



Blockchain Technology: Opportunities in Healthcare

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Agenda

- Introduction
- Objectives
- Methodology
- Review of Literature
- Discussion
- Conclusion

Introduction

Blockchain was started with Bitcoin in 2009. Bitcoin was designed by a group of programmers under Satoshi Nakamoto as a global network for transferring currencies with the trusted intermediaries which was introduced in 31 October 2008.

A blockchain can be like a collection of public catalog of health records that references databases, fitness and medical devices, mobile phones, laptops etc. It can be used to connect with all the patient's, healthcare providers, and payer to a protected, yet public network.

Introduction contd..

Types of blockchain:

1. Permission less blockchain - On permission less block chains, all the parties involved can view all the records.
2. Permissioned or consortium blockchain - In this privacy can be maintained by an agreement relating to which parties can view which transactions and where, by encrypting the identity of the party.

Objectives

- To understand the architecture of blockchain in healthcare.
- To study how blockchain can enhance EHR interoperability.
- To explore the extent of blockchain in health insurance, supply chain and other areas.
- To identify the opportunities and challenges of blockchain in healthcare.

Methodology

- Study Design – Systematic review of articles related to blockchain technology in healthcare.
- Duration of study – Three months (February 2017 to April 2017).
- Data collection source – Secondary sources of data collected from journals, articles and previous studies restricted to blockchain technology in healthcare.

Review of Literature

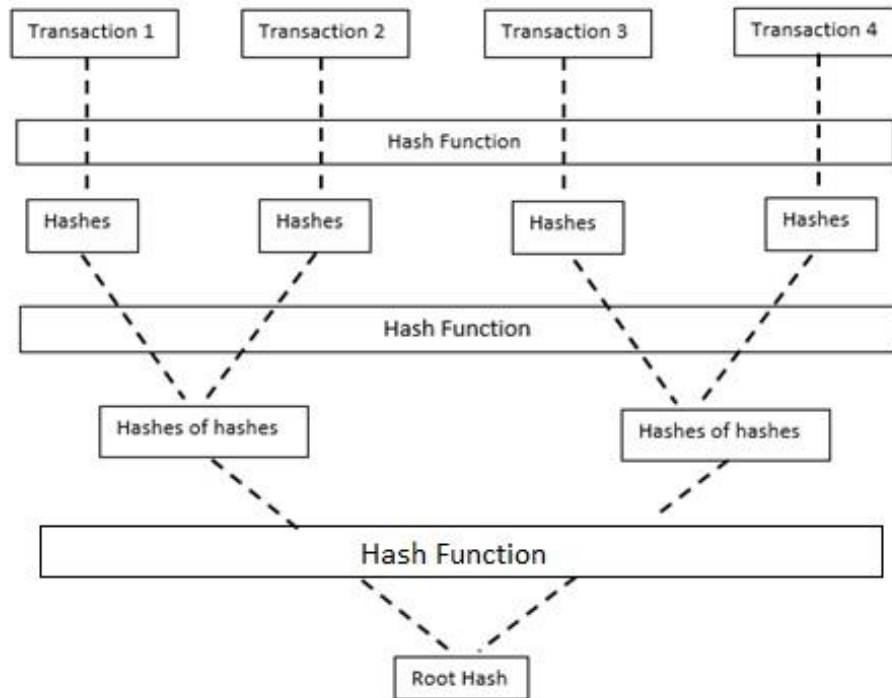
Blockchain

Blockchain is a distributed system for recording and storing transaction records. It is a shared, unchangeable record of peer-to-peer transactions linked to transaction blocks and warehoused in a digital ledger. It relies on cryptographic techniques which allows each participant in the network to interact with each other.



Blockchain Architecture in Healthcare

Merkle tree structure



The merkle tree structure depicts conversion of transactions into hash values.

