

Blockchain is a system of organization of distributed databases. It consists of data structure blocks—which hold exclusively data in initial blockchain implementations. Each block contains a timestamp and information linking it to a previous block. Blockchain is a database that stores all transactions that have ever occurred in this system and all the existing data concerning these transactions. It consists of blocks of public data related to each other. A block is the “current” part of a blockchain, which records some or all of the recent transactions, and once completed, goes into the blockchain as permanent database. Each time a block gets completed, a new block is generated. Blocks are linked to each other (like a chain) in proper linear, chronological order with every block containing a hash of the previous block. The full copy of the blockchain has records of every transaction ever executed. It can thus provide insight about facts like how much value belonged to a particular address at any point in the past.

At the same time, the cryptography process does not prevent to read the contents of blocks, but instead this cryptography process mathematically connects the blocks to each other, and any record in any block cannot be replaced — there will be discrepancy in the math between the units, this will create a need to change the following block, followed by the next and so the whole chain. The blockchain is a distributed database, *i.e.* the copies of it are stored independently for each transaction ever held. So each user can independently check its copy of the blockchain. The discrepancy that any of the blocks would try to create will be immediately detected, and other nodes will reject such a block and it will not connected to the circuit. Blockchain is open and public, and everyone can check the contents of transactions without problems.

The original definition of blockchain was published by someone using the name Satoshi Nakamoto in 2008 and implemented in the original source code of Bitcoin published in 2009. By April 2014, more than 80 uses of such ledgers had been documented. As of 2014, "Blockchain 2.0" was a term used in the distributed blockchain database field. By April 2014, at least eight funded projects to develop blockchain 2.0 technology were under way.

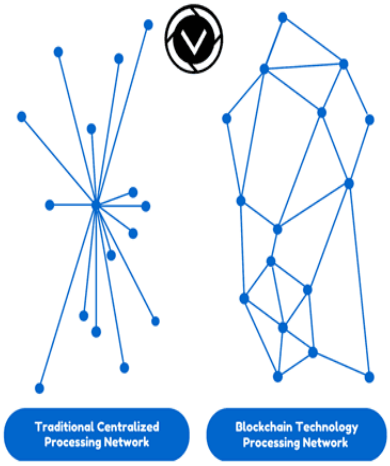
Bitcoin was also invented by Satoshi Nakamoto, who published the invention on 31 October 2008 in a research paper called "Bitcoin: A Peer-to-Peer Electronic Cash System". It was implemented as open source code and released in January 2009. Bitcoin is often called the first cryptocurrency although prior systems existed. Bitcoin is more correctly described as the first and most widely spread decentralized digital currency.

Nowadays blockchain is used mostly as a repository of information about the operations with cryptocurrency. This technology can be implemented in banking — cryptology allows reducing the time to conduct large transactions (loans, stock trading, and so on).

1.1 How does it work?

A blockchain is a data structure that makes it possible to create a digital ledger of transactions and share it among a distributed network of computers. It uses cryptography to allow each participant on the network to manipulate the ledger in a secure way without the need for a central authority. Thanks to this structure, blockchain is truly peer-to-peer; it doesn't require powerful intermediaries to authenticate or to settle transactions.

Transactions are the content to be stored in the blockchain. Transactions are created by users who wish to record information in the blockchain. In the case of cryptocurrencies, a transaction is created any time a cryptocurrency owner sends cryptocurrency to another user.



Source: followmyvote.com

Transactions are passed from node to node on a best-effort basis. The system implementing the blockchain defines a valid transaction. In cryptocurrency applications, a valid transaction must be digitally signed and ensure that the sum of transaction outputs does not exceed the sum of inputs. Meaning that one can only get the exact number or sum of units that has been passed in a transaction. The simple example is a usual Bitcoin transaction: Person 1 sent the exact number of 399 Bitcoins, it means that the Person 2 who will receive this transaction could not get 400 Bitcoins out of the system but just 399 BTC.

