



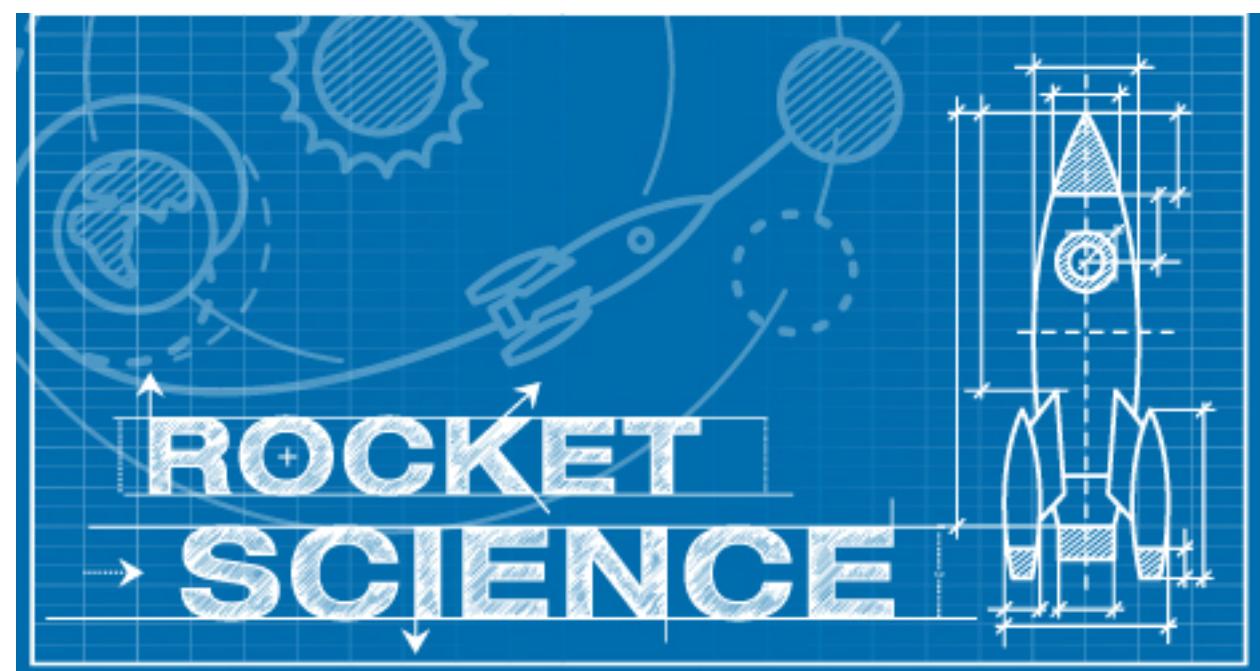
A concerted effort to establish **Blockchain Infrastructure** to fix **Health Data Management** and provide the substrate for **Mechanism Design** for any **outcome**

KTH Blockchain Association January 23, 2018



Johan Sellström

Fm83



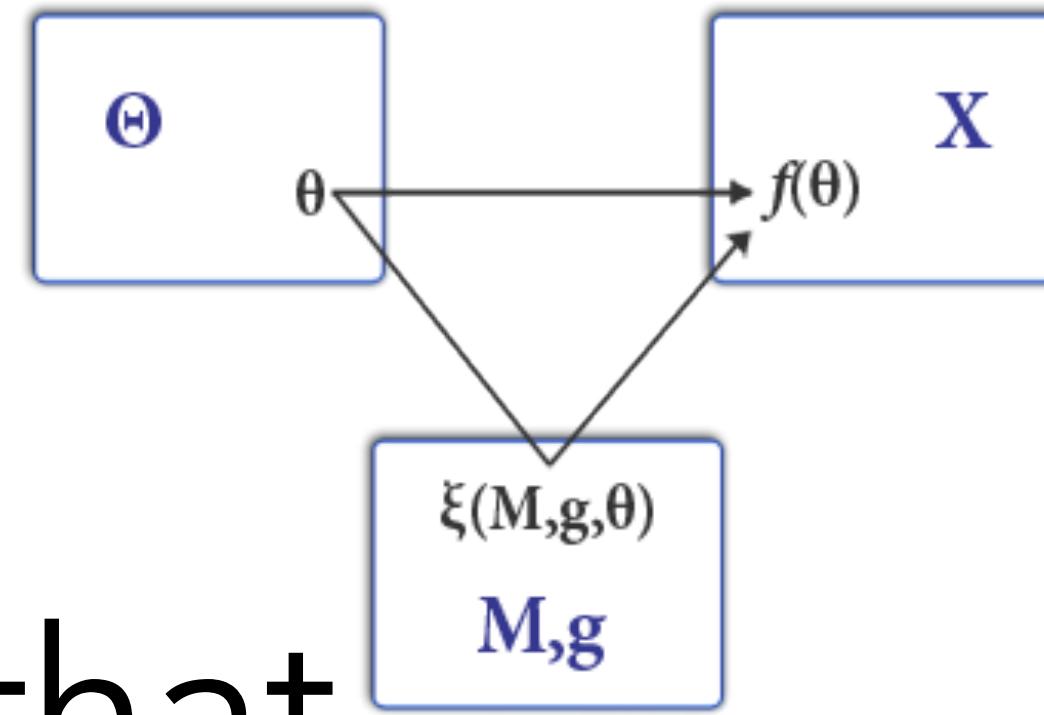
IconMedialab™

Outline

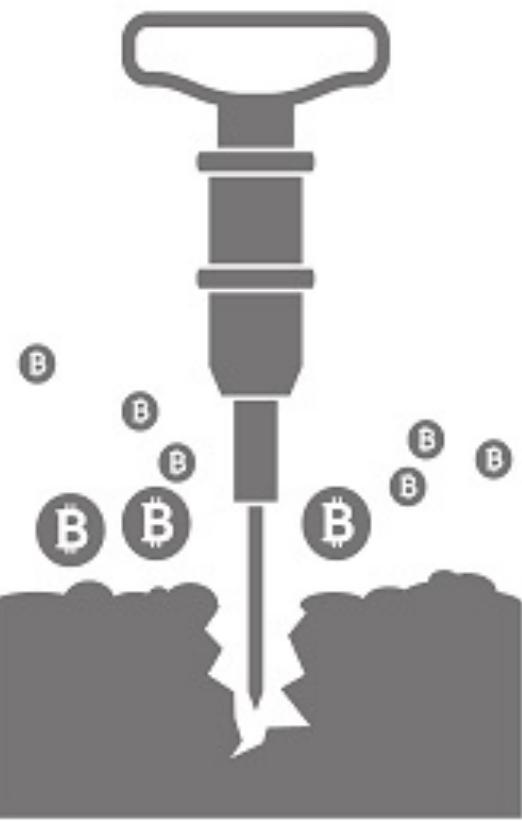
1. Mechanism design & Cryptoeconomics
2. Magic
3. New design elements
4. CareChain as an example of Impact Design
5. Impact Tokens as design pattern
6. The Pattern

Mechanism Design

a field in **economics** and **game theory** that takes an **engineering** approach to designing economic mechanisms or **incentives**, toward desired objectives, in **strategic settings**, where (social) players act **rationally**. Because it starts at the end of the game, then goes backwards, it is also called **reverse game theory**.



