

Towards a New & (more) Ethical Revenue Model of Data



prof. dr. ir. Erik Mannens









A large iceberg floats in a clear blue ocean under a bright blue sky with scattered white clouds. The iceberg's tip is above the water surface, while its much larger, jagged base is submerged. The water is a deep, clear blue, and the sky is a lighter, vibrant blue. The overall scene is serene and evokes a sense of hidden depth and potential.

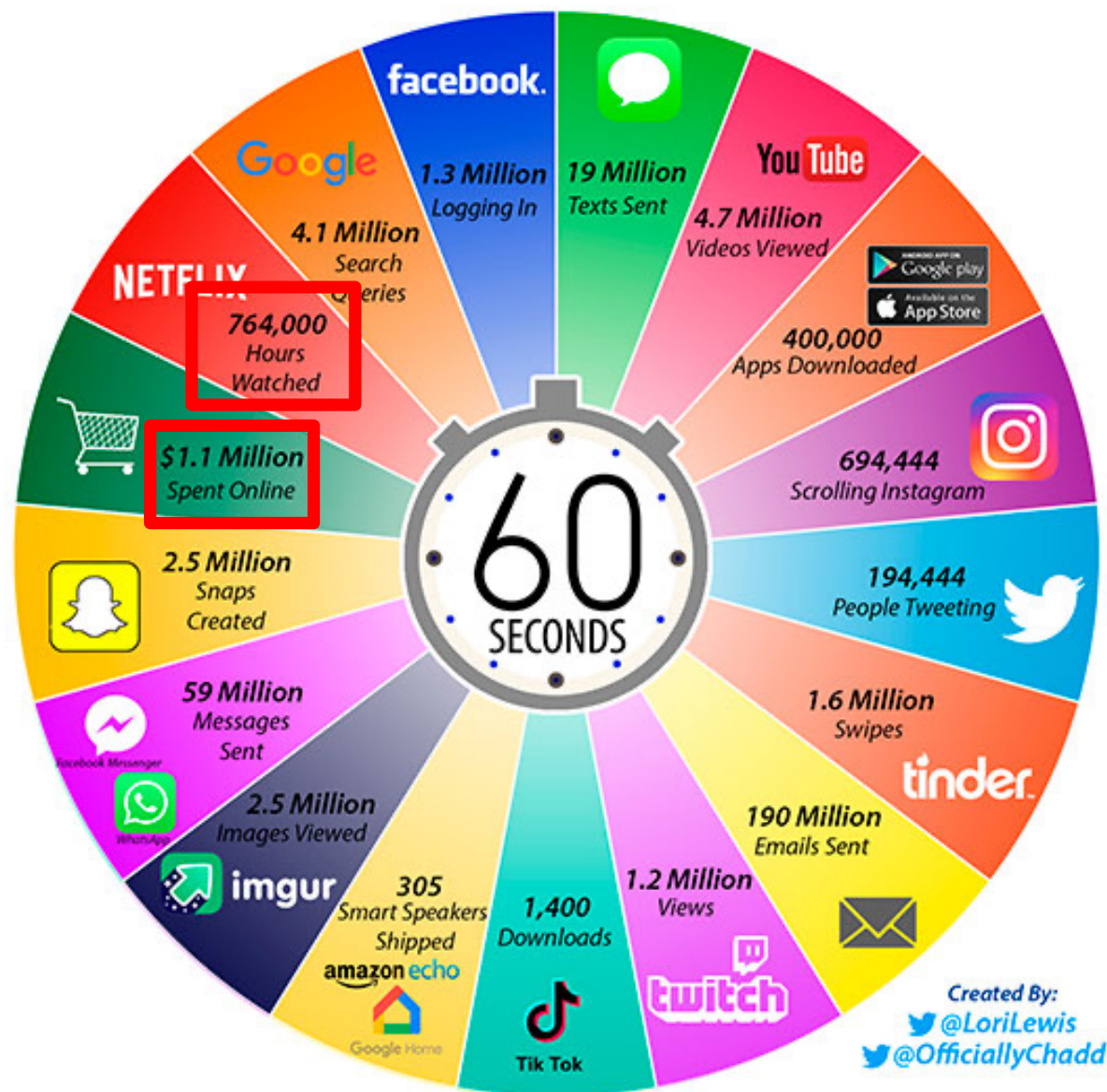
DATA

Evolution?

2017 *This Is What Happens In An Internet Minute*



2020 *This Is What Happens In An Internet Minute*



THE COMING FLOOD OF DATA IN AUTONOMOUS VEHICLES

RADAR
~10-100 KB
PER SECOND

SONAR
~10-100 KB
PER SECOND

GPS
~50KB
PER SECOND

CAMERAS
~20-40 MB
PER SECOND

LIDAR
~10-70 MB
PER SECOND

AUTONOMOUS VEHICLES
4,000 GB
PER DAY... EACH DAY







Take Away

DATA



**Much
More
DATA**

A large iceberg floats in a clear blue ocean under a bright blue sky with scattered white clouds. The visible tip of the iceberg is small and jagged, while the much larger, submerged part is hidden below the water line, illustrating the concept of data that is not immediately apparent or processed.

DATA

**Processing
Problem?**

Multiple heterogeneous Data Sets





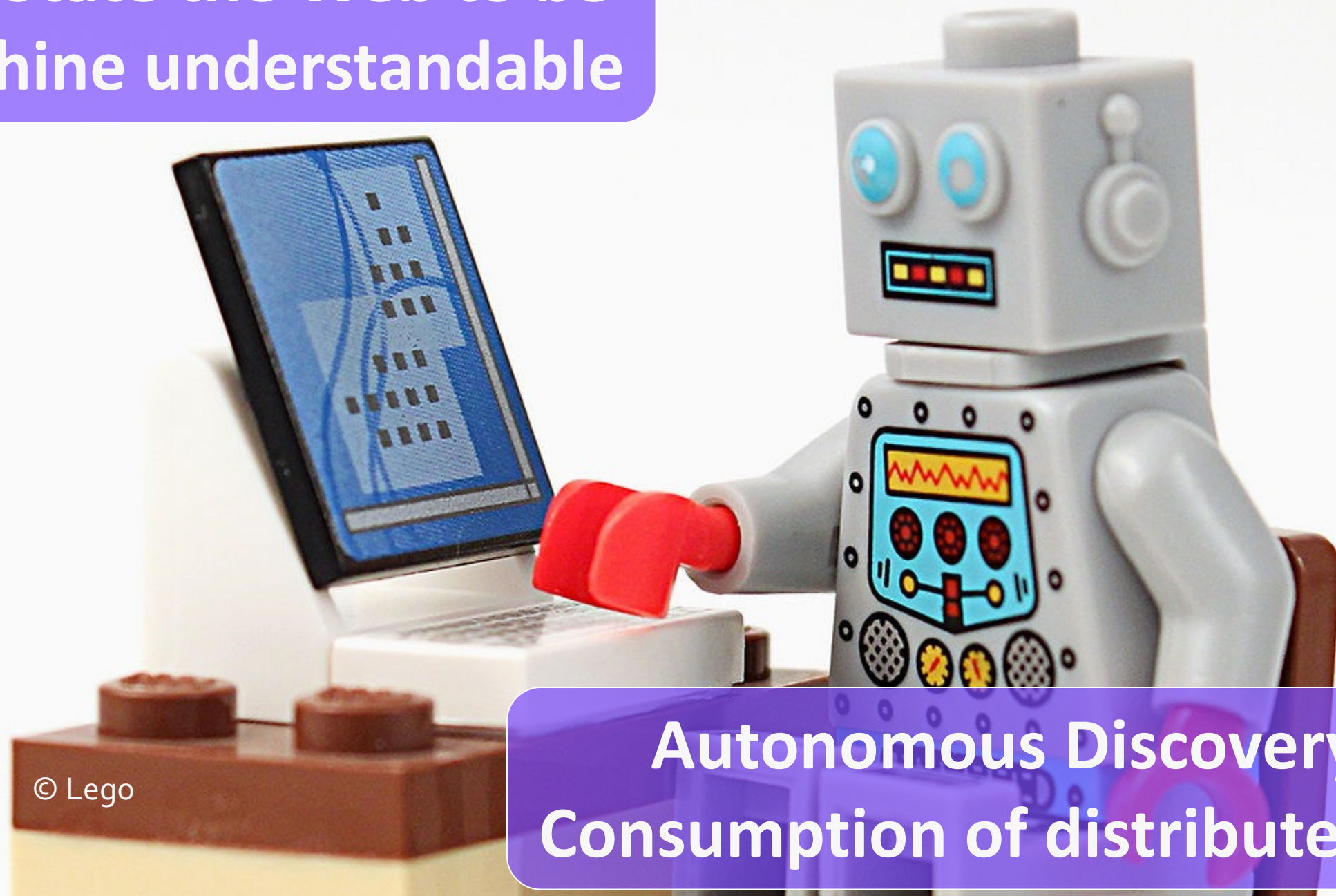
This is what Data looks like

Democratize Knowledge for Machines



Quality depends greatly on
the Amount of accessible Knowledge

Annotate the Web to be
Machine understandable



© Lego

Autonomous Discovery &
Consumption of distributed Data

Silos of Data





“Stop Hugging your Data”

OPEN



Standards

Semantics

What we say to dogs

Okay, Ginger! I've had it!
You stay out of the garbage!
Understand, Ginger? Stay out
of the garbage, or else!



What they hear

blah blah GINGER blah
blah blah blah blah blah
blah blah GINGER blah
blah blah blah blah...