Blocks record one or more transactions. A transaction's presence in a block confirms when and in what sequence it occurred. Blocks are created by users known as "miners" who use specialized software or equipment designed specifically to create blocks. Miners compete with each other to see who can first complete the next block and therefore earn rewards for doing so.

In a cryptocurrency system, miners collect two types of rewards: a pre-defined per-block award and fees offered within the transactions themselves, payable to any miner who confirms the transaction. Every node in a decentralized system has a copy of the blockchain. No centralized "official" copy exists and no user is "trusted" more than any other.

Transactions are broadcast to the network using software applications. Mining nodes validate transactions, add them to the block they're creating and then broadcast the completed block to other nodes.

Blockchains use various timestamping schemes, such as proof-of-work to serialize changes. The “proof of work” is a “right” to participate in the blockchain system. It is manifested as a “big enough hurdle” that prevents users from changing records on the blockchain without re-doing the proof of work. So, proof of work is a key building block because it cannot be “undone,” and it is secured via the strengths of cryptographic hashes that ensure its authenticity.

Source: cnbc.com

Once a block of data is recorded on the blockchain ledger, it’s extremely difficult to change or remove it. When someone wants to add to it, participants in the network — all of which have copies of the existing blockchain — run algorithms to evaluate and verify the proposed transaction. If a majority of nodes agree that the transaction looks valid — that is, identifying information matches the blockchain’s history — then the new transaction will be approved and a new block added to the chain.

The system uses cryptography, so if we have a global, distributed database that can record the fact that we have done this transaction, what else could it record? Well, it could record any structured information, not just who paid whom but also who married whom or who owns what land or what light bought power from what power source. In the case of the Internet of Things, we’re going to need a blockchain-settlement system underneath as banks won’t be able to settle trillions of real-time transactions between things.

1.2 Public and private blockchain concepts and examples

Public blockchain: A public blockchain is a platform where anyone on the platform would be able to read or write to the platform, provided they are able to show proof of work for the same. There has been a lot of activity in this space as the number of potential users that any technology in this space could generate is high. Also, a public blockchain is considered to be a fully decentralized blockchain. Some examples:

- **Bitcoin** is the first and most popular cryptocurrency. The biggest part of transactions made via blockchain are made with the use of BTC (the symbol of a Bitcoin unit). The current rate of one BTC is US$ 605.97 (EUR 542.56),

- **Ethereum**, a provider of a decentralized platform and programming language that helps running smart contracts and allows developers to publish distributed applications,

- **Factom**, a provider of records management, records business processes for business and governments,

- **Blockstream**, a provider of sidechain technology (sidechains are networks based on protocols that are isolated from a Bitcoin-type blockchain), focused on extending capabilities of Bitcoin. The company has started experimenting on providing accounting (considered a function to be done on private blockchain) with the use of public blockchain technology. On October 12, 2015, *Blockstream* announced the release of its Liquid sidechain which could allow for the transfer of assets between the sidechain and the main blockchain. Blockstream produces software that facilitates interoperability between the main chain and the sidechain.

Private blockchain: A private blockchain, on the other hand, allows only the owner to have the rights on any changes that have to be done. This could be seen as a similar version to the existing infrastructure wherein the owner (a centralized authority) would have the power to change the rules, revert transactions, etc. based on its own needs. This could be a concept with huge interest for financial institutions (FIs) and large companies. It could find use cases to build proprietary systems and reduce the costs while at the same time, increase their efficiency.

Some examples could be:

- **Eris** Industries aims to be the provider of shared software database using blockchain technology,

- **Blockstack** plans to provide financial institutions back office operations, including clearing & settlement on a private blockchain,

- **Multichain**, provides an open source distributed database for financial transactions,

- **Chain**, a provider of blockchain APIs (Application Programming Interface). *Chain* partnered with NASDAQ OMX Group, to provide a platform that enables trading private company shares with the blockchain.

