

# **Peril on the road to Utopia** - Opportunities and risks of infusing personal data into Smart City ecosystems



Enschede 19 October 2022 | Guest Lecture University of Twente | Dr. Haydee S. Sheombar

#### The fall of Icarus

## 1. Technology can make us "fly"

#### **2. Handle with care**

## **3. Always listen to your father**

**By Peter Paul Rubens** 

#### The fall of Icarus

## 1. Technology can make us "fly"

#### **2. Handle with care**

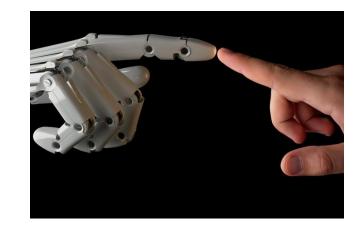
# **3. Avoid hubris, show restraint**

**By Peter Paul Rubens** 

#### **Thesis outline**







Digitalisation brings profound change Technology not always fulfilling its promise

Don't repeat mistakes with personal data

#### Founded in 2015



RSM ERASMUS Thesis- & Analytics Leadership Coach

**Research** Afilliate

**Digital Transformation** 

Public- and Private Sector



Horizon 2020 EU Research on Urban Data Platforms



21 Years with PWC & IBM



Consulting, Client Management, Business Development

### 1. Digitalisation

## 2-Smart City Ecosystems

# 3. Personal Data (Vaults)4. Toward Utopia?



#### Digitalisation –

#### the 4<sup>th</sup> industrial revolution

< 1760 - 1840 >

#### 1<sup>st</sup> Industrial Revolution

93

N.C.C.Co.