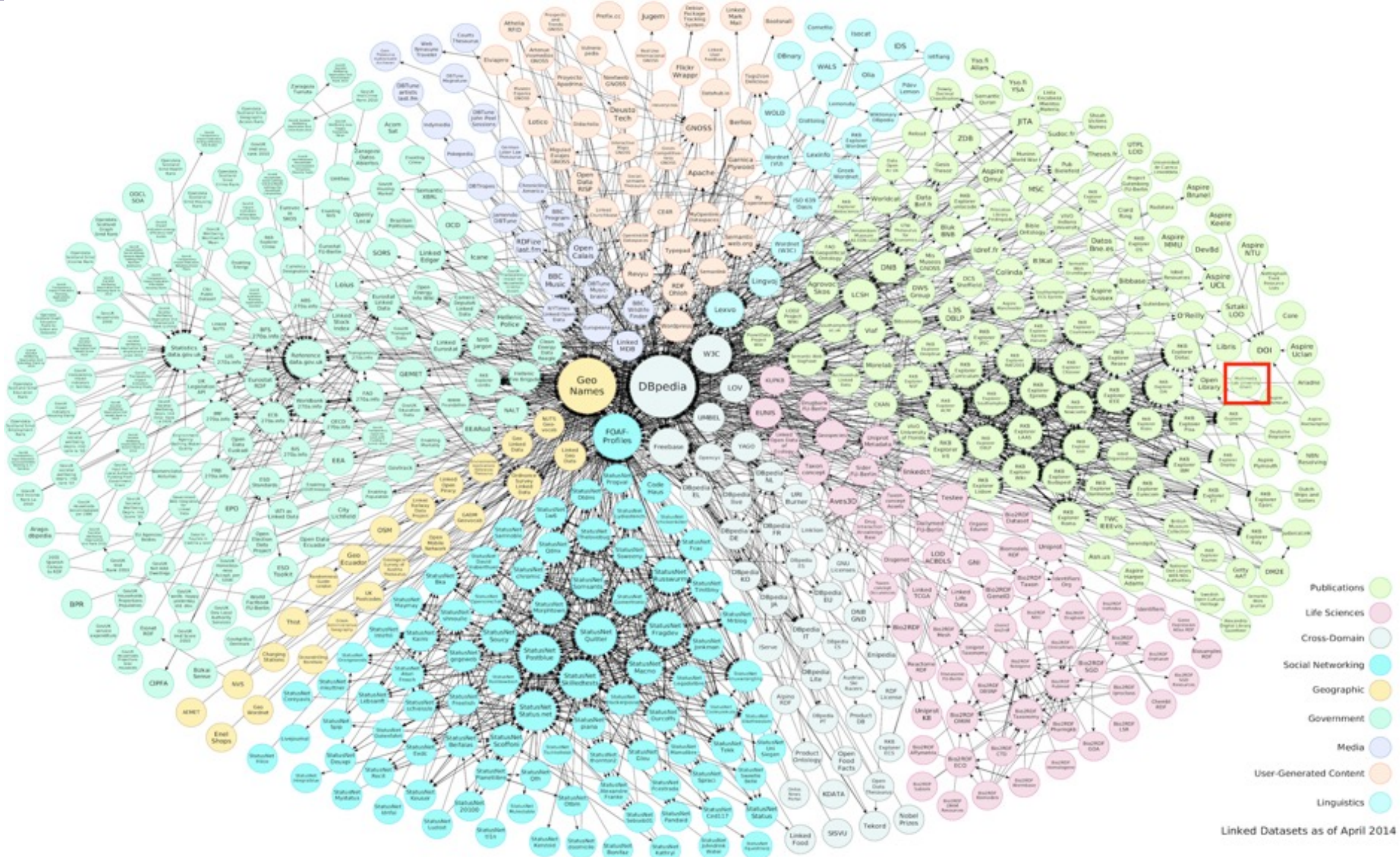


Connect your Silos

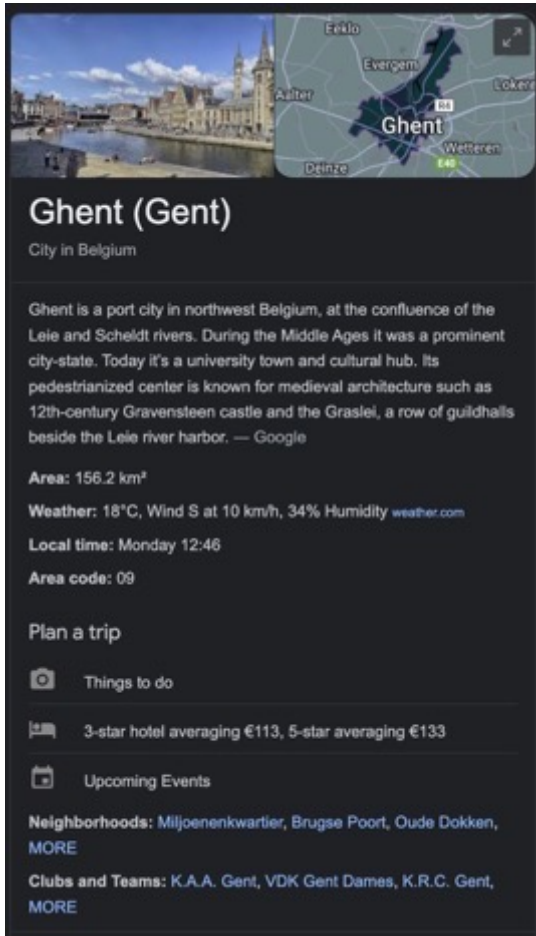
© BigStockPhotos



Linked Open Data



Knowledge Graphs



Ghent (Gent)
City in Belgium

Ghent is a port city in northwest Belgium, at the confluence of the Leie and Scheldt rivers. During the Middle Ages it was a prominent city-state. Today it's a university town and cultural hub. Its pedestrianized center is known for medieval architecture such as 12th-century Gravensteen castle and the Graslei, a row of guildhalls beside the Leie river harbor. — Google

Area: 156.2 km²

Weather: 18°C, Wind S at 10 km/h, 34% Humidity [weather.com](#)

Local time: Monday 12:46

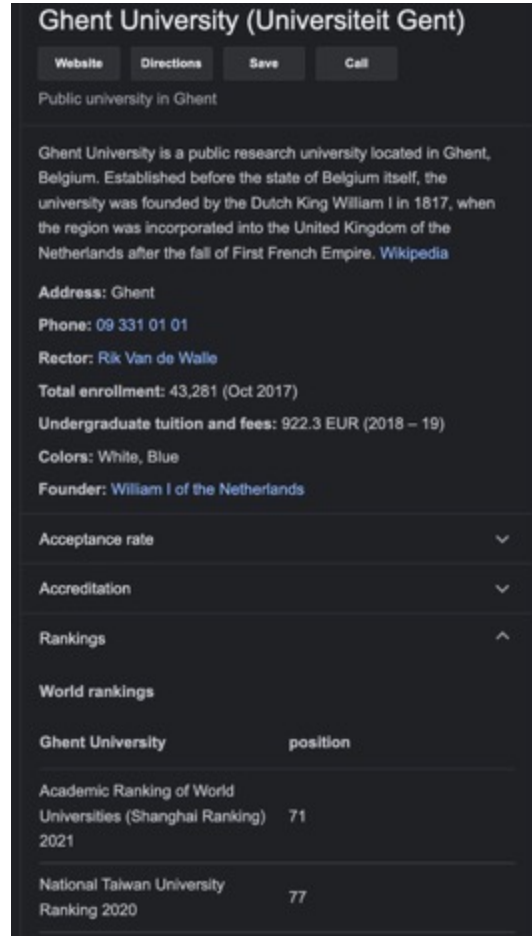
Area code: 09

Plan a trip

- Things to do
- 3-star hotel averaging €113, 5-star averaging €133
- Upcoming Events

Neighborhoods: Miljoenenkwartier, Brugse Poort, Oude Dokken, [MORE](#)

Clubs and Teams: K.A.A. Gent, VDK Gent Dames, K.R.C. Gent, [MORE](#)



Ghent University (Universiteit Gent)
Public university in Ghent

Ghent University is a public research university located in Ghent, Belgium. Established before the state of Belgium itself, the university was founded by the Dutch King William I in 1817, when the region was incorporated into the United Kingdom of the Netherlands after the fall of First French Empire. [Wikipedia](#)

Address: Ghent

Phone: 09 331 01 01

Rector: Rik Van de Walle

Total enrollment: 43,281 (Oct 2017)

Undergraduate tuition and fees: 922.3 EUR (2018 – 19)

Colors: White, Blue

Founder: William I of the Netherlands

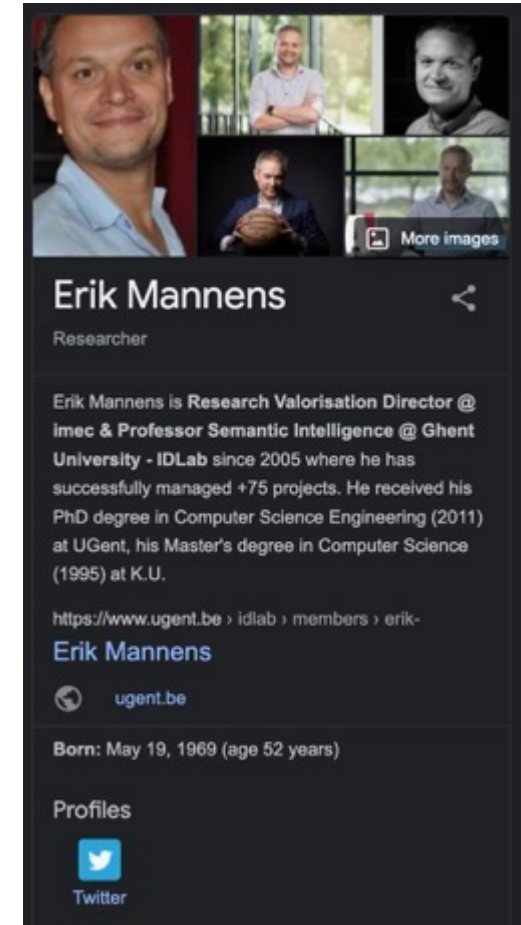
Acceptance rate [v](#)

Accreditation [v](#)

Rankings [^](#)

World rankings

Ghent University	position
Academic Ranking of World Universities (Shanghai Ranking) 2021	71
National Taiwan University Ranking 2020	77



Erik Mannens
Researcher

Erik Mannens is Research Valorisation Director @ imec & Professor Semantic Intelligence @ Ghent University - IDLab since 2005 where he has successfully managed +75 projects. He received his PhD degree in Computer Science Engineering (2011) at UGent, his Master's degree in Computer Science (1995) at K.U.

<https://www.ugent.be/idlab/members/erik->
[Erik Mannens](#)

[ugent.be](#)

Born: May 19, 1969 (age 52 years)

Profiles

- [Twitter](#)

participation
everyone has the means
to actively engage



no restrictions
free & unrestricted access
to all available data

opportunity
new social & business
opportunities



empower
every voice is heard



transparency
promotes accountability
and provides information



digital
convenient &
reusable data



availability
committable, operable
& usable upon demand



access
available to all

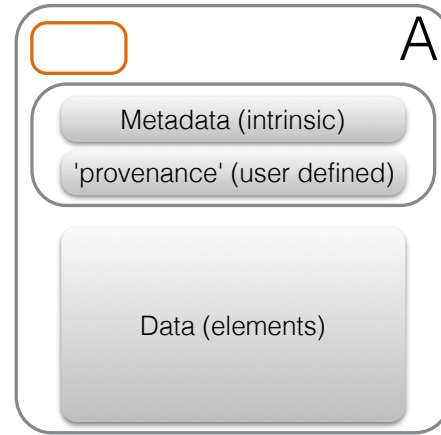


Data as increasingly FAIR Digital Objects

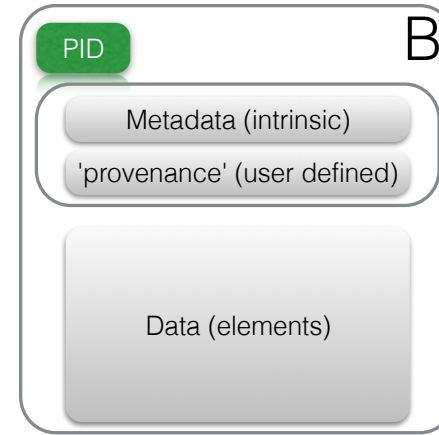
FAIR

FINDABLE
ACCESSIBLE
INTEROPERABLE
RE-USABLE

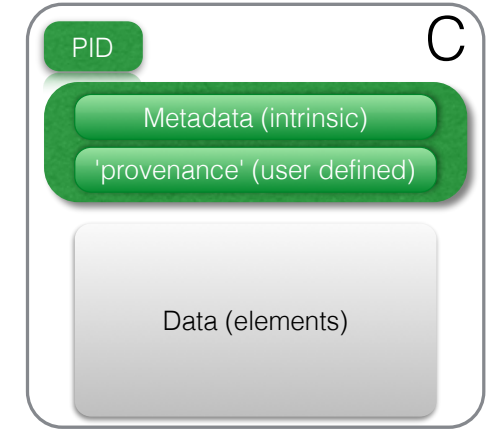
Re-useless data (80%)



