National Conference on industry 4.0 (NCI 4.0-2020)
Faculty of Engineering & Computing Sciences ,TeerthankerMahaveer University , Moradabad

[2020]

Blockchain Technology: A Futuristic Survey and its Challenges

Nitin Kumar, Tikendra Kumar, Rohaila Naaz, Ashendra Kumar saxena

FoE&CS, Computer science Department

TMU, Moradabad

India

nitinkumar6553@gmail.com

tikendrakumar163@gmail.com

[3]Rohailanaaz2@gmail.com

Ashendra.computers@tmu.ac.in

Abstract—

Blockchain is considered by many to be a disruptive core technology. Although many researchers have realized the importance of blockchain, the research of blockchain is still in its infancy. Additionally, we conduct a clustering analysis and identify the following five research aspects of BT(Blockchain Technology) that would largely impact future deployment of following sector-FinTech Economy, Agriculture Sector,health and Insurance Sector, Real Estate and Identity Crisis.This paper also discusses future challenges of Blockchain in various sectors

Keywords— **Blockchain, Classification, Applications Future challenges**

I. INTRODUCTION

Almost a decade ego Satohi Nakamoto, the unknown person/group behind Bitcoin, described how the blockchain technology, a distributed peer to peer linked-structure, could be used to solve the problem to maintaining the order of transactions and to avoid the double-spending problem. Blockchains introduced serious disruptions to the traditional business processes since the applications and transactions, which needed centralized architectures or trusted third parties to verify them.

II. BLOCKCHAIN OVERVIEW

A blockchain should be considered as a distributed append only time stamped data structure. Blockchain allow us to have a distributed peer to peer network where non trusting members can verifiably interact with each without the need for a trusted authority. Wewant to briefly discuss chance and challenge to provide a common point of definition from that we will link the possibilities of BT to the fundamental concept of open science

III. CLASSIFICATION

There is various type of blockchain technology. Initially the blockchain technology presumes complete freedom and independence of the chain, In which there is no single administrator. However, interest of large companies and financial institution in the new technology lead to the emergence of more centralized control system while distributed data are preserved.

Types of Blockchain

1) Public Blockchain

Any person in the world can get an access to public blockchains. In the blockchain topology, this means that he or she can send transactions and wait for their inclusion if they are valid, and also participate in the consensus process, that is, determination which blocks will be added to the chain.

Bitcoin and Ethereum are the most popular examples of public blockchains. The public nature of the blockchain allows these platforms to be used to make direct transactions between users without intermediaries [1].

2) Private Blockchain

Last but not least type of blockchain technology is private blockchain.Fully private blockchains is a chain of blocks in which the recording of new blocks is assigned only to one organization. The permission to read can be public or limited to some extent.

There are additional options, such as database management, audit, and so on, within one company, when in many cases public access will not be necessary. Although it is impossible to go without it, when a public activity report is required.

3) Blockchain, belonging to consortium

Other types of blockchain are consortium blockchains. Consortium blockchains are controlled by a pre-selected set of nodes. As an example Vitalik Buterin mentions a system of 15 financial institutions, each of which manages the node, and 10 of which must confirm each block to be recognized as valid and added to the chain.

R3 (full name R3 CEV LLC) — financial and technological research company. It works with a consortium of 70 large financial companies (including Bank of America, Goldman Sachs, Citigroup, National Australia Bank, Royal Bank of Canada, Sumitomo Mitsui Banking Corporation and others) in the development of the use of blockchain technology in the financial system [2]

How Does a Blockchain Work?

Picture a spreadsheet that is duplicated thousands of times across a network of computers. Then imagine that this network is designed to regularly update this spreadsheet and you have a basic understanding of the blockchain.
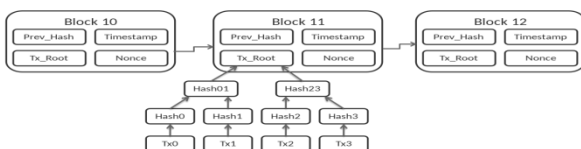

Fig.1 Diagram of the blocks with their hashes

Information held on a blockchain exists as a shared and continually reconciled database. This is a way of using the network that has obvious benefits. The blockchain database isn't stored in any single location, meaning the records it keeps are truly public and easily verifiable.

