

AI & Blockchain: An Introduction

Matt Turck, FirstMark Capital

June 28, 2018

Brains and Chains:
aiblockchainconf.com

FIRSTMARK

Early stage venture capital firm based
in New York City

SELECT FIRSTMARK INVESTMENTS

Machine Learning & AI



Crypto & Blockchain



VAULT



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Hype... and more hype

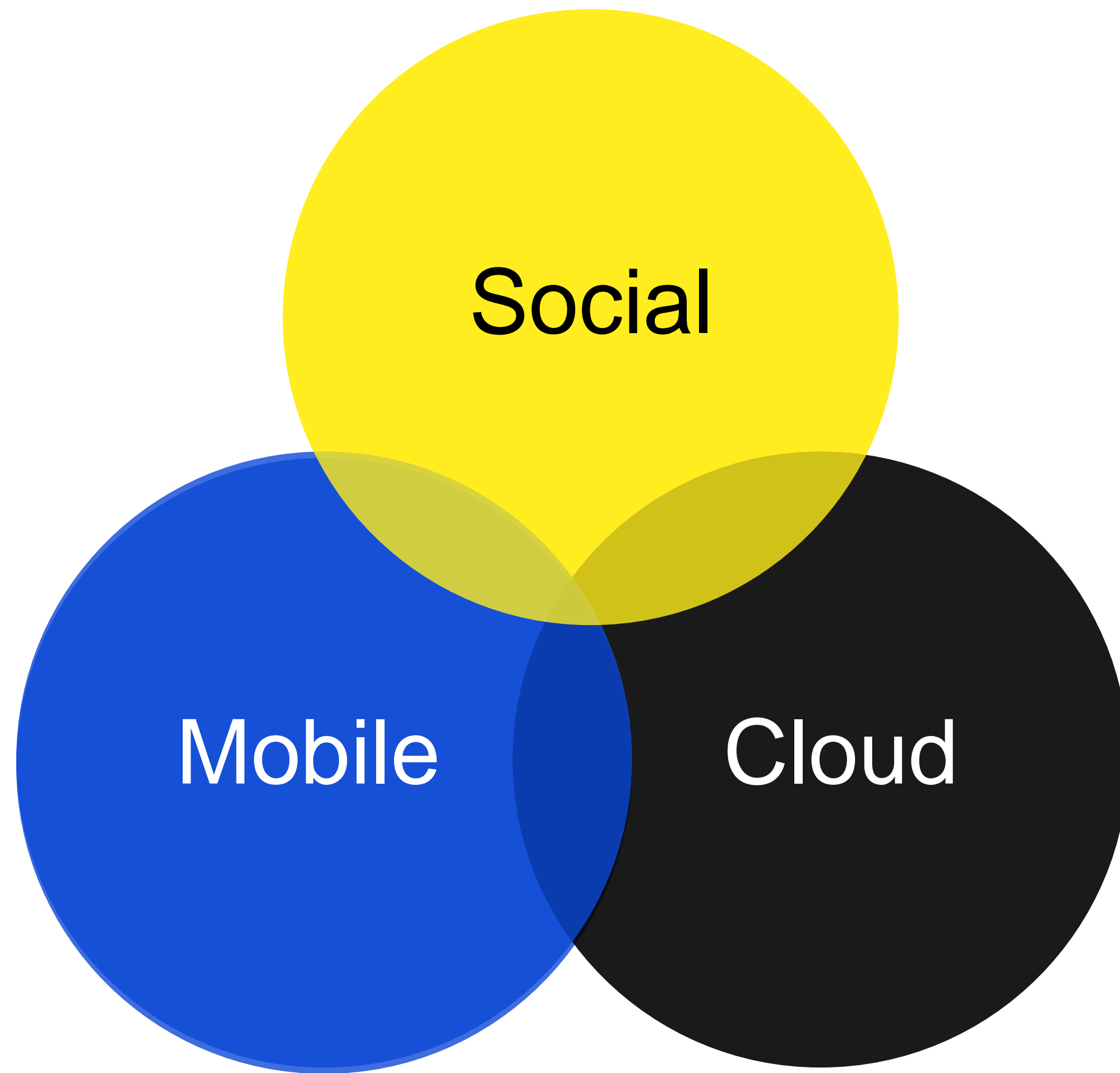


BLOCKCHAIN

**SILICON
VALLEY**

**MACHINE
LEARNING**

Defining Technologies of the Last Decade



But Only Obvious in Hindsight

SEP 11, 2008 @ 12:08 PM 31

A Cloud-Filled Debate



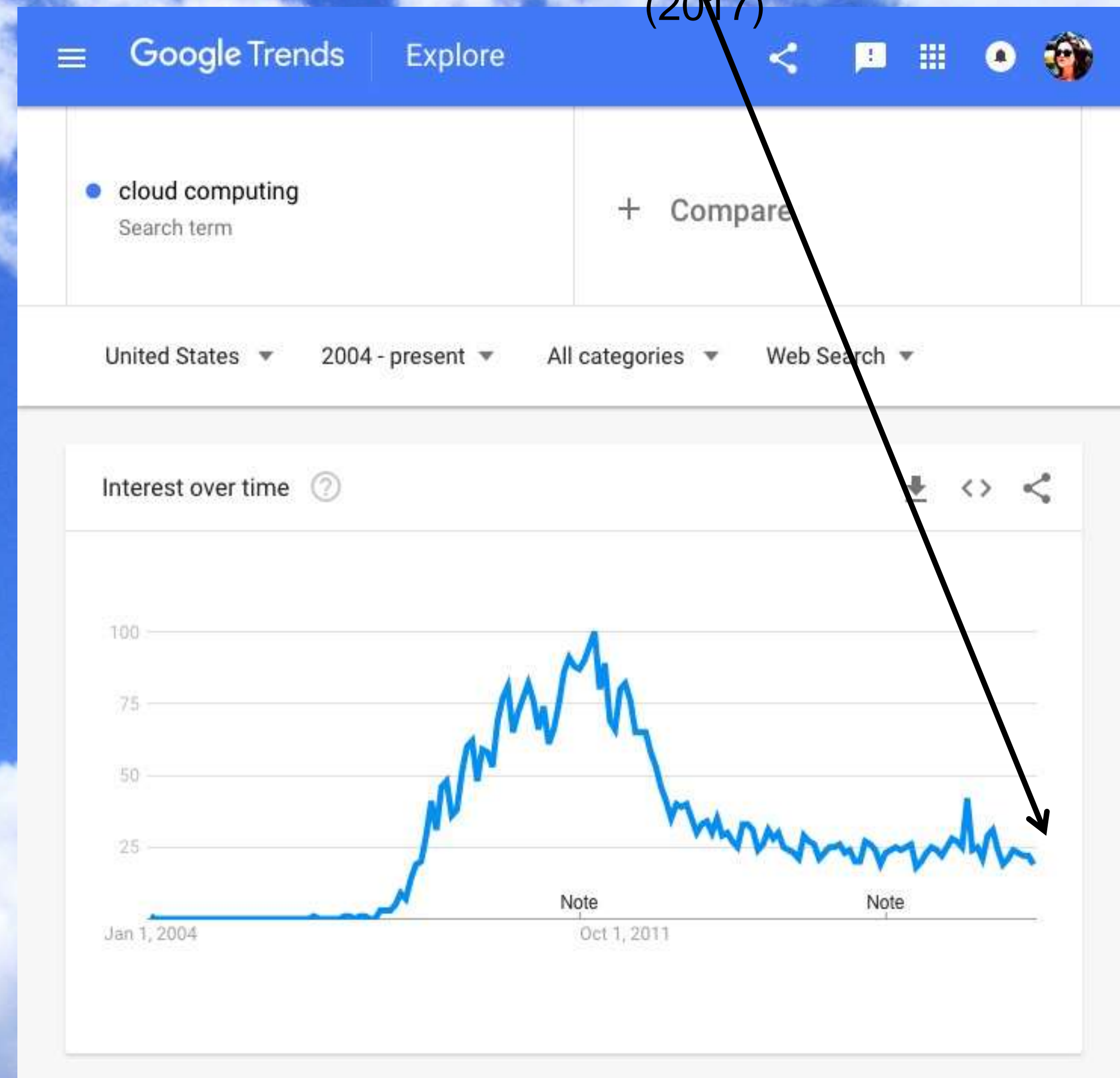
Andy Greenberg, FORBES STAFF

Covering the worlds of data security, privacy and hacker culture. [FULL BIO](#)

