

# Blockchain | Disruptive Technologies for Global Health

Hammer/Nail?!

Jim Nasr, CEO, Acoer  
e: [jnasr@acoer.com](mailto:jnasr@acoer.com)  
t: @jnasr

Last updated: MAR.24.2021



# In 3 Acts...

---

## Block and Tackle

Key principles shaping our thoughts

## Today's Reality

Substance, Signal, Practicality

## From the Trenches

Real Use Cases





But First...Something  
Completely Different!



aetna™

IBM

Sapient

Armedia

CDC  
CENTERS FOR DISEASE  
CONTROL AND PREVENTION

CERTARA®

acoer®

Consulting  
Architect  
Aetna, IBM, Sapient



Tech Startup  
Entrepreneur  
Armedia



Big Public Health & Pharma  
Chief Architect  
CDC, Certara

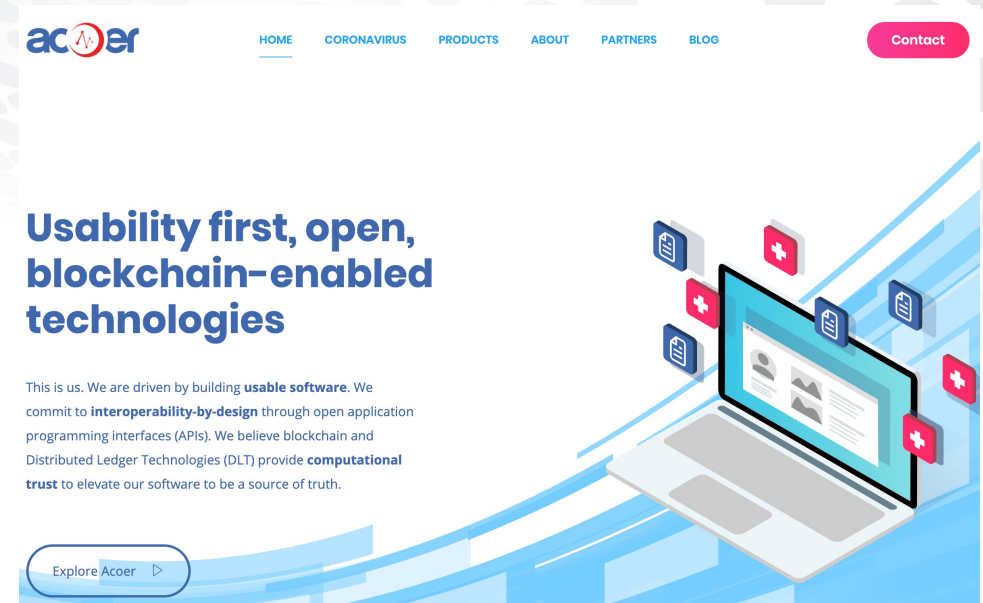


Software Startup  
Entrepreneur  
Acoer



# Who is Acoer?

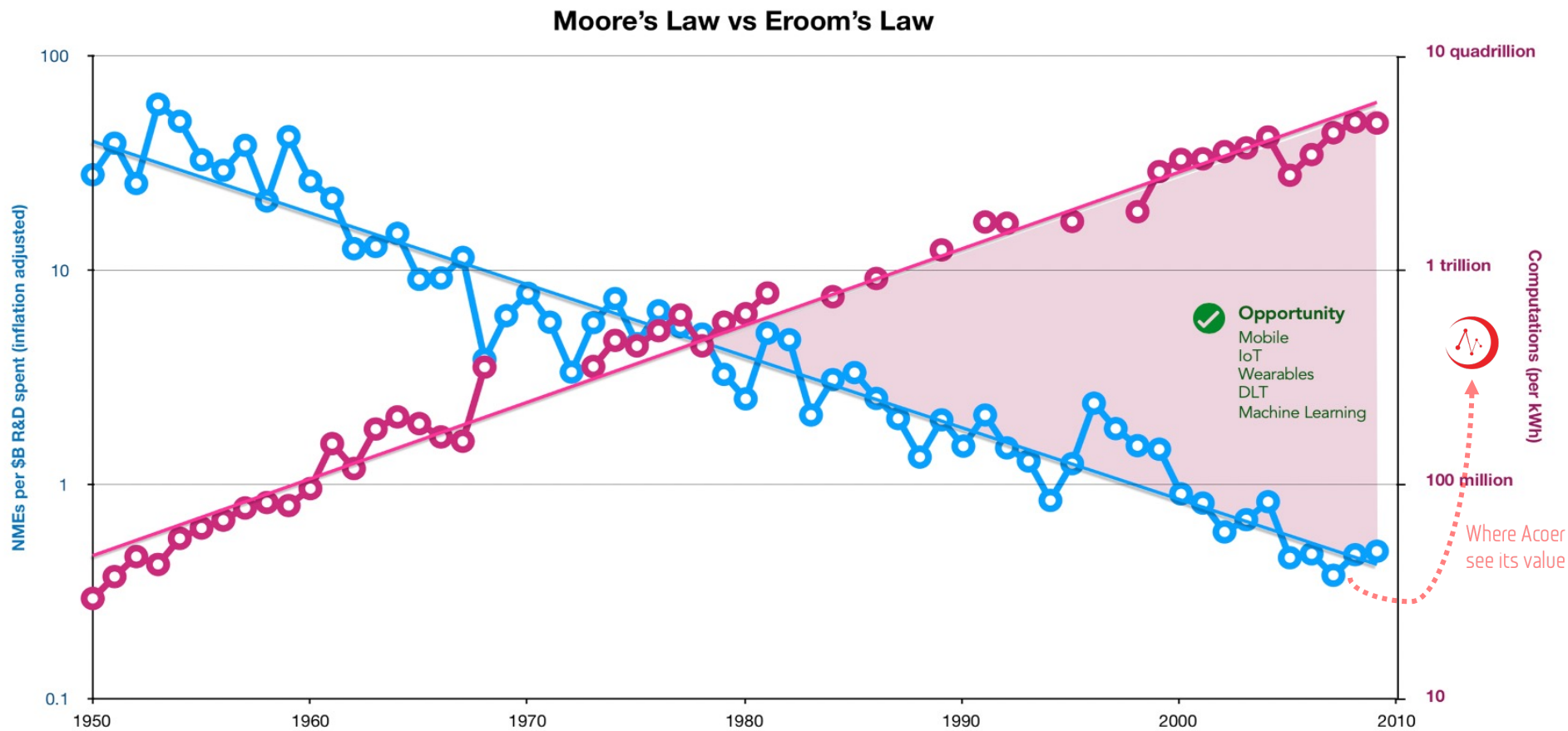
- Software development firm
  - DNA: Usability first, Real-time, Interoperable, Blockchain-enabled
- Focused on Healthcare
  - Including: Public Health, Global Health and Life Sciences
- From the creators of OpenCDC and numerous other large-scale healthcare applications and platforms
  - Jim Nasr, CEO. Formerly CDC Chief Software Architect
  - Ben Chevallereau, CTO. Formerly lead developer on numerous open source initiatives



[acoer.com](https://acoer.com)

