Blockchain: The Pathway to a Secure Future

Catalyzing a safe data universe for efficiency in business, policies and life

The emergence and evolution of Blockchain

Blockchain technology, a term which is commonly associated with bitcoin and cryptocurrencies, is now proving to be a disruptive innovation of boundless depth. It is, in fact, claimed to be one of the most important inventions after the internet, catching the attention of technology experts, business professionals, budding entrepreneurs, governments and many other players worldwide. Simply put, a blockchain is a list of records built on a peer-to-peer network. Each record is called a block, containing a timestamp, transaction data and a link to the previous block, thus forming a database, called a chain. It is the primary supporting technology behind digital currencies. The most popular one, Bitcoin, was invented by an unknown identity called Satoshi Nakamoto who simultaneously developed a digital public ledger (blockchain) as a platform to enable the usage of Bitcoin for transactions between people who do not know or trust each other.

Why is everyone talking about it?

Blockchain's evolution across diverse business functions around the world is challenging the traditional way of doing things by posing new possibilities for every individual, organization and entity engaged in storing and using data. The expansion in the usage of the Internet, across a majority of businesses and households, has brought with itself fundamental challenges of trust resulting from the vulnerability of databases to hack threats and data breaches. Such compromises or manipulation of data include thefts of personal health details, credentials of social network and other applications, which we read about in the news persistently. These occur despite several preventive measures such as firewall, biometrics and two-factor authentication.

The irreversibility of transactions in the digital ledger, the traceable decentralization of access control, consensus-focused alteration of the entries (blocks), and the immutable nature of the database (chain), enable blockchain to reduce the above risks to a great extent. These capabilities of the blockchain in making databases tamper-proof without the need for a central authority, has resulted in experts often referring to it as the "trust protocol". The importance of these features in the numerous applications of blockchain, can be discussed in three significant stages – Digital currencies, Smart Contracts and how these applications are pushing the world towards autonomous organizations, processes and self-management.

Understanding cryptocurrencies

Cryptocurrency is a class of digital currencies, a fast-growing trend, which can be used as a form medium of value online via computers and mobile phones. Another innovation brought into the picture by the dominant popularity of Bitcoin, virtual currencies have now become mainstream.

More and more corporate players such as Barclays, Credit Suisse and Amazon, among others, have already integrated or are exploring opportunities to integrate these currencies into their operational systems. For instance, PwC and EY have both started accepting Bitcoin (฿) as a mode of payment for their clients, and Amazon has indicated intentions in following suit.[1] Other popular examples of cryptocurrencies that have recently stepped into the market are Ether (Ξ), Ripple (XRP), Litecoin (Ł), Tether (₮), Libra (5TR), and so on. Libra is soon to be launched by Facebook as an addition to its wide range of fintech-based service ventures. Funds are raised through Initial Coin Offering (ICO) to create these new currencies, similar to the purpose of IPOs for companies.

How do Bitcoin and Ethereum work?

The process of generating Bitcoin is called mining, wherein miners earn the Bitcoin tokens as rewards for solving complex puzzles, thus building blocks of verified transactions which are then added to the blockchain. Such mandatory verification of the previous transactions in the chain eliminates the problem of "double spending", i.e., the risk of the holder of the bitcoin spending it twice.

Miners claim that the process takes large amounts of effort and computing power for solving the numeric problems. Nevertheless, Bitcoin can also be bought using traditional payment methods on bitcoin wallets, traded for other cryptocurrencies on exchanges, or even earned as income for performing a job, such as posting a blog for instance.[2] Transaction management and money issuance can be conducted more efficiently and autonomously using Bitcoin, considering the absence of a central authority in the operations and the usage of peer-to-peer technology. It also satisfies the
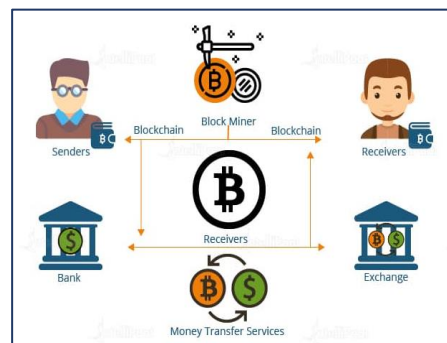
How Does Bitcoin Work, Source: Intellipaat.com

trust factor of conventional payment instruments as the transactions are irreversible and can be stored in encrypted form with a private key known only to the individuals involved.