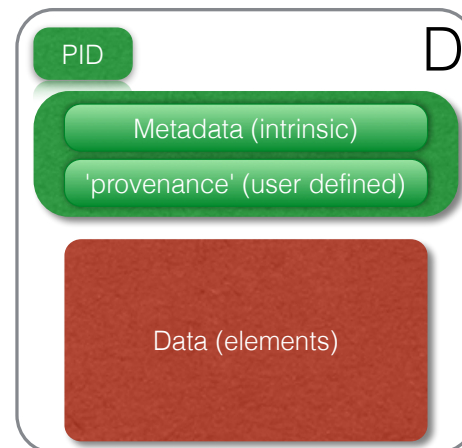
Findable



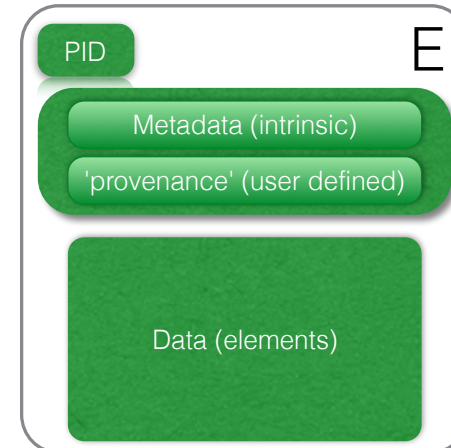
FAIR metadata



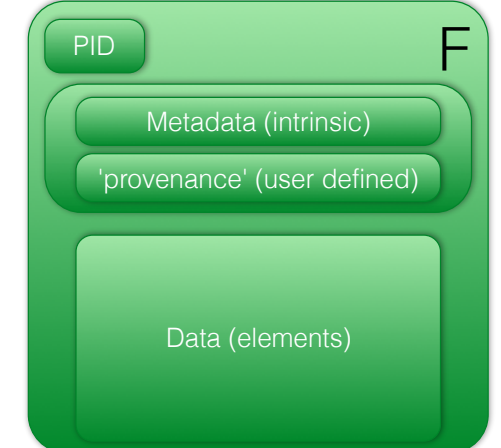
FAIR data-
restricted access



FAIR data-
Open Access



FAIR data-
Open Access/Functionally Linked



Take Away

**FAIR
(Open)
DATA**



DATA



A large iceberg floats in a clear blue ocean under a bright blue sky with scattered white clouds. The visible tip of the iceberg is on the left side of the frame, while the much larger, submerged portion extends across the middle and right. The water is a deep, clear blue, and the sky is a lighter, vibrant blue.

DATA

**Current
Economic
Caveat?**

MEMORY LANE

BRICK CT.

Web 1.0 - 1990

read only → consumers → free content (with ads)

A torn piece of white paper is centered in the frame, set against a solid blue background. The word "simple." is written in a bold, dark grey, sans-serif font on the white paper. The paper has a jagged, torn edge at the top and bottom. To the right of the white paper, there is a vertical strip of blue paper that appears to be a piece that has been torn away, creating a shadow on the blue background below it.

simple.

OPEN

1000% FREE



**FREE FREE
BEER! LUNCH!**

& FALSE ADVERTISING!





センタービル

BURGER KING

渋谷センター街

5-6F

MALON

ENERGY

CALORIE HALF

CALORIE 0

GOODYEAR

渋谷センター街

ASBEE

ブオケ
歌広場

松屋

Miami Garden

ENJOY THE VIEW

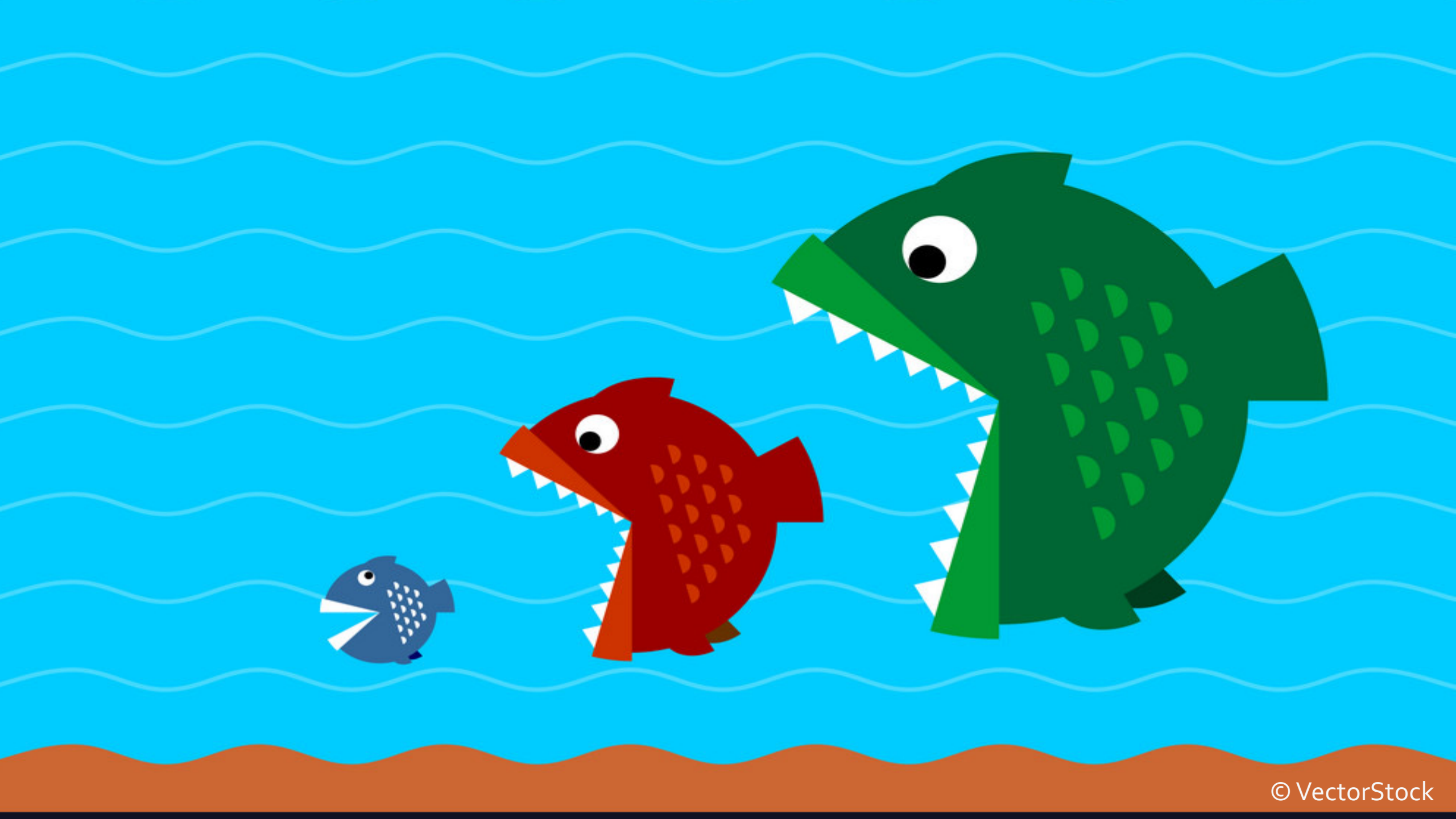
七牛

2F

3F

4F

ガ

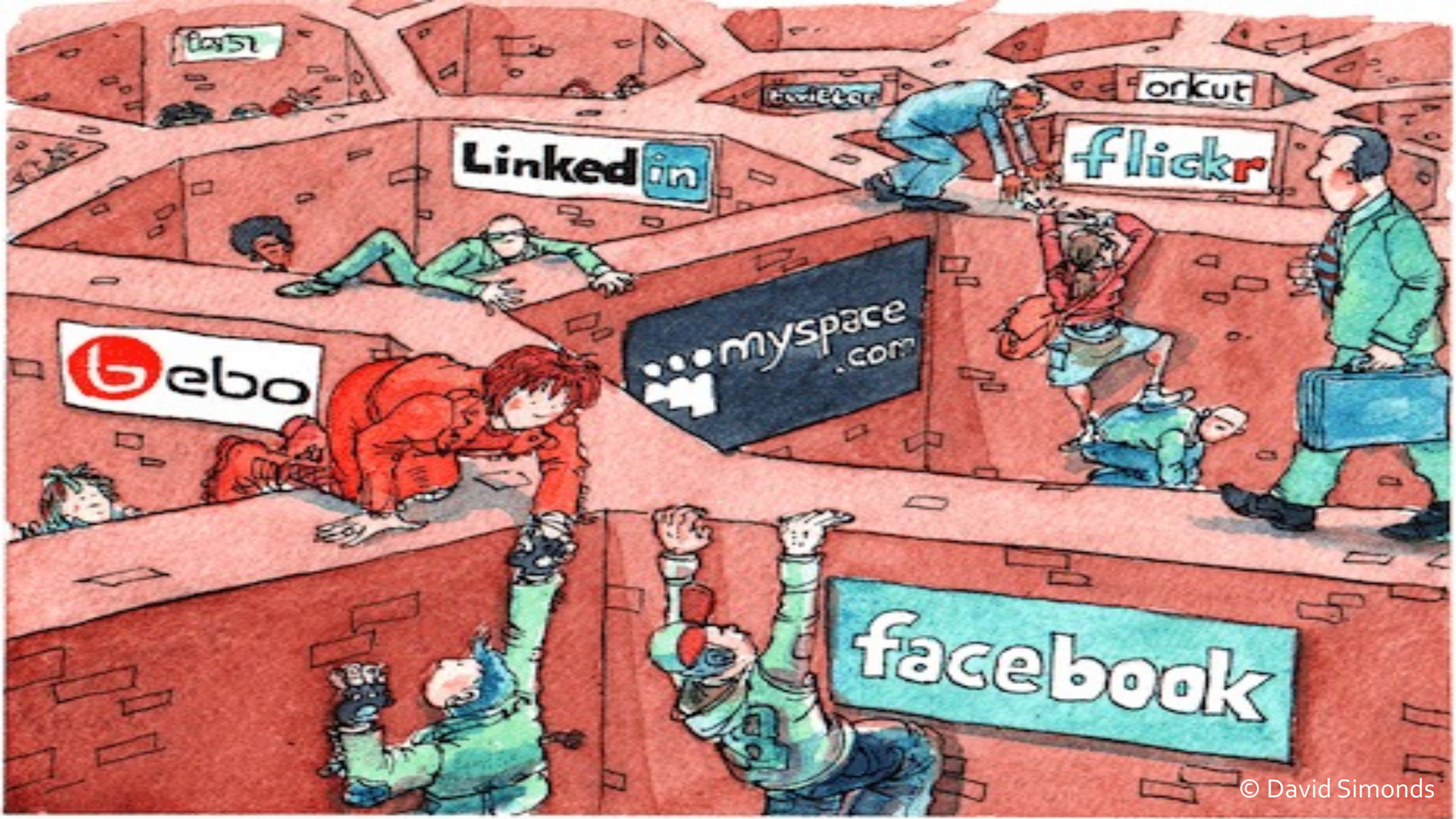


Information Economy

The image features a large, stylized number '1' on the right side, formed by four quadrants. The background is a complex, glowing network of blue and green lines and dots, resembling a circuit board or data flow. The text 'Information Economy' is prominently displayed at the top left in a bold, black font.