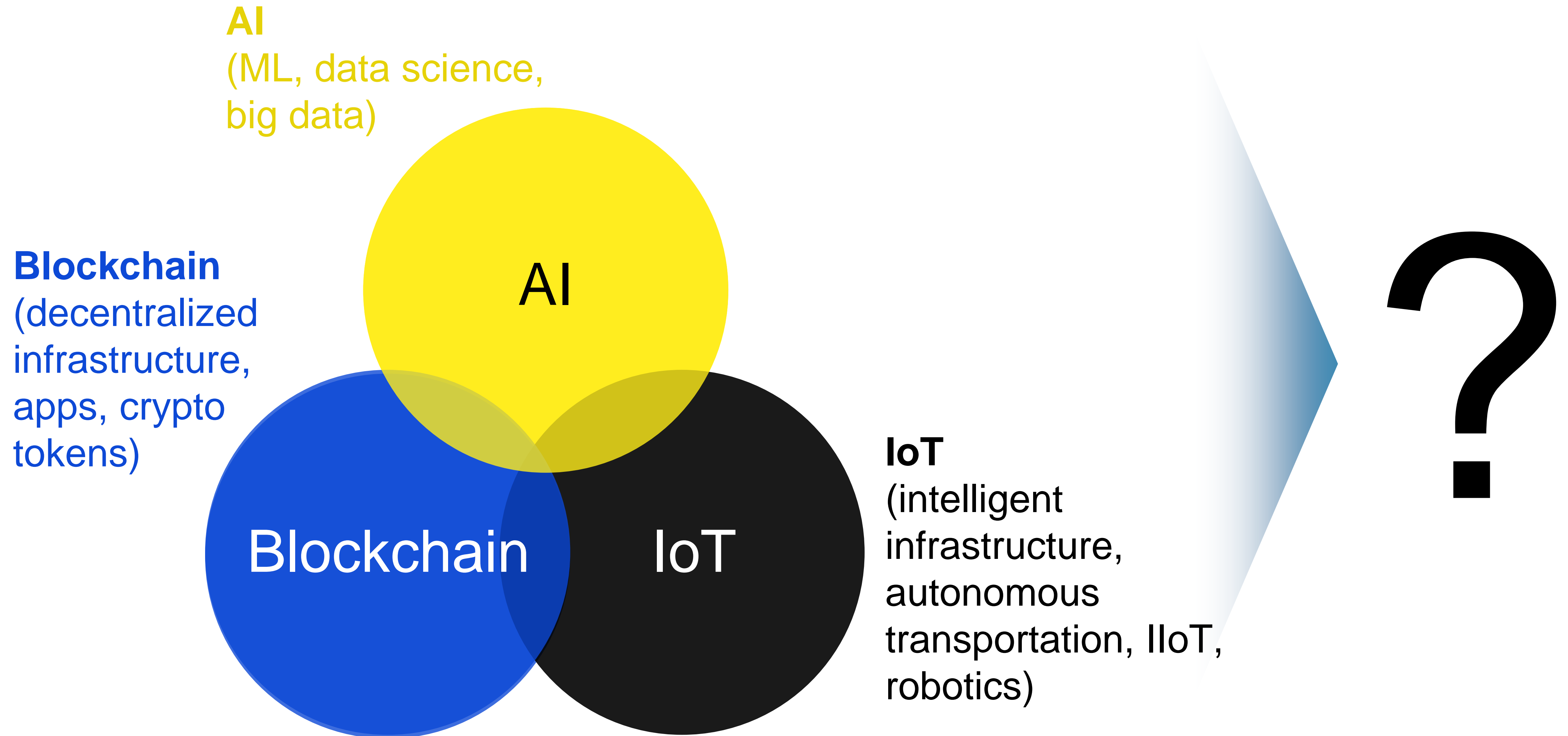
Cloud computing, the ubiquitous buzzword that's often promised as the future of information technology, is becoming more and more like its name: an amorphous outline that everyone seems to interpret as a different animal.

To some, the idea of moving data resources and applications out of companies' expensive server closets and into a centralized and networked location means a faster, more convenient way to access and store information--one that could save companies billions. To others, the same system sounds like a tangle of security, privacy and technical problems, painted over with a layer of marketing snake oil.

AWS = \$17.5B in revenues
(2017)



Defining Technologies of the Next Decade



AI + Blockchain: Strange Bedfellows?

“Crypto is libertarian,
AI is communist “

- Peter Thiel

“Crypto is anarchy,
AI is the rule of law “

- Reid Hoffman

Opposing Paradigms

Crypto

- Decentralized
- Open
- Transparent
- Deterministic

AI

- Centralized
- (Mostly) Closed
- Black Box
- Probabilistic

[illegible]

Not Just in China...

Orlando Police End Test Of Amazon's Real-Time Facial 'Rekognition' System

June 26, 2018 · 12:57 PM ET

BILL CHAPPELL 



An image from a presentation by Amazon's Ranju Das shows a demonstration of real-time facial recognition and tracking. Das said the video came from a traffic cam in Orlando, Fla., where police were in a pilot program of Amazon's Rekognition service.

Amazon Web Services Korea via YouTube/Screenshot by NPR

4 JUNE 2018 **NEWS**

Google to withdraw from Pentagon's AI contract

"Under the project, Google has worked to build machine learning algorithms in order to enable the US Pentagon to improve its surveillance efforts generally."

GAFA Monopoly and Platform Dependency

“Over time, the best entrepreneurs, developers, and investors have become wary of building on top of centralized platforms. We now have decades of evidence that doing so will end in disappointment. In addition, users give up privacy, control of their data, and become vulnerable to security breaches. These problems with centralized platforms will likely become even more pronounced in the future.”