While bitcoin aims to disrupt PayPal and online banking, the vision of Ethereum (the platform for the currency Ether) is to develop similar infrastructure for purposes beyond monetary transactions. It aims to enable people anywhere in the world to write new programs for creating autonomous applications and agreements. To achieve this, the Ethereum adopts a major chunk of its protocol from that of Bitcoin.[3]

Decentralized applications (dapps) and Smart Contracts are two fundamental developments based on the Ethereum platform. The ultimate goal is to form a leaderless organization, where decisions can be facilitated by the members themselves using automated processes. Dapps, unlike the apps we use today such as Foodpanda and Spotify, do not require an intermediary to manage user information for the app to function. Instead, they can use 'smart contracts' which consolidate information from multiple parties to deliver the service on the app.

What are smart contracts?

Smart contracts are blockchain-based digital contracts which are embedded with a self-executable if-this-then-that (IFTTT) code. The code enables automatic execution of the contractual terms once the conditions, such as an expiration date or an asset's target price, are duly met. The ability of this computer program to oversee all aspects of the agreement, from its facilitation to execution, eliminates the need for an intermediary in the due diligence process of ensuring that all parties in the contract follow through with the terms.

Moreover, the code and conditions of the smart contract are publicly available on the digital ledger, for regulators to watch the proceedings of the contract without compromising the privacy of the individuals involved. Such features ultimately result in increased operational efficiency as well as security resilience of these contracts.
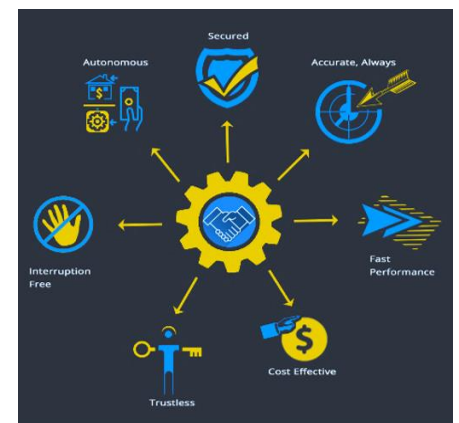
Benefits of Smart contracts, Source: 101 Blockchains.com[4], 2018

Applications of smart contracts in various industries

Smart contracts serve as an effective and convenient alternative to large amounts of paperwork and water-tight multi-party contracts, by cutting out the middlemen and related costs. They can be used for a vast range of dealings such as trading of financial assets like stocks,

bonds, real estate, as well as for legal agreements, vendor management, geo-political contracts and so on. These contracts can be very helpful in the insurance industry, due to increased ease and speed of processing the claims and reduced admin costs. A recent example of this would be AXA's blockchain solution "Fizzy", launched in 2017, which compensates the clients for flight delays. The contract is automatically activated once a delay of more than 2 hours is noticed by the platform in the global air traffic databases that it is linked to. [5]

Smart contracts can record the ownership, direction and time of the flow of the goods between different stages and points of a supply chain – supply, warehousing, retail shops and so on. They facilitate transparent tracking of the order in view of the terms the parties have agreed to in the contracts. Eventually, with the usage of blockchain, NGOs, companies, government bodies, individuals and other institutions can efficiently function with maximum autonomy and data privacy. This will pose opportunities like online voting, digital issuance of important personal identification documents like passport, birth, death and other certificates, reserving music and art ownership rights, greater control over smart appliances (the Internet of Things) etc.

Risks and challenges of blockchain

Every innovative disruption in the technology space is inevitably followed by its own risks and challenges, which must be carefully weighed against its positive impact for every use it is put to. According to Deloitte's Global Blockchain Survey 2018 and 2019, the most commonly stated reasons by executives in large companies across various countries for hesitating with the adoption of blockchain include complexity of implementation and management, security threats, lack of in-house operational knowledge and capabilities, uncertain returns on investment, and so on.[6] In comparison to 2018, these negative perceptions of the executives seem to have slightly subsided in the 2019 survey, considering the promising advancements in the blockchain space overweighing the challenges.

Nevertheless, potential exposure of sensitive information and lack of regulation remain as primary concerns of investors and professionals regarding implementing blockchain in their organizations. It has been difficult to justify the credibility of virtual currencies like Bitcoin due to the lack of a designated governing body and underlying regulatory guidelines. These concerns further hinder building consumer trust in adopting new technologies.