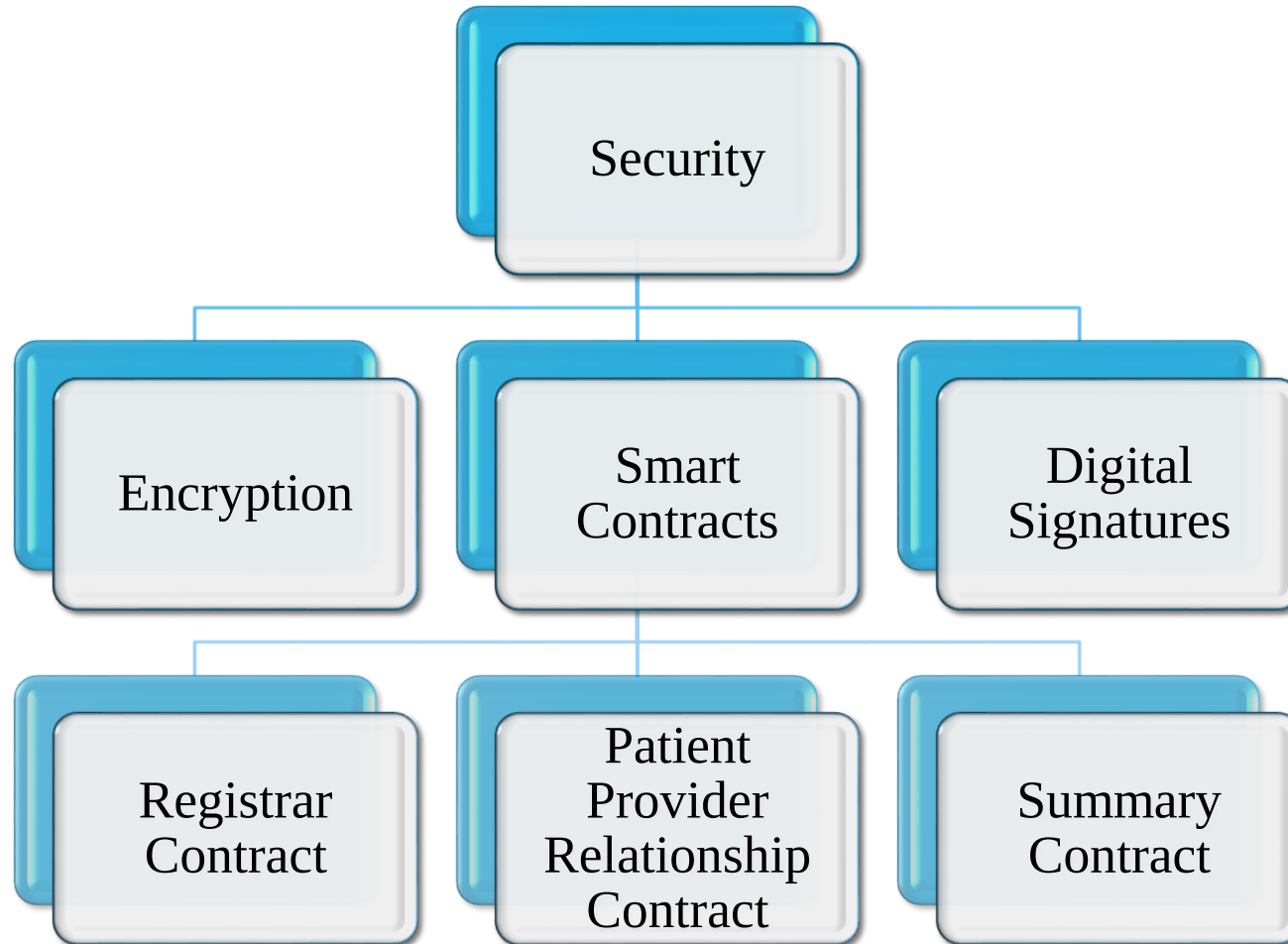
Components of block

Block Version	02000000
Previous block header hash	B6ff1b2c22640a243c41db55f458e0g972e443cfc68db1f000000000000000000
Merkle tree root	Ad10aa62ee94938ca9385695f04ede380dca10810deqad23cb8b057aaab32742
Timestamp	35d76b65
nBits	41d42c29
Nonce	1010

A block entered into the blockchain consists of the above details along with the data being entered into it.

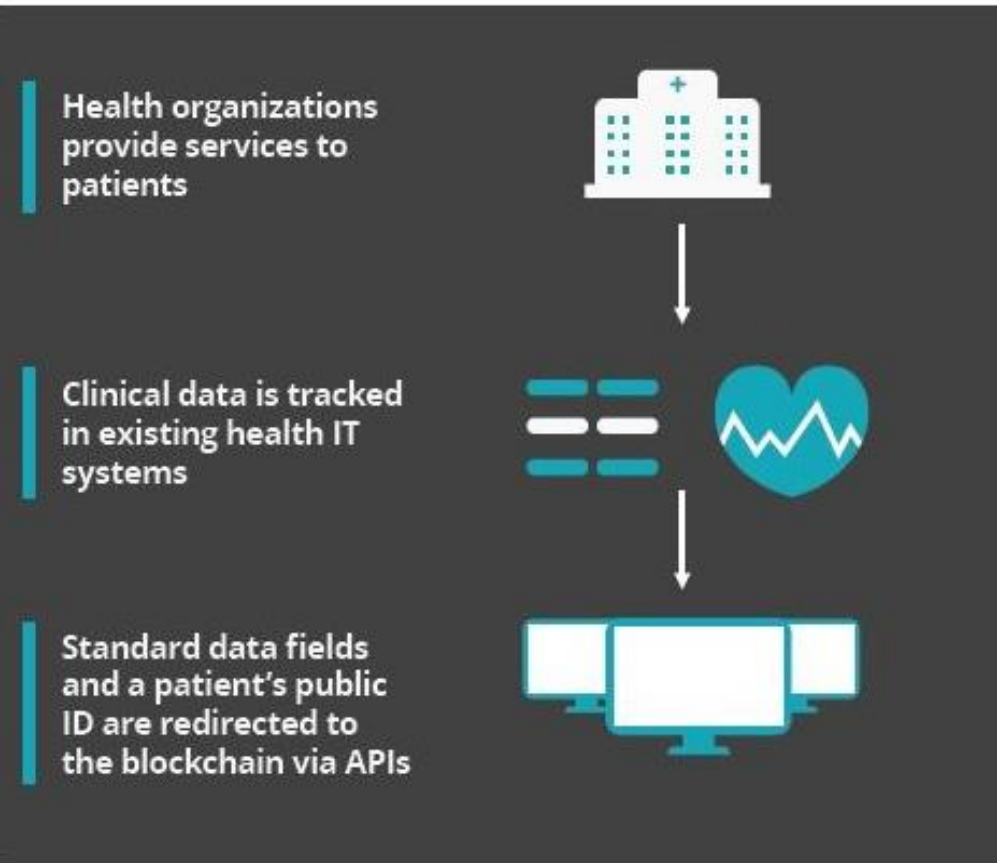
Security

In blockchain mainly three types of security methods are being used encryption, smart contracts and digital signatures.