I



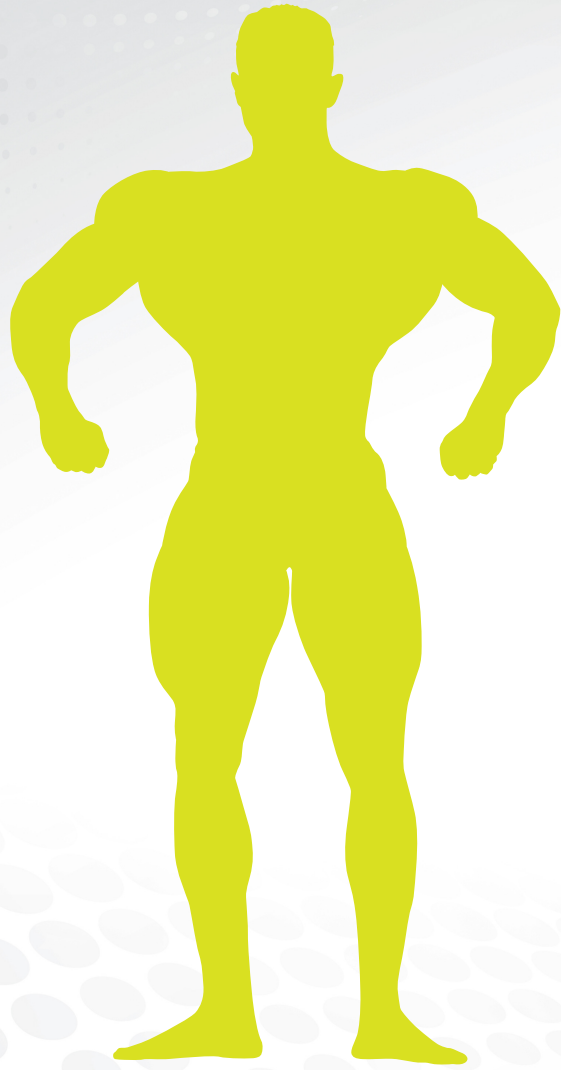


**Moore's Law: Computing power becomes faster and less expensive over time**

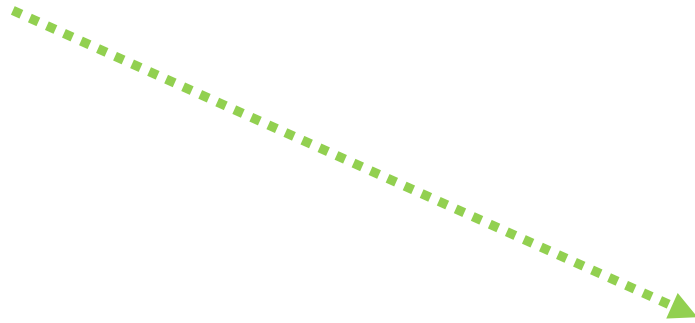
**Eroom's Law: Drug discovery is becoming slower and more expensive over time**

Eroom's Law: [https://en.wikipedia.org/wiki/Eroom%27s\\_law](https://en.wikipedia.org/wiki/Eroom%27s_law)