– Chris Dixon

Blockchain as a foil against the pitfalls of AI

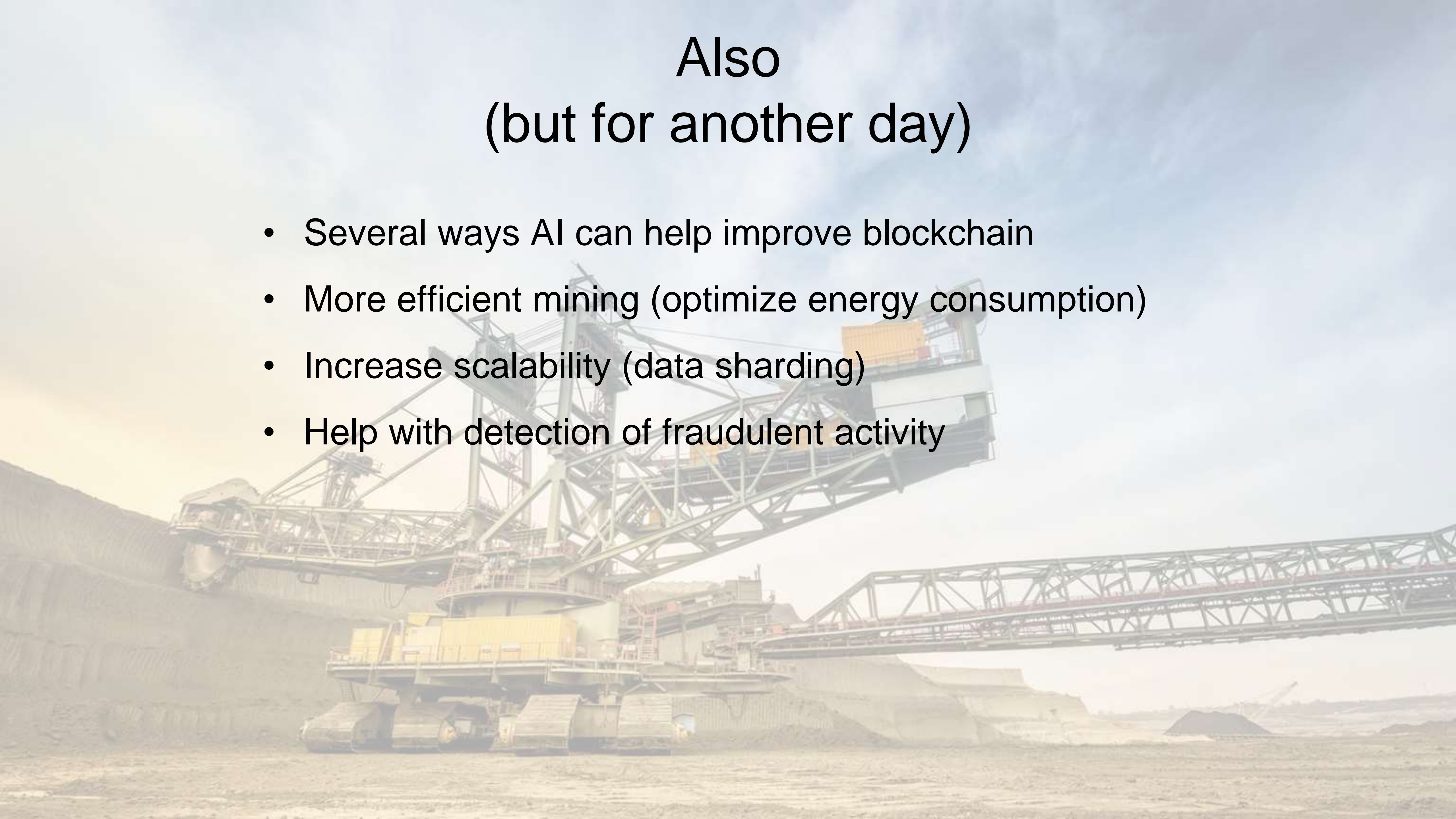
Two big ideas:

- Decentralized AI Marketplaces
- AI Networks & Decentralized Autonomous Organizations (DAO)



Also (but for another day)

- Several ways AI can help improve blockchain
- More efficient mining (optimize energy consumption)
- Increase scalability (data sharding)
- Help with detection of fraudulent activity



Decentralized AI Marketplaces: The Concept

What if...

- ... every individual and business could provide their data completely privately and securely in an open data exchange?
- ... AI models could compete with each other to provide the best results?
- ... everyone could be compensated fairly for participating in the above?

Wouldn't we...

- ... end up with MORE data than is currently available to GAFA and other centralized entities?
- ... also have NEW and BETTER data?
- ... and therefore better models, and better AI?
- ... but also more transparent AI

Decentralizing the Building Blocks of AI

(Lots of)
Data

Models

Computing
Power

Wait...

isn't the blockchain bad infrastructure for AI?

Among other issues:

- Not scalable
- Heterogenous nodes → hard to arrive at the same machine learning outputs



BigchainDB: Building a Scalable Blockchain Database

Approach:

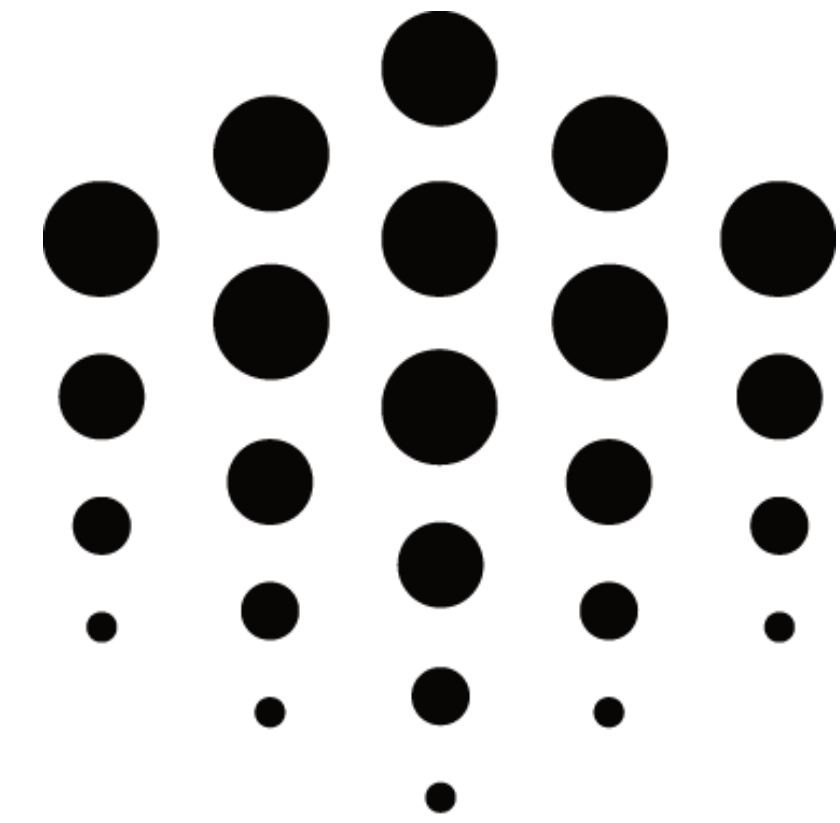
- Start with an enterprise-grade distributed database
- Engineer-in blockchain characteristics