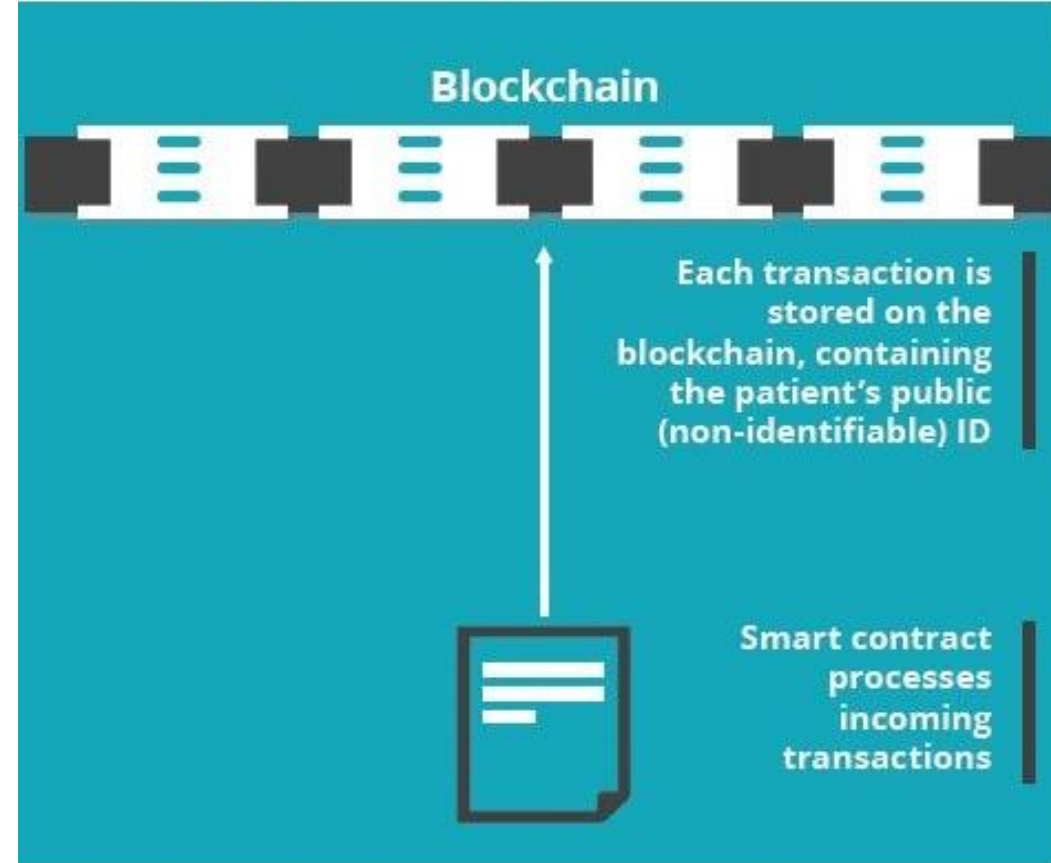


Data flow in blockchain

1 Health organizations direct information to the blockchain



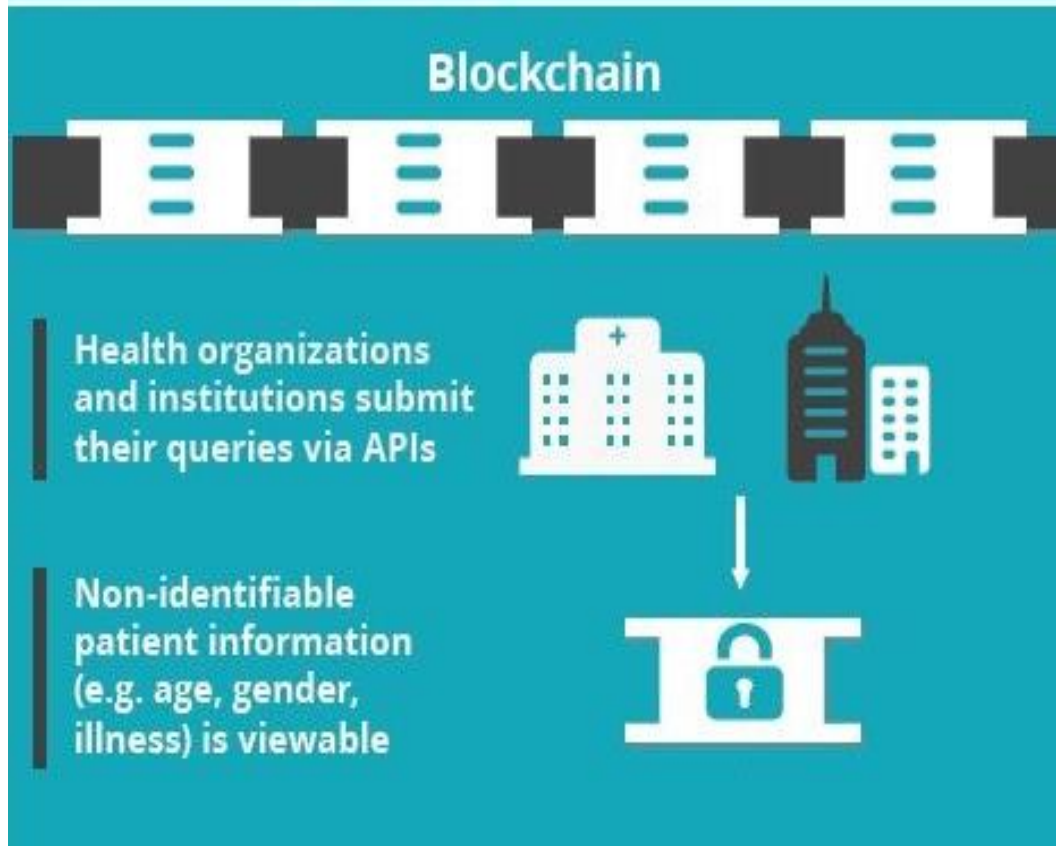
2 Transactions are completed and uniquely identified