\$\$\$

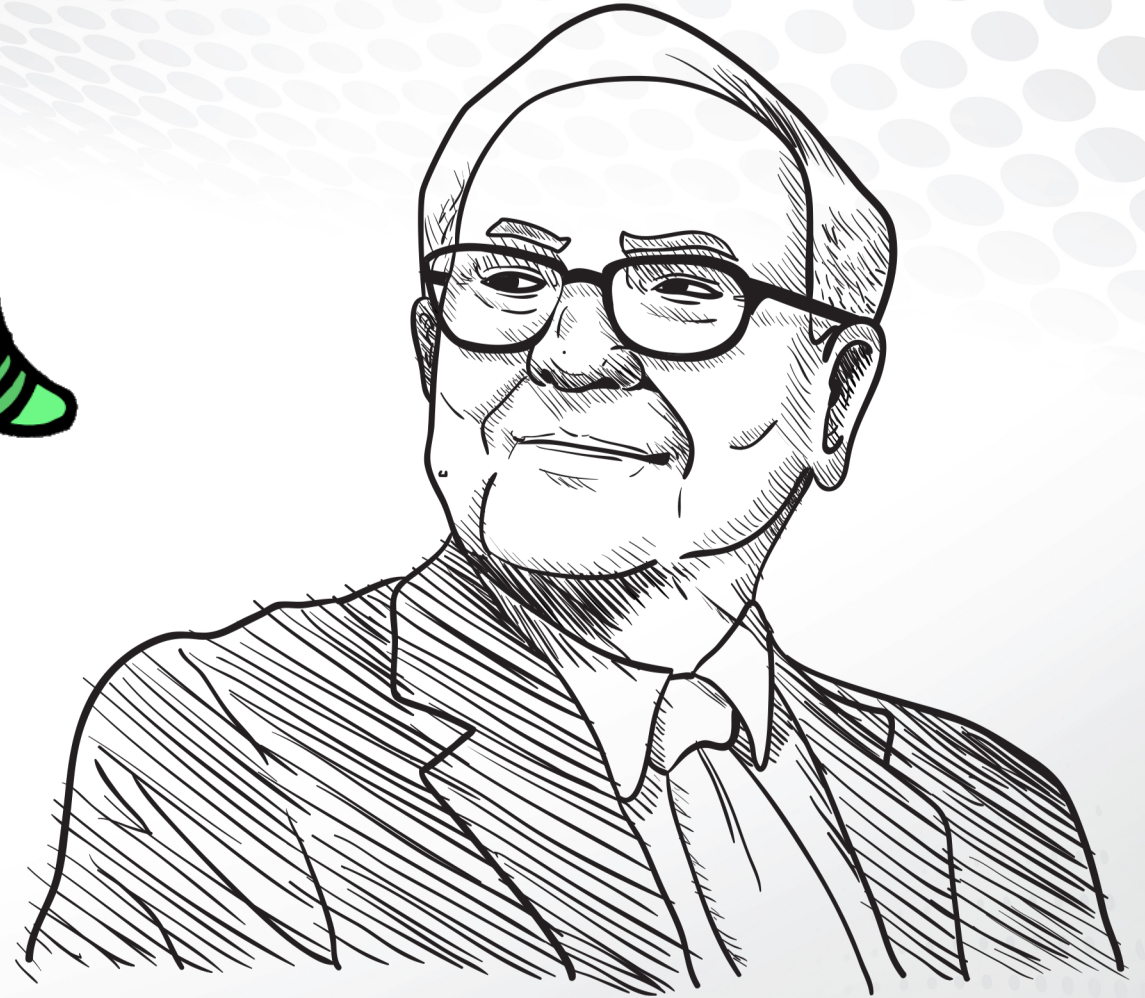


Results

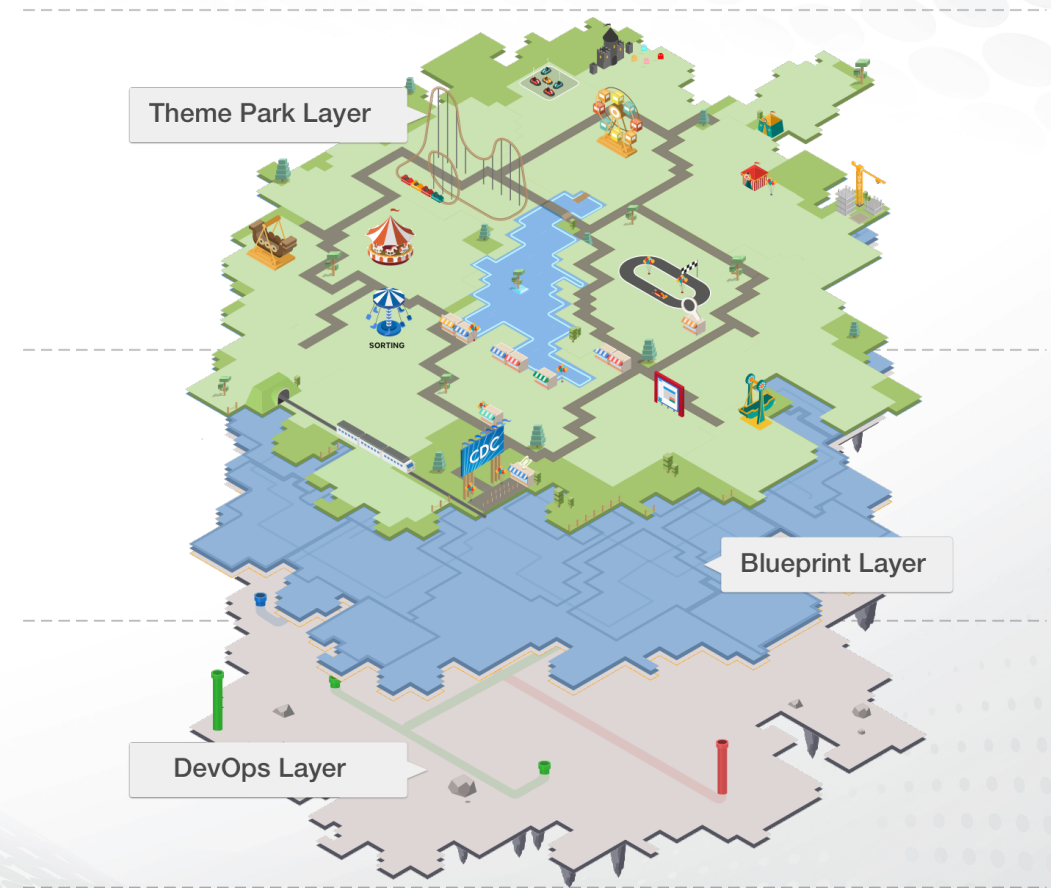




**“A hungry  
tapeworm on  
the American  
economy”**



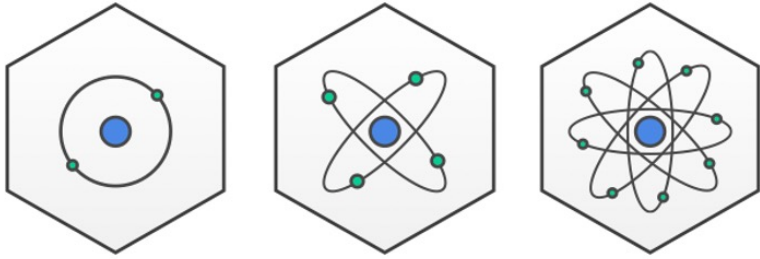
# Software as a Theme Park



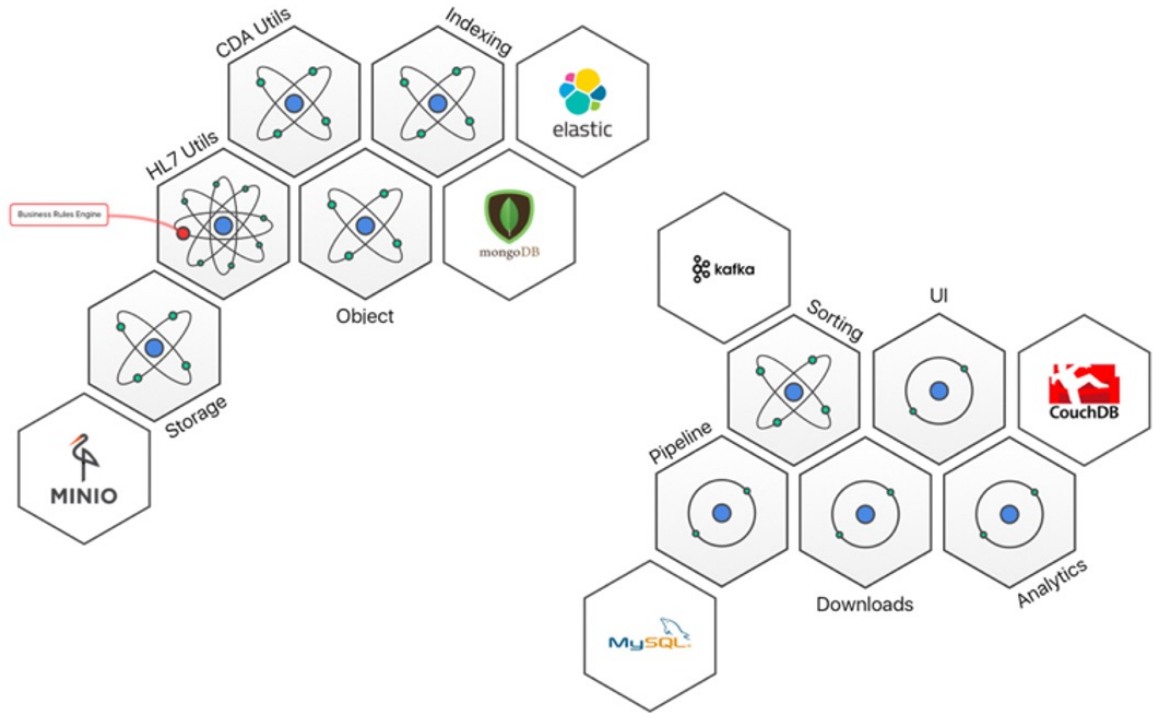
Source: Jim Nasr & Centers for Disease Control and Prevention (CDC)



# Deconstructing Interoperable Software



Microservices (atomic to multifunction)