BIGCHAIN^{DB}

	Bitcoin Blockchain	Distributed Database	BIGCHAIN ^{DB}
Immutability	✓		✓
No Central Authority	✓		✓
Assets Over Network	✓		✓
High Throughput		✓	✓
Low Latency		✓	✓
High Capacity		✓	✓
Rich Permissioning		✓	✓
Query Capabilities		✓	✓

Ocean, Computable Labs: Building Decentralized Data Protocols

- A tokenized service layer to allow data to be shared and sold in a secure manner
- Stores metadata (i.e. who owns what), links to the data itself, and more
- On top of the protocol, there can be numerous data marketplaces and exchanges, all accessing the same data

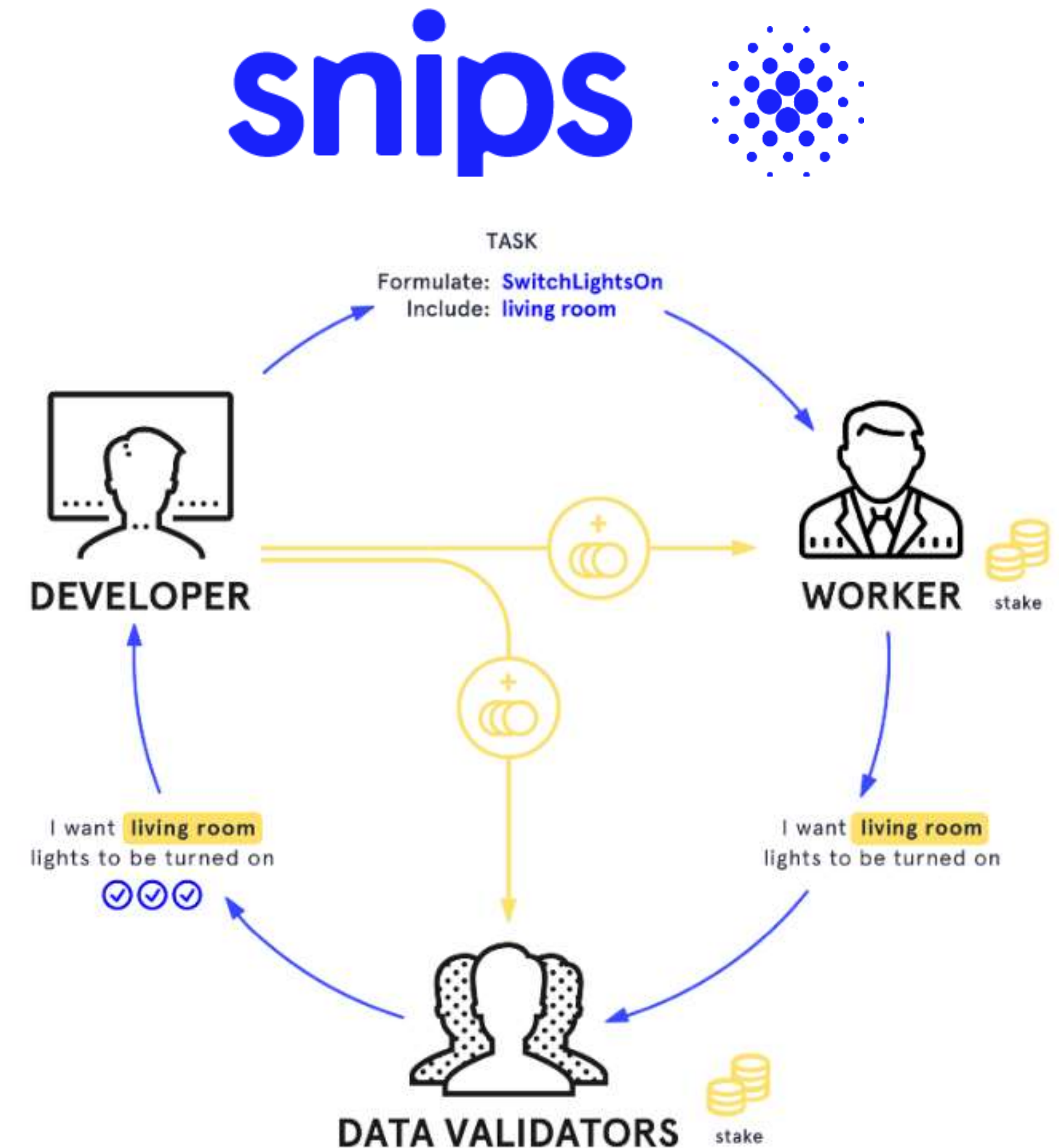


ocean

>computable

Snips: Decentralized Data Generation

- Sometimes the data does not exist! (e.g. consumers have never spoken to their coffee machine before)
- Create “fake” user data by generating thousands of training examples
- Snips is creating a decentralized network incentivized by the upcoming Snips AIR token



