

Single Day Event

Blockchain: The Gatekeeper of Clinical Big Data

Tanuj Chakraborty
ICON Clinical Research Pvt. Ltd.



Disclaimer

The views, thoughts and opinions expressed in this presentation and on the following slides are solely those of the presenter and not necessarily those of ICON.

ICON does not guarantee the accuracy or reliability of the information provided herein.



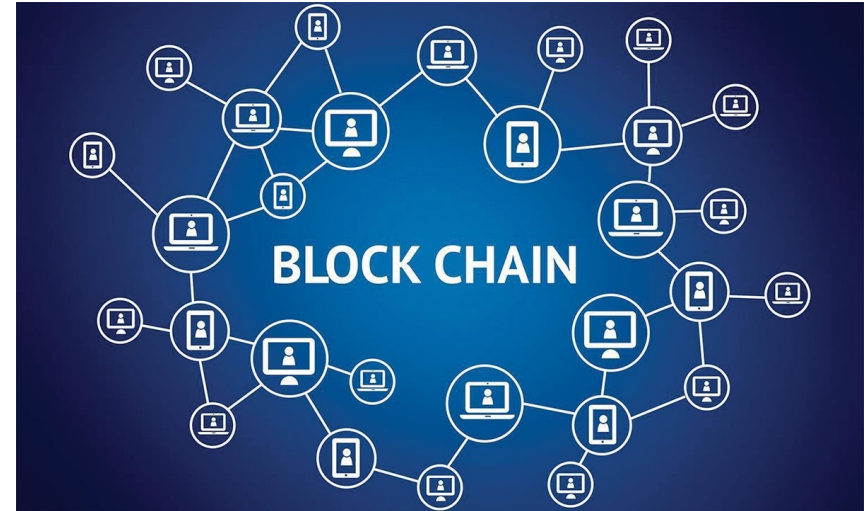
Who am I ?





The Flow

- **The Basics of Blockchain**
- **The Evolution**
- **Why Healthcare needs Blockchain?**
- **How Blockchain can work in healthcare?**
- **Current applications**
- **A Case Study in Healthcare**
- **Challenges**

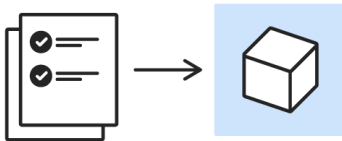




Basics of Blockchain

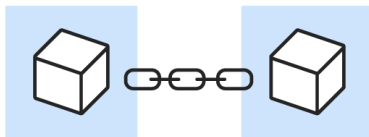
1

Information is recorded in a block.



2

Once the block is full, it's chained to the rest of the blocks in the database.



k 004

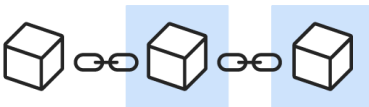
sh 3

stamp
action ID

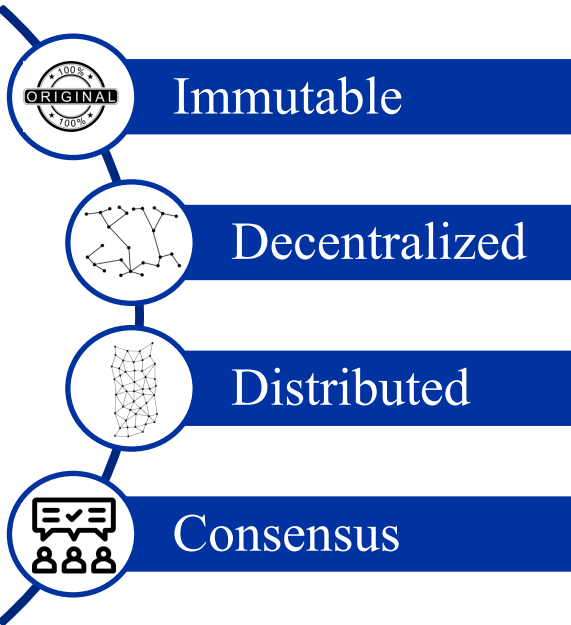
sh 4

3

An empty block is added to the end of the chain to record new information.