||



# Data Before Blockchain

*Where is the data?*

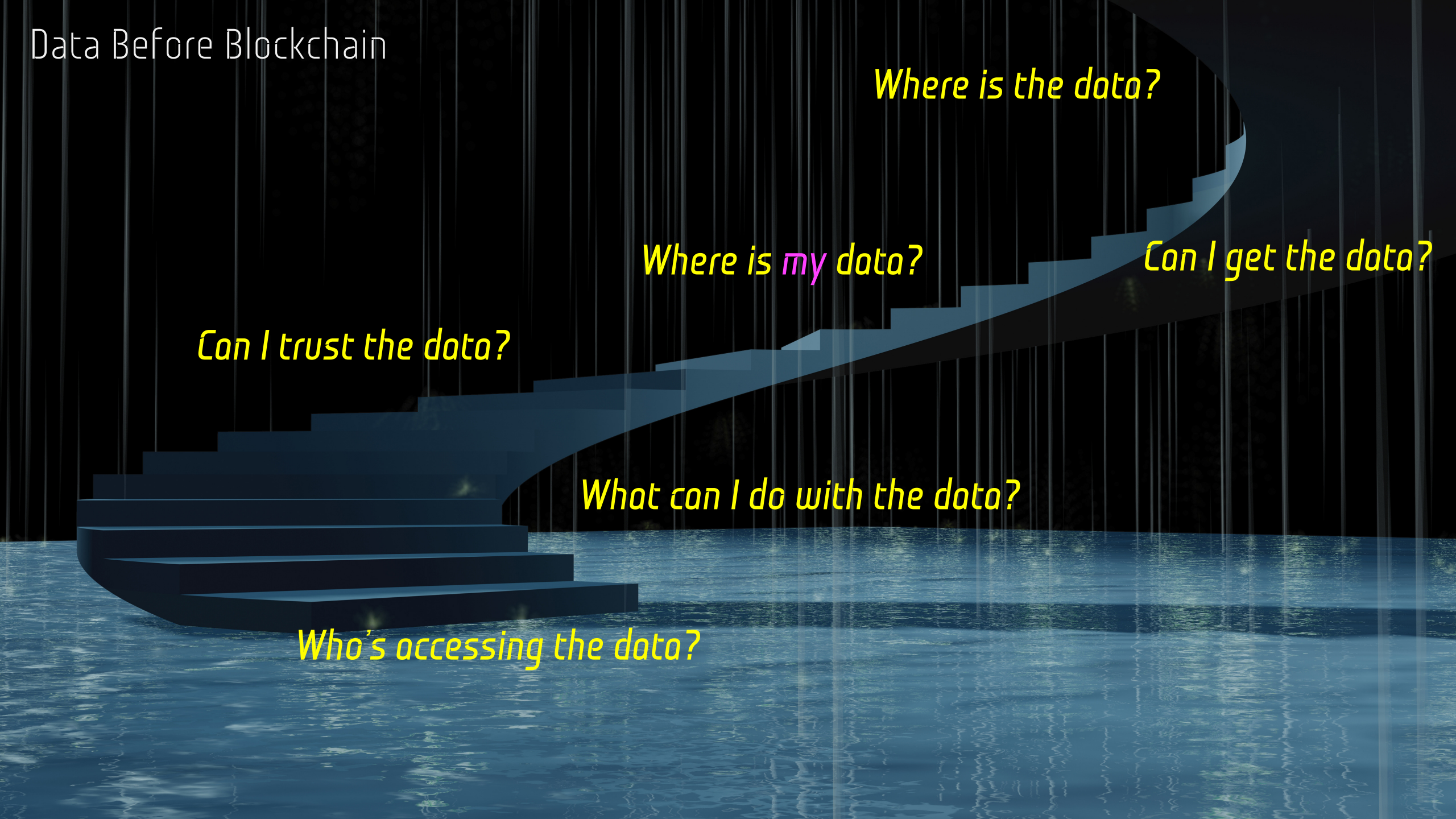
*Where is **my** data?*

*Can I get the data?*

*Can I trust the data?*

*What can I do with the data?*

*Who's accessing the data?*

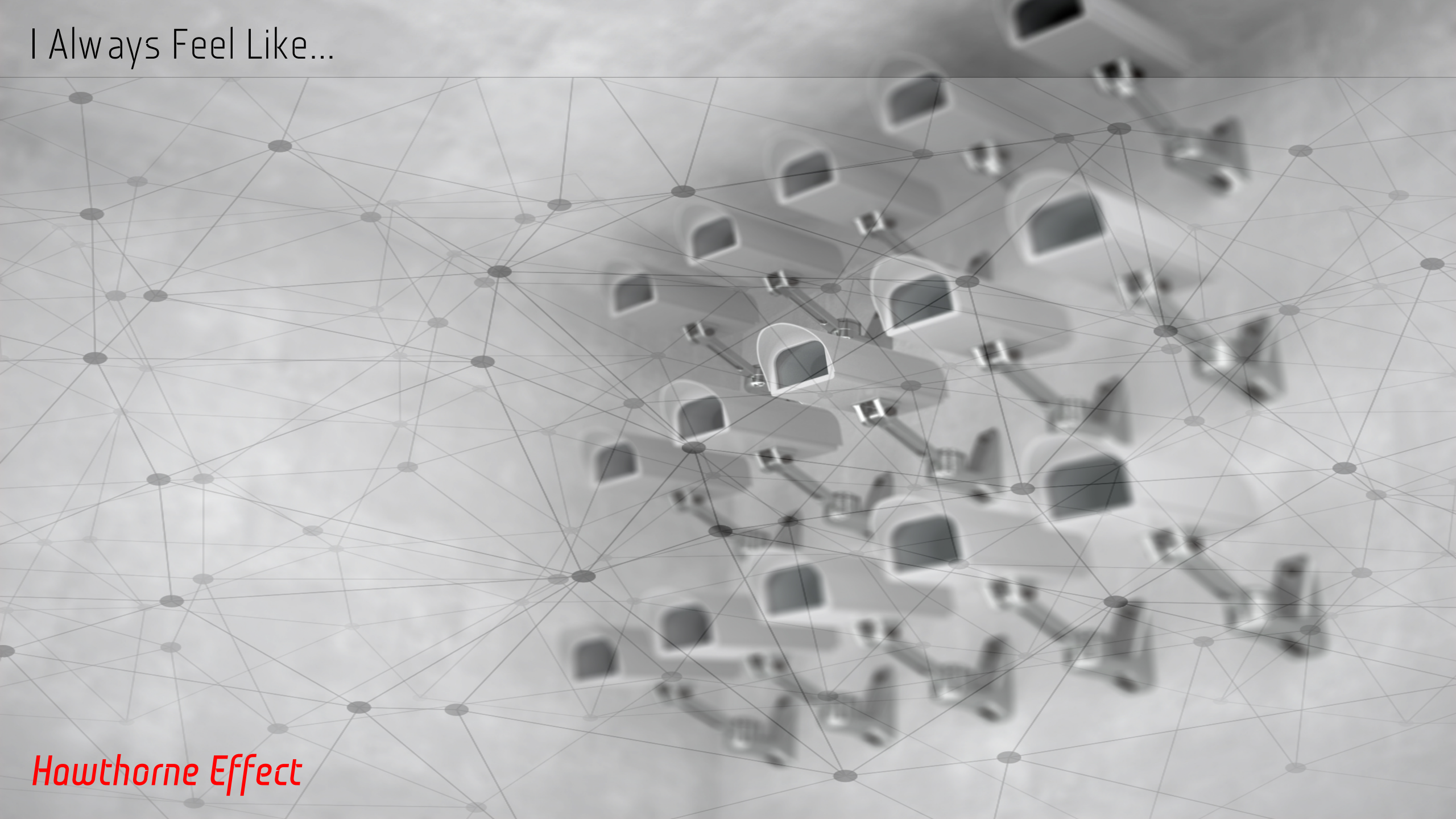


It's about COMPUTATIONAL Trust



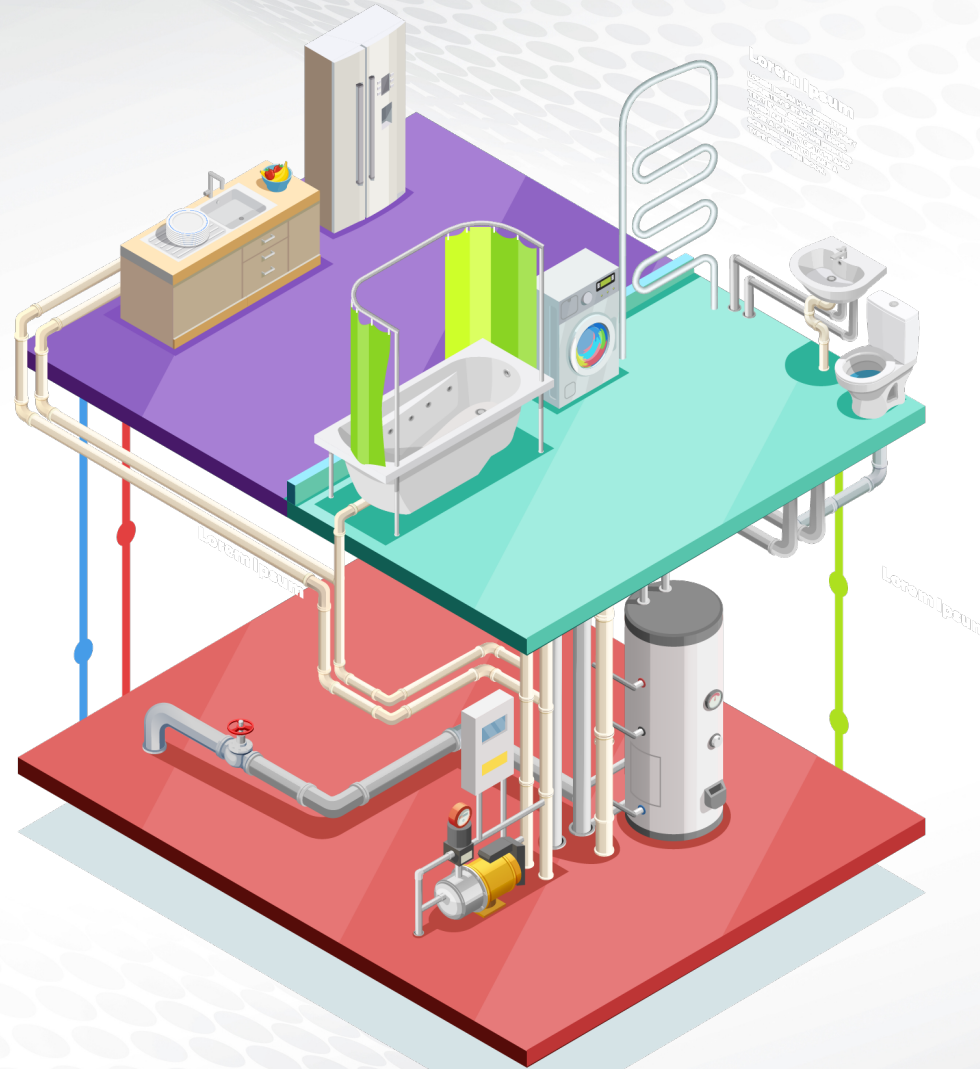
I Always Feel Like...