The usage of blockchain technology for governmental goals is becoming popular. For instance, Sweden is conducting tests to put the country's land registry system on blockchain. The state is working on the project with Swedish blockchain company *ChromaWay*, consulting firm *Kairos Future*, and telecommunications service provider *Telia*. The plan is to put real estate transactions on blockchain once the buyer and seller agree on a deal and a contract is made.

Moreover, The National Settlement Depository (NSD), Russia's sole central securities depository (CSD), has announced it has tested a blockchain-based voting system in April 2016. The NSD used the NXT blockchain system (an open source cryptocurrency and payment network launched in November 2013) to create an open-source prototype, with the goal to enable shareholders to more easily vote as part of annual shareholder meetings.

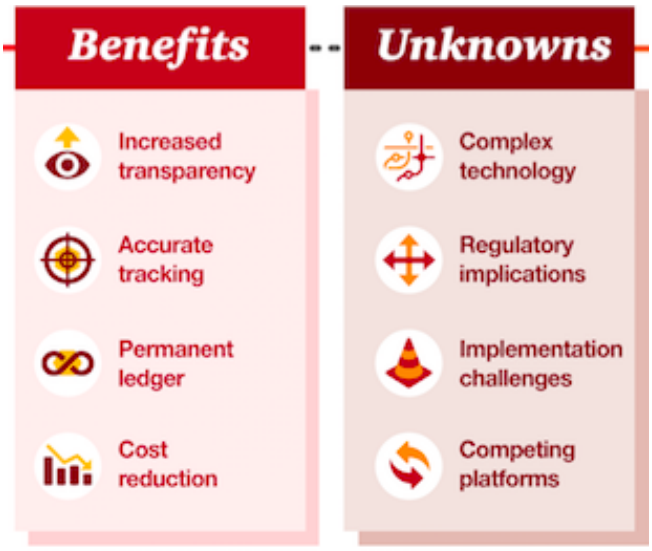
Also, Estonia's tech-friendly government seems willing to implement innovations like blockchain technology for healthcare, banking services and even governance by allowing its citizens to become "e-Residents."

This service also gives Estonian citizens and businesses digital authentication. It was also one of the first to use a blockchain-based e-voting service that enables people to become shareholders of NASDAQ's Tallinn Stock Exchange. The country now hosts a number of Bitcoin ATMs and startups such as *Paxful*, a global peer-to-peer buying and selling service for Bitcoins. With one of the highest internet penetration rates in the world, Estonia is well positioned to be a place where a cryptocurrency users can certainly feel welcome.

The term blockchain today usually describes a version of this distributed ledger structure and distributed consensus process. There are different blockchain configurations that use different consensus mechanisms, depending on the type and size of the network and the use case of a particular company. The Bitcoin blockchain, for example, is a public system, meaning anyone can participate and contribute to the ledger. Many firms also are exploring private blockchains whose network is made up only of known participants. Each of these blockchain implementations operates in different ways.

1.3 Advantages of Blockchain

As of now, blockchain is seen as an immutable, unhackable distributed database of digital assets. This is a platform for transparency and it is a platform for trust. The implications are staggering, not just for the financial-services industry but also right across virtually every aspect of society.



Source: pwc.com

Benefits of blockchain technology as identified by *Forbes* are:

- As a public ledger system, blockchain records and validate each and every transaction made, which makes it secure and reliable,
- All the transactions made are authorized by miners, which makes the transactions immutable and prevent it from the threat of hacking,
- Blockchain technology discards the need of any third-party or central authority for peer-to-peer transactions,
- Decentralization of the technology.