Gems, Effect: Decentralized Mechanical Turk for Data Labeling

- Decentralized, interactive marketplace for micro tasks that require human intelligence
- When workers compete a task, they are paid with a network token



EFFECT.AI

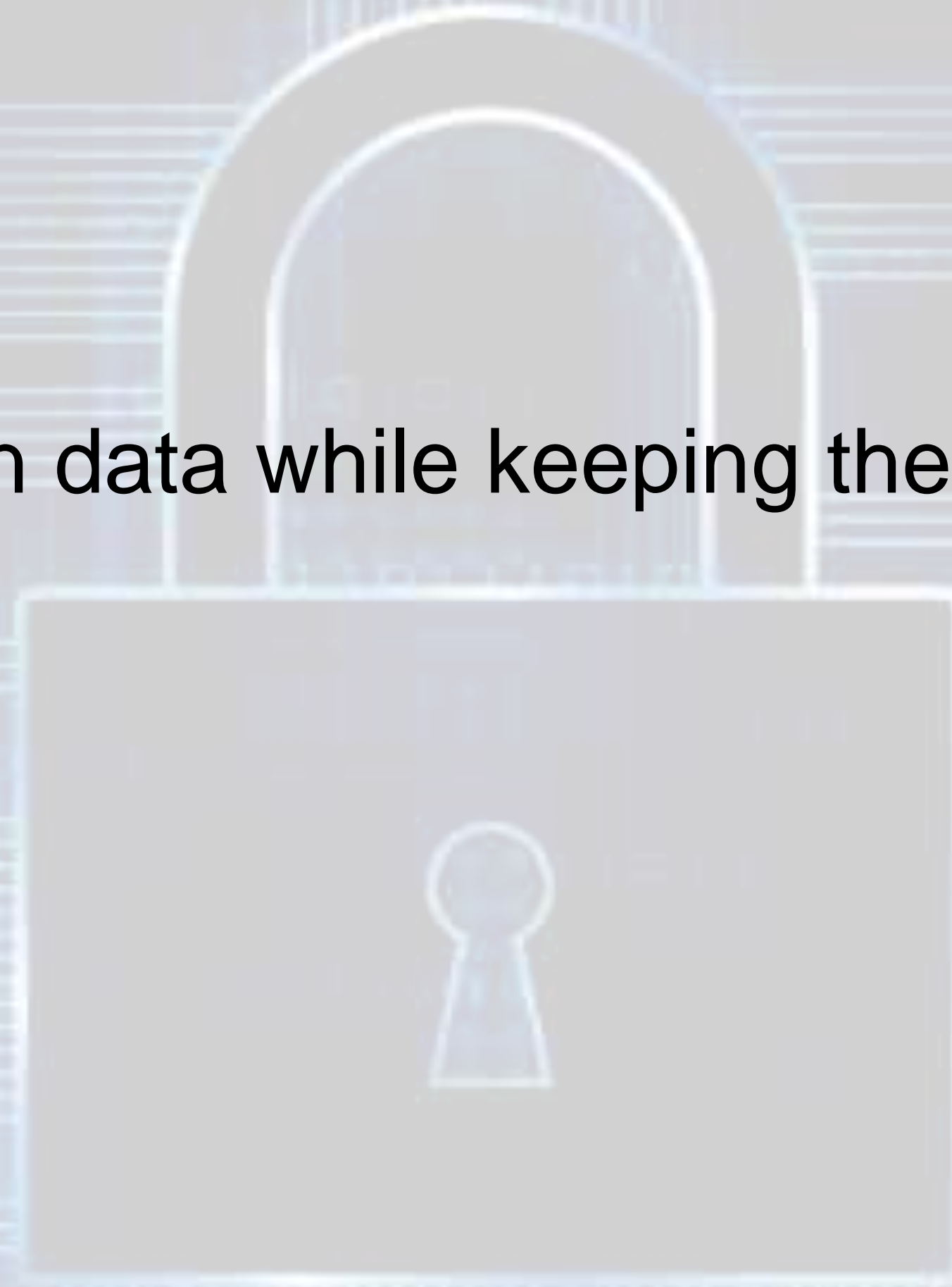


Gems

Secure Computing

Goal:

Training models on data while keeping the data private



OpenMined: Private Machine Learning

Protects **data owners** using:

- federated learning
- differential privacy



Protects **model owners** using:

- multi-party computation
- homomorphic encryption

Algorithmia: Selling Models

- Developed a protocol for crowdsourcing ML models
- Buyers supply data and offer rewards to incentivize model submissions
- Model validation takes place on a public blockchain
- If model meets requirements, payment is sent via smart contract

ALGORITHMIA

Numerai:

Creating Competition Among Models

- Building a stock market meta-model through crowdsourcing
- Participants get data and in return submit models
- Incentives are aligned through staking and rewards
- Model validation is centralized but payment takes place via smart contract



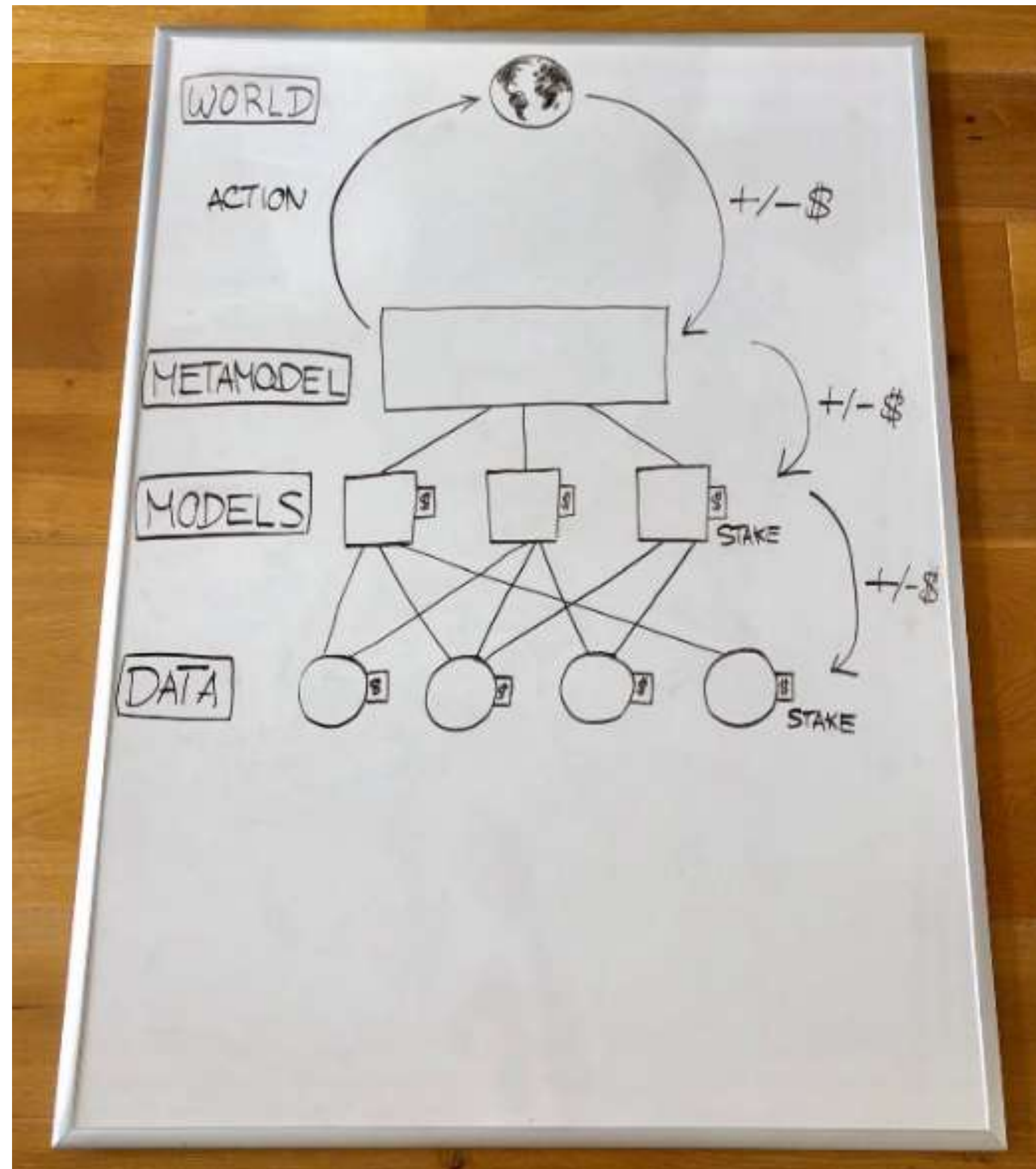
NUMERAI

DeepBrain Chain: Decentralized Cloud Computing Platform

- Vision is to become “The AWS of AI”
- Help AI companies save up to 70% of computing costs
- Leverages idle GPU / FPGA clusters and individual computing units owned by SMEs



Putting It All Together: Decentralized Data Marketplaces



- Tokens & Crypto Economics to solve the cold start problem and incentivize participants
- Network effects:
“Multi-sided network effects from users, data providers, and data scientists make the system self-reinforcing.”
— *Fred Ehrsam*

Next Big Idea: Bots / AI networks



- Currently: lots of companies building “AI for X”: Specialized bots
- What happens when we have many bots covering individual tasks? Can they be combined for more ambitious projects?
- Can this be done in an open manner?