Web 2.0 - 2005

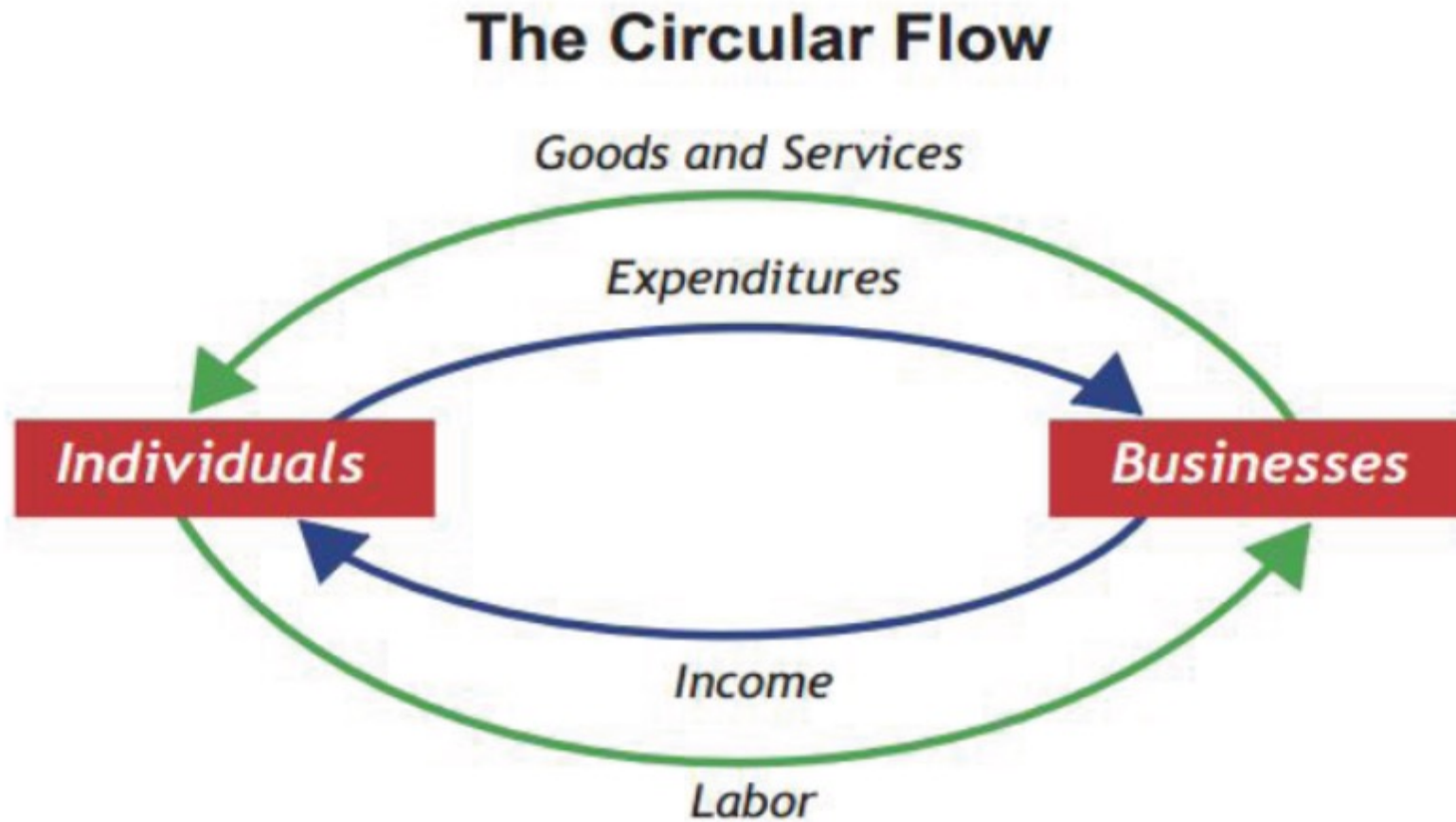
read/write → producers → data harvesting & data selling





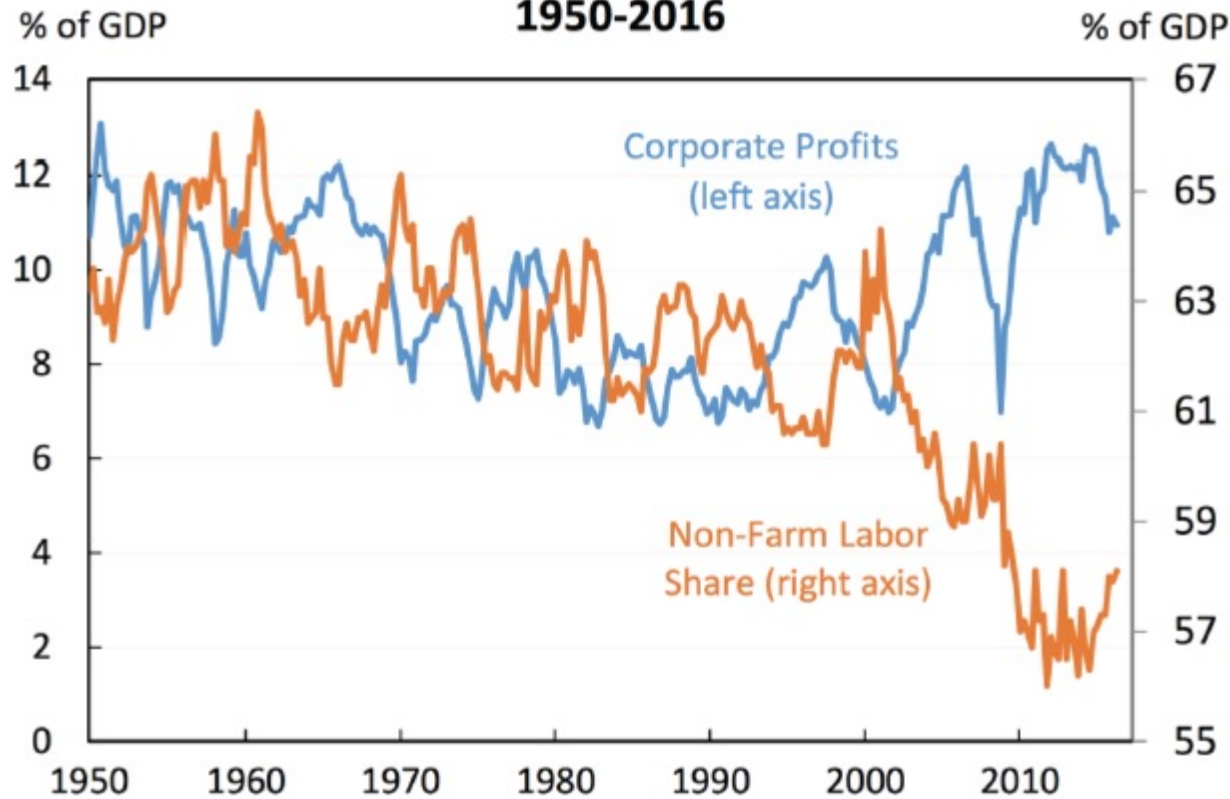


Where did that bring us?



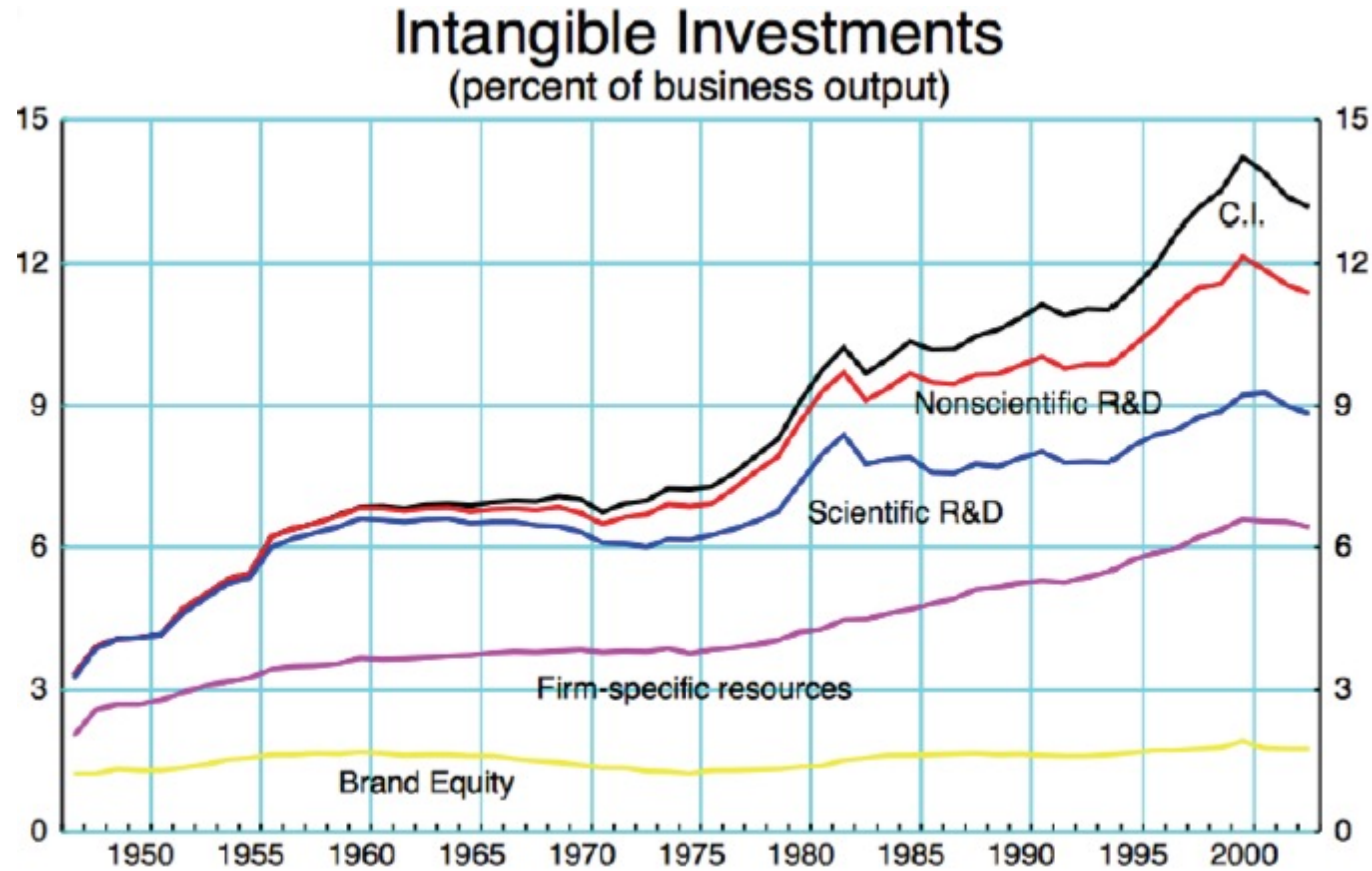
Increasing income inequality

Figure 5: Non-Farm Labor and Corporate Profits Share of GDP, 1950-2016



Source: Bureau of Economic Analysis, Bureau of Labor Statistics; CEA calculations