2. Blockchain use cases

2.1 Three key sections of segmentation according to *Capgemini*

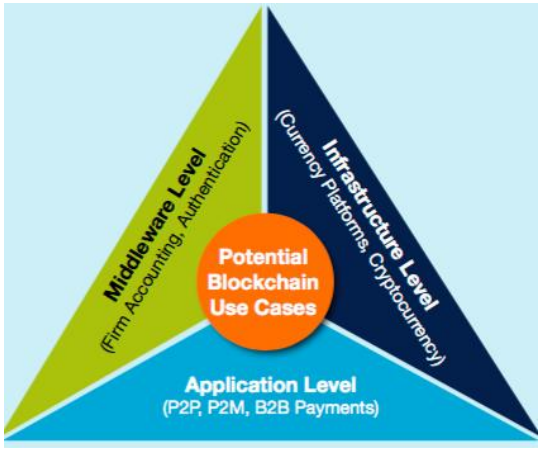
A. Application level (P2P, P2M, B2B payments) – One of the most popular and most used type is payments. Person-to-person, person-to-merchant and business-to-business are most spread types of payments. Many different cryptocurrencies are being used in order to maintain such payments via blockchain.

B. Middleware level (Firm Accounting, Authentication) – It can work as a database and storage. Moreover, the technology is being used as a mean of authentication process – the work of miners can handle it. Due to the high level of security, transparency and deep verification we can be sure that authentication is accurate enough.

C. Infrastracture level (Currency platforms, Cryptocurrency) – As it has been mentioned in the point ''A. Application level'' blockchain technology serves for currency platforms which are the basis of international transactions.

List of most popular cryptocurrencies:

1) *Bitcoin*
2) *Ethereum*
3) *Ripple*
4) *Litecoin*
5) *Peercoin*
6) *NXT*
7) *Namecoin*



Source: capgemini.com

2.2 Other potential usage/application

However, financial sector is not the only one where blockchain can be used. Nowadays, cryptocurrency transactions are still one of the most popular activities where this technology is being used. But this trend is about to change. Day by day, technology is being applied by many authorities, many businesses in various sectors.

Table 1 - Other potential usage of blockchain

Use case	Capital market examples	Other industry examples	Reason for adoption
Tokenizing assets not currently on a common ledger (new blockchains or tokens on Bitcoin)	• Pre-IPO equities • Syndicated loans • Depository receipts	• Physical objects *e.g.* diamonds, paintings, etc.	• Proof of ownership/ provenance • Settlement efficiency
New blockchains to share data between participants	• KYC data sharing • Collateral ledger to support efficient margining (the difference between a product or service's selling price and its cost of production or to the ratio between a company's revenues and expenses) • Reference and market data	• Supply chain data invoicing • Trade finance	• Efficiency of information collection
New blockchains to process transactions	• Corporate finance bookkeeping • Fund portfolio management	• Inter-bank blockchain to support cross- border banking payments • Intra-bank blockchain to support cross- bank accounting	• Disintermediation of players • Simplified data and infrastructure
Monitoring of richer datasets	• Concentration monitoring • Market surveillance • Pricing data	• Trade flows, transit data	• Powerful understanding of data
Processing using blockchains	• Securities servicing • Regulatory reporting		• Efficient processing capabilities

Source: oliverwyman.com

It is now a known fact that the use cases of blockchain have been increasing by the day. There has increasingly been a large number of ways in which real-world assets could be linked to the blockchain and traded digitally. A proof-of-concept is being run for trading commodities (like physical bars of gold, silver and diamond) after being authenticated via blockchain, establishing ownership of real-estate properties, to provide election voting, etc.

Several examples of use cases:

- **App development**: Proof of ownership of modules in app development,
- **Digital content**: Proof of ownership for digital content storage and delivery,
- **Ride-sharing**: Points-based value transfer for ride-sharing,
- **Digital security trading**: Ownership and transfer,
- **Digitization of documents/contracts**: Digitization of documents/contracts and proof of ownership for transfers,
- **Decentralized storage**: Decentralized storage using a network of computers on blockchain,
- **Company incorporations**: Digitizing company incorporations, transfer of equity/ownership and governance,
- **Decentralized Internet and computing resources**: Decentralized Internet and computing resources to cover every home and business,
- **Home automation**: Platform to link the home network and electrical devices to the cloud,
- **Digital identity**: Provides digital identity that protects consumer privacy,
- **Escrow/custodian service**: Escrow/custodian service for the gaming industry; loan servicing and e-commerce,
- **IT portal**: A smart contract IT portal executing order fulfillment in ecommerce/manufacturing,
- **Patient records**: Decentralized patient records management,
- **Digitizing assets**: Improves anti-counterfeit measures,
- **Reputation management**: Helps users engage, share reputation and collect feedback,
- **Prediction platform**: Decentralized prediction platform for the share markets, elections, etc.,
- **Enables authenticity of a review**: Enables authenticity of a review through trustworthy endorsements for employee peer reviews,

- **Marketplace for sales and purchases of digital assets**: Proof of ownership and a marketplace for sales and purchases of digital assets.

Interest in blockchain has been coming in from every corner of the world with major ones being banks and technology providers. Banks' interest in blockchain is seeing a huge uptick with the exploration of potential use cases for the distributed ledger system.

3. Blockchain players and fields of coverage

Major players are investigating blockchain innovative technology. These are the companies, which are representing the most perspective and promising projects in numerous sectors of the business. In this section most developing players and fields of coverage will be discussed.

3.1 Financial Institutions

Firstly, the financial usage of blockchain. The financial sector includes many large players. Some of them are:

- **R3,** a blockchain technology company. It leads a consortium of 45 financial companies in research and development of blockchain usage in the financial system. The consortium started on September 15, 2015 with 9 financial companies: *Barclays, BBVA, Commonwealth Bank of Australia, Credit Suisse, Goldman Sachs, J.P. Morgan, Royal Bank of Scotland, State Street* and *UBS*. As of April 25, 2016, three additional financial companies had joined: *SBI Holdings* of Japan, *Hana Financial* of South Korea, and *Bank Itau* of Brazil. As of June 23, 2016, *Toyota Financial Services* has joined. On March 3, 2016, R3 announced that it had completed a trial involving 40 banks held in the last two weeks of February, testing the use of blockchain solutions offered by *Eris Industries*, *IBM*, *Intel* and *Chain* to facilitate the trading of debt instruments. This was a follow-on to an 11-bank trial conducted earlier in January which used *Ethereum* hosted on *Microsoft Azure*.

Source : coindesk.com

- **NASDAQ:** The stock exchange firm revealed that they were planning to use blockchain as an enterprise-wide technology to enhance their capabilities on the NASDAQ Private Market Platform. The NASDAQ Private Market Platform is a new initiative launched in January 2014, to enable pre-IPO trading among private companies.

It has also said that they would leverage the Open Assets Protocol, a colored coin concept, to build their private exchange platform. Later, in June 2015, it announced a partnership with *Chain*, a blockchain infrastructure provider for FIs and enterprises. The aim of colored coins is to transfer ownership of other assets (like commodities, shares, bonds) with the same speed, transparency and low cost as Bitcoin.

- **DBS Bank**: The bank organized a blockchain hackathon in Singapore in partnership with Coin Republic, a Singapore-based Bitcoin company & Startupbootcamp FinTech. *BitX, Blockstrap* and *Colu* provided the APIs for the two-day hackathon series.

- **EBA**: Euro Banking Association (EBA) has released a report talking about the implications of crypto-technologies from the perspective of transaction banking and payment professionals in the coming one to three years. EBA has noted that these technologies could be leveraged by banks to reduce governance and audit costs, to provide better products and faster time to market.

- **US Federal Reserve**: Federal Reserve is reportedly working with *IBM* on developing a new digital payment system tied to blockchain.

- **Deutsche Bank**: The bank has said that it has been exploring various use cases of blockchain in areas like payments and settlement of fiat currencies, asset registries, enforcement and clearing derivative contracts, regulatory reporting, KYC, AML registries, improving post-trade processing services, etc. It has been experimenting on these technologies at their innovation labs in London, Berlin and Silicon Valley.