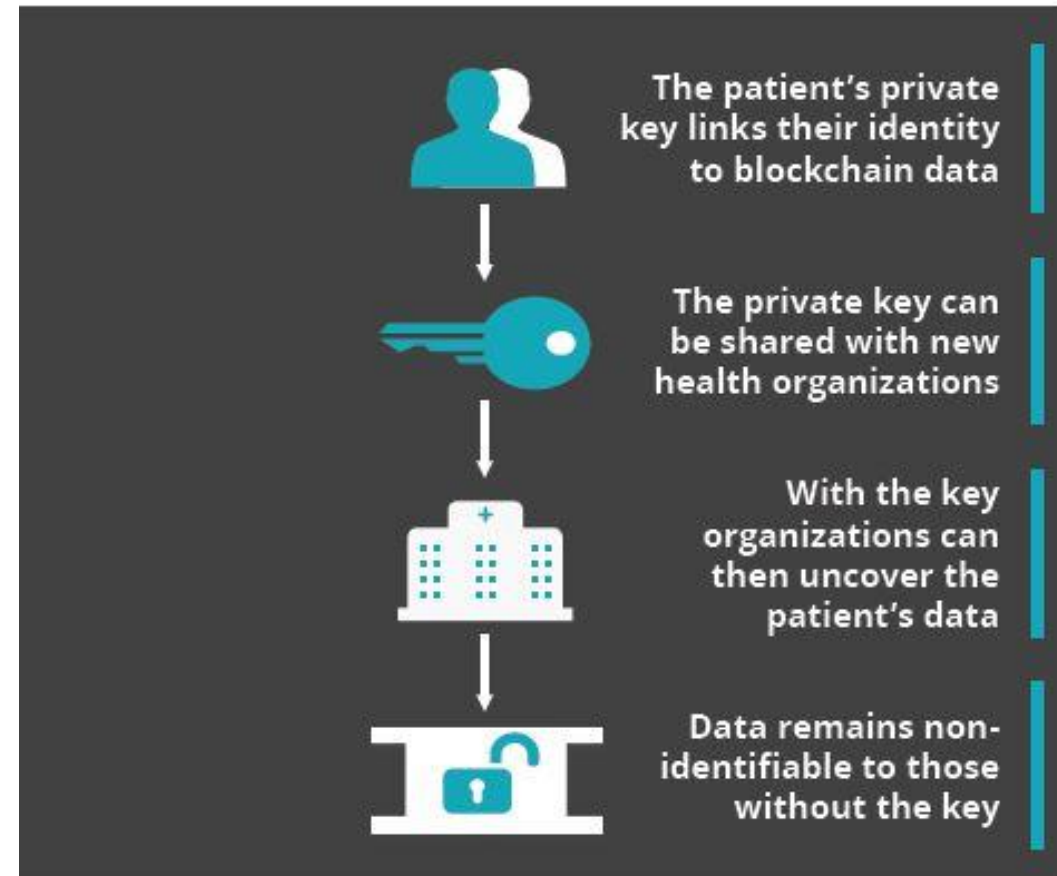
Source - <https://www2.deloitte.com/us/en/pages/public-sector/articles/blockchain-opportunities-for-health-care.html>

Data flow contd..

3 Health organizations and institutions can directly query the blockchain



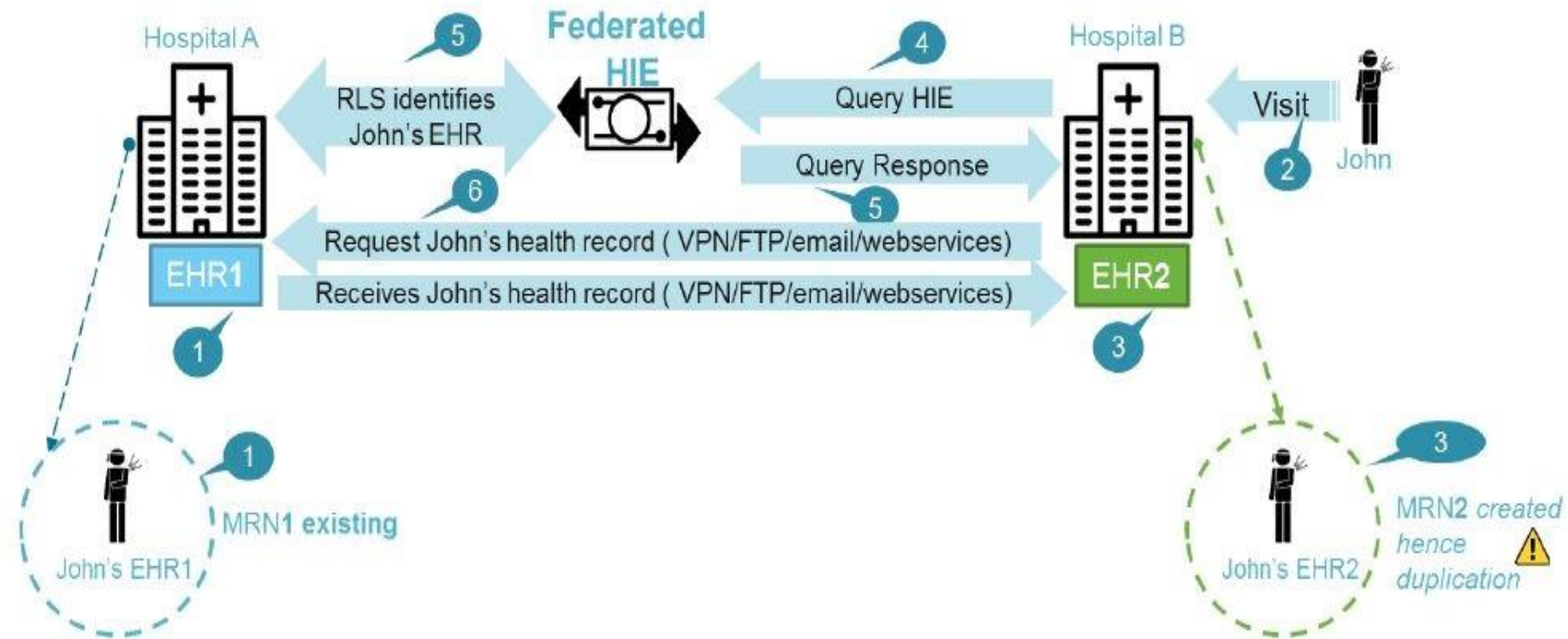
4 Patients can share their identity with health organizations