FEATURES





Unlocking the chain

1

A wants to send money to B



2

The transaction is represented online as a block



3

The block is broadcasted to every party in the network



4

The network approves the transaction



5

The block is added to the existing blockchain in a transparent and unalterable way



6

The transaction is complete

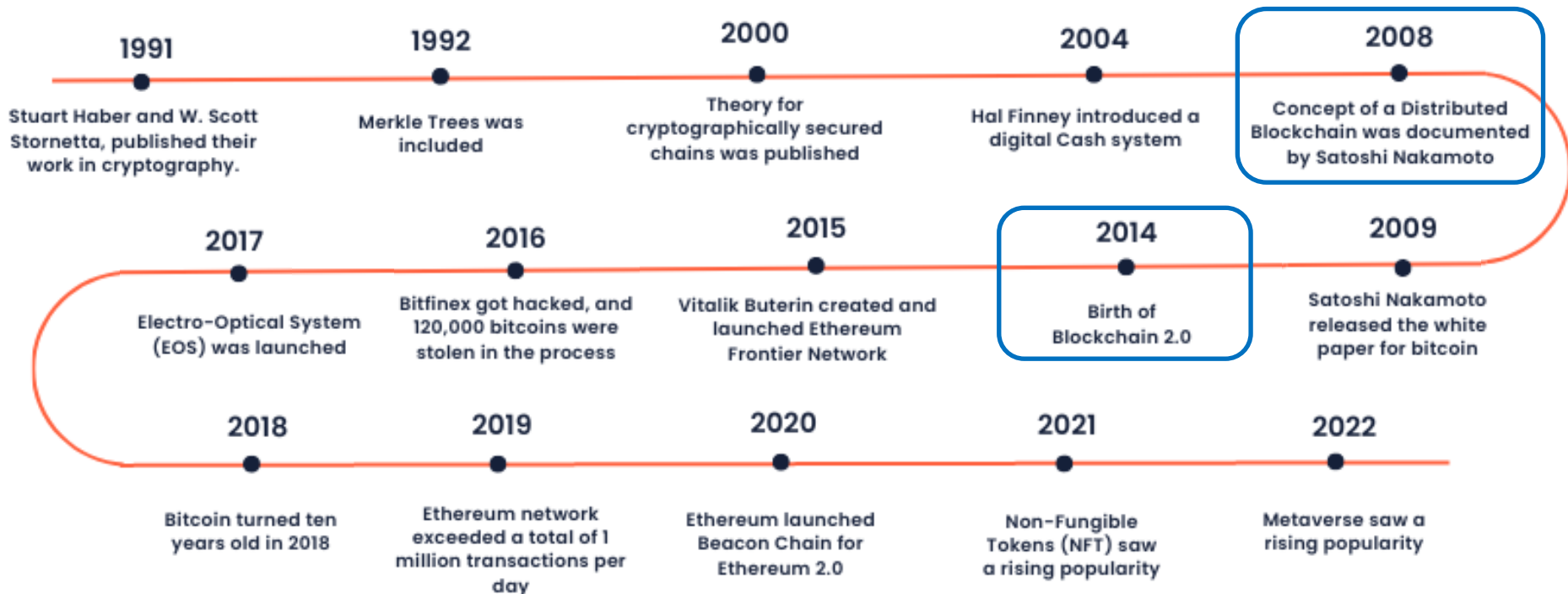


Let me
simplify
blockchain





The evolution of Blockchain





Why healthcare needs blockchain?

- Miscommunication - 80% of medical errors
- 30% of visits do not have patient charts
- 20% of malpractice claims involve missed or delayed diagnosis
- \$250-\$1000 per breached healthcare record sold in black-market
- Save upto \$100-\$150 billion per year by 2025 in data breach-related, IT, operations, support function costs, and through a reduction in frauds and counterfeit products.

2021 Healthcare Data Breach Costs

According to a report released by IBM Security, there was a 29.5% increase in the costs associated with a data breach in 2021.