There have also been reports that derivatives companies *CME Group*, *Deutsche Boerse*, clearing houses DTCC (depository trust & clearing corporation) and EuroCCP are working on projects around the use of blockchain in areas such as clearing. Also, there has been news that money transfer service provider *Western Union* could possibly look into *Ripple* technology to understand blockchain.

Below is a brief of **banks** experimenting with blockchain:

- **Fidor Bank**: The bank has partnered with *Kraken* to provide a digital currency exchange in EU, and with Bitcoin.de, a P2P BTC trading platform in Germany. It later partnered with *Ripple Labs* to provide money transfer services.

- **LHV Bank:** Reported to have started working on blockchain technology in June 2014. They developed an app based on colored coins called Cuber Wallet in June 2015. They also have partnerships with *Coinbase* & *Coinfloor* and are experimenting on digital security with blockchain.

- **CBW Bank, Cross River Bank:** Partnered with Ripple Labs to build risk management system and provide lower cost remittance services.

- **Rabobank, ABN Amro, ING Bank**: Exploring blockchain for various banking services. *Rabobank* has also partnered with *Ripple Labs*.

- **Goldman Sachs**: *Goldman Sachs* participated as a lead investor in Bitcoin startup Circle Internet Financial's US$ 50 million (EUR 44.8 million) funding round. They have also reported extensively on Bitcoin and blockchain in their annual publication Future of Finance.

- **BBVA Ventures**: Investor in *Coinbase*. *BBVA* have also released a research report stating their interest in blockchain technology.

- **Santander**: Claims to have 20-25 use cases for blockchain and has a team called "Crypto 2.0" to research the use of blockchain in banking.

- **Westpac:** *Westpac* had partnered with *Ripple* to develop a low-cost, cross-border payments platform. Reinventure, its VC arm, participated in *Coinbase*'s US$ 75 million (EUR 66.1 million) Series C funding.

- **UBS:** Has a cryptocurrency lab in London and is experimenting in the areas of payments, trading & settlement, smart bonds. It is planning to build an enterprise-wide product called "utility settlement coin" in partnership with *Clearmatics*. It has also stated that they have 20-25 use cases of blockchain for finance.

- **BNY Mellon:** Created own currency called "BK Coins" as a corporate recognition program which can be redeemed for gifts and other rewards.

- **Barclays Bank:** The bank has two Bitcoin labs in London that are open for various Bitcoin and blockchain entrepreneurs, coders and businesses. It has also partnered with *Safello*, to develop various banking services on blockchain. It is also running accelerators to provide blockchain enthusiasts mentoring and a chance to work with the bank on specific projects (*Everledger* is one of the companies that has emerged from *Barclays*' accelerator program). Barclays also claims to have 45 experiments they want to do internally.

- **CBA:** Has partnered with *Ripple Labs* to implement blockchain ledger system for payment settlements between its subsidiaries.

- **USAA Bank**: Created a research team to study uses of Bitcoin.

- **ANZ Bank:** Partnered with *Ripple* to explore potential use cases of blockchain.

- **BNP Paribas:** Experimenting at making transactions faster by using blockchain.

- **Societe Generale**: Planning to hold special trainings concerning BTC, blockchain and cryptocurrency for its employees.

- **Citibank**: They have set up three separate systems within Citi that deploy blockchain-based distributed technologies. They developed an equivalent to Bitcoin called "Citicoin," which is being used internally to understand the digital currency trading system better.

3.2 Blockchain applications beyond the financial services industry

Blockchain fever hasn't been limited to financial institutions. Along with banks and FinTech startups, non-financial players have been paying attention and looking for ways to leverage the opportunities that distributed ledger technology opens. Below there are some interesting examples of the non-financial applications of blockchain technology.