*Hawthorne Effect*



# Blockchain as Plumbing

(Distributed) Apps



Blockchain Infrastructure  
& Protocols





**Public vs. Private (is this just a shared ledger?)**

**Network Nodes**

**Tokens**



**Protocols**

**Consensus (mining complexity)**

**Scaling**

**Smart Contracts**

**Key Management**

**On-Chain vs. Off-Chain**

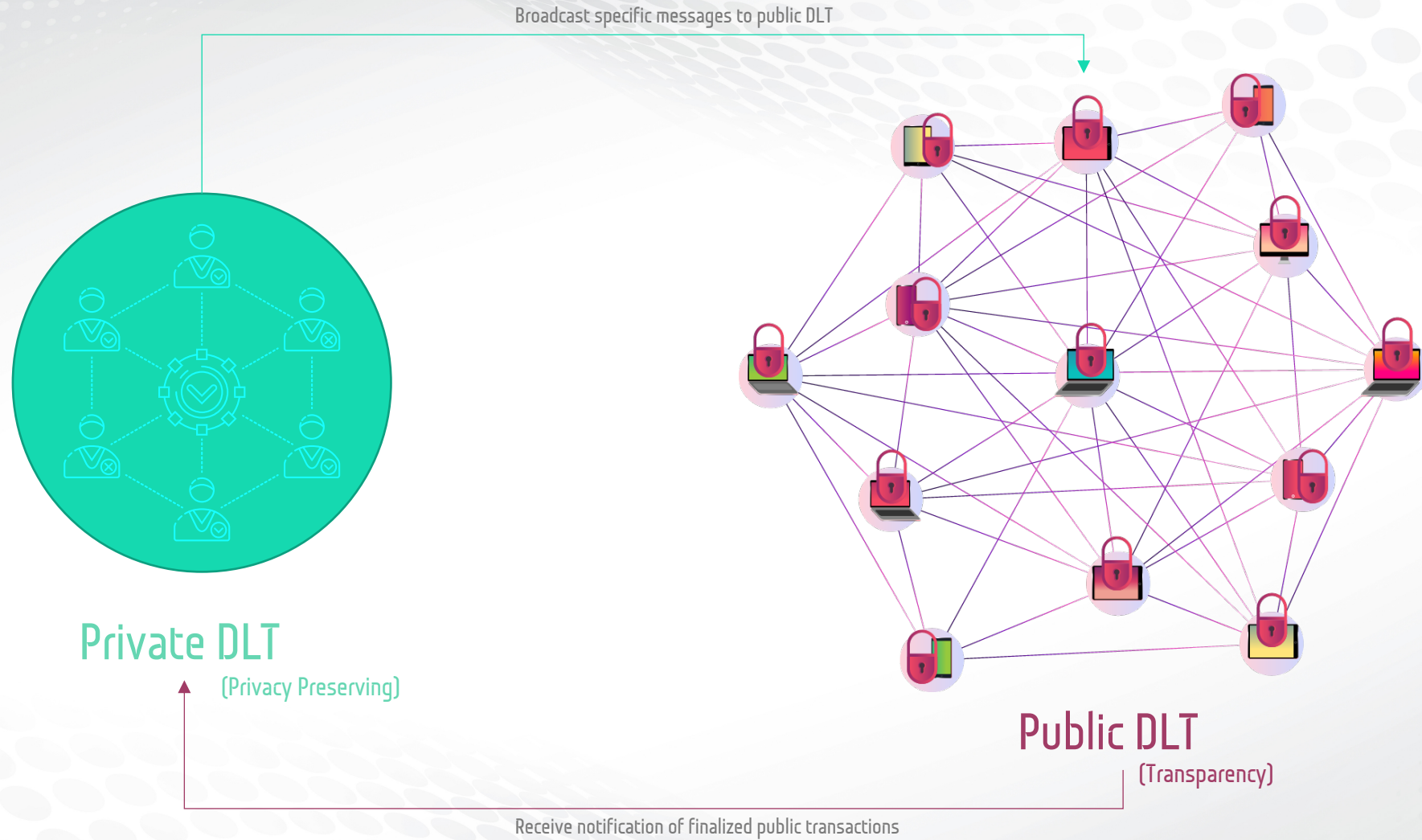
**Partial Ownership, ...**



# DNA of Public Distributed Ledger Technologies (DLTs)



# Public, Private and Hybrid



## What to do?!

Off-chain APIs

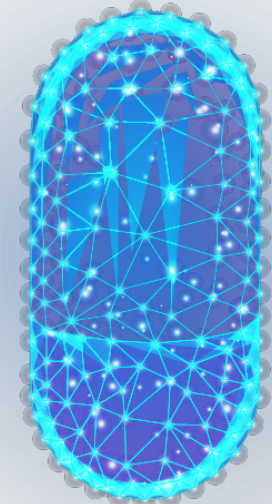
Public DLTs for Transaction Finality Only

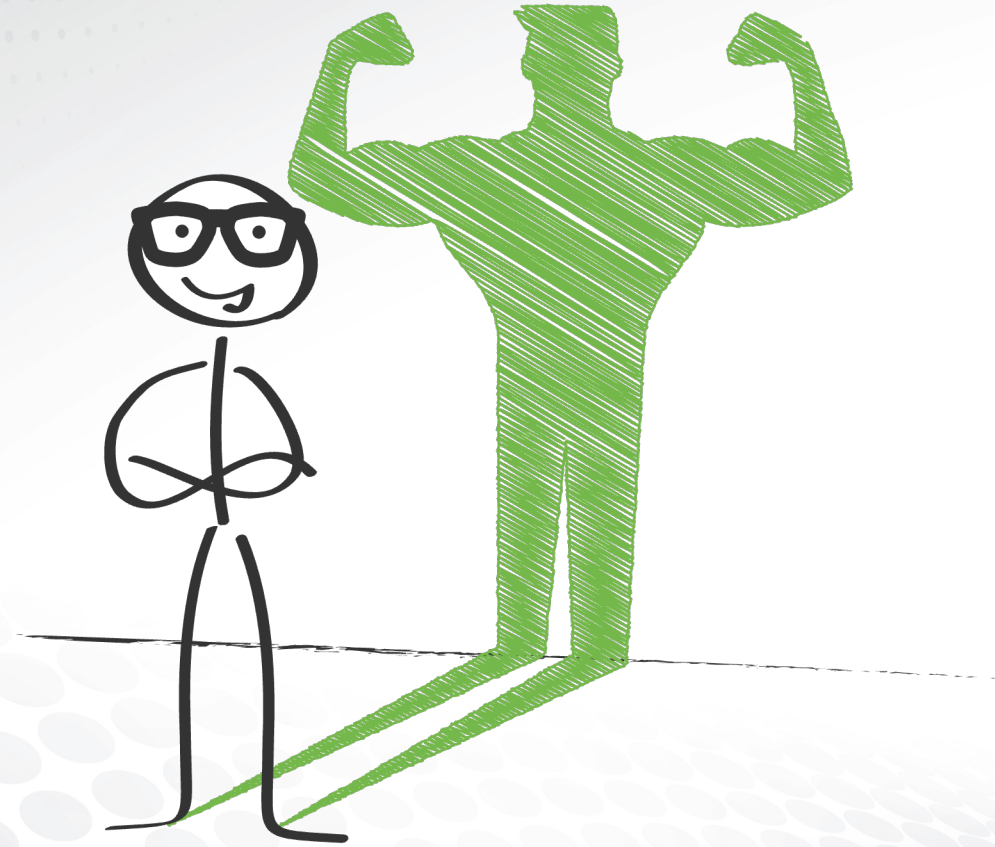
Network of Networks

Hybrid Blockchains

Exchanges

Oracles, Parachains, Relay Chains, IBCs, ...