Increasing intangible assets (Knowledge)



Note: C.I. = Computerized information

Public corp's by market capitalization (2004)

Post-Bubble

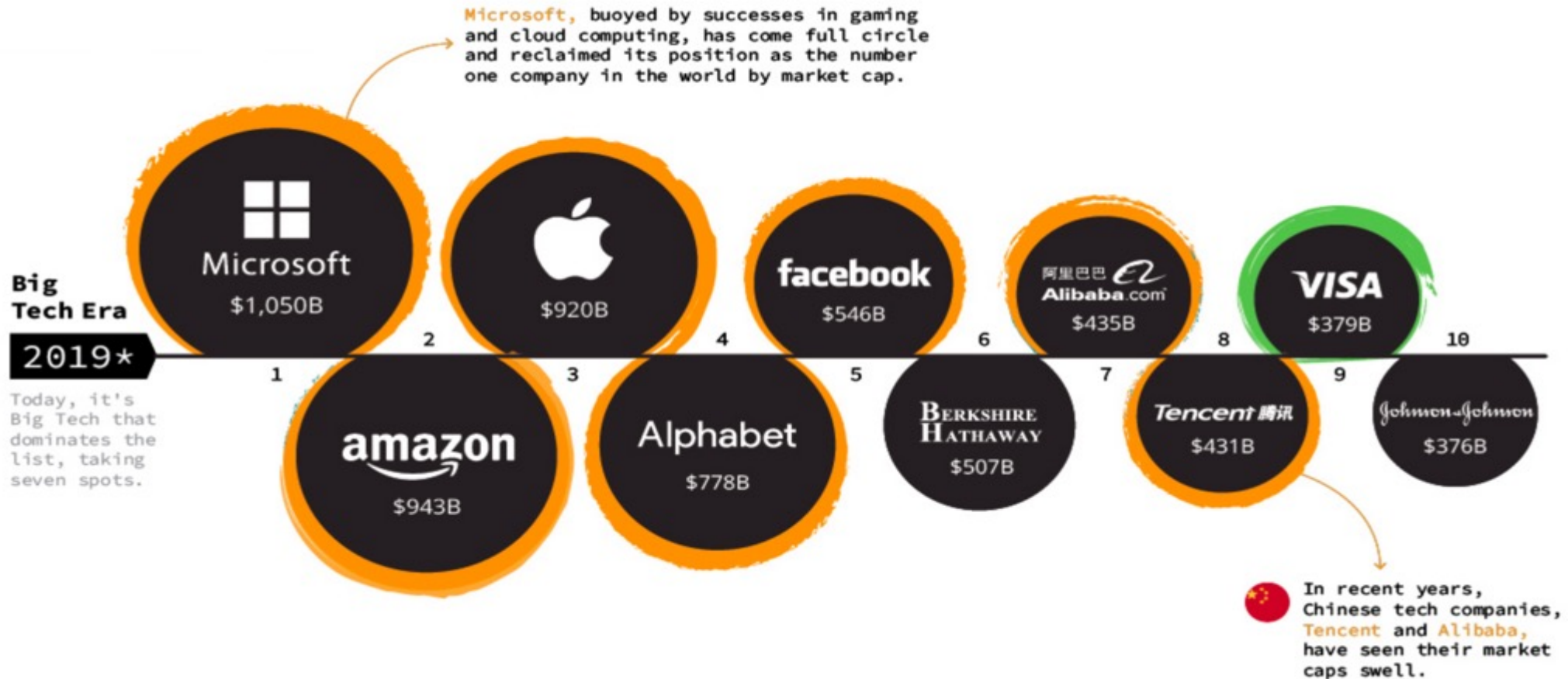
2004

No market cap dominance by any particular industry



Insurance giant, American International Group (AIG), was flying high until its collapse during the 2008 financial crisis, requiring a \$180 billion taxpayer bailout to keep it afloat.

Public corp's by market capitalization (2019)





**THE
DATA €OLLAR
STORE**

Companies that invest most in AI R&D?



Companies that invest most in Data?



So ... How many times do they cash?



Driving a Wedge – Makes one think, right?

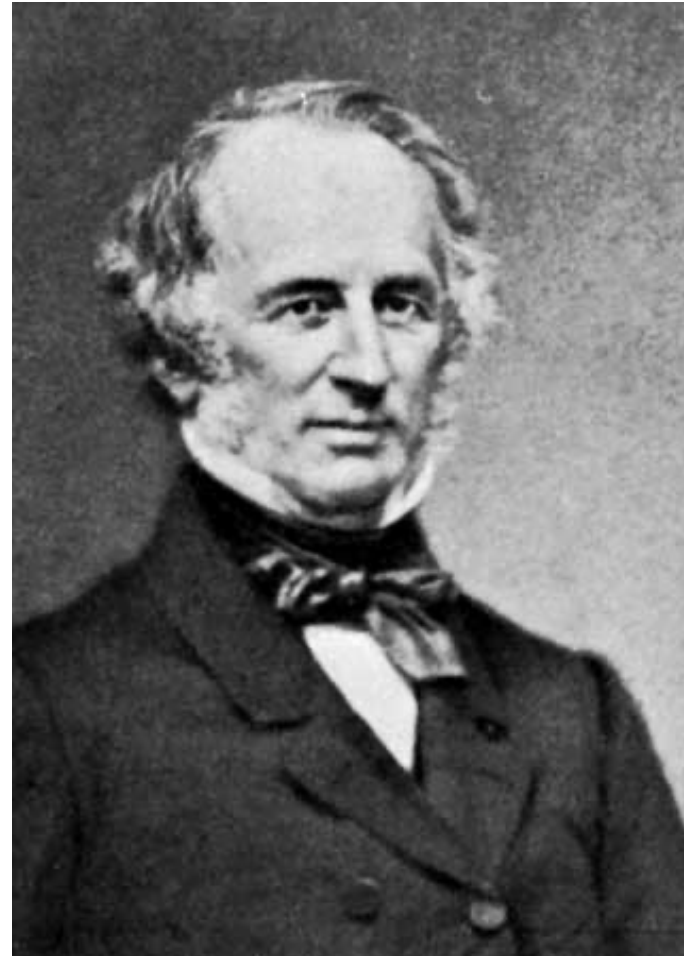
1b Union Pacific 

Heavy Diesel locomotives
Type: not known Weight: 207 tons
Year: 1970 Length: 18.0 m
Output: 6600 BHP Speed: 110 km/h



Famous Union Pacific locomotive for express container trains

a. CP Rail c. CP Rail
b. Union Pacific d. Pennsylv.



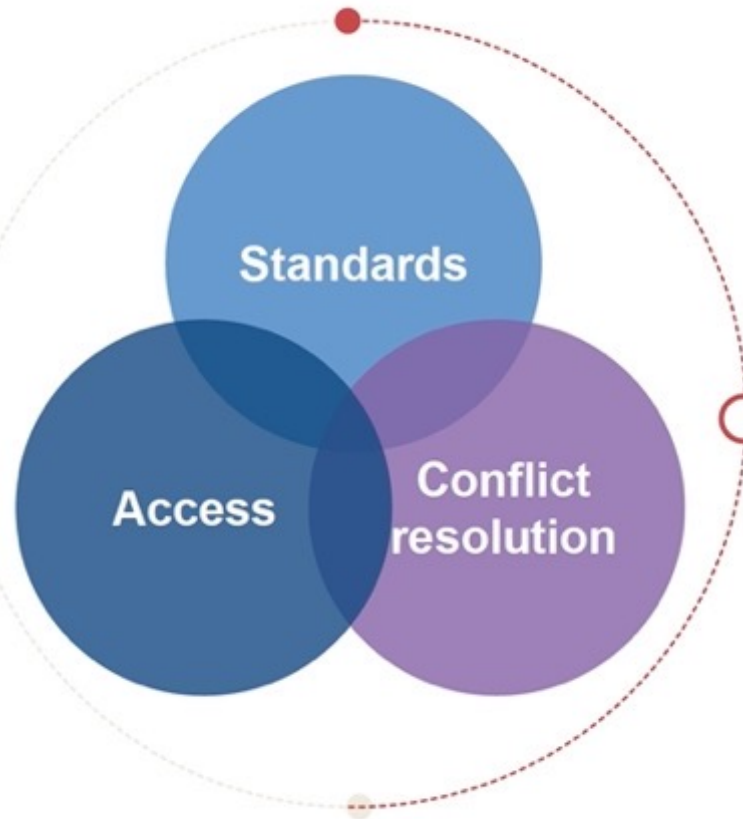
Platform Economy ... the Good, the Bad & the Ugly

Traffic lights



Google, Apple
Amazon, etc.

Complicated,
Closed,
Cumbersome



Simple, Open, Free

Roundabouts



The Internet
The World Wide Web

Simple, Open, Free
(Free ... as in Freedom, not as in Free beer)

Take Away

NOT FAIR !!!



**Current
DATA
Economics**

A large iceberg floats in a clear blue ocean under a bright blue sky with scattered white clouds. The iceberg's tip is above the water surface, while its much larger, jagged base is submerged. The water is a deep, clear blue, and the sky is a lighter blue with soft, white clouds. The overall scene is serene and visually striking, used here as a metaphor for data ownership.

DATA

Ownership?

Web3 - 2020

decentralisation, transparency, privacy → self-control → SOLID & Blockchain

?



?



?



Today's Web Ecosystems

WINNER TAKES ALL

Facebook isn't 'free' when the cost is your data – and Zuckerberg knows it

How Tim Cook and Mark Zuckerberg's war of words reveals a profound split – and potential shift – in how technology companies view and respect our privacy.

RENE RITCHIE 12 Apr 2018

24

The Customer is the product.
You pay more
for “relevant” people
based on their data they share.