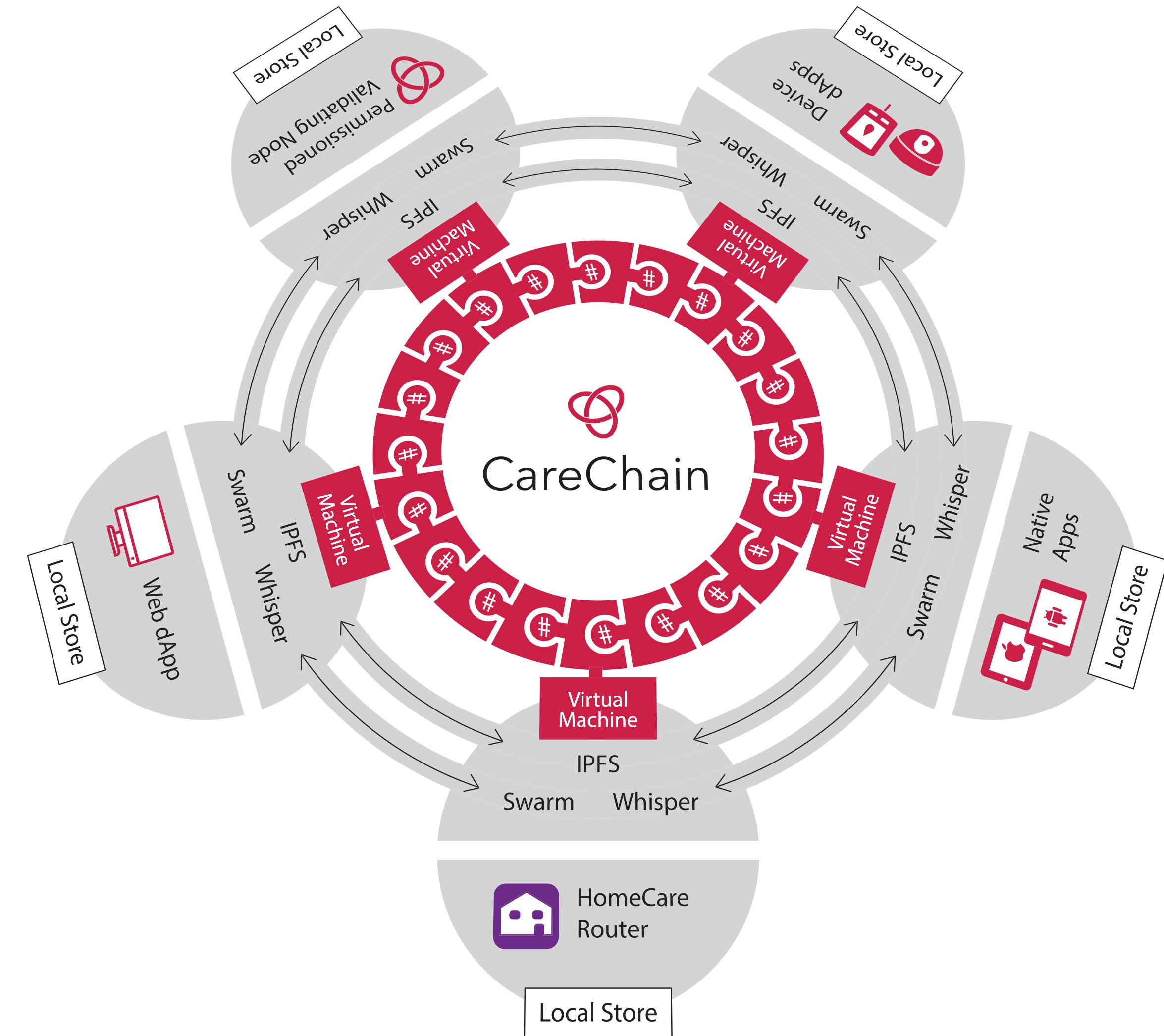
Cryptoeconomics



- Cryptography is used to prove **properties** established in the **past**, such as account balances, identities and ownership.
- Digital representations of **economic value** become possible, accessible to all, assignable, exchangeable and immune to censorship, able to be **relied upon in the future**.

Underlying Magic

- Web 3.0 is the **real cloud**
- New protocols enable completely **decentralised** systems where everyone can talk directly to everyone else (peer-to-peer).
- **Security by design** - no single cloud to hack
- Peer to Peer **exchange of value**
- **No intermediary**
- **No SPOF** - single point of failure



Why Data on a Blockchain?



Timestamped

Provable timing for all content



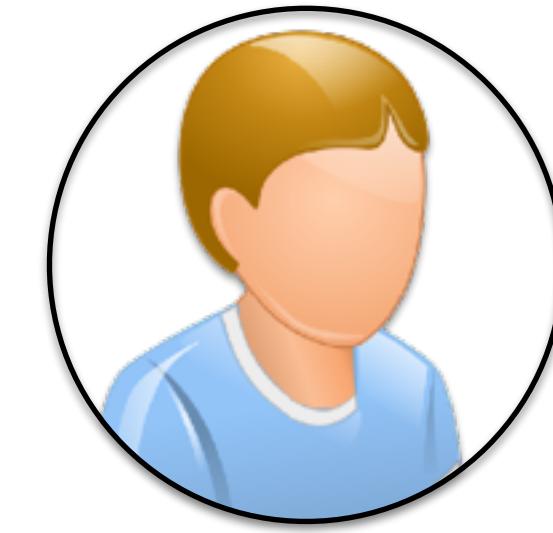
Encrypted

No data in clear



No Super-User

No privileged access mode



User in Control

User controls all access



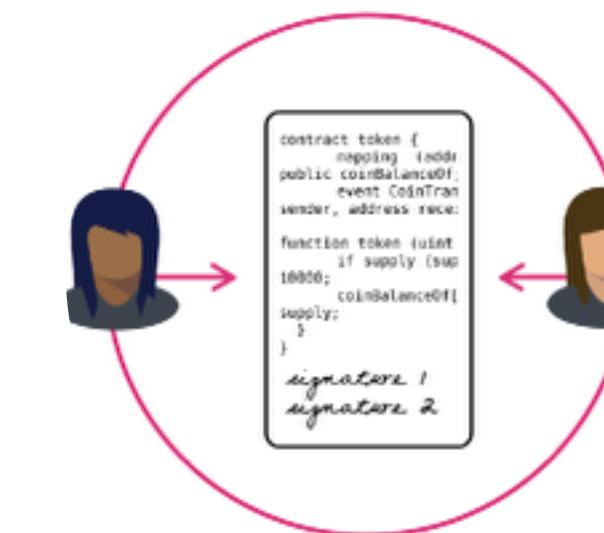
Immutable

Content cannot be changed



Anti-fragile

Open and distributed. No single point of failure



Smart Contracts

Programmable functionality

Digital Currency

Trustless

BYO Data Networks

150

Permissionless Money Creation

Resource Allocation

“Money makes the world go around”
Cabaret

Data Economy

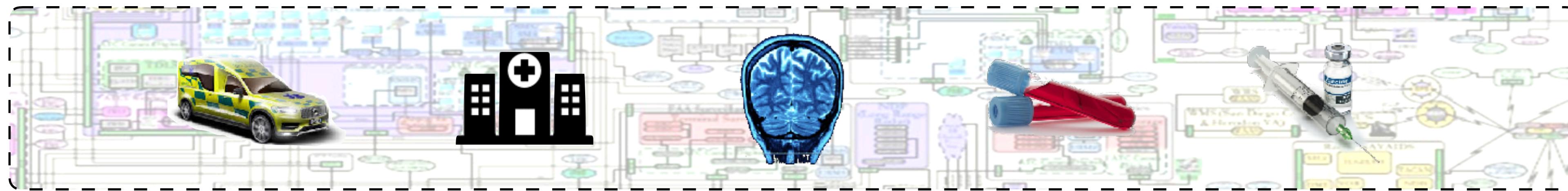
“As society gives you money for giving society what it wants, blockchains give you coins for giving the network what it wants.”

Naval Ravikant, Angelist



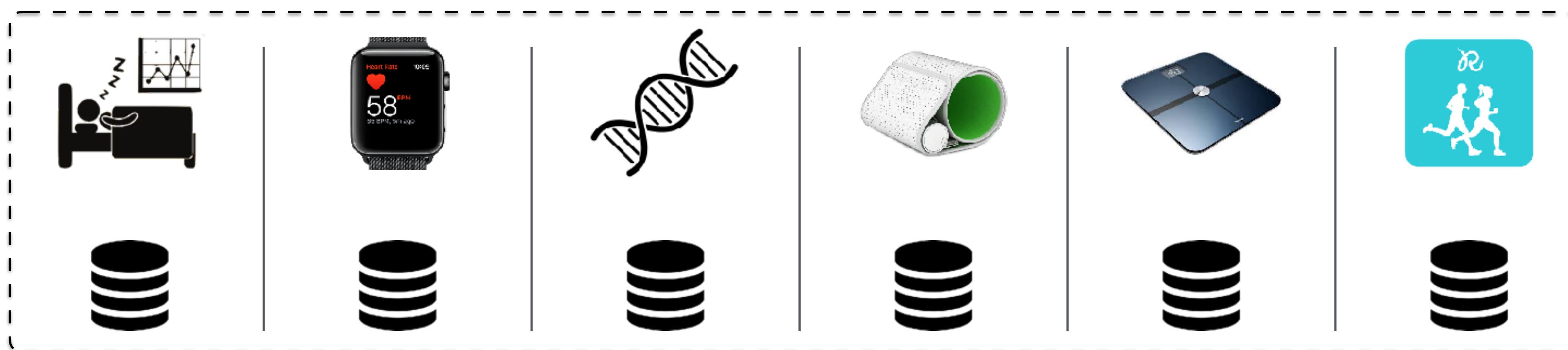
No Common Data Platform...