Source - <https://www2.deloitte.com/us/en/pages/public-sector/articles/blockchain-opportunities-for-health-care.html>

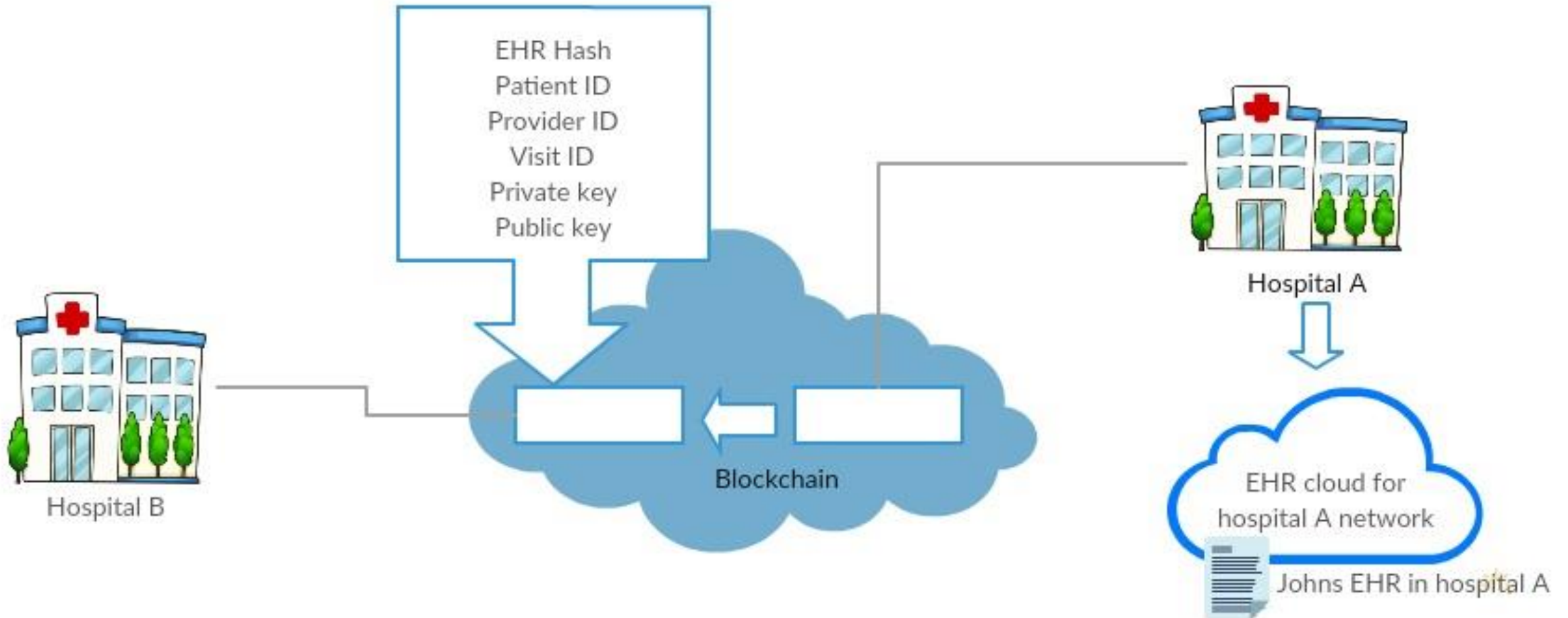
EHR interoperability with blockchain

Current EHR interoperability process



Source - <http://tinyurl.com/gn74nkz>

EHR interoperability with blockchain-



Extent of blockchain in health insurance, supply chain and other areas

1. Health Insurance

Blockchain technology cut shorts the process by providing access to insurance companies to only the necessary patient information they require.

2. Supply Chain

The blockchain technology allows to more securely track all types of transactions so definitely it can help in supply chain.

Extent of blockchain Contd..

3. Clinical Trials –

Through the use of smart contracts the participant of the clinical trial can make sure themselves that their personal information will not be shared by anyone else rather than whom they choose to view and modify their personal information.

4. Medication Reconciliation –

The MIT media lab developed medrec blockchain system which uses medchain for medication reconciliation process

Opportunities and Challenges of blockchain

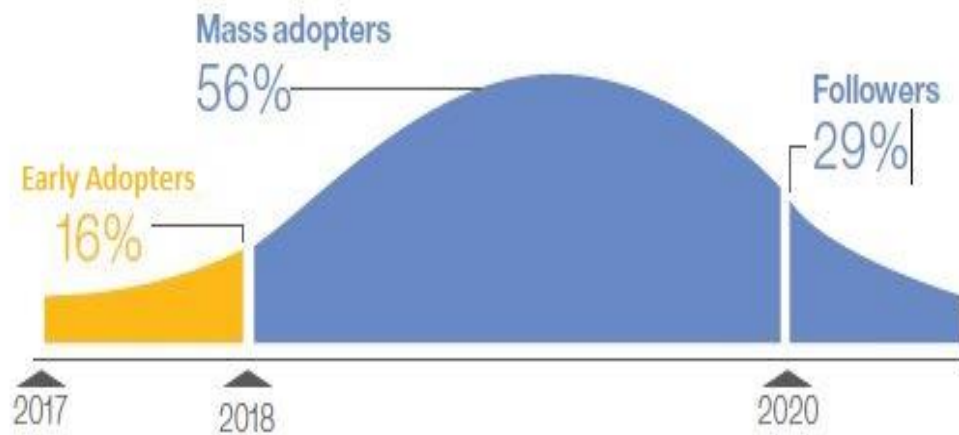
Opportunities

- Security and Privacy
- Benefits to patients
- Interoperability
- Reduction in fraud Billings
- Benefits to healthcare providers
- Pharmaceutical and insurance companies