Today's Web Ecosystems

EXTREME BARRIERS FOR NON-DOMINANT PLAYERS

SERVICE PROVIDERS

High COST
✓ HIGH RISK

HIGH INVESTMENTS,
HIGH RISKS TO
INTRODUCE SERVICES



LARGEST PORTION
OF ADDED VALUE
TO THE GIANTS



WITHOUT ACCESS TO THE DATA,
LIMITED INNOVATION
OPPORTUNITIES

END-USER (ACQUISITION)

EXTREME HASSLE
FOR USER TO CHANGE SERVICE
=TRANSFER ALL THE DATA



COMBINING SERVICES ON
SAME DATA NOT POSSIBLE



DATA OWNERSHIP AS A BUSINESS MODEL WILL NO LONGER BE SUSTAINABLE.

legal pressure

GDPR

societal pressure

data leaks & ownership

competition

pressure

lack of innovation



BLOCKCHAIN (distributed ledgers)

The Properties of Distributed Ledger Technology (DLT)

Programmable

A blockchain is programmable (i.e. Smart Contracts)

Distributed

All network participants have a copy of the ledger for complete transparency

Secure

All records are individually encrypted

Immutable

Any validated records are irreversible and cannot be changed

Anonymous

The identity of participants is either anonymous or pseudonymous

Unanimous

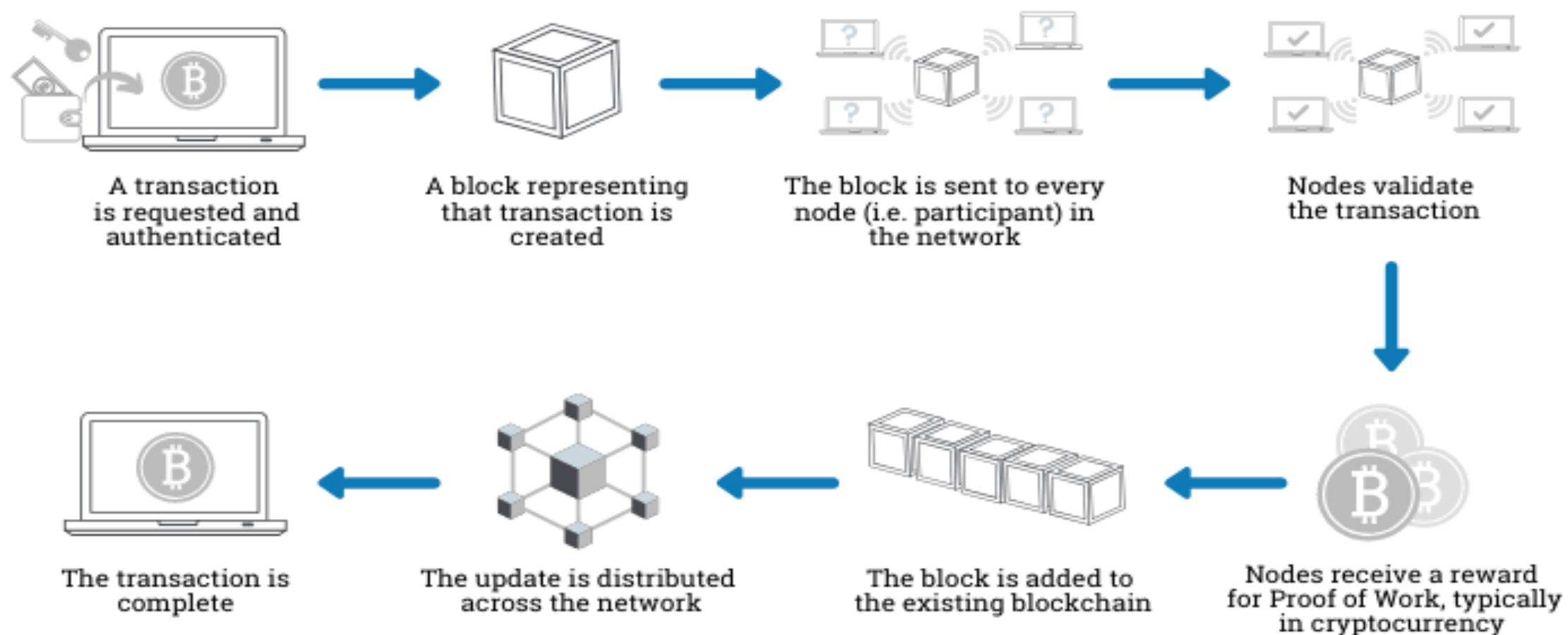
All network participants agree to the validity of each of the records

Time-stamped

A transaction timestamp is recorded on a block



How does a transaction get into the blockchain?



Criticism : (ecologically) inefficient

Proof-of-Work (PoW) is the consensus mechanism first popularized for permissionless blockchains and cryptocurrencies through the Bitcoin network. This PoW network is run by validators, so-called miners, who add new blocks of transactions to the network on an ongoing basis. As a reward, these miners receive incentives in the form of block rewards (a fixed amount that is predetermined) and transaction fees (paid by each user conducting a transaction).

Bitcoin's PoW miners compete for these incentives by adding computational power to the network; the more computational power, the higher the chance to receive the incentive. Specialized PoW mining hardware devices generate computational power, so-called ASIC miners, which consume vast amounts of energy in the process. Accordingly, Bitcoin's PoW miners are incentivized to add more and more computational power to the network, consuming more and more

Criticism : “Proof of Work” vs. “Proof of Stake”

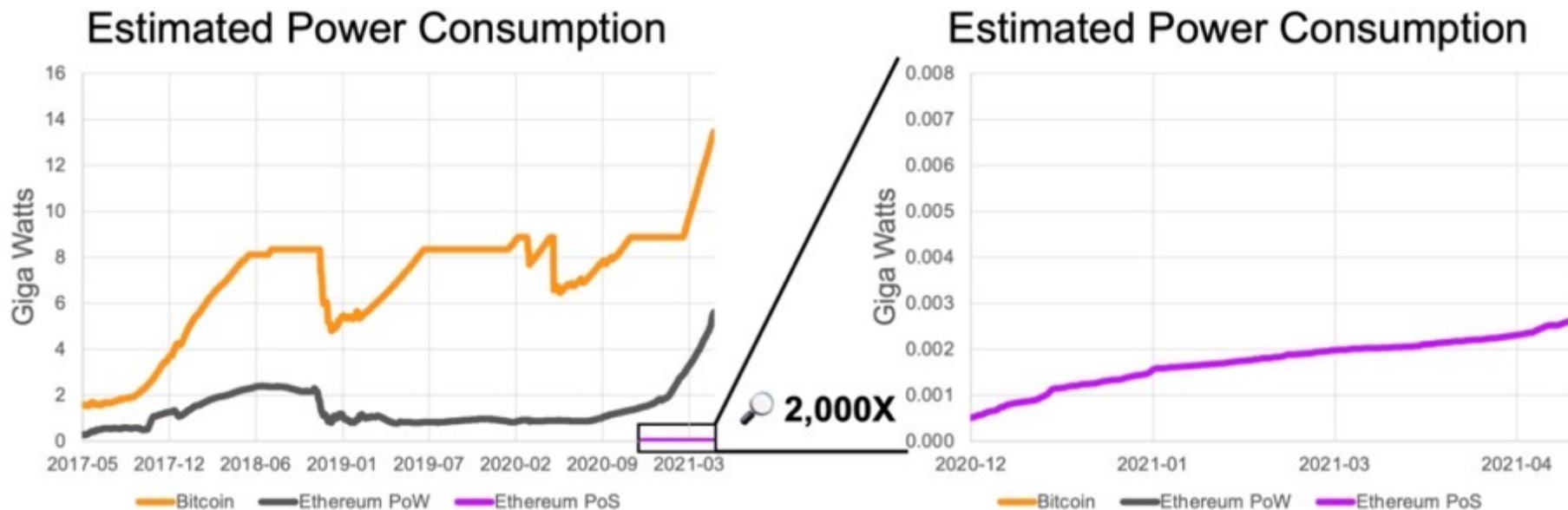


Figure 2 — Bitcoin and Ethereum PoW energy consumption compared to Ethereum PoS (from Digiconomist).

CRYPTO

Bitcoin

A matter of design: why Bitcoin consumes so much energy

Of all the 21 million Bitcoins that can exist at the same time, [nearly 90 percent was already mined in mid-2021](#). This, however, does not necessarily mean that the Bitcoin supply is running out as the last Bitcoin was forecast to be mined around the year 2140. This is a design choice in the cryptocurrency: The closer Bitcoin gets to its supply limits, the computing power – and therefore energy - needed to mine goes up incrementally. The [BTC mining difficulty](#) or amount of computing power being applied to mine Bitcoin reflects that: Bitcoin mining in, say, 2014 – when there were less Bitcoin in circulation - was easier and less energy consuming than in 2021. By then, there were significantly more coins in circulation and the cryptocurrency's design essentially tries to halt the creation of more.

Bitcoin Mining Energy Consumption in TeraWatt/Year

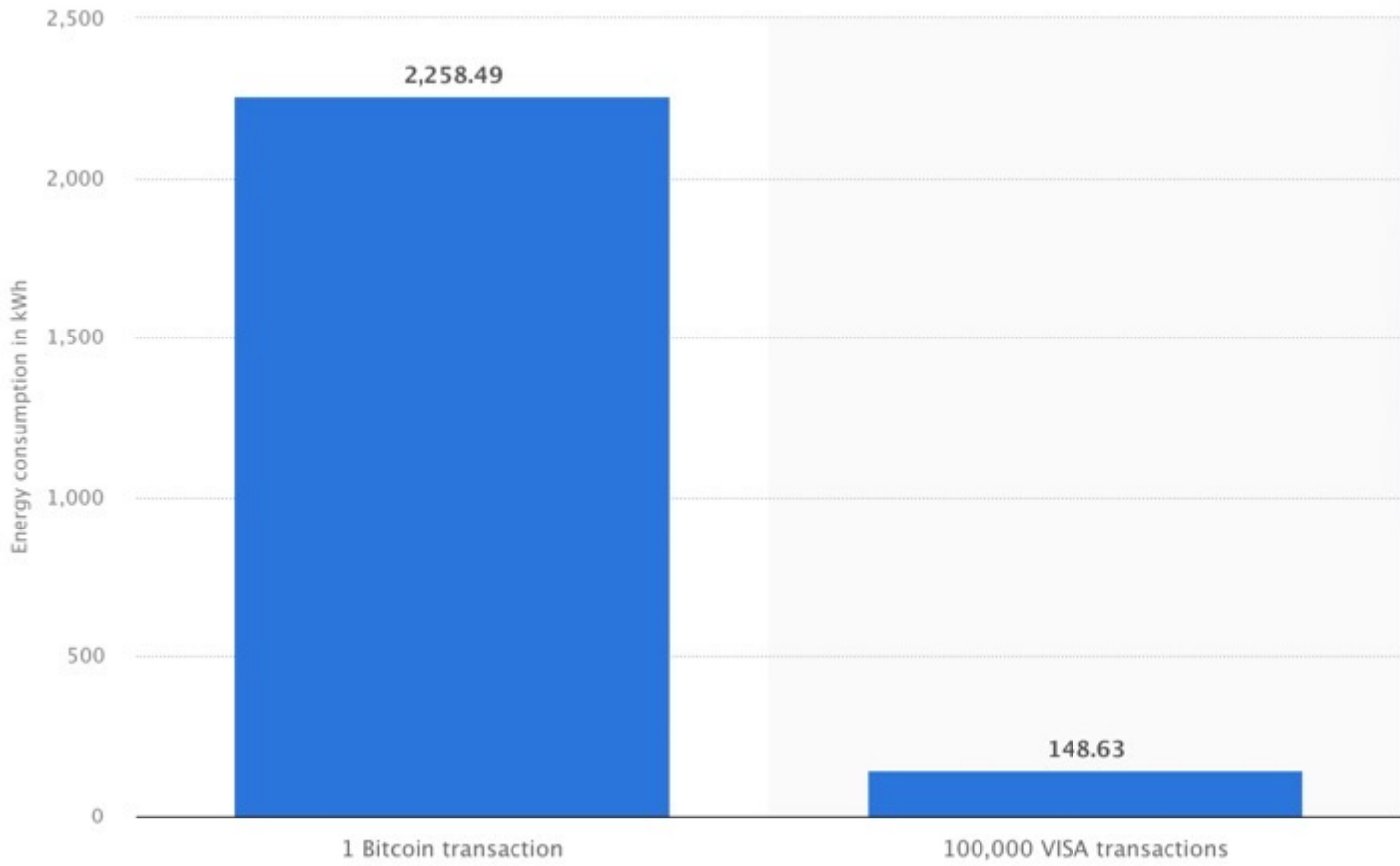


Buy a “mars” bar for 0.00002 Bitcoin



LONDON — Bitcoin transactions use so much energy that the electricity used for a single trade could power a home for almost a whole month, according to a paper from Dutch bank ING.