Healthcare is a mess of interconnected and antique systems



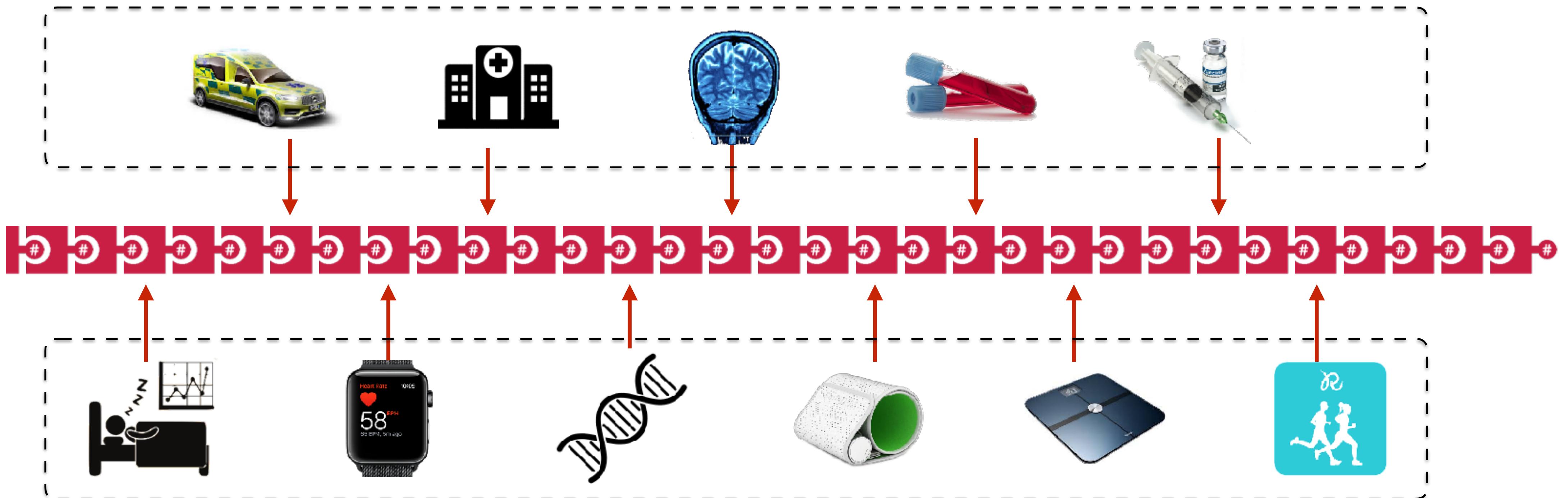
Within Healthcare → Incidents Only

Consumer apps are stove-piped with little or no data sharing/reuse



Self Generated → Continuous

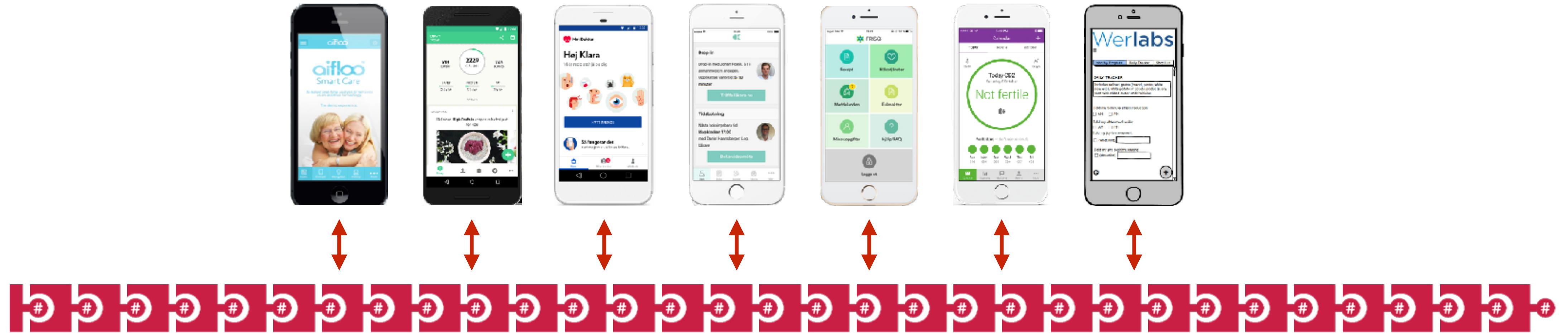
CareChain - A Blockchain For Health Data



Powered by:  **ethereum**  IPFS

Member of:  **ENTERPRISE
ETHEREUM
ALLIANCE**

From Stove-Piped to Wideband



- User brings his/her own data
- Data from one app is reused in other apps
- Individual apps can leverage broader data sets and deliver better service

A Swedish Innovation Platform

- Establish a **Swedish consortium** to set up the required infrastructure
- **Public Permissioned Model** - a number of well known institutions running a network open for public use; **scalability, privacy and compliance**
- Each organisation **owns, controls and guarantees** the integrity of the Blockchain
- Low risk; **deploy** software developed by EEA



Why Consortium Chains?

Performance: to get around current public chain scalability issues. No “mining”. Proof of Authority

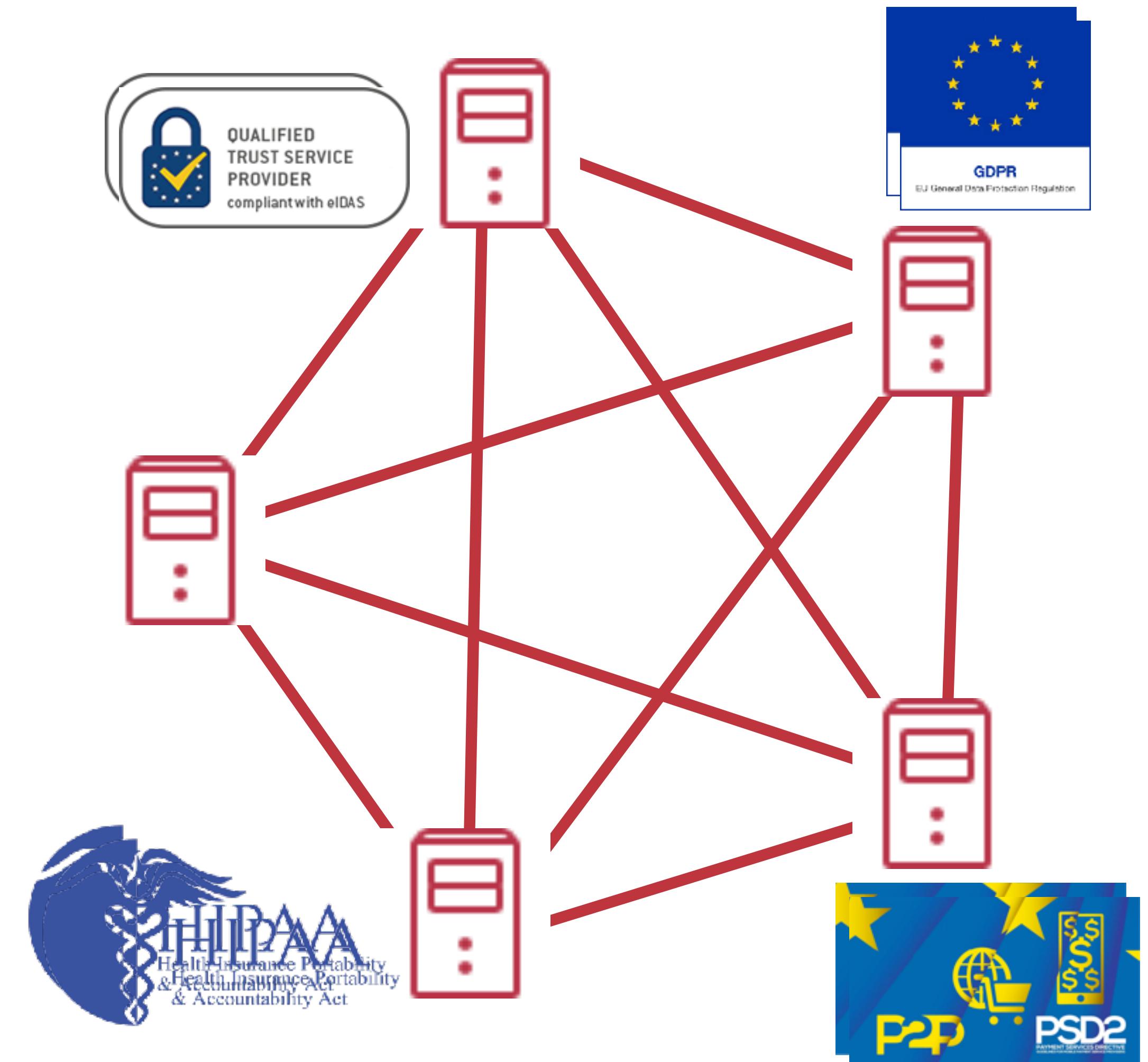
Privacy: still “under construction”