\$9.3 Million
The average cost of a healthcare data breach rose to \$9.3 million per incident

38%
Of the cost of the breach was attributed to lost business

Compliance Failures

increased costs by 67.7%

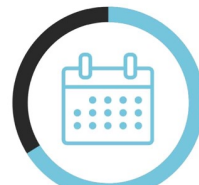
44%

of breaches targeted sensitive information such as protected health information



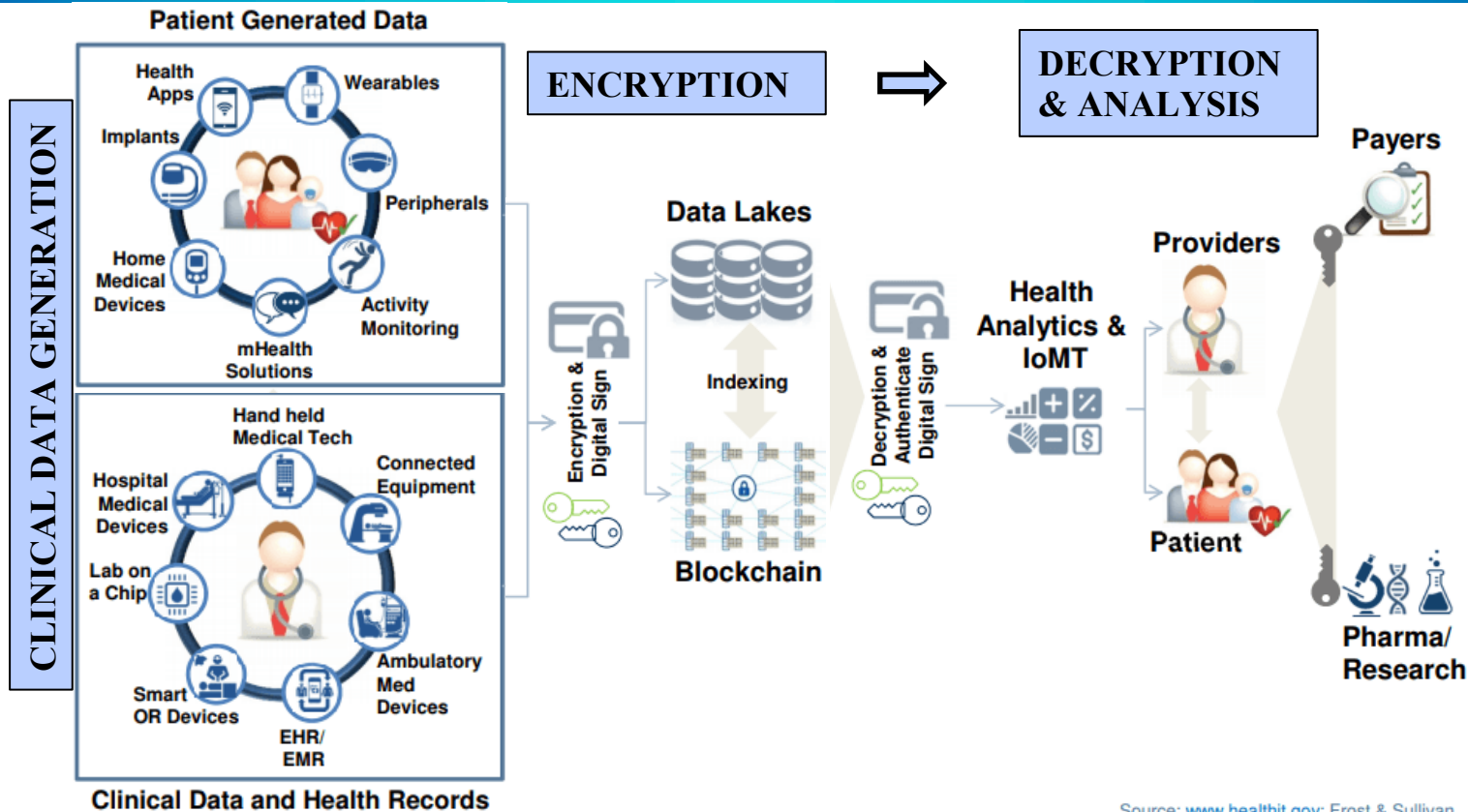
Breaches involving stolen login credentials lasted

341 DAYS



In 2021, it took an average of 212 days to identify and 75 days to contain a data breach

Blockchain in healthcare





Current Applications

- **Electronic Health Record** - Monitor accounts accessing data and give patients control over their data.