The traditional way of sharing documents with collaboration is to send a Microsoft Word document to another recipient and ask them to make revisions to it. The problem with that scenario is that you need to wait until receiving a return copy before you can see or make other changes because you are locked out of editing it until the other person is done with it. That's how databases work today. Two owners can't be messing with the same record at once. That's how banks maintain money balances and transfers

The reason why the Blockchain has gained so much admiration is that:

- It is not owned by a single entity, hence it is decentralized. The data is cryptographically stored inside the block.

- The blockchain is immutable, so no one can tamper with the data that is inside the blockchain

- The blockchain is transparent so one can track the data if they want to.

The Three Pillars of Blockchain Technology

The three main properties of Blockchain Technology which have helped it gain widespread acclaim are as follows:

- Decentralization

- Transparency

- Immutability

IV FUTURE IMAPCT OF BLOCKCHAIN

National Conference on industry 4.0 (NCI 4.0-2020)
Faculty of Engineering & Computing Sciences ,TeerthankerMahaveer University , Moradabad

[2020]

BLOCKCHAIN IN FINTECH ECONOMY

With technological advancements making waves in almost every sphere of global business, the financial service industry is no more left behind. In recent times it has gone on to become the fastest growing industry of the decade. Anyone with an internet connection can now engage in day-to-day banking activities, trading and investment in the stock market, widen e-commerce platforms, make online payments, exchange currency online, undertake equity funding and more while benefiting from the numerous finance apps designed for personal and business uses.As per a survey on financial services sector and fintech conducted by PWC, around 77% of financial services industry plan on adopting blockchain by 2020. Banks being 1/3rd of the institutions surveyed have shown an inclination in incorporating blockchain in their operations as was reported by a study published by Accenture and McLagan (January 2017) that made a mention of at least eight of the ten biggest global investment banks embracing the blockchain route. While blockchain promises to remedy inefficiencies in the back-office setups of most banks – particularly when it comes to processes such as clearing and settlement, arguably, the most noticeable impact this technology is set to bring about is by substantially reducing cases of fraud and cyber-attacks in the financial landscape.By allowing Fintech companies a decentralized network to share or transfer secure and unaltered information, blockchain would help in curbing data breach and other similar fraudulent activities, by making all concerned parties aware of such activity in financial transactions.It, therefore comes as no surprise that leading business executive and media personality Don Tapscott hails blockchain as a Distributed Ledger Technology with potential far greater than the internet itself.The impact of blockchain on the financial service sector is largely tangible. After all, startups in the fintech industry are receiving increased funding than ever before, with the funding having increased at a rate of 41 percent CAGR and crossing more than $40 billion investment in the last four years, as per the PWC's 2017 Global Fintech report.

BLOCKCHAIN IN AGRICULTURE

The Food and Agriculture Organization of the United Nations (FAO) and the International Telecommunication Union (ITU) continue to work together to promote the use of sustainable information and communication technologies (ICTs) in agriculture.
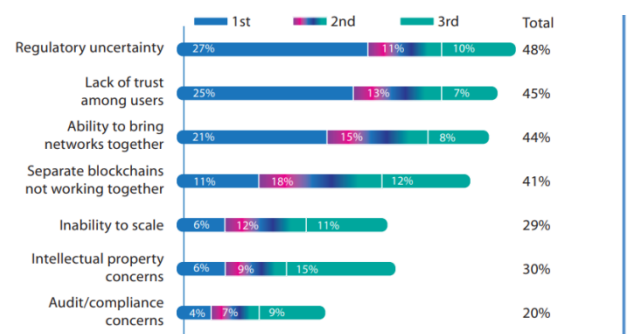

Fig 2.Biggest Barriers in Blockchain Adoption[8]

In the agriculture domain, self-executing smart contracts together with automated payments would be the game changer. The role of smart contracts especially in agricultural insurance, green bonds, and traceability could be very effective. Agricultural insurance built on blockchain with key weather incidents and related payouts drafted on a smart contract, linked to mobile wallets with weather data being provided regularly by sensors in the field and correlated by data from proximity weather stations would facilitate immediate payout in the case of a drought or flooding in the field. However, the framework to support such an innovation, such as high quality data, enabling policies and regulations, should be first addressed in order to ensure the maximum efficacy for smart contracts. The process of designing, verifying, implementing and enforcing smart contracts in traditional agricultural value chains is still a work in progress, with only a few pilot implementations to show proof-of-concept.