## Evolution of Identity Management

- I. Centralized Identity
- II. Federated Identity
- III. User-Centric Identity
- IV. Self-Sovereign Identity (SSI)

# Pragmatist's Road to Blockchain

25

*Build uncoupled, modular software*

*Use Open Source*

*Use Open APIs*

*De-silo Data*

*Deploy Thru Cloud Operations*

*Design for App Usability*

*Consider Use Case & ROI for Blockchain Protocol*

*Consider Early: Private vs. Public; Think Long-term*

*Think Game Theory and Use of Tokens*

*Consider On-Chain vs. Off*

*Implement Proof of Transaction (Data Stamping)*

*Revisit ROI and Iterate*



## Be Careful!

*Garbage in, tamper-proof garbage forever*

*Mapping real-world to digital*

*Identifying things & people – digital identity*

*Scaling governance*

*Getting to consensus*

*D'oh...Smart Contracts ☹️*

*Dealing with Legacy (i.e. all) data*





# Real-time Data Stamping Driving Practical Use Cases

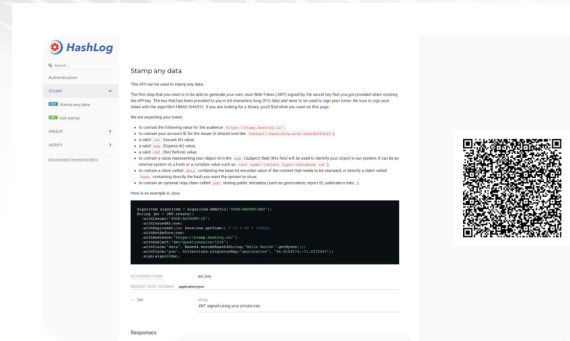
## Healthcare

- Mortality & Substance Abuse Reporting
- Coronavirus Tracking
- National Health ID Generation
- Tamper Proof Records of Medical Transactions
- Patient Consent Management

## Other

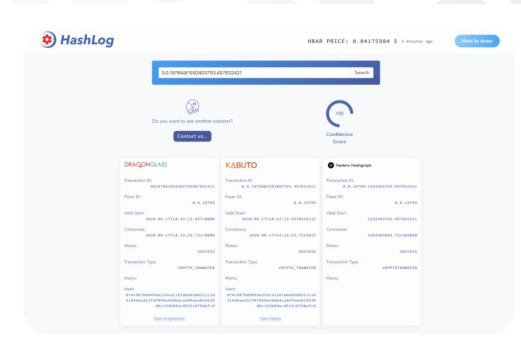
- Agriculture Tracking
- Real-time Flight Tracking
- NASA Secure Content Collaboration
- Combating #FakeNews
- Combating Journalist Censorship

### Acoer HashLog



#### Data Stamping Service API

Stamp and validate digital objects with geolocation, date, time, a 2D barcode, and information on when it was issued and if or when it expires.



#### Ledger Explorer

A transaction explorer and analytics platform for Hedera Hashgraph, a decentralized ledger technology.



#### Health Data Explorer

A platform that supports and improves medicolegal death investigations

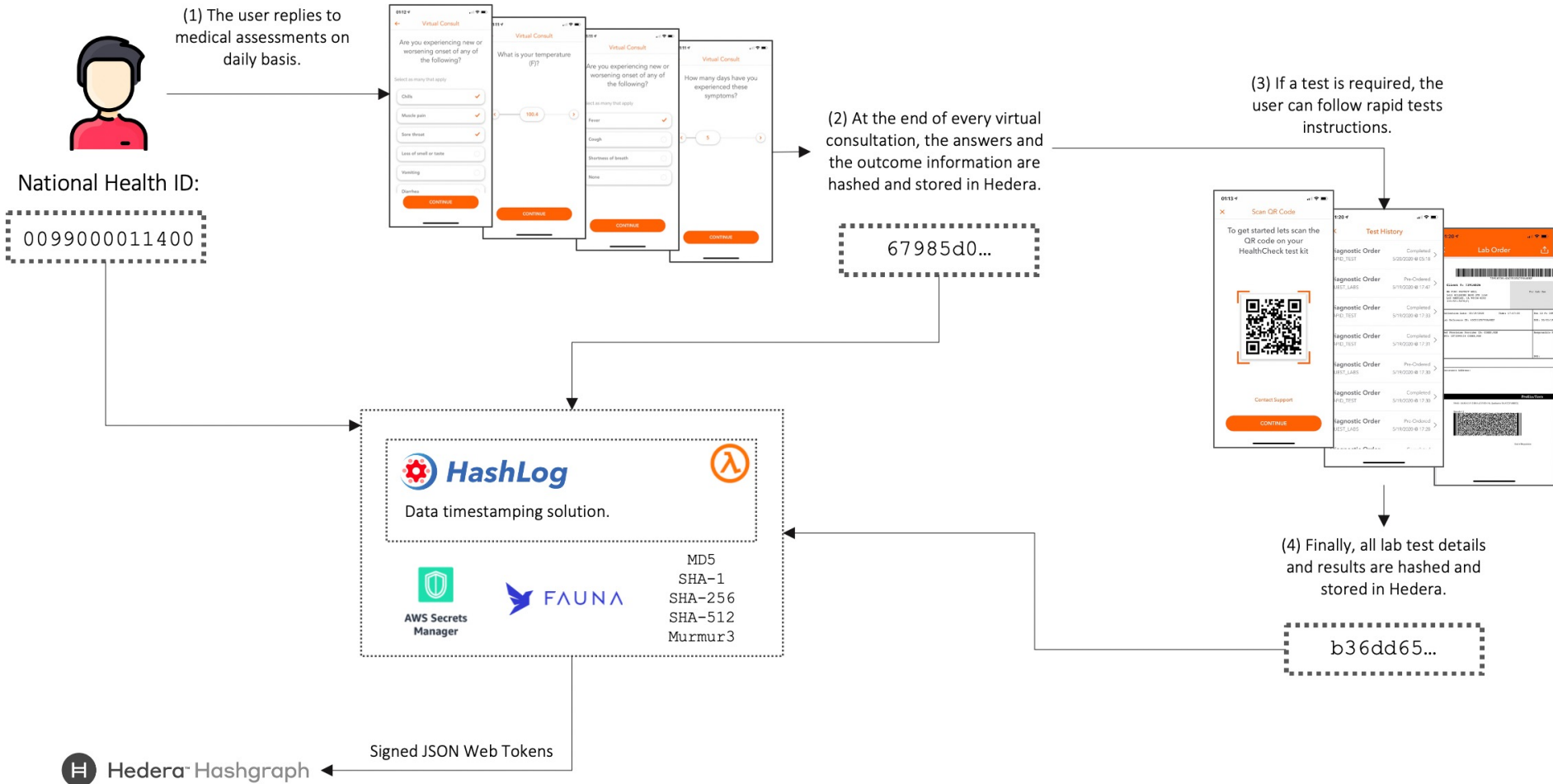


#### Knowledge Seeker

A set of data analytics dashboards that cover clinical trials, dementia, and mortality data



# ASU HealthCheck App | Transaction Authenticity Proof thru Data Stamping





## National Health ID (NID) Proposition

XX 00 000 000 000

Two Alphanumeric Characters (A-Z, 0-9) Representing the Issuer ID  
Possible Options: 1,296

One Digit (0-9) Representing the Issuer Type  
Possible Options: 10  
Example:  
0 - State Vital Records Department  
1 - Federal Agency  
2 - Local Office  
...