- **Supply Chains** – Reduce time delays and human errors. Also, track authenticity of products since origin.



- **Genomic Market** – Create virtual black box of the gene-sequenced data.



Sources:

Medicalchain - <https://medicalchain.com/Medicalchain-Whitepaper-EN.pdf>

Medibloc - <https://www.frontiersin.org/articles/10.3389/fbloc.2022.844834/full#B19>

Blockpharma - <https://arxiv.org/ftp/arxiv/papers/2004/2004.06795.pdf>

Modum and Chronicled - <https://blog.chronicled.com/modum-and-chronicled-collaborate-on-opportunities-to-bring-value-to-the-pharmaceutical-supply-b14327af5767>

Patientory - <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8080150/>

Encrygen and Nebula - <https://doi.org/10.1093/jamia/ocv149>



A case study in healthcare

```
{
  "UserID": "vr1r0gTal9f4lpqHRpptnriGDIF2",
  "LogID": 1,
  "LogTime": 1559887461,
  "LogType": "ProjectStart",
  "LogData": {
    "name": "EQ-5D",
    "score": 11111
  },
  "HashChain": "d55f374fafb7e2cfcb2e3e4dc4fb7e89d283c62c6ae5e7eaf9e3df0c3ac8ef0"
}

{
  "UserID": "vr1r0gTal9f4lpqHRpptnriGDIF2",
  "LogID": 2,
  "LogTime": 1559887610,
  "LogType": "TestScore",
  "LogData": {
    "name": "GPAQ",
    "score": 200