Regulations: We have to guarantee geolocation of data and keys

Persistence: Guarantee long term durability (and finality) of records

Network Effect: *The value is in the automation and cross-organisational efficiencies in a vertical*

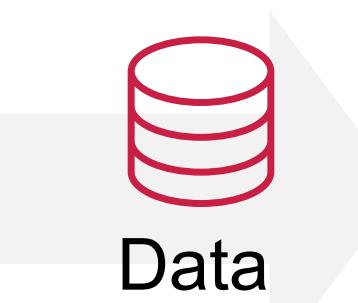
Driver: Cost savings, Compliance, Future-proof



Why we do it: Research Commons

Establish a research commons

- Anonymous and pseudonymous donation and **investment** of streaming data
- Match up and join **cohorts** to cross reference analytics and share experiences and coping strategies
- Run **machine learning models** and queries in Zero Knowledge on device
- Population Scale **Precision Medicine**



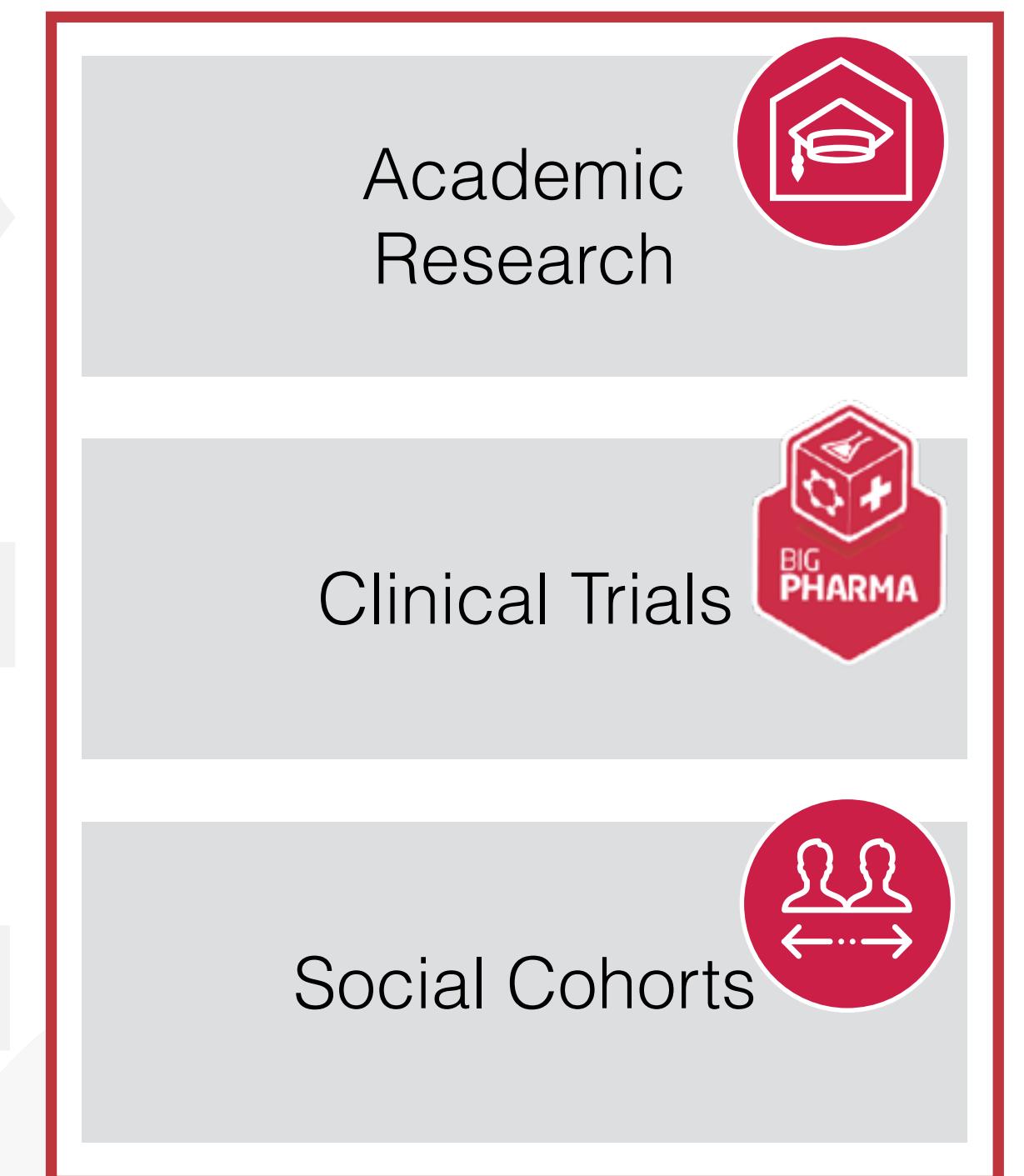
Data



Algorithms



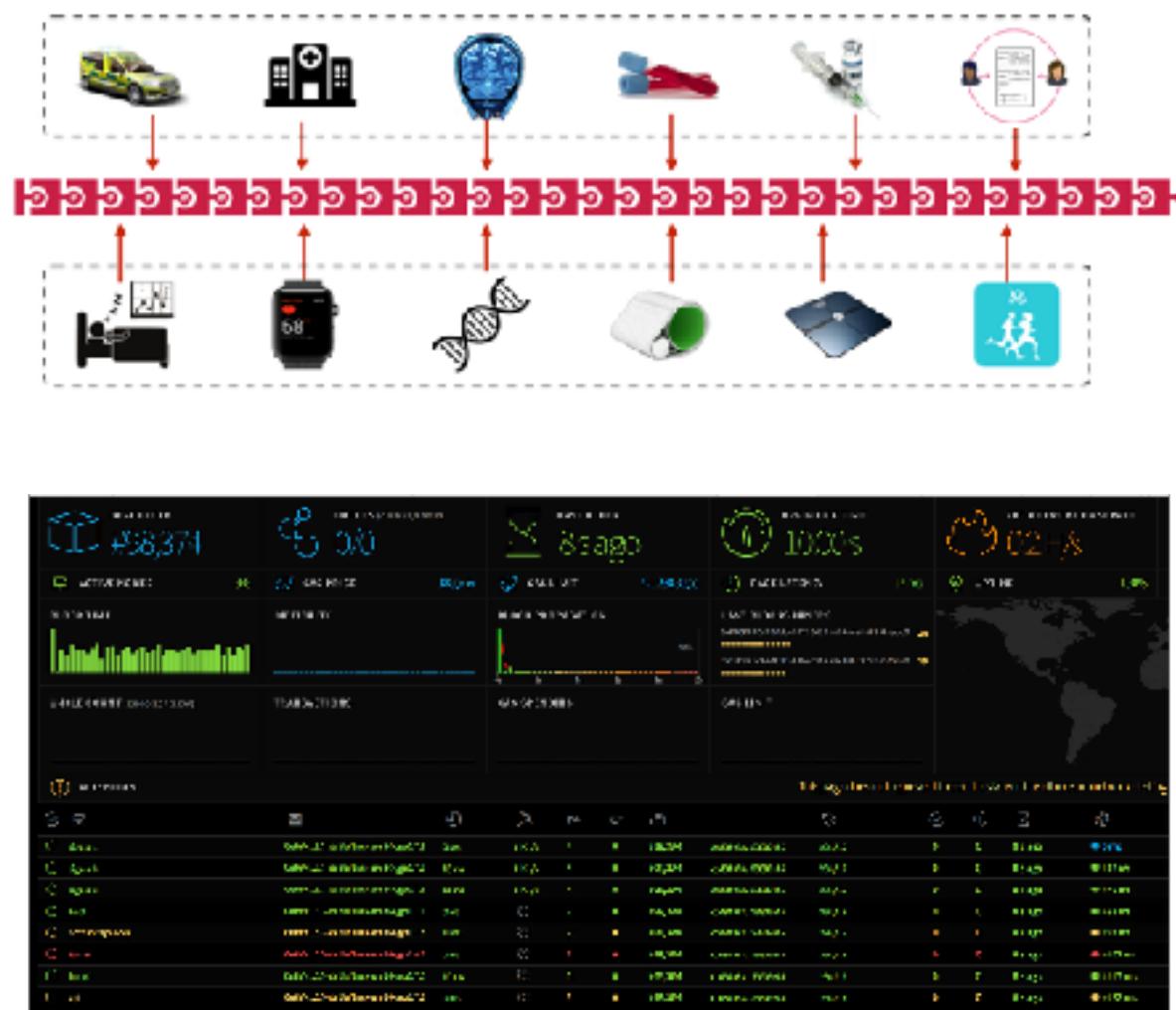
Insights



3-Phase Vision

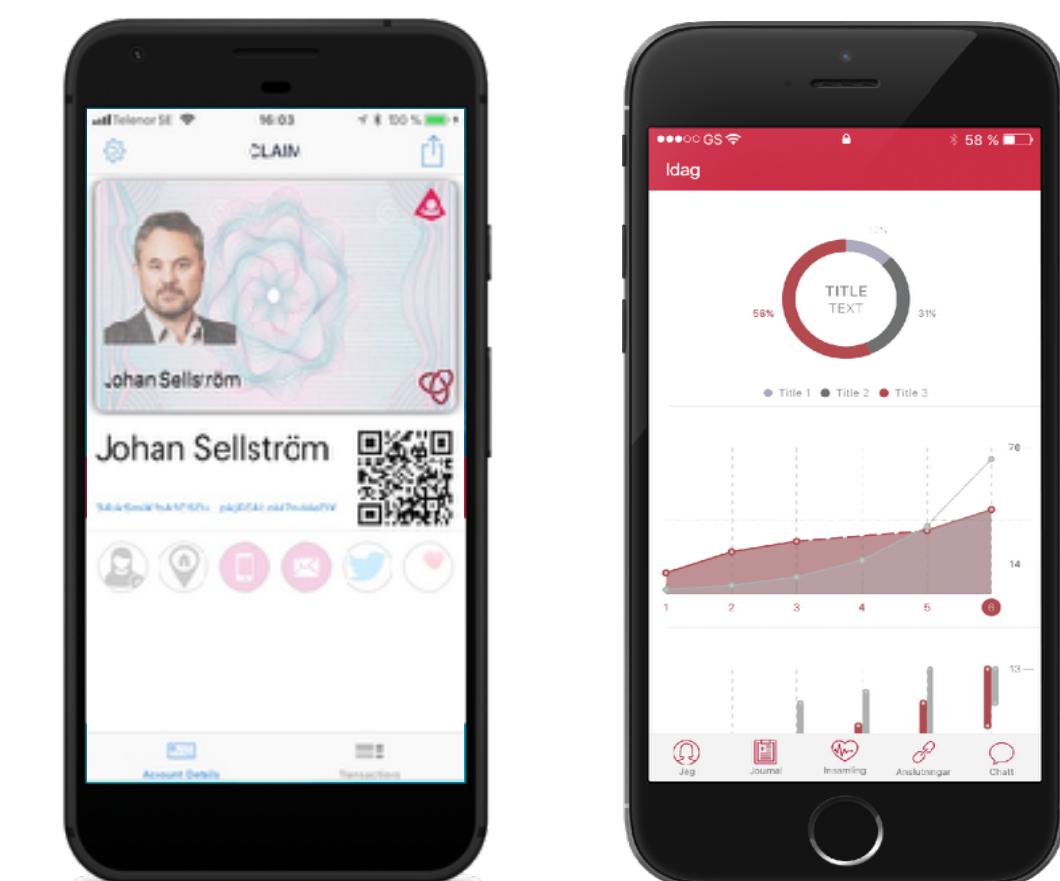
1

Platform



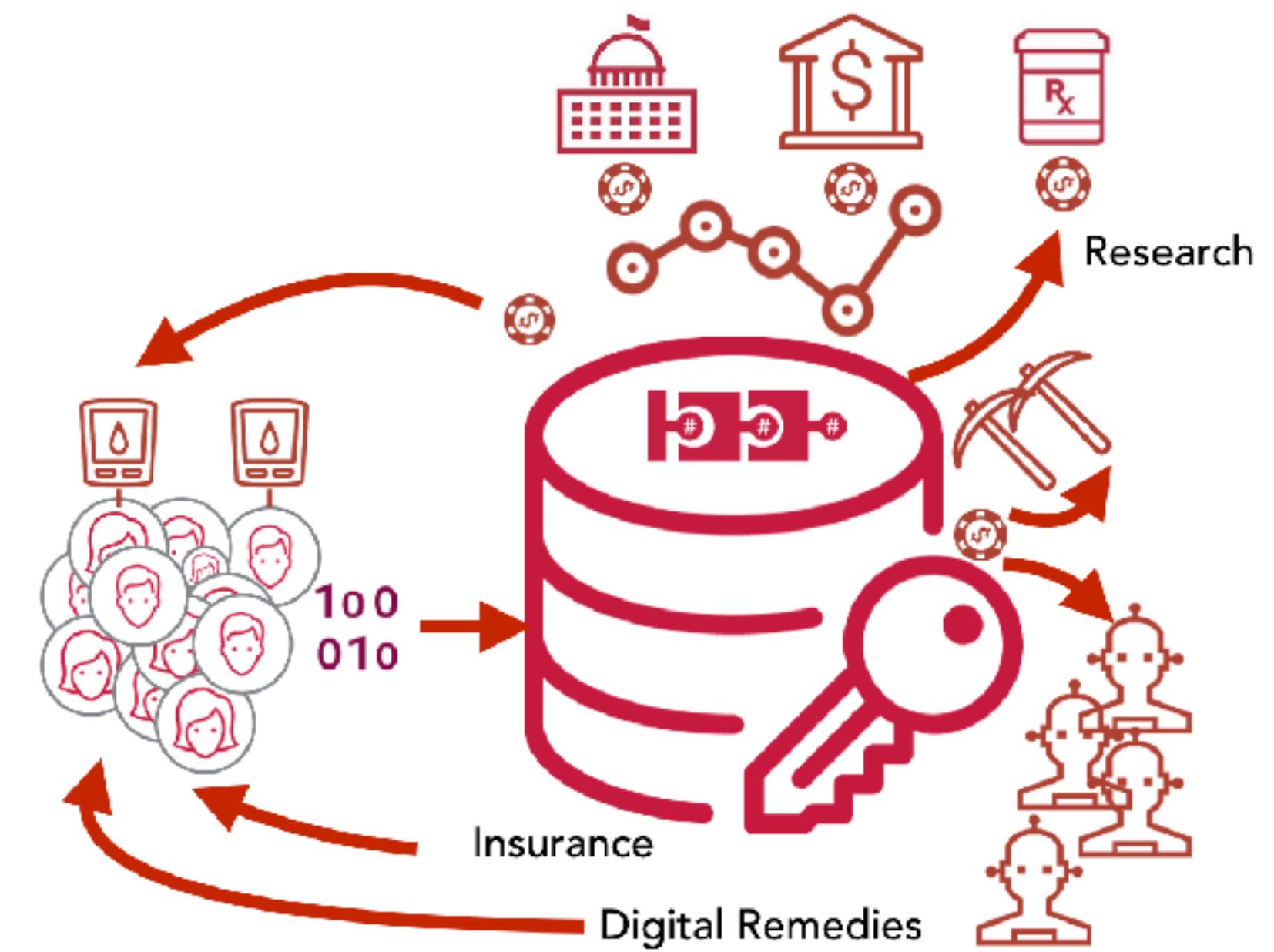
2

Applications



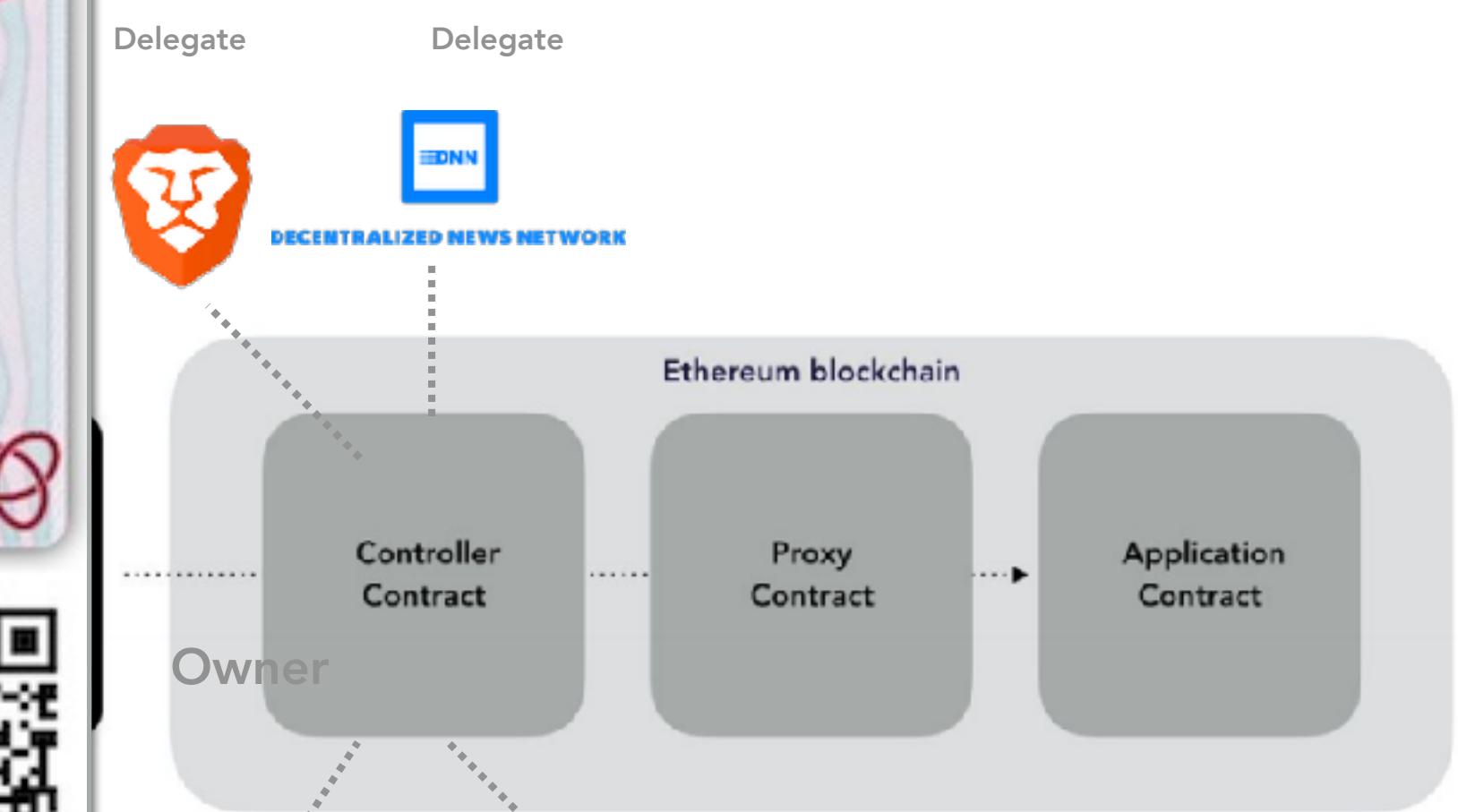
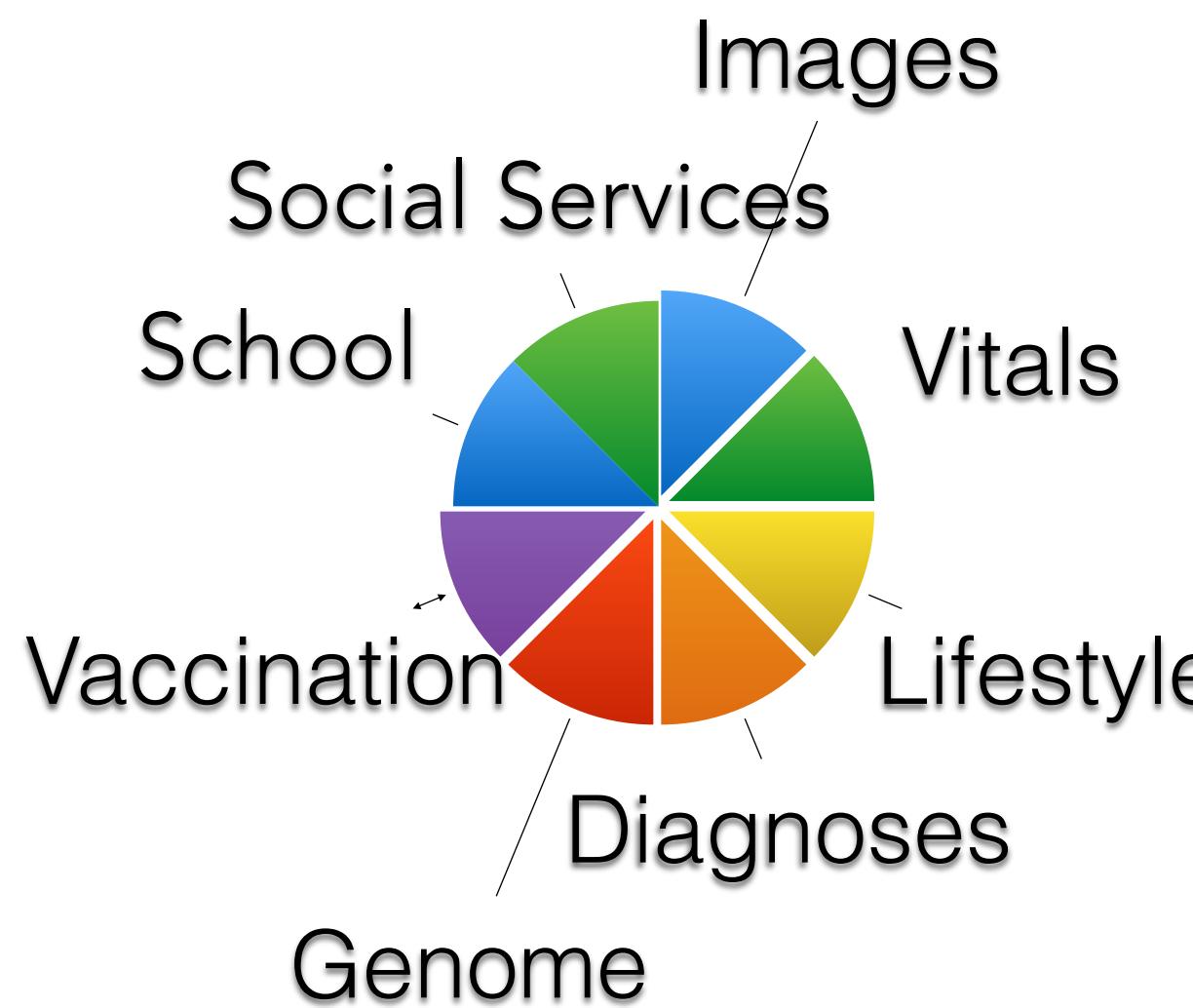
3