3.2.1 Blockchain and commodities

The Real Asset Company enables individuals around the world to buy gold and silver bullion securely and efficiently. The company's investor-friendly platform sits on top of global vaulting infrastructure, providing an online account for buying gold and silver and holding precious metals. *Goldbloc*, the company's gold-backed cryptocurrency adds an additional layer of transparency and control to users' gold investment. Backed by one gram of gold, the company believes its cryptocurrency to be the first step to bringing gold back into the monetary system.

Uphold is a platform for moving, converting, transacting and holding any form of money or commodity. The company connects banks, credit and debit cards and Bitcoin to digital wallets for free financial services and transactions. Businesses and consumers can fund their Uphold accounts via bank transfer or by linking a credit/debit card in addition to Bitcoin.

3.2.2 Blockchain and data management

Factom is one of the most notable blockchain companies applying distributed ledger to the non-financial market – in this case, data management. The company uses blockchain-based identity ledgers in database management and data analytics to support various applications. Businesses and governments can use *Factom* to simplify records management, record business processes, and address security and compliance issues. *Factom* maintains a permanent, time-stamped record of data in the blockchain that allows companies to reduce the cost and complexity of conducting audits, managing records, and complying with government regulations.

3.2.3 Blockchain and digital content

Ascribe helps artists and creators to attribute digital art via blockchain. *Ascribe*'s marketplace allows to generate digital editions with a unique ID and a digital certificate of authenticity to prove provenance and authenticity. It also allows accepting consignments from artists and transferring digital works to collectors with all the terms and legals.

There are also companies like *Bitproof, Blockai, Stampery* and other companies applying blockchain to digital art attribution and authentication.

3.2.4 Blockchain and network infrastructure

Ethereum is a platform and a programming language that makes it possible for any developer to build and publish next-generation distributed applications. *Ethereum* can be used to codify, decentralize, secure and trade just about anything: voting, domain names, financial exchanges, crowdfunding, company governance, contracts and agreements of most kinds, intellectual property, and even smart property thanks to hardware integration.

ChromaWay offers blockchain as a platform for financial institutions and is working on a smart contract platform that allows for digitizing and representing workflows in a secure, private and efficient way.

3.2.5 Blockchain in market forecasting

Augur.net is an open-source, decentralized market prediction platform built on *Etherum* blockchain. It allows users to trade on the outcome of events, and for the market to then leverage that crowdsourced information. *Augur* plans to use decentralized public ledgers to create a way for anyone in any field, from finance, healthcare and governance, to tap into the collective forecasting power of a global user base.

3.2.6 Blockchain and diamonds

The diamond industry is one of the biggest natural resource industries and makes a substantial part of the GDP in African countries and other major diamond-miners. The hallmark of the industry is that it is highly criminalized. Stones are small and easy to hide and transport. The best part for criminals is that transactions can be made confidentially and the sell returns the value over years. Diamonds are known to be involved in money laundering and financing of terrorism on a truly massive scale around the world.

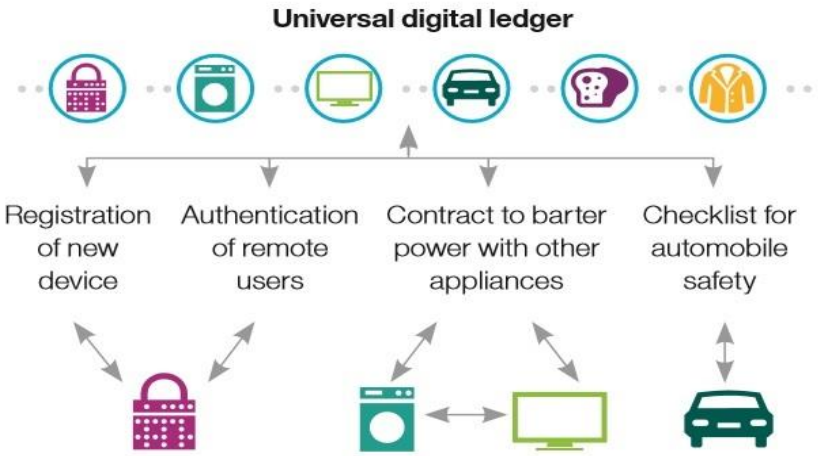
Due to a range of challenges with diamonds business, one of the tech pioneers in the sphere is *Everledger*. The company provides an immutable ledger for diamond identification and transaction verification for various stakeholders, from insurance companies to claimants and law enforcement agencies. *Everledger* assigns a “digital passport” to each diamond that will accompany each stone as it is transacted and creates a unique fingerprint.