BLOCKCHAIN IN HEALTH AND INSURANCE

the healthcare industry is seeing huge advantage in adapting blockchain to its companies. But in order to maximise its usability, most (if not all) must participate in the public network. In fact, current insurers partnering up with blockchain-linked businesses are already seeing impressive innovations in their sphere of influence.

Since blockchain permanently logs all transactions between its participants, it offers a level of transparency not available in the current paradigm of the insurance world. There are often multiple levels of middlemen throughout the lifecycle of a health insurance policy. Information is shared between several stakeholders, but it takes forever for the cycle to go from one end to the other. The process is riddled with inefficiencies and blockchain can help with that.For example, applying automation to blockchain-developed programs, patients can establish 'contractual agreements' with hospitals, physicians, and pharmaceutical companies. Completed transactions between parties take up a 'block' that's subsequently linked to the 'chain', and over time results in a dependable record of all concurrent interactions. As an illustration, take your standard health plan agreement, where each party would usually give the other a paper contract while dealing with various third-party entities. With blockchain technology, each participant can now individually (and digitally) load only the information that's relevant to their shared contract. This way when a transaction is being executed, everyone involved can view the status, history, and process of what's being authorized. Hypothetically, if you ever need a specialized health professional (like an orthodontist to treat your sudden wisdom tooth impaction), they're now able to send and receive information solely related to that case. The

peer-to-peer (P2P) freedom and privacy blockchain offers is what's making it an incredibly valuable proposition for the industry**.**

resently, a handful of health insurance companies are working on projects incorporating blockchain technology to accelerate their growth and market share. Since it's a relatively new development, smart insurers are paying extra attention to the long-term benefits — while remaining focused on maintaining short-term vigilance.

For example, The Office of the National Coordinator for Health Information Technology, in response to the blockchain challenge (where everyone needs to participate in order to maximize usability), is now spreading awareness through white papers on the technology and its potential use in health IT "to address privacy, security and scalability challenges of managing electronic health records and resources".

The goal of blockchain is to implement a user-oriented, user-friendly, and voluntary method for maintaining any health information (like patient records or prescription scripts).

According to Tieron's 2016 report on the potential for blockchain in healthcare, you now can (and should):

- Improve your integrity and security by providing better management of patient data
- Call for a higher quality of clinical trial records
- Reduce regulatory and compliance costs
- Set up new standards and practices
- Optimize interactions between healthcare professionals, insurance companies, and policyholders
- Form partnerships with leading ventures using blockchain technology

BLOCKCHAIN IN REAL ESTATE

Commercial real estate constitutes a significant portion of world economic asset and transaction activity. According to an MSCI report, the size of the professionally managed global real estate investment market increased from $7.4 trillion in 2016 to $8.5 trillion in 2017.

With rising valuations of properties and continuous development around the world, blockchain technology is primed to bring several benefits to the real estate industry:

- Automation and more efficient processes
- Reduced costs
- Network transparency and data accessibility
- Real-time payment settlements
- Tokenization

Blockchain technology has recently been adopted and adapted for use by the commercial real estate (CRE) industry. CRE executives are finding that blockchain-based smart contracts can play a much larger role in their industry. Blockchain technology can potentially transform core CRE operations such as property transactions like purchase, sale, financing, leasing, and management transactions.

Our Blockchain in commercial real estate report takes a deeper dive into the ways blockchain technology can create opportunities while alleviating some of the existing challenges. We look at six use cases for improving the leasing and purchase and sale process through the use of blockchain:

1. Improve property search process

2. Expedite pre-lease due diligence

3. Ease leasing and subsequent property and cash flow management

4. Enable smarter decision-making

5. Transparent and relatively cheaper property title management

6. Enable more efficient processing of financing and payments

Blockchain technology has significant potential to drive transparency, efficiency, and cost savings for CRE owners by removing many of the existing inefficiencies in key processes. CRE companies and industry participants evaluating an upgrade or overhaul of their current systems should have blockchain on their radar as its demonstrated usefulness has the ability to bring significant value to the industry.

BLOCKCHAIN IN IDENTITY CRISIS

Trust is the foundation of any transaction: is your counterpart who they claim to be? Is the information provided accurate and up to date? Even on a small scale these aspects can be difficult to manage, but in a complex world with several layers to every transaction, the probability of weaknesses in the chain of information increases constantly.