Economies



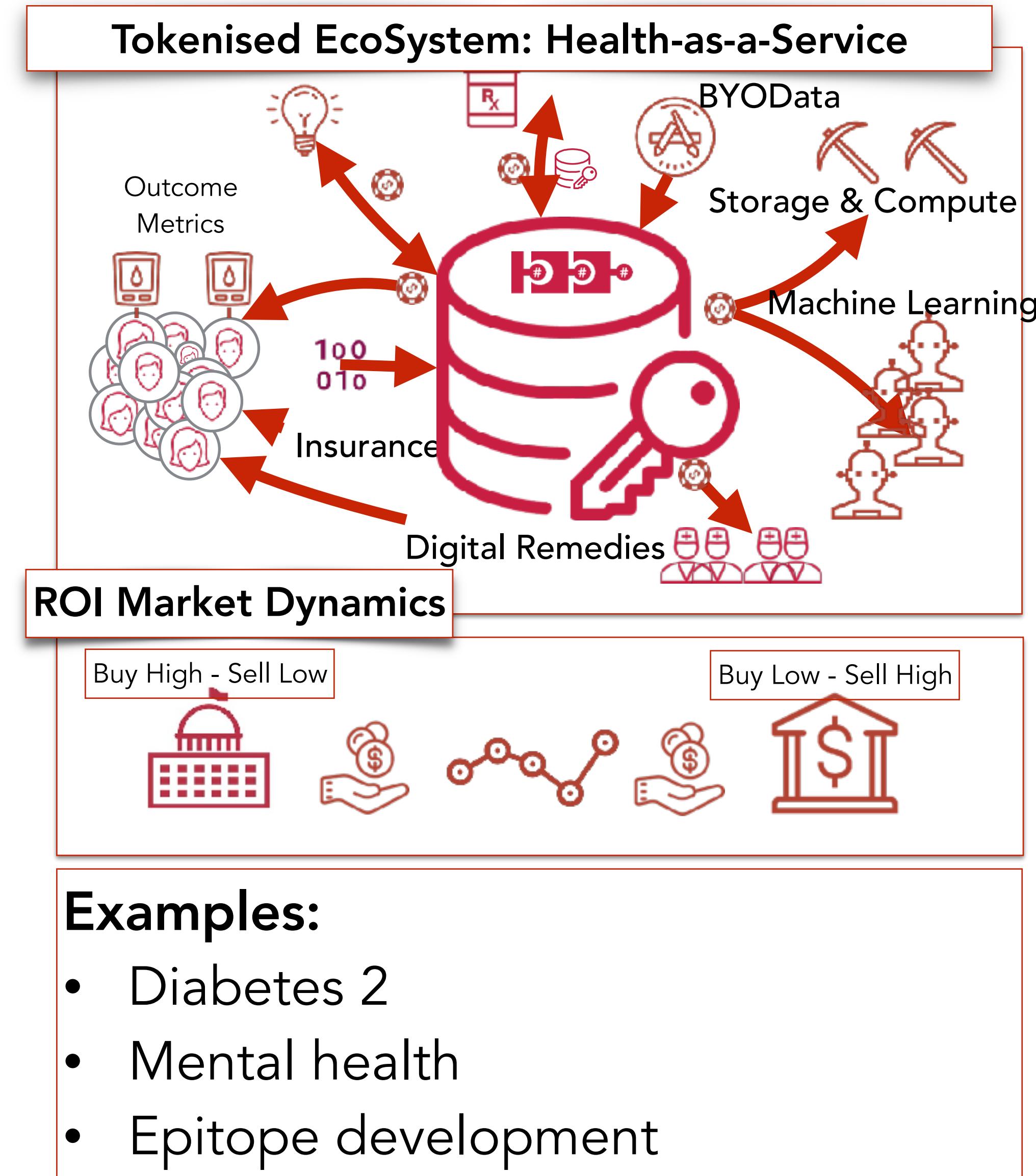
App 1: The Data Rich Citizen

- Third Party Attestations
- Verifiable Claims
- Bring Your Own Data
- GDPR-by-Design

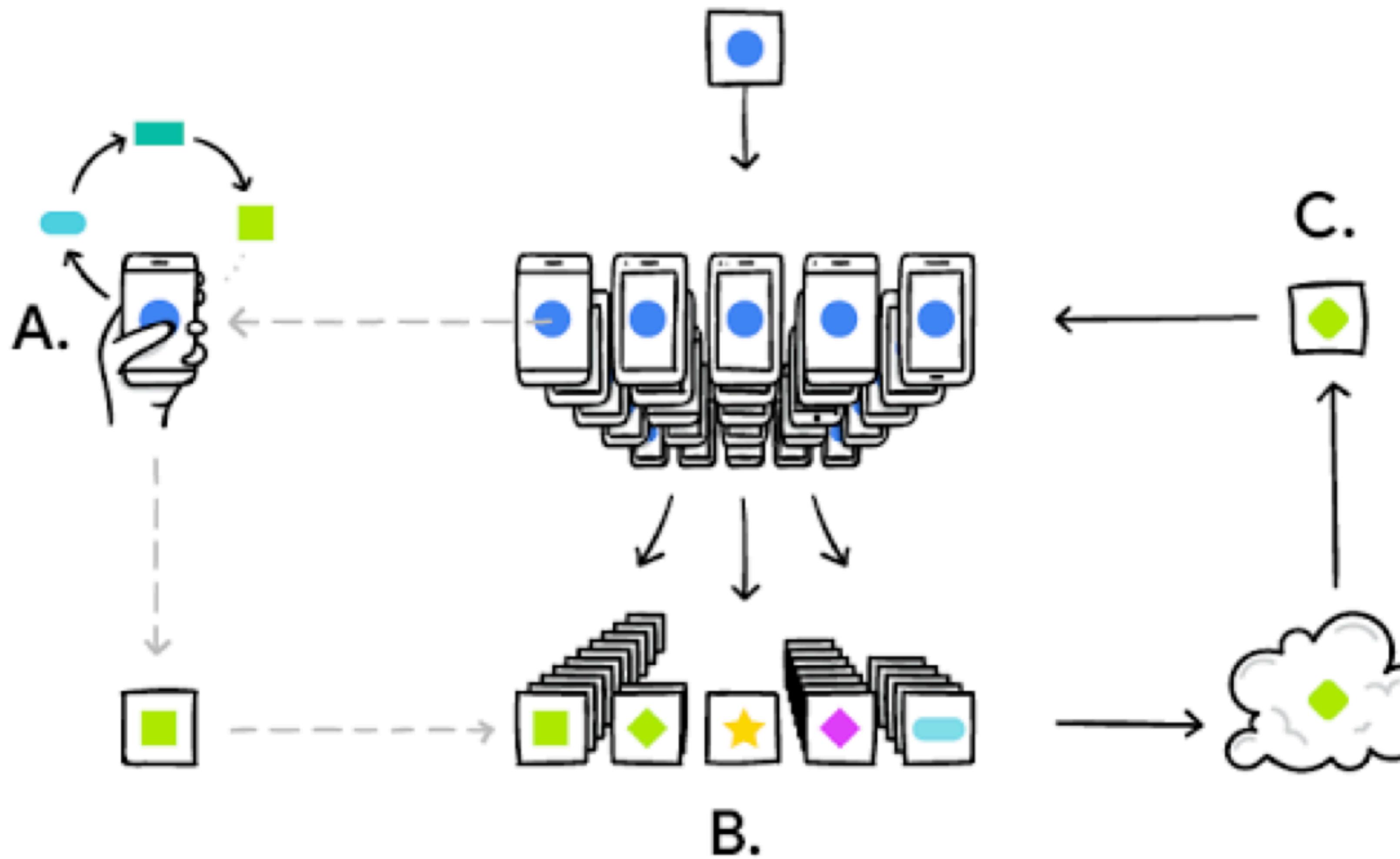


Design Pattern: Health Impact Bonds Tokens

- Impact Bonds are designed for professional investors, tokens provide strong financial incentive for **large groups** of people to work together towards a **positive social outcome**
- **Permissionless** participation: powerful **network effects** and strong **feedback loops** and **gamification** using mechanism design
- **Sustainable** impact
- **Multi-payer**
 - aggregated, homomorphic **data and insights can be sold** to Pharma for the benefit of the mutual insurance fund
 - **large companies or governments**
 - taxed **citizens**
 - **patients**
- Pre-existing conditions provide valuable data to **offset discriminatory** insurance coverage policies
- In effect **Social Insurance Networks** (non-discriminatory) with a data based **revenue** model