3.2.7 Blockchain and IoT

The Internet of Things is becoming a popular topic all over the world. Of course, there are some projects, trying to implement the blockchain technology in this domain. *Chain of Things* is a consortium that is exploring the role blockchain may have in providing security for the Internet of Things. *CoT* was formed by a group of technologists at the nexus of IoT hardware manufacturing and alternative blockchain applications.

IoTA - IoTA enables companies to explore new B2B models by making every technological resource a potential service to be traded on an open market in real time, with no fees. It is a transactional settlement and data transfer layer for the Internet of Things. It's based on a distributed ledger, the Tangle, which overcomes the inefficiencies of current Blockchain designs and introduces a way of reaching consensus in a decentralized peer-to-peer system.

The blockchain functions as a universal digital ledger facilitating various types of IoT transactions between devices



Source: goldmansachs.com

3.2.8 Blockchain and automotive industry

One of the most attractive business sectors could not pass by the blockchain technology. *General Motors*, a car manufacturer, announced in January 2016 its collaboration with *Lyft*. This company provides a platform for on-demand ridesharing. *Lyft* offers a service for connecting drivers to ride-seekers via smartphone software. The companies will collaborate to create self-driving vehicles.

Moreover, in the beginning of January 2016 Google announced its collaboration with Ford also in order to create self-driving cars.

Both of these projects promise to work on smart contracts, blockchain-powered contracts that can tie IoT and vehicle finance together.

3.2.9 Blockchain and healthcare

The blockchain projects are being also developed in one of the most important sectors. *Gem*, a provider of enterprise blockchain solutions, launched Gem Health, a network for developing applications and shared infrastructure for healthcare powered by the *Ethereum* blockchain, and announced that *Philips Blockchain Lab*, a research and development center of healthcare giant Philips, is the first major healthcare operator to join the Gem Health network.

Gem Health is a blockchain network for the global community of companies and individuals that take part in the continuum of care. The company intends to leverage blockchain technology to address the trade-off between patient centric care and operational efficiency by creating a healthcare ecosystem connected to universal data infrastructure.

The Gem Health blockchain network includes identity schemes, data storage, and smart contracts applications that execute against shared data infrastructure. Using the Gem Health network, different healthcare operators can access the same information, which will permit the development of a new class of blockchain-based applications that will unlock wasted resources and solve important operational problems in healthcare.

4. Conclusion

Nowadays blockchain mostly serves for cryptocurrency transactions and other financial operations. However, other ways of usage of the technology are developing: insurance, voting, commodities, data management and many other sectors are among them. The technology provides a high level of service, speed, diversity, convenience and, the most crucial, high level of transparency and security. Blockchain could be leveraged to cut costs and improve the transparency of financial transactions. The blockchain is a way of creating and maintaining the truth. Especially, its diversity permits to spread more and more, not depending on boarders. The diversity makes this technology particularly attractive for many players of different sectors and creates numerous opportunities. The technology is promising and fast growing opening new horizons for many types of businesses.

Glossary

B2B	Business-to-Business
BTC	Bitcoin (Symbol)
CSD	Central Securities Depository
CoT	Chain of Things
EBA	Euro Banking Association
FI	Financial Institution
GDP	Gross Domestic Product
IoT	Internet of Things
ID	Identification
KYC	Know Your Client
NSD	National Settlement Depository
P2M	Person-to-Merchant
P2P	Person-to-Person

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