One Digit (0-9) Representing the Check Digit  
Use of Long Algorithm (same as NPI)  
Possible Options: 10

Nine Digits (0-9) Representing the sequence number  
Possible Options: 1,000,000,000



### Public Distributed Ledger Technology

Example:

1B 10 000 024 698

Issuer ID: 1B

$1 \times 36^1 + 11 \times 36^0$   
====> 47 ====> 48<sup>th</sup>

Issuer Type: 1

====> Federal Agency

Sequence Number: 24 698

====> 24 699<sup>th</sup>

Master Topic  
By Issuer Type

48 <sup>th</sup> Issuer
0.0.342576
1 <sup>st</sup> Issuer
<TOPIC ID>

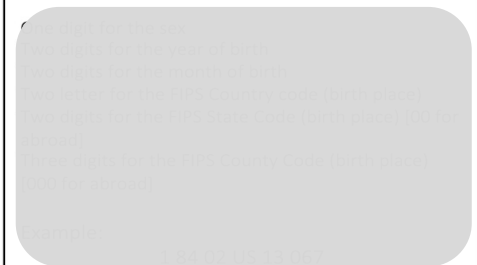
Issuer List

Issuer Topic  
For 1B5  
0.0.342576

24699 <sup>th</sup> Record
...
1 <sup>st</sup> Record
<RECORD ID>

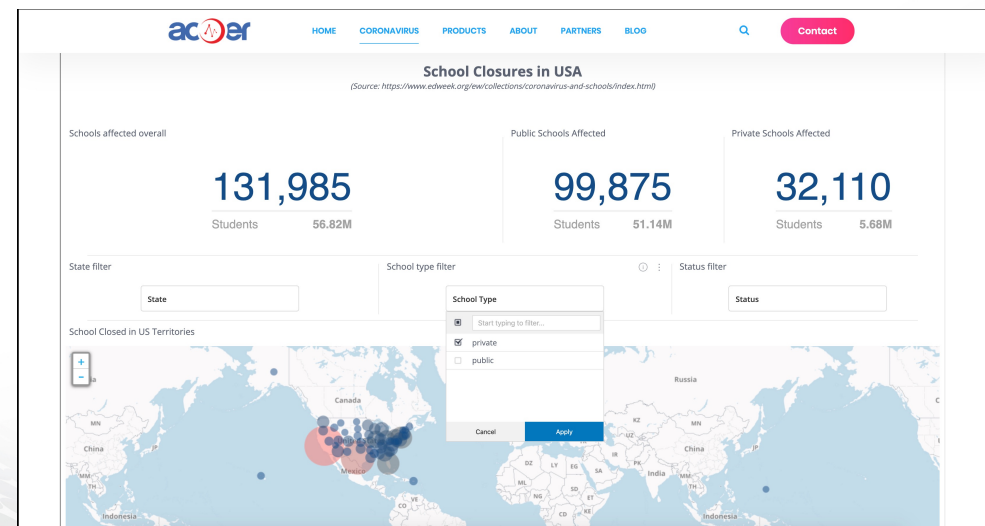
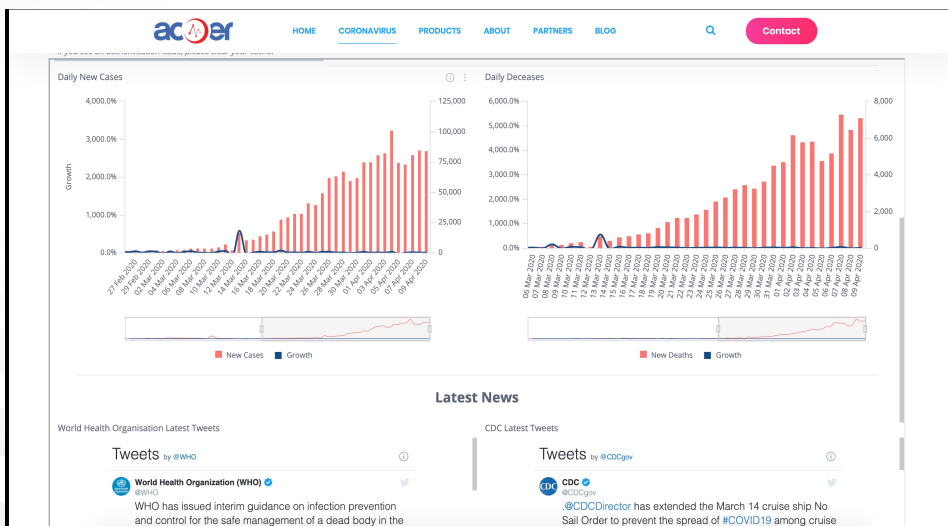
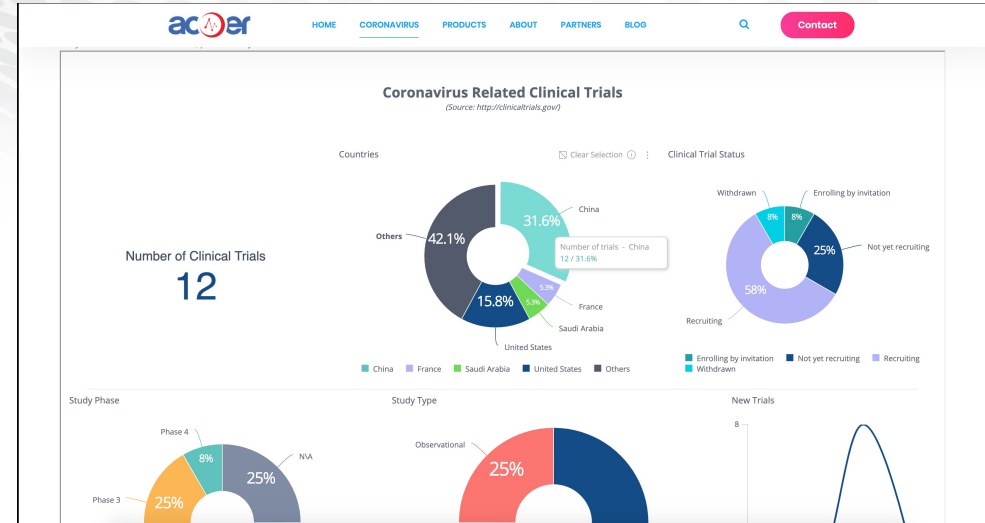
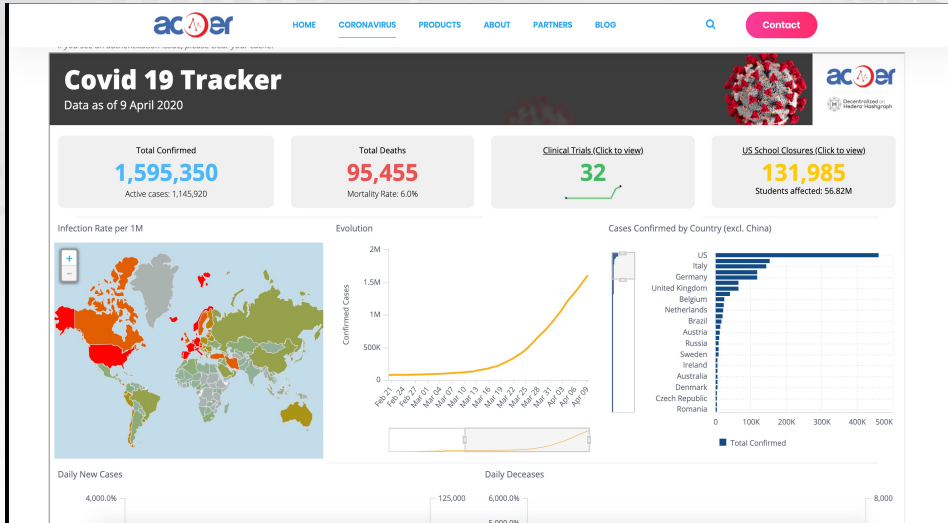
Record List

Should ideally be computed from a mix of demographic and biometric data. For this project, we propose:

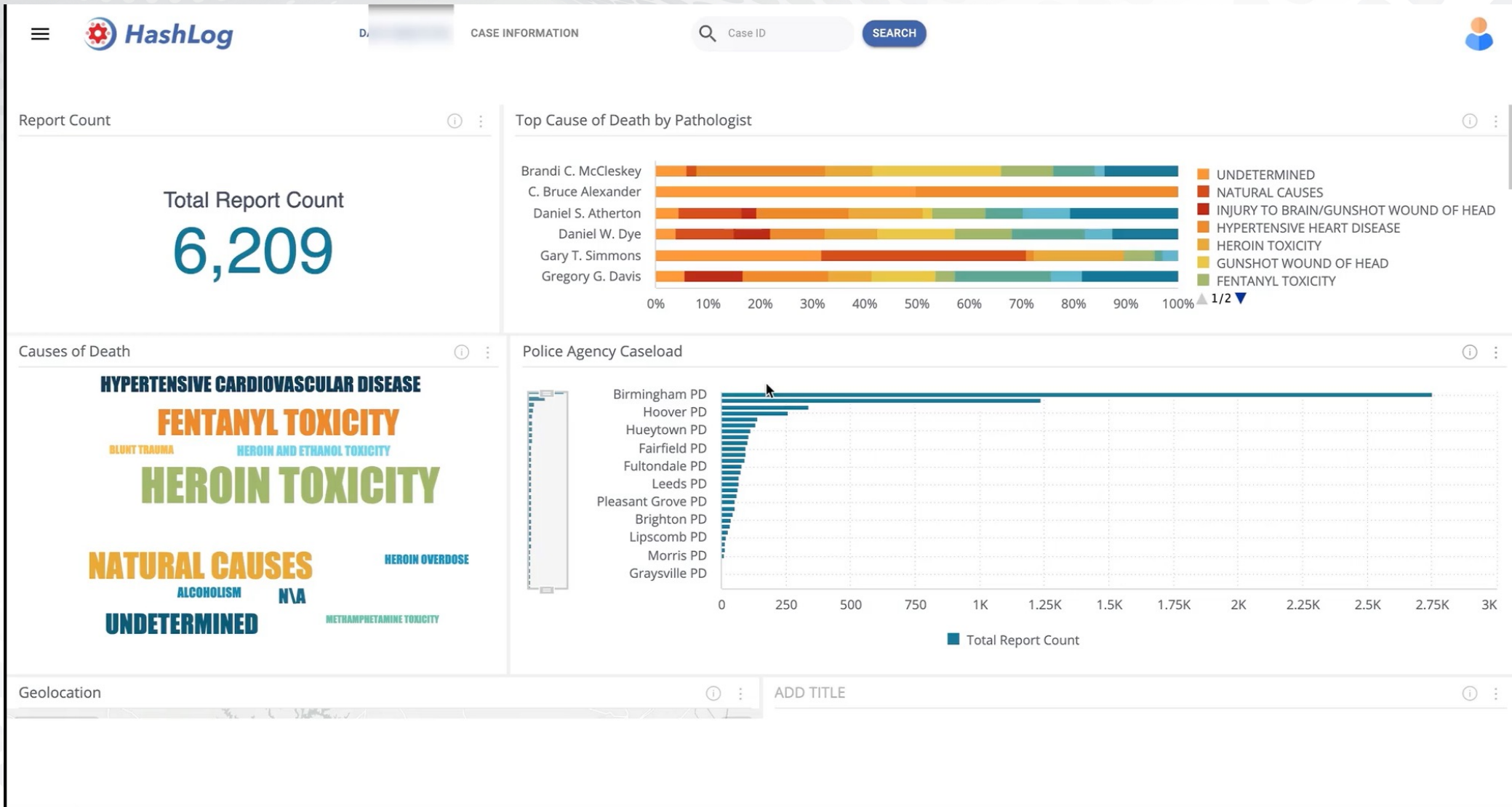


Male born in Feb 1984 in US, GA, Cobb County

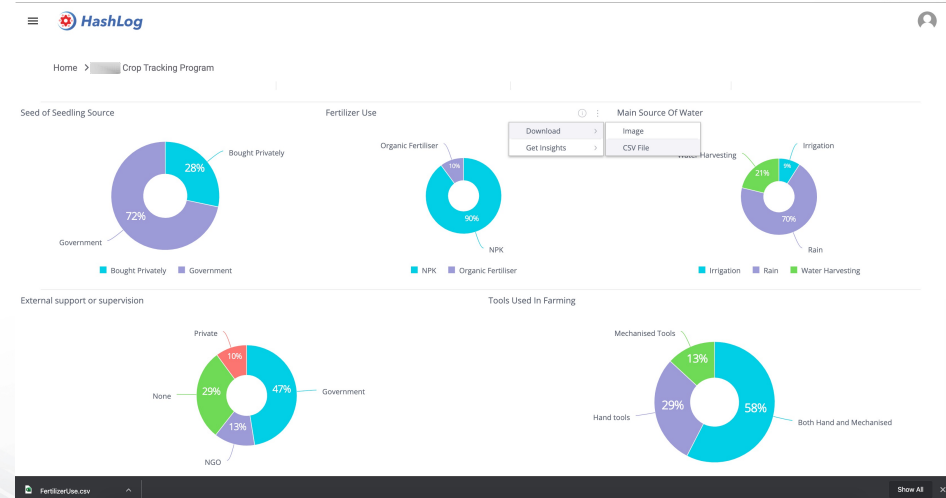
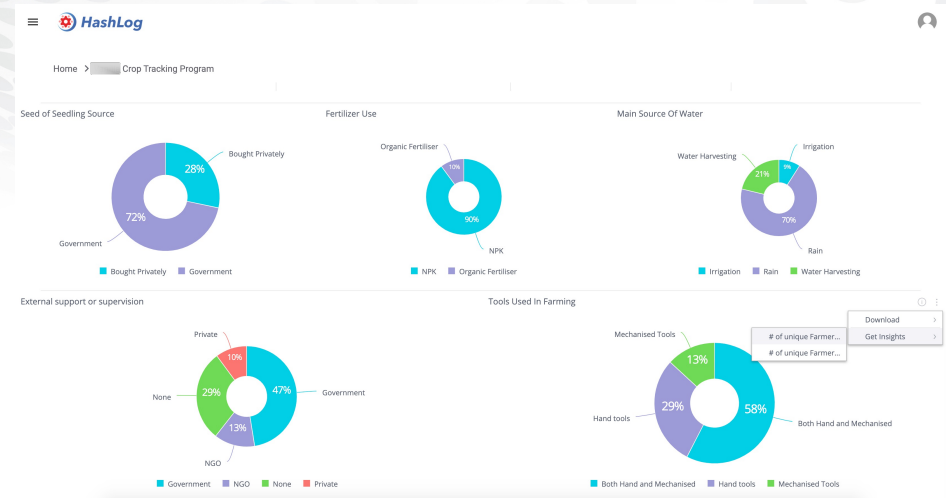
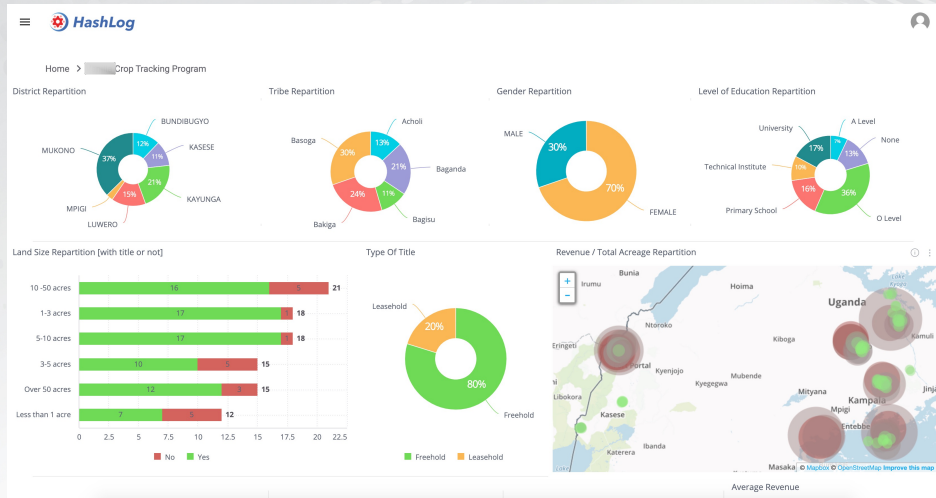




# Mortality and Substance Abuse Reporting in State of Alabama



# Agriculture Supply Chain Tracking in Uganda



# Questions?

Jim Nasr, CEO, Acoer

e: [jnasr@acoer.com](mailto:jnasr@acoer.com)

t: @jnasr

[www.acoer.com](http://www.acoer.com)