Blockchain on the other hand takes trust out of the equation as it data is time stamped with each transaction and block added to the chain to create a record that cannot be tampered with and is available in real-time. At the same time, Blockchain technology addresses another key issue of our time: the concern about privacy and data protection.Cryptography provides protection where traditional systems are vulnerable to attacks and identity theft.

Using blockchain for identity management (as a form of a decentralized public key infrastructure) makes protecting your identity much easier. Blockchain and trust go hand in hand: this way, you don't have to fully reveal yourself to whoever you're interacting with. Through the use of secret keys and a special type of digital signature, those requiring your information can ensure, beyond a shadow of a doubt, you are the right person when initiating a transaction or requesting a change. So many applications can use identity management via blockchain to their advantage. As long as there is an identity piece to it, and as long as there's a trust element to it, it can be built. A secure digital identity is possible with the right tools, as blockchain and trust go hand in hand. Organizations supporting the use of blockchain for identity management are certainly getting some traction as well, like the **Decentralized Identity Foundation**, which has gained over 30 company members just within the last year. Or the **Hyperledger Indy project**, which is hosted by one of the world's largest blockchain-focused open source alliances called Hyperledger. These organizations are great ways to learn more and share ideas with people that are passionate about blockchain identity solutions and other technology.

V CHALLENGES OF BLOCKCHAIN

1. Initial Costs

Though the adoption of blockchain technology promises long-term benefits with regard to productivity, efficiency, timeliness and reduced costs, it is expensive to initially put it in place.

2. Integration with Legacy Systems

In order to make the move to a blockchain-based system, an organization must either completely overhaul their previous system or find a way to integrate their existing system with the blockchain solution.

3. Energy Consumption

The Bitcoin network,as well as the Ethereum network, both use the proof-of-work mechanism to validate transactions made on the blockchains.

4. Public Perception

The majority of the public is still oblivious to the existence and potential uses of this technology.

5. Privacy and Security

Blockchains, as in the original design, are made to be publicly visible. Take, for instance, the Bitcoin blockchain, which is designed to be

accessible to all those who have made a transaction on the network.

Fig.2 Challenges of Blockchain Technology

- example of public blockchain [1]
- example of consortium of blockchain [2]

VI CONCLUSIONS

We regard BT as just one building block among other and we believe that the ideas behind open science can only we implemented if all pieces are put together in a meaningful way and complement each other. The combination of well known characteristics like hashing decentralization and immutability makes the BT unique and explain the increasing interest of science and industry in it.

ACKNOWLEDGEMENT

REFERENCES

1. Abeyratne, S., and Monfared, R. (2016). Blockchain ready manufacturing supply chain using distributed ledger. Int. J. Res. Eng. Technol. 5, 1–10. doi: 10.15623/ijret.2016.0509001

2. Abraham, I., and Mahlkhi, D. (2017). The blockchain consensus layer and BFT. Bull. EATCS 123, 1–22. Available online at: https://dahliamalkhi.files.wordpress.com/2016/08/blockchainbft-beatcs2017.pdf

3. Ahn, J.-w., Chang, M. D., Kokku, R., and Watson, P. (2018). Blockchain for Open Scientific Research. Patent Number: 20180323980, Armonk, NY.

4. Gipp, B., Meuschke, N., and Gernandt, A. (2015). "Decentralized trusted timestamping using the crypto currency bitcoin," in Proceedings of the iConference 2015 (Newport Beach, CA).

5. Gnosis (2017). Gnosis - Crowdsourced Wisdom. Available online at: https://gnosis.io/pdf/gnosis-whitepaper.pdf

6. Golem (2016). TheGolem Project - Global Market for Idle Computer Power. Available online at: https://golem.network/crowdfunding/Golemwhitepaper.pdf

7. Gray, J. (2009). "A transformed scientific method," in The Fourth Paradigm: Data-Intensive Scientific Discovery, eds T. Hey, S. Tansley, and K. Tolle (Mountainview, CA: Microsoft Research).

8. https://www.bing.com/search?FORM=INCOH1&pc=IC03&ptag=ICO-9f9c38107d44f695&q=challenge%20of%20blockchain

9. https://feed.2-pdf.com/?q=blockchain&publisher=2-pdf&barcodeid=553100000000000

10. https://blockgeeks.com/guides/what-is-blockchain-technology/