  },
  "HashChain": "06eb3bfc59c2f3ceb43f7b97080883813ea3a992d7ce9ce25af15c92e13c2b45"
}

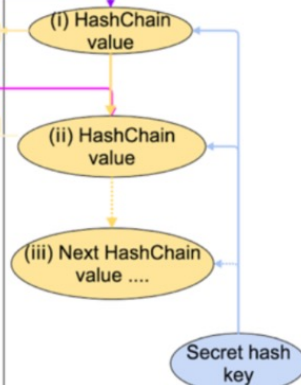
{
  "UserID": "vr1r0gTal9f4lpqHRpptnriGDIF2",
  "LogID": 3,
  "LogTime": 1567686723,
  "LogType": "TestScore",
  "LogData": {
    "name": "GPAQ",
    "score": 420
  },
  "HashChain": "16ed11c4ab8eda6355c5f954083548da777b9134c436908bd5285c1d1d3ba558"
}

...

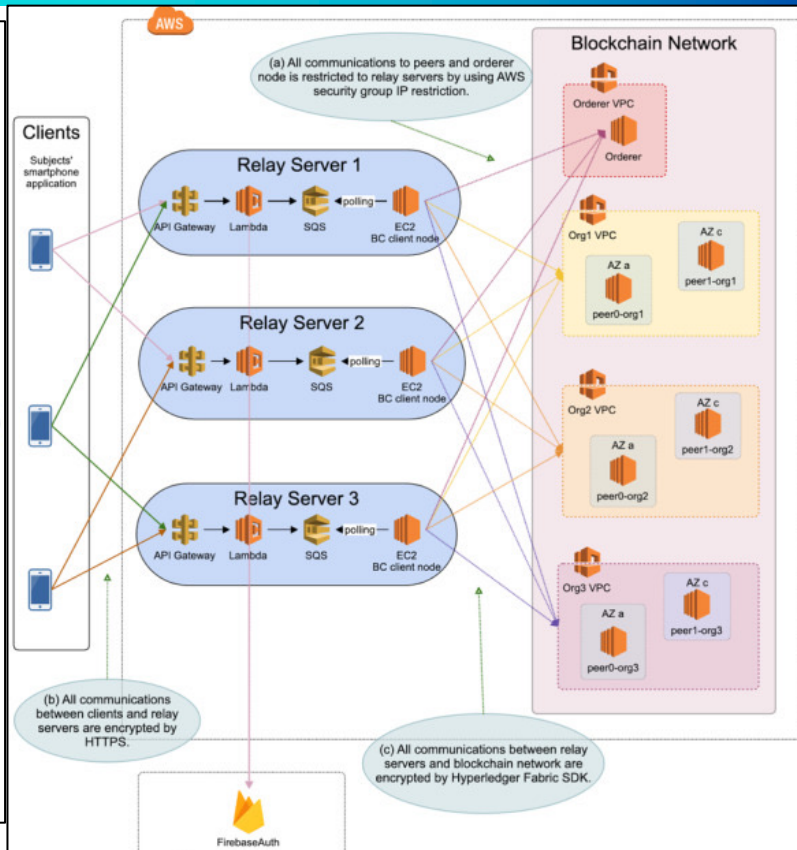
{
  "UserID": "vr1r0gTal9f4lpqHRpptnriGDIF2",
  "LogID": 14,
  "LogTime": 1574421483,
  "LogType": "TestScore",
  "LogData": {
    "score": 33,
    "name": "CFS"
  },
  "HashChain": "8cbae9ab944e6f9510c6ee6b40952df1c46719ffc00283079774df91f1b69657"
}

{
  "UserID": "vr1r0gTal9f4lpqHRpptnriGDIF2",
  "LogID": 15,
  "LogTime": 1581653016,
  "LogType": "TestScore",
  "LogData": {
    "name": "GPAQ",
    "score": 200
  },
  "HashChain": "d333af6987424071743b4e2c1413fc75fa48a38d609e845c7dabb58a791a5f48"
}

{
  "UserID": "vr1r0gTal9f4lpqHRpptnriGDIF2",
  "LogID": 16,
  "LogTime": 1581653048,
  "LogType": "ProjectEnd",
  "LogData": {
    "key": "iq4YI0YNu3w1oTUAdqAJ"
  },
  "HashChain": "e2e82988b701a79aead637bf3b0e2cdb6a7e6939652ede535108ae911b690d1d"
}
```