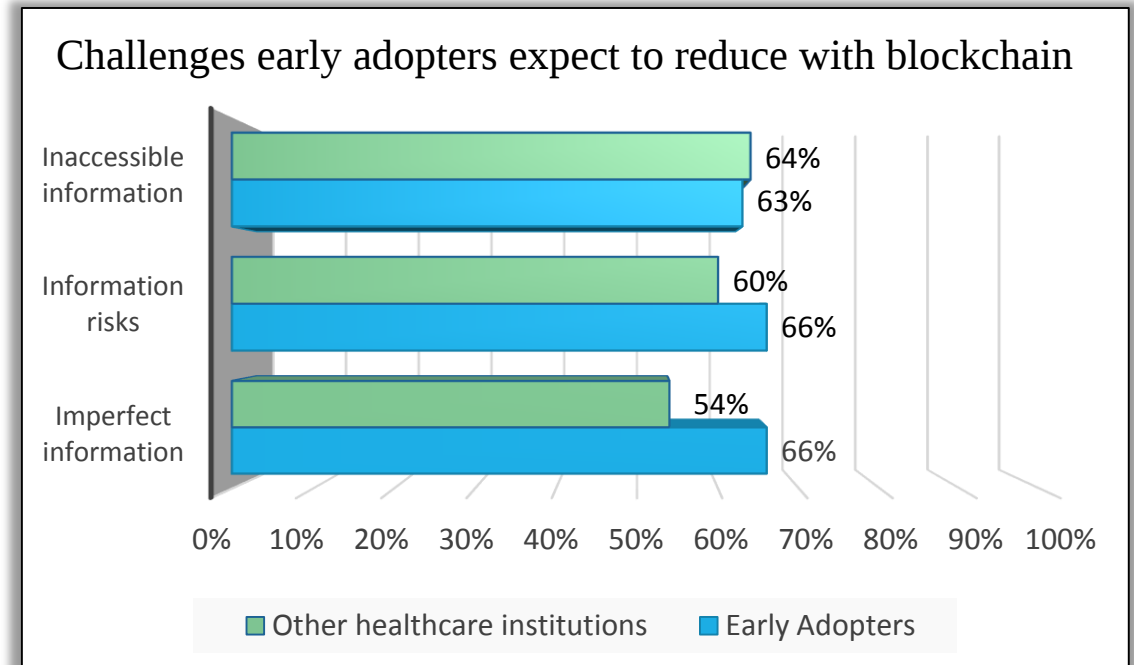
Challenges

- Type of blockchain used
- Scalability
- Lack of awareness
- Too many stakeholders
- Patient controlled data
- Immutability

IBM Institute for Business Value survey on blockchain adoption by healthcare organizations