Bitcoin Transaction Cost



Criticism : (ecologically) inefficient ... squared!!!

EUR 22.2 per 100 kWh

The average cost of electricity in Flanders is at **EUR 22.2 per 100 kWh**, which is relatively higher than in Europe as whole. When it comes to the cost of natural gas, Flanders – at EUR 6.7 per 100 kWh – is less expensive than the European average.

<https://www.flandersinvestmentandtrade.com> › invest › uti... ⋮

Utility costs in Flanders

Thus ... current Bitcoin transaction cost = 496 €

SOLID



“inverted” Apps using only decentralized Data



ALL HAVE # PERSONAL DATA PODS

SENSITIVITY LEVELS

ACCESS CONTROL RULES

DATA RETENTION POLICIES

DIFFERENT LIFE SPANS

End Users choose where they store their Data

Author's name and latest profile picture

stored in author's personal data pod

Work-related opinion about an article

stored in data pod of author's company

Discussed article title and photo

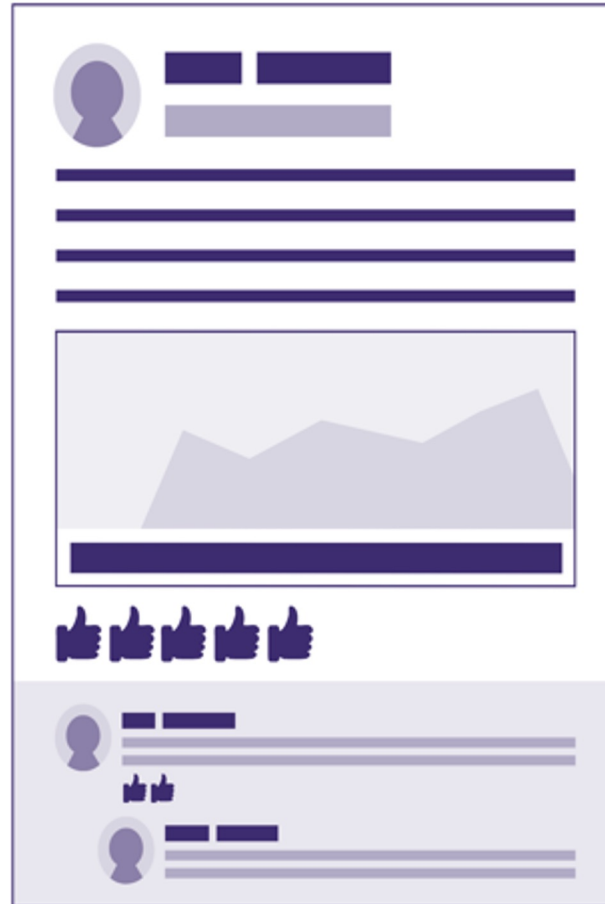
stored in news website's data pod

Likes on this post

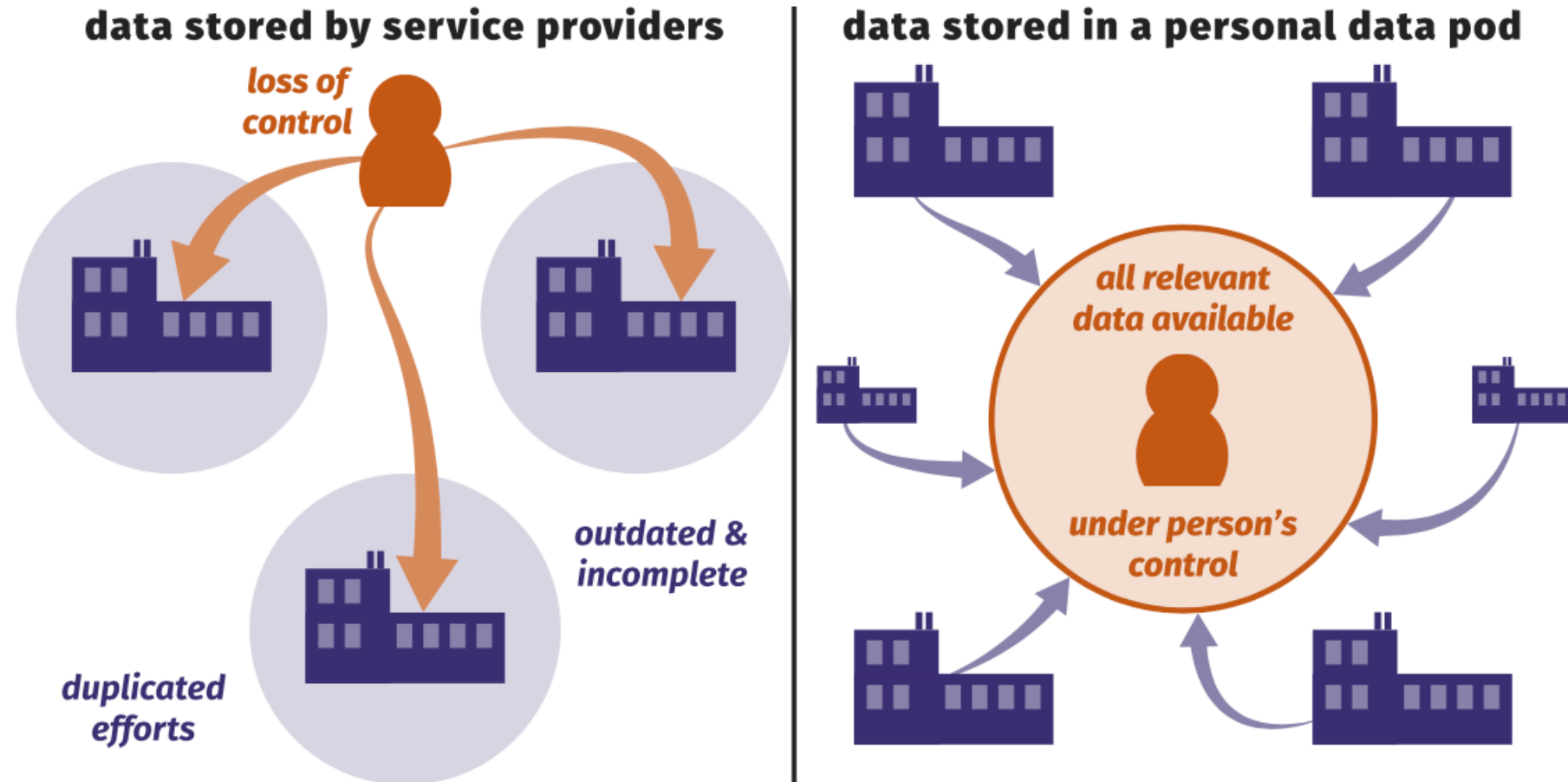
each one in different individuals' data pods

Comments on this post

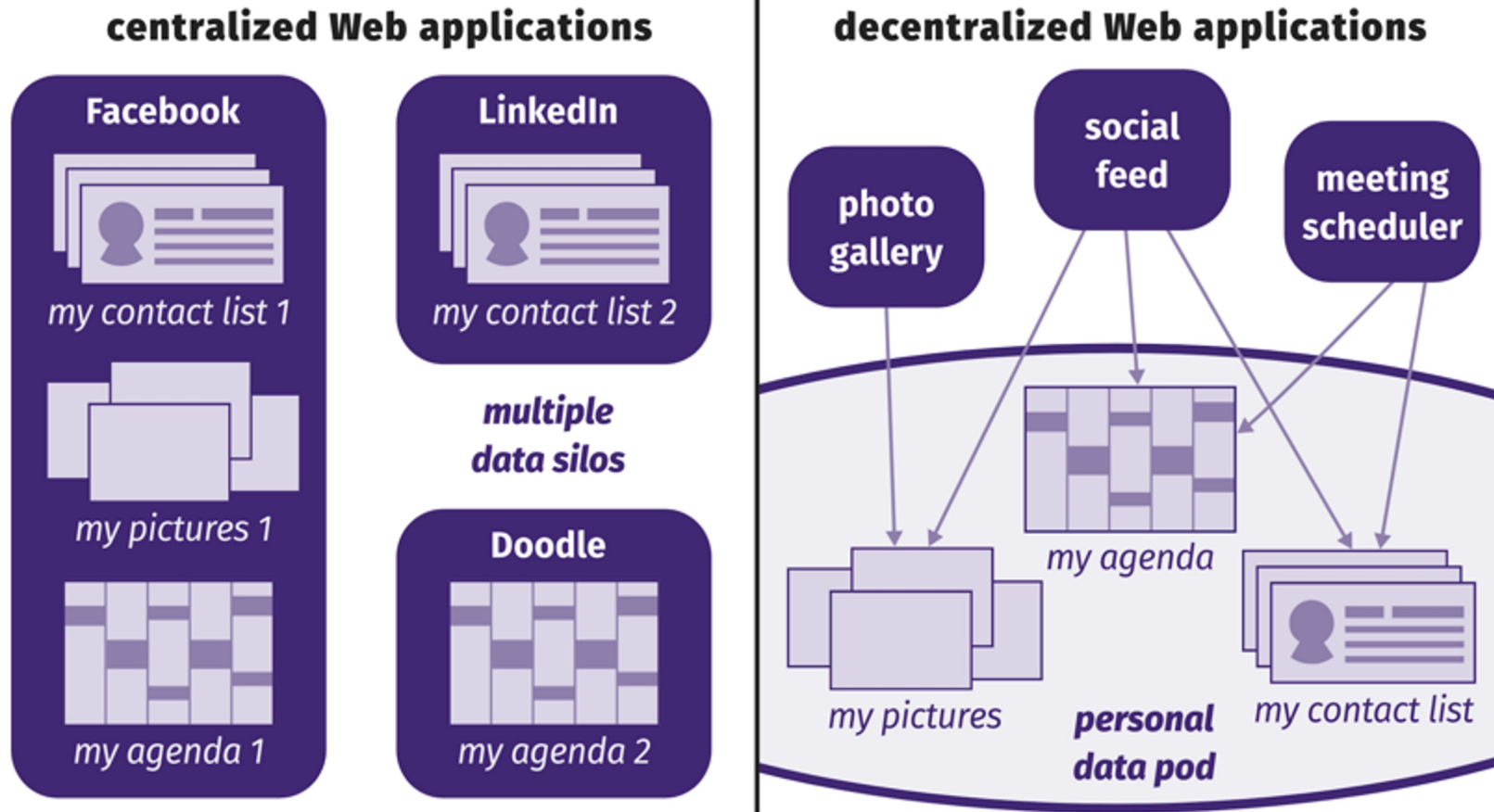
each one in different individuals' data pods