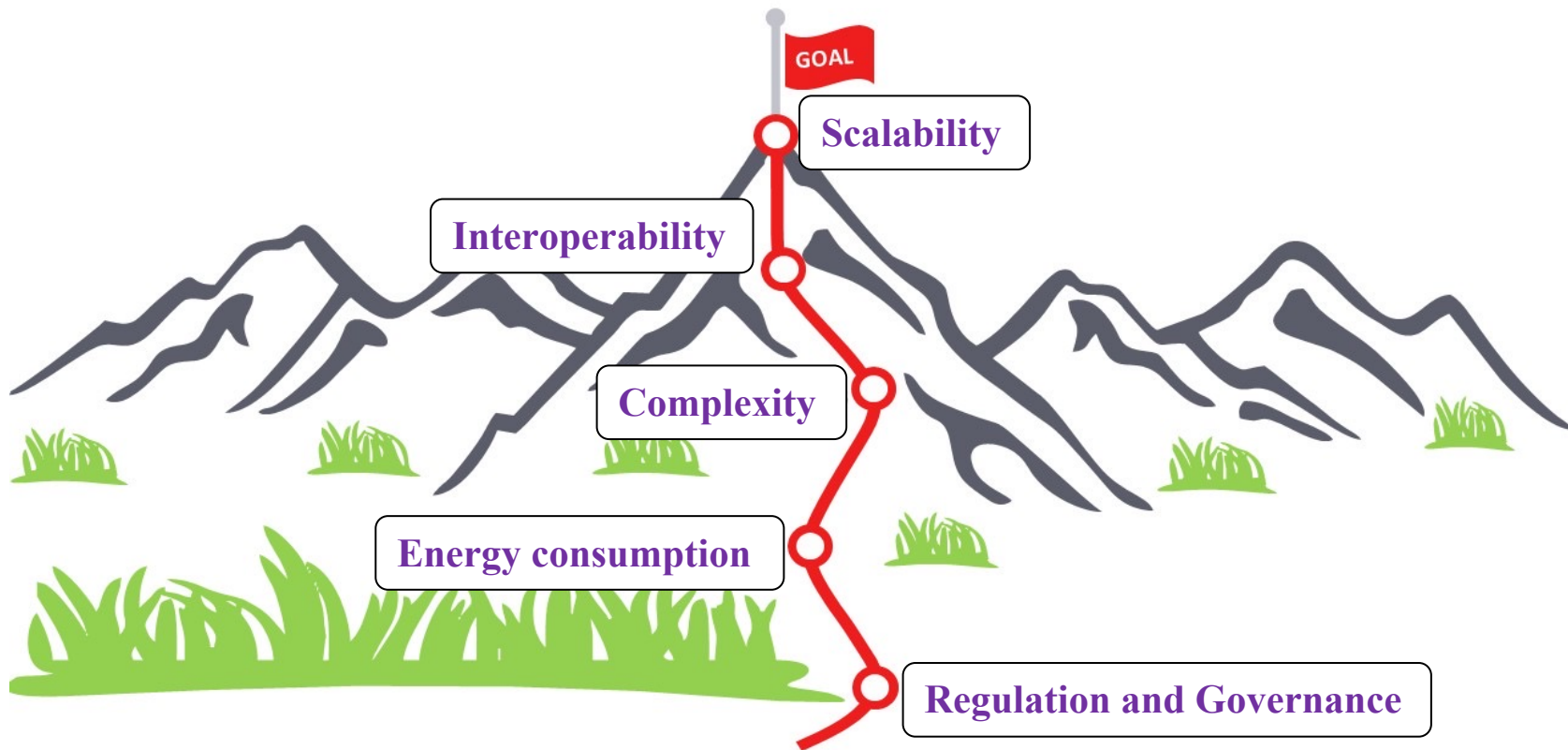


This subject's secret hash key is sent to the blockchain network. We can make HashChain Value in each JSON records by using this key.





Challenges





References

- <https://marketooinist.com/>
- <https://www.theguardian.com/technology/2014/mar/07/satoshi-nakamoto-denies-inventing-bitcoin>
- <https://blogs.iadb.org/caribbean-dev-trends/en/blockchain-technology-explained-and-what-it-could-mean-for-the-caribbean/>
- <https://us.norton.com/blog/privacy/blockchain-security>
- <https://www.investing.com/academy/crypto/blockchain-definition/>
- <https://www.theknowledgeacademy.com/blog/history-of-blockchain/>
- <https://www.ibm.com/reports/data-breach>
- <https://www.prnewswire.com/news-releases/how-blockchain-in-healthcare-could-save-the-healthcare-industry-up-to-100-150-billion-per-year-301416227>
- <https://belitsoft.com/custom-application-development-services/healthcare-software-development/blockchain-in-healthcare-use-cases>
- <https://www.youtube.com/watch?v=Oga9J0NFwAA>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7298640/?report=printable>
- <https://www.cartoonstock.com/>
- <https://www.forbes.com/sites/bernardmarr/2023/04/14/the-5-biggest-problems-with-blockchain-technology-everyone-must-know-about/?sh=41d2e16e55d2>
- <https://www2.deloitte.com/content/dam/Deloitte/uk/Documents/Innovation/deloitte-uk-blockchain-key-challenges.pdf>



**The Global Healthcare
Data Science Community**

Contact Channels

UK +44 1843 609600
office@phuse.global
phuse.global

Social Media

@phusetwit
/phusebook
/phusetube
/company/phuse



I always say there's no such thing
as a stupid question