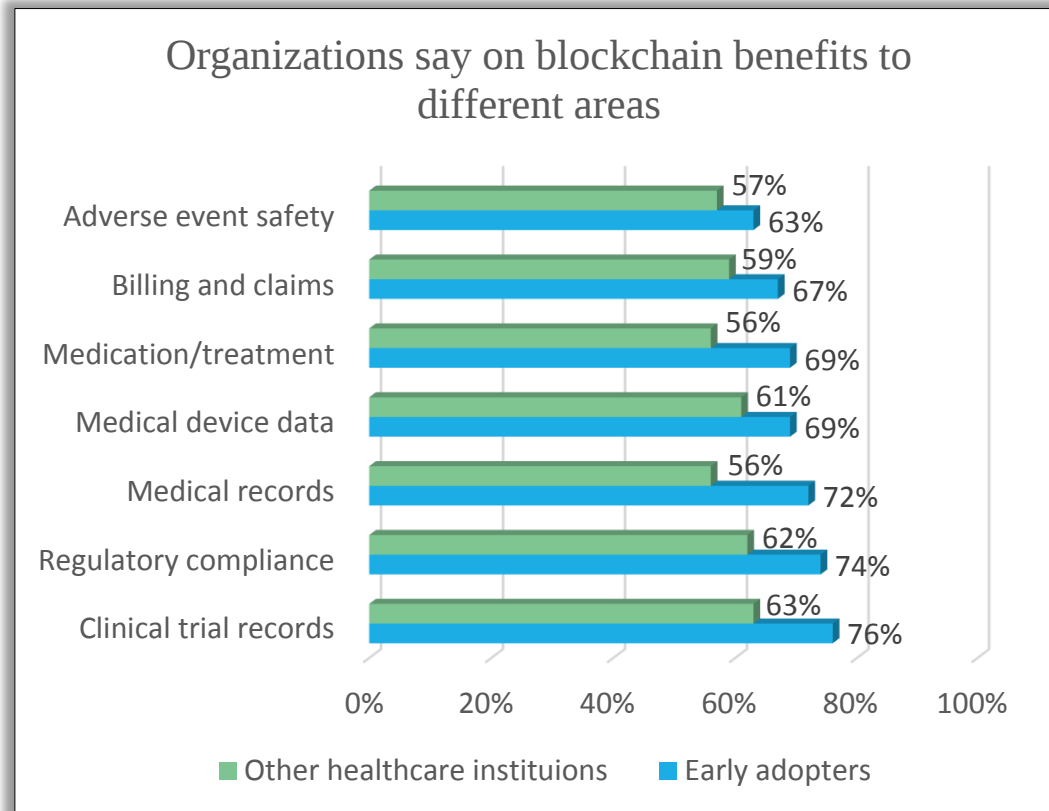


Healthcare organizations adopting blockchain

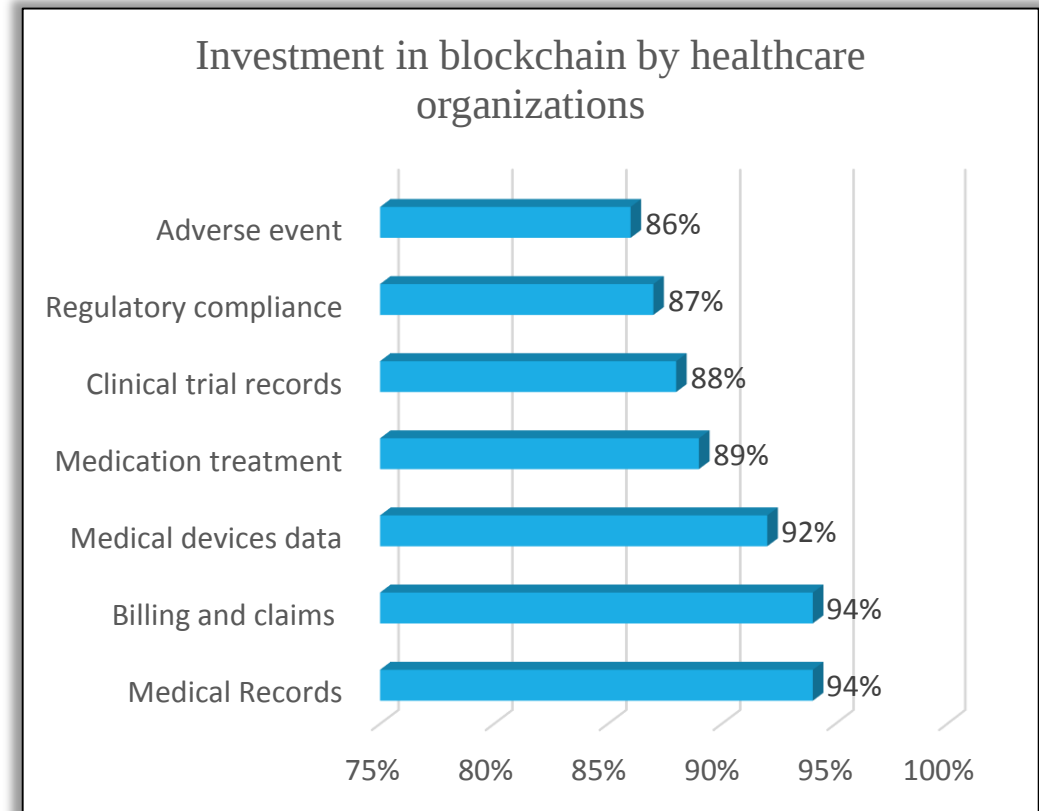


Challenges early adopters expect to reduce with blockchain

IBM survey contd..

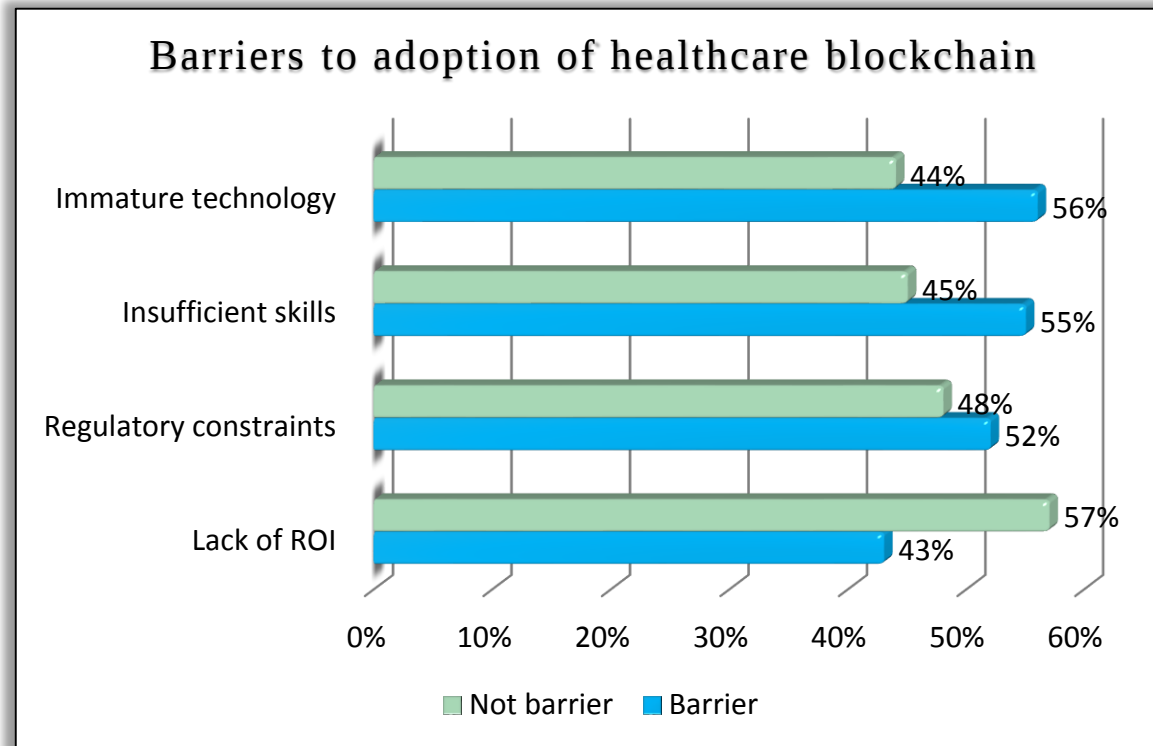


Organizations say on blockchain benefits to different areas



Investment in blockchain by healthcare organizations

IBM survey contd..