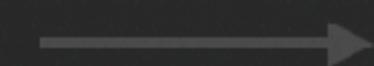


Distributed Machine Learning

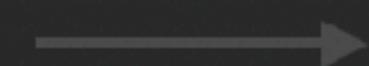


OpenMined.org

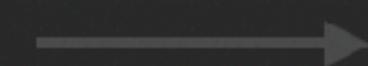
CREATE



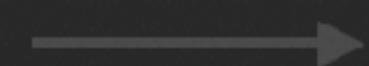
DISTRIBUTE



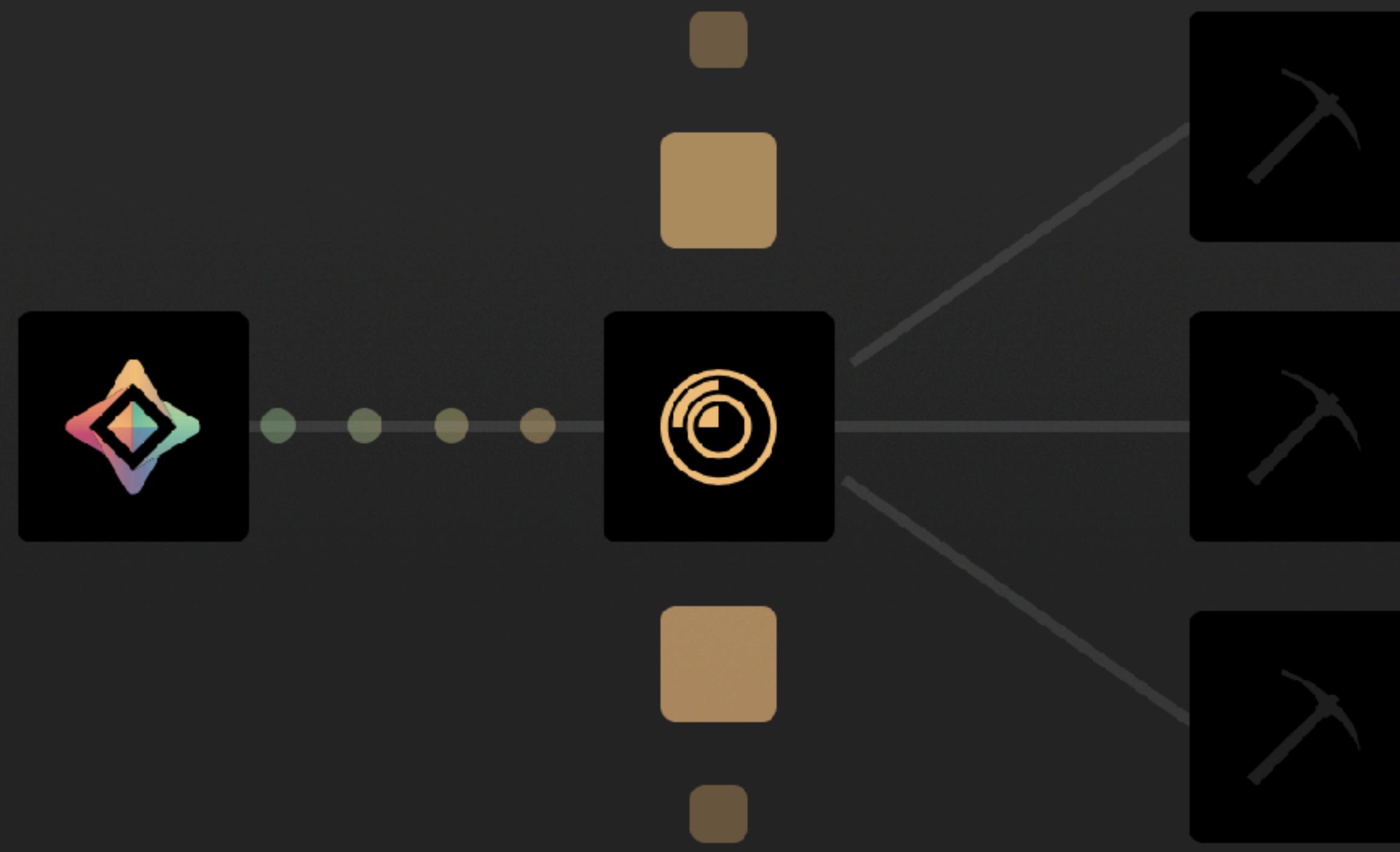
TRAIN



RWARD



DELIVER



DELIVER THE RESULTS SECURELY

Once a success criteria is met, the model is decrypted by a private key or share held only by the data scientist. All the while, neither party has access to each other's data or intellectual property.

CONTRIBUTE



PYSONAR



SONAR

Try this Pattern at home: Blueprint for a New Economy

1. Release Your Own Greed
2. Build a Massive Loyalty Coalition and Killer App
3. Stealth gamify the App
4. Make the Reward Token Universal
5. The People's Visa
6. Universal Basic Income

FRONT ELEVATION
 $\frac{1}{4}$ " Scale

RIGHT SIDE ELEVATION
 $\frac{1}{4}$ " Scale

Courtesy: <https://hackernoon.com/gamifying-the-delivery-of-money-c55c25cecae>

Sorcerers

Founding Team - Veteran Internet Entrepreneurs



Johan Sellström
Co-founder



Stefan Farestam
Co-founder



Erik Wikström
Board Member, IR

Pipeline



Developer



Infrastructure



DevOps



Data Scientist



Legal



Medical Expertise

Community



Darja Isaksson
Government



Manolis Nymark
Law



Rikard Lövström
MD, Health Informatics



Ulla-Britt Fräjdin-Hellqvist
Corporate Governance



Henrik Ahlen
Evangelism



Sara Riggare
Spetspatient



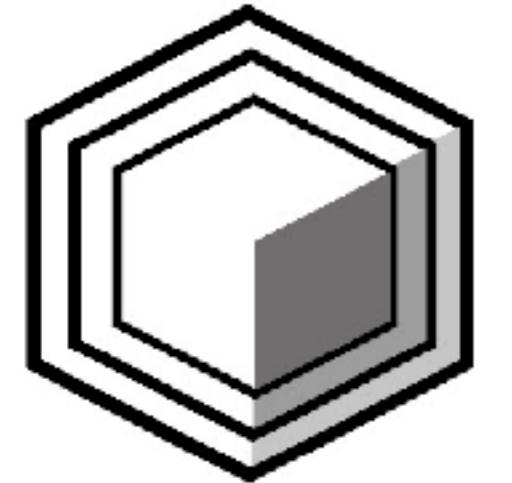
Announcement

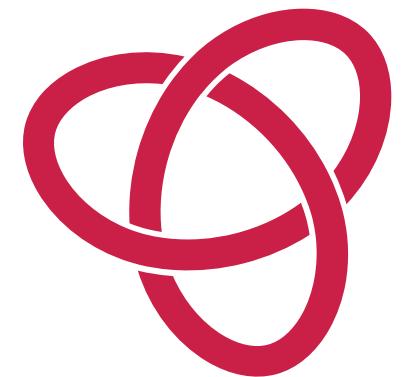
1. First Swedish ICO

2. Icon Medialab => iCoin Medialab

**You are welcome to sign up as a contributors,
interns or employees!**

Email: johan@icoinmedialab.com





CareChain

We need help with:

- Consortium **members** to **expand** the network!
- Proof-of-Concept **use cases**
- App **testers**
- **Testimonies**
- **Exjobb and Committers**

Sign up at info@carechain.io

Slides: carechain.io/slides.pdf

Whitepaper: carechain.io/wp.pdf

The image shows a smartphone and a laptop both displaying the CareChain platform. The smartphone screen shows a digital ID card for 'Johan Sellström' with a portrait photo, a QR code, and various health icons. The laptop screen shows a dashboard with a 'BEST BLOCK #98,374' section, a bar chart for 'ACTIVE NODES', and a 'BLOCK TIME' section. Below the dashboard is a list of transactions with columns for hash, timestamp, and status. A sidebar on the laptop shows account details and a transaction history.

When laying the foundation for a robust interoperable healthcare system, we need to start at the protocol level and design new infrastructure that is owned and controlled by no one and everyone. We need identity and digital value protocol layers and we need immutable health records controlled by their rightful owners. Due to regional data protection regulations, like GDPR, privacy sensitive information, like health records, must be guaranteed to stay within specific geographic jurisdictions. This is why public chain deployment is not yet an option.

Together with The Enterprise Ethereum Alliance, we want to contribute to the development of required tooling and policy frameworks to run permissioned blockchains as critical infrastructure. Leveraging the decentralized computing platform, we are reinventing data management for the entire healthcare system. We are forming a consortium, CareChain, to deploy Trusted Infrastructure, starting in Sweden and the European Union.^[1]

Ur pressreleasen i samband med att CareChain gick med i Enterprise Ethereum Alliance [1]

CareChain är ett initiativ och ett konsortium för att åstadkomma en nationell blockkedja för hälsa. En blockkedja gör det för första gången möjligt att ge individen ägarskap och kontroll över sin egen hälsodata.

Det är inte längre bara teknikentusiaster som samlar in data om sig själva via egna sensorer (wearables). En studie från 2016^[2] visar att 32 procent av befolkningen i Sverige registrerar sin vikt och att 26 procent registrerade sin tränning. Dessutom har 20 procent delat egengenererad data med vården. Intresset bland medborgarna för att engagera sig i sin egen hälsa och sin vård ökar snabbt samtidigt som den tekniska utvecklingen inom wearables och sensorer för att instrumentera den mänskliga kroppen går oerhört snabbt.

Samtidigt accelererar intresset inom vården och forskningen för att komplettera journal- och forskningsdata med stora mängder egengenererad data för att utvinna de viktiga insikterna som kan fås genom att köra analyser på hela datamängden och den

<https://entethalliance.org/enterprise-ethereum-alliance-release-05-19-2017.pdf>

Future health index 2016 <https://www.futurehealthindex.com/report/2016/chapter/454/country-profile-sweden-se/>

Hash	Timestamp	Status	Time Ago	Latency
b444923...23609e45	196,715	0	0	+42 ms
b444923...23609e45	196,715	0	0	+70 ms
b444923...23609e45	196,715	0	0	+83 ms
b444923...23609e45	196,715	0	0	+93 ms
b444923...23609e45	196,715	0	0	+102 ms
b444923...23609e45	196,715	0	0	+113 ms
b444923...23609e45	196,715	0	0	+122 ms



Thanks for the attention