Fetch:

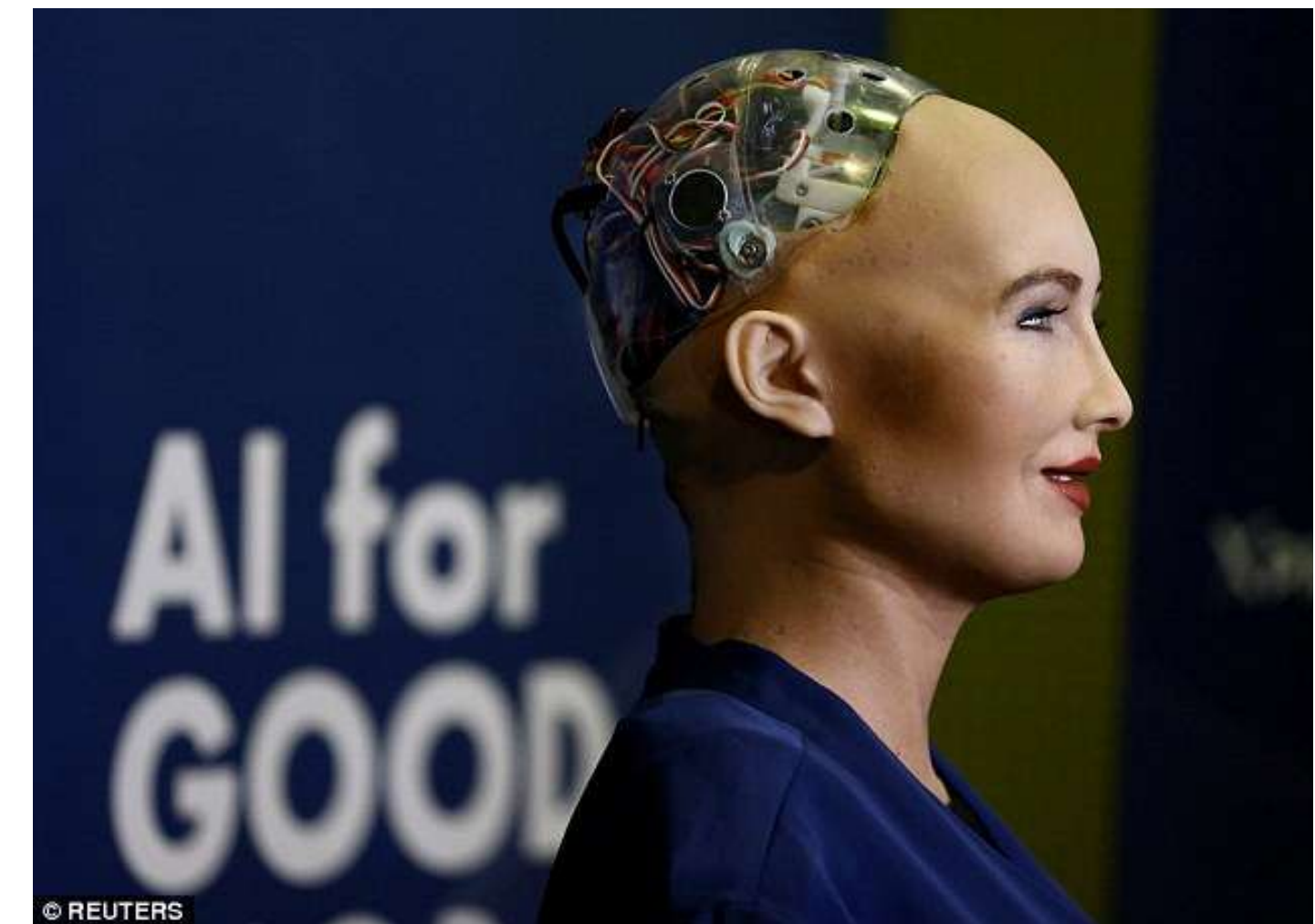
Autonomous Economic Agents

- AEA = autonomous digital entities that can transact independently of human intervention and can work together to construct solutions
- Open economic framework = “the ultimate value exchange dating agency”
- Smart ledger (scalable)
- Example use case: organize complex trip (predict misconceptions, dynamically reroute trips, etc.)



SingularityNET: “The Global AI Network”

- Decentralized marketplace for transacting with AI agents
- AI agents could include neural net tools, machine vision toolkits, etc.
- Uses staking and reputation to optimize discovery of the best AI agents
- AI agents can sub-contract tasks to more specialized AI agents



Botchain: Secure Identity System for Autonomous AI Agents

- Bot identity and validation
- Bot audit and compliance
- Control boundaries of autonomy
- Shared marketplace for bot add-ons



AI-Powered Decentralized Autonomous Organizations



What is an AI DAO?

A computational system that runs autonomously on decentralized infrastructure

Feedback loop continues by itself, taking inputs, using resources, producing outputs

Example

A decentralized, autonomous Uber service of autonomous vehicles

Only one issue with AI DAOs...

You wouldn't be able to
turn them off... ever.



Conclusion

- Fascinating area
- Combining two individually challenging areas = major levels of complexity
- All very early and experimental
- But a lot of infrastructure is being built
- Now is the time to think through the implications