In fact, this was the very reason AXA was unable to reach its commercial targets for fizzy in spite of being a first mover. The insurance group failed to identify the right distribution channels due to insufficient appetite among its target audience for the product and had to take it off the market.[7] There are still numerous uncertainties regarding the accountability for potential error or fraud, and the applicable rules for resolving disputes, especially multi-parties smart contracts.

Moreover, the interoperability of blockchain requires very large capacities of network and equipment, and extensive amounts of time and effort to be spent on consolidating all the transactions. As such, the overall functional potential and usage of the technology is limited and is not sufficiently capable of handling a very large number of transactions without compromising the efficiency which it promises.

The greater the volume of transactions to be made on a blockchain application, the more the blocks to be mined and the larger the network to be developed. On the other hand, making the network less prone to security attacks demands for more complex mining algorithms or puzzles. And ensuring speedy transactions for the users cannot go hand-in-hand with security, as the scaling process will be slower with complex solving ordeals. Decentralization is the third factor of this 'Scalability Trilemma' as the lack of a central authority will impose any disputes in the process upon the entire community thus leading to further inefficiency and defeating the purposes of the technology. In view of these concerns, professionals are collaborating with tech experts around the world, to explore the possibilities of enhancing the scalability in blockchain and utilizing its potential to the fullest.

How can blockchain play a part in dealing with the COVID-19 crisis?

There has been a huge spike in the demand for certain healthcare products for a safe fight against COVID-19, as well as household and furnishing items due to national lockdowns with citizens spending most time at homes. Suppliers are juggling with changing border restrictions and the overwhelming pressure on the transportation and storage facilities, the core elements in managing their global supply chains.

This has led to a disruption in the global trade network, revealing a greater need for improving the connectivity and transparency of data exchange in our supply chains. Blockchain has helped facilitate efficient shipment of medicines from the pharmaceuticals to the affected areas.[9] This example of blockchain as a catalyst in fighting COVID-19 was observed in China where the most popular digital payment platform Alipay collaborated with the provincial authorities to launch an application which can record and track the demand, supply, and logistics of medical supplies.

The visibility and traceability of the open blockchain network has helped the healthcare providers ensure fair and duly allocation of resources and donations. Immutability (inability to alter) of these records also eliminates any chances of mishandling the medical equipment and products used in the healthcare system.[10]

An outlook on the future of blockchain

Venture capitalists and other corporate and tech investors are making big bets on the future of blockchain technology. Finances are pouring in to support its research and development on

organizational, regional, national and global levels. On a corporate level, the above-mentioned 2019 global blockchain survey by Deloitte[6] claims that there has been an increasing interest in investing USD 5 million or more in new blockchain initiatives over the period 2019-2020.

As a result, we can see a large number of fintech-based startups specializing in blockchain services, emerging in the market, which some argue might lead to cannibalization or obsoletion of existing banks, forcing them to rethink and reinvent their operations. With this, financial institutions such as Goldman Sachs and Mastercard, among others, are extensively investing their resources into researching potential opportunities blockchain can create for their own growth, as well as that of the economy.

The French Minister of the Economy and Finance commented that blockchain is an integral catalyst in addressing ongoing global issues of climate change and impending threats to sovereignty.[11] Blockchain can possibly build a path towards a sustainable economy, with the amount of monetary and human resources wastage it can reduce, by enabling more informed lifestyle choices and transparent collective decisions respectively.

Forecasts suggest that global spending on blockchain technology will experience massive growth in the market in the coming years, expected to climb to over USD 23.3 billion in size by 2023. (Figure A) A dominating 60 per cent of these investments attribute to the financial sector, as they are the most benefitted by the scope for advancements in this field.
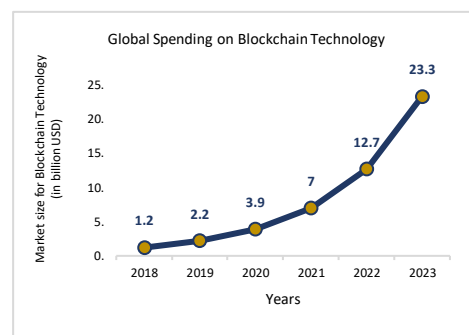

Figure A, Information Source: Statista 2019[12]

Governments and policy makers are pooling efforts to discuss and fully understand the technology to formulate the necessary regulatory frameworks and develop standards for the operability and exchange of digital currencies. The boundless depth of the blockchain space calls for deeper exploration with enhanced focus of all these players. In view of the bigger picture, it will ultimately bring to life collaborations and services that we might not have imagined before, and a future of autonomous entities.

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