Give Citizens back Control of their personal Data

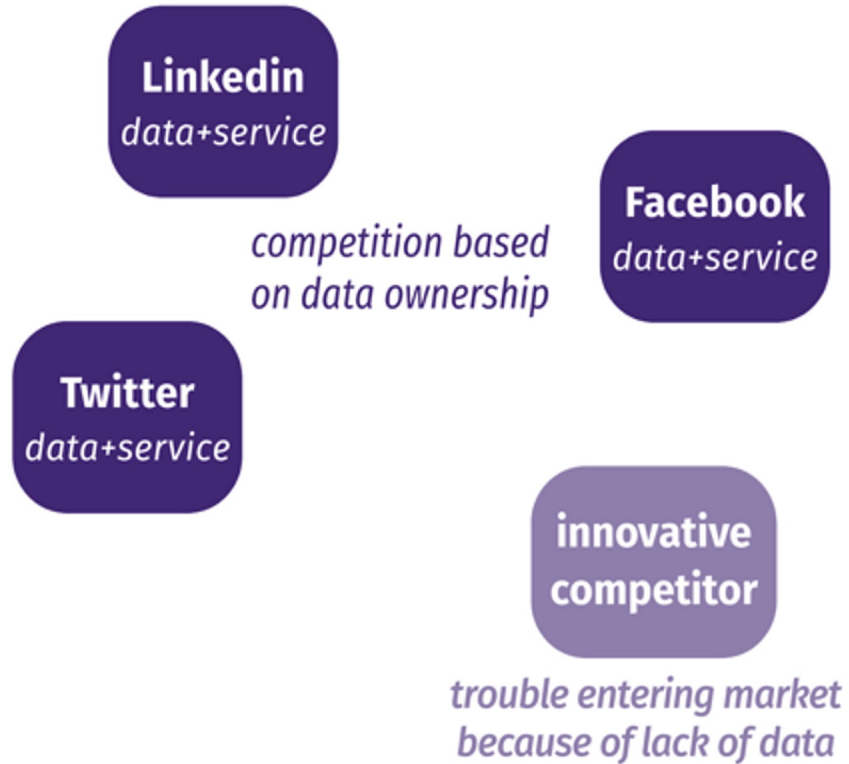


Applications evolve into Views

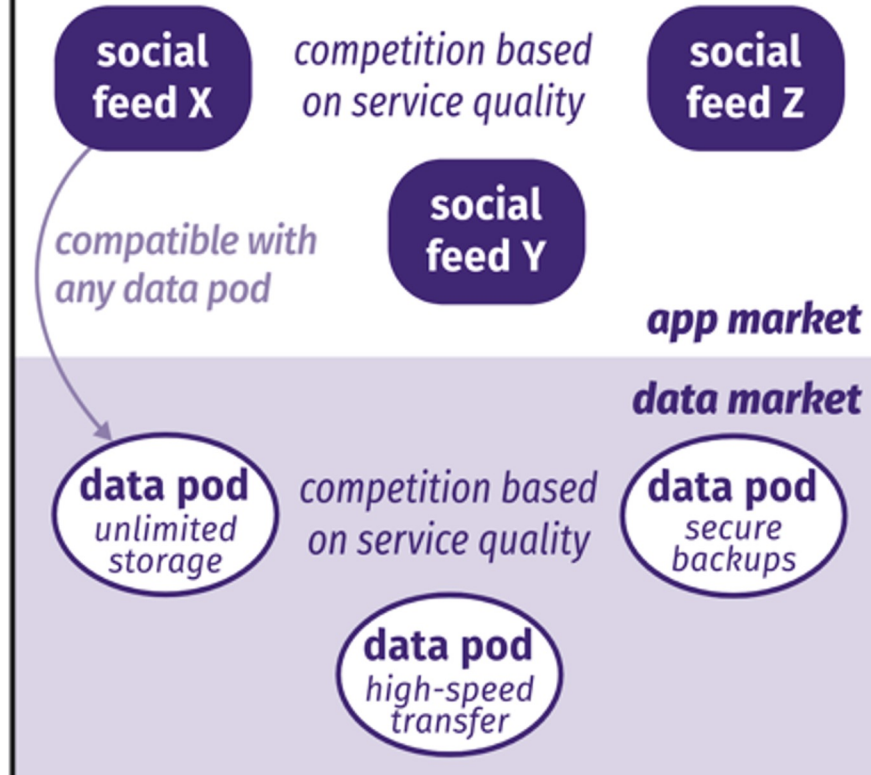


Two-level Competition with Multiple Winners

single market for centralized apps



separate data and app markets



Solid is not a platform to replace others, but a way of building for the Web.

Solid is an ecosystem.

Standards enable interoperability

Solid is a movement.

We need to shift the app builder mindset.

Solid is a community.

Building Solid requires different people, companies, and organisations.

Co-shaping the Future of the Web

IMEC ACTIVITIES SETTING THE GLOBAL SCENE



FRONTRUNNER
WITH NEW CONCEPTS



DRIVING
STANDARDS



REFERENCE
IMPLEMENTATIONS



RML LDF SOLID



KEY CONTRIBUTIONS SINCE 2007 IN
SEMANTIC WEB, OPEN DATA, LINKED DATA,
SCALABLE QUERYING



50+ INDUSTRY COLLABORATIONS

Take Away

Logic
/
DATA

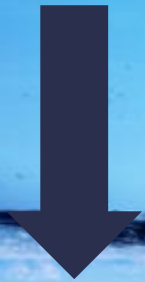


DATA



Take Away

Apps
are
Views



DATA
pods

A large, jagged iceberg floats in a deep blue ocean. The water is clear, and the sky is a lighter blue with some white clouds. The iceberg is the central focus, with its reflection visible in the water below. The overall tone is cool and futuristic.

**a
more ethical
revenue model
of
DATA**

What's Next?

Flanders leads the Way (internationally)

'We moeten weer baas worden over onze data'



De Gentse computerwetenschapper Ruben Verborgh werkt samen met de Brit Tim Berners-Lee aan het platform Solid. Dat laat gebruikers toe zelf hun data te beheren. © Thomas Sweertshoegher

ROLAND LEGRAND | 11 mei 2019 07:53

In deze digitale wereld zijn we de controle over onze data verloren. Dat moet anders, vindt de Gentse professor Ruben Verborgh. 'Bedrijven en individuen moeten hun eigen data beheren en zelf kunnen beslissen wie ze mag zien.' Het Facebook-model heeft afgedaan.

Hij ziet eruit als een jonge techie uit Silicon Valley, maar Ruben Verborgh is professor aan de Universiteit Gent, gespecialiseerd in het wereldwijde web. Hij gebruikt zijn expertise om het bestaande web radicaal te hervormen en werkt daarbij samen met niemand minder dan de uitvinder van het web, de Brit Tim Berners-Lee.

OPINIE INTERNETREUZEN

Tem de Big Tech: stop data in privékluisen

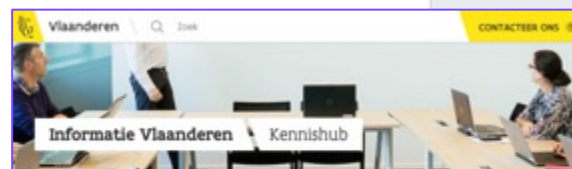
Om de macht van grote technologiebedrijven terug te dringen, moet je gebruikers controle over hun persoonlijke data geven, schrijft Ruben Verborgh.

Ruben Verborgh

Onderzoeker bij Imec en Massachusetts Institute of Technology, en hoogleraar Webtechnologie aan de UGent. Deze bijdrage verscheen ook in NRC.

Donderdag 30 juli 2020 om 3.25 uur

13:00 - 13:55



Virtuele themamiddag "Solid - burgers in regie van hun eigen gegevens"

28 sept 2020

Introductie Solid: setting the scene

Welkom en introductie van het concept
Ruben Verborgh (UGent - imec)

What governments and Solid can do for each other
How Solid can impact governments, citizens and business, and why Flanders is in pole position.
Sir Tim Berners-Lee (Inrupt)

Burgers in regie van hun eigen gegevens - Waarom Vlaanderen dit belangrijk vindt
De minister-president licht toe waarom de Vlaamse overheid met veel interesse het concept onderzoekt om haar dienstverlening te verbeteren.
Minister-president Jan Jambon

Is de burger daar ook klaar voor?
Situatieschets van de verschillende initiatieven die vandaag al lopen bij de Vlaamse onderzoeksinstituten en overheden
Lieven De Marez (UGent - imec)

Enkele koplopers aan het woord
Pitch van initiatieven die binnen verschillende domeinen vormgegeven worden.
Frederik Delaplace (VRT) - Paul Theyskens (Mydata.org) - Erik Mannens (UGent - imec) - Goedele Van der Spiegel (Informatie Vlaanderen)

SolidLab Vlaanderen

SolidLab Vlaanderen heeft de ambitie om Vlaanderen de leidinggevende Europese kennisregio te maken op het vlak van persoonlijke datakluisen en hun toepassing in de dataeconomie, en dit in een quadruple helix samen met de beleidsmaker, burger en ondernemer.

Ministerraad - Plan Vlaamse Veerkracht van 17 december 2021



Documenten ministerraad - plan vlaamse veerkracht 17 december 2021

De documenten van deze ministerraad zullen beschikbaar zijn vanaf 20 december 2021 - 14:00 uur.

Plan Vlaamse Veerkracht: subsidie Imec voor opstart SolidLab Vlaanderen

17 december 2021 op voorstel van viceminister-president Hilde Crevits

In het kader van de versterking van het onderzoeksveld en de versnelling van Onderzoek&Ontwikkeling keurt de Vlaamse Regering de opstart goed van SolidLab Vlaanderen en voorziet hiervoor 7 miljoen euro subsidie aan Imec. SolidLab Vlaanderen zal technologisch, maatschappelijk en applicatieonderzoek opzetten om persoonlijke datakluisen mogelijk te maken en expertise in Vlaanderen daarover uit te bouwen.

Research Challenges

Society

- User research and Solid readiness
- Governance and business models
- User interface & User Experience (UX) Design

Technology

- Interop of personal data sources
- Integrity: access control and archiving
- Scalability
- Workflows, processes and orchestration
- Information security

Infrastructure and Testing

- Generic panel and Technical Infrastructure
- Methodology

Effort

Total: 33 FTE (3,5 M€ budget/Y)

Type R&D: FTE

- 65% technology
- 35% society

Type R&D: FTE

- 45% PhD
- 55% (senior) researcher

Research Teams

Society

- User research and Solid readiness
- Governance and business models
- User interface & User Experience (UX) Design



VAKGROEP METAJURIDICA, PRIVAAT- EN ONDERNEMINGSRECHT

Technology

- Interop of personal data sources
- Integrity: access control and archiving
- Scalability
- Workflows, processes and orchestration
- Information security



Infrastructure and Testing

- Generic panel and Technical Infrastructuur
- Methodology



Importance for Flanders



Jan Jambon

Jan Jambon, Minister-president van de Vlaamse Regering en Vlaams minister van Buitenlandse Zaken, Cultuur, Digitalisering en Facilitair Management



Data Utility Company
Citizen profile

 Vlaanderen | DIGITAAL VLAANDEREN



Hilde Crevits

Viceminister-president van de Vlaamse Regering en Vlaams minister van Economie, Innovatie, Werk, Sociale economie en Landbouw

Career management



Wouter Beke

Vlaams minister van Welzijn, Volksgezondheid, Gezin en Armoedebestrijding

Health care



Benjamin Dalle

Vlaams minister van Brussel, Jeugd en Media

Media



Your Data, Your Choice !!!















Ethical

Economical



Ecological

Eugenical



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