Barriers to adoption of healthcare
blockchain

Source - <https://www-01.ibm.com/common/ssi/cgi-bin/ssialias?htmlfid=GBE03790USEN>

Discussion

Blockchain uses the FHIR (Fast Healthcare Interoperability Resources) standards as these standards use the languages such as XML, JSON etc. for their coding purposes which are easy to code.

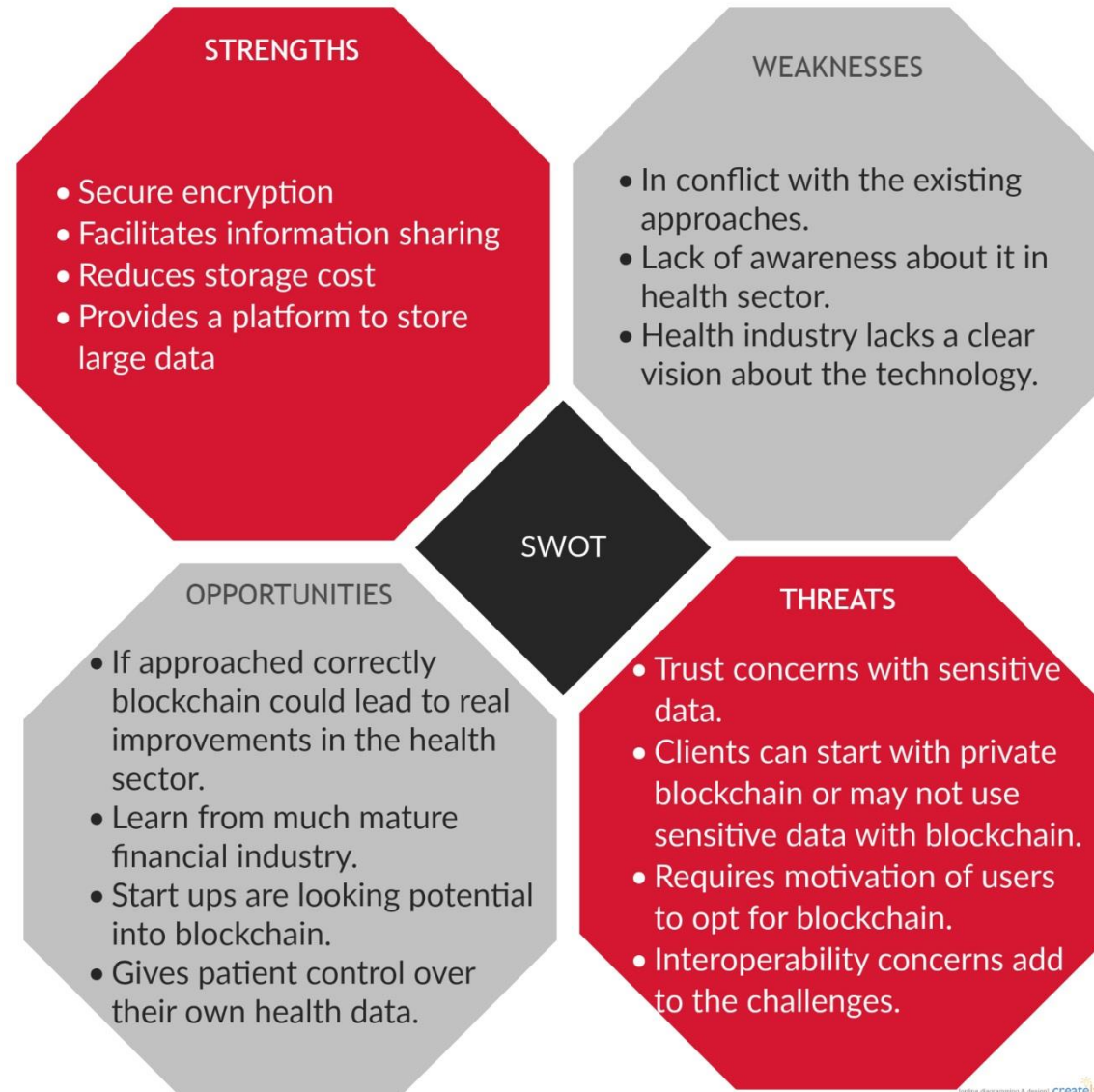
The main benefit being security and privacy of the data being entered into the blockchain. The one big challenge being many sectors are unaware of the technology since it is a very new technology being developed. The increase in storage can be one of the challenge which could be faced by the healthcare organizations.

Discussion contd..

The organizations like NMC Healthcare Dubai is opting for blockchain technology with Mobile Telecom DU for transferring their patient data through blockchain.

The healthcare organizations in Estonia are also signing up with Guardtime a blockchain system provider for their storage and transfer of the data by the year 2018.

❖ SWOT analysis



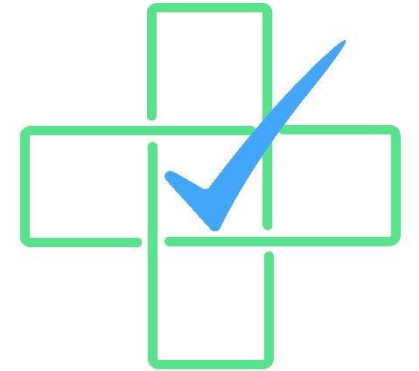
Blockchain applications



Gem



pokitdok



BLOCKPHARMA



factom



stratumn

Source: <https://www.linkedin.com/pulse/blockchain-startups-revolutionising-healthcare-sector-anca-petre>

Conclusion

While blockchain technology is still in its infancy, the organizations who are considering it in to healthcare believe in its promise. As the future unfolds, there is no doubt that innovative thinking will evolve and countless ideas will emerge. For now, we can only see just the beginning of blockchain-enabled processes in healthcare sector, but as we continue we can definitely see the industry transformed.

Thank you