## **Steam Engine, Railroads, Mechanisation**

< late 19th – early 20th century >

#### 2<sup>nd</sup> Industrial Revolution

#### **Electrification & Mass Production**

#### 3<sup>rd</sup> Industrial Revolution

#### Computers, Automation & The Internet

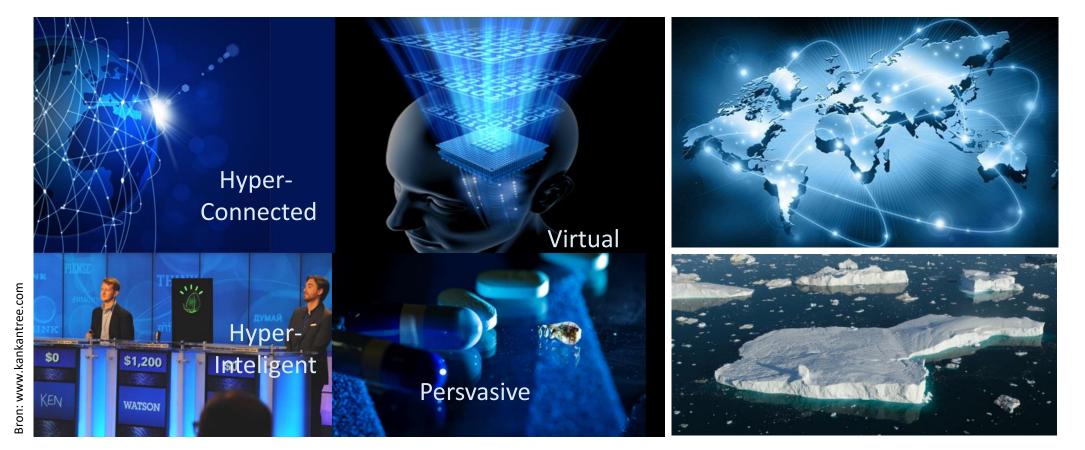
< 1960's – 2000 >

## 4<sup>th</sup> Industrial Revolution Machine Intelligence, Virtuality,

#### **Autonomous Systems**

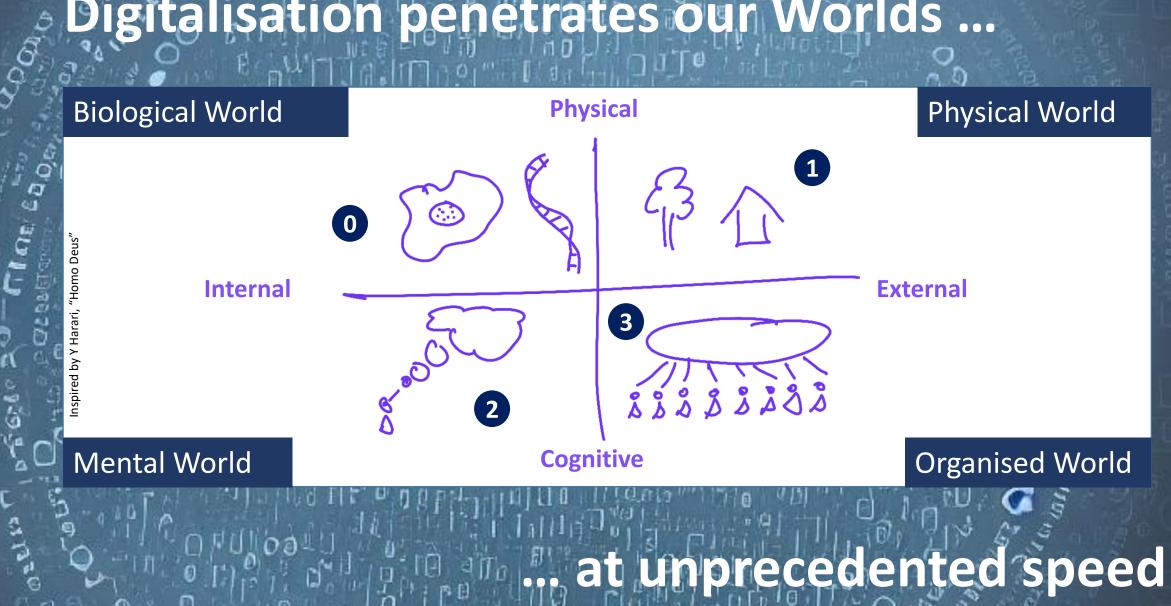
< 2010 - ongoing >

#### The world is changing rapidly



#### DIGITALISATION - (DE)GLOBALISATION - CLIMATE

# Digitalisation penetrates our Worlds ...



#### Virtualisation

# "Always On" Hyper Coordination Mass Collaboration

# 2013

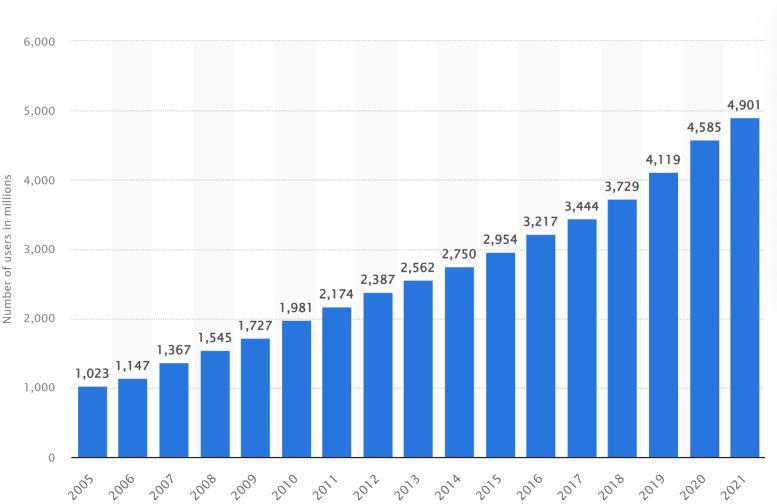
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#### **Fear of Missing Out!**

PHOTO: ERIC J. SMITH

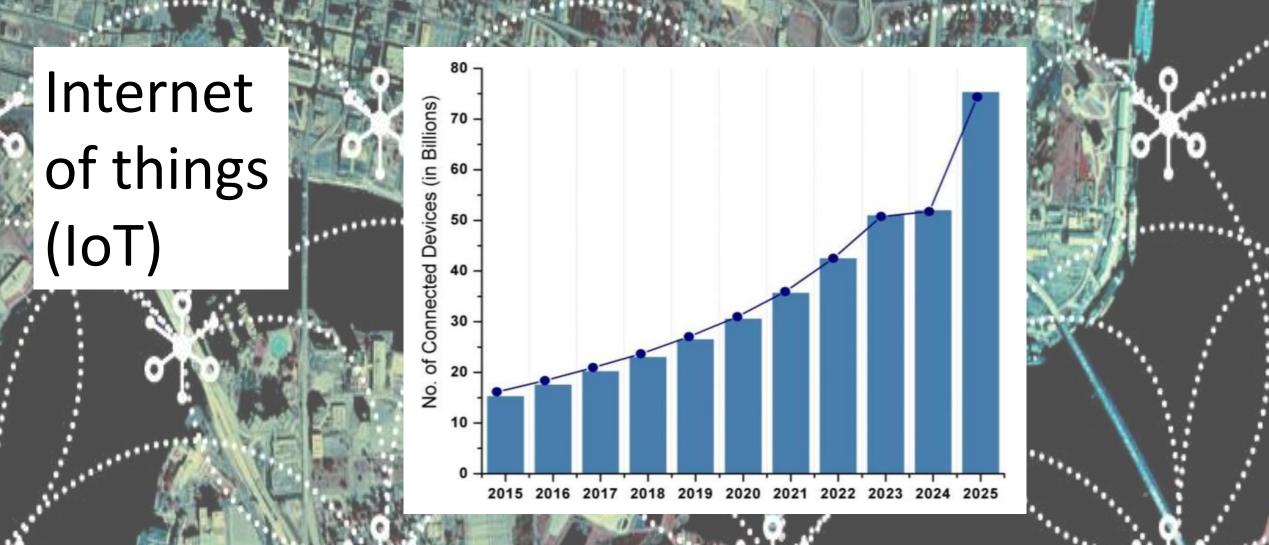
#### Number of internet users worldwide from 2005 to 2021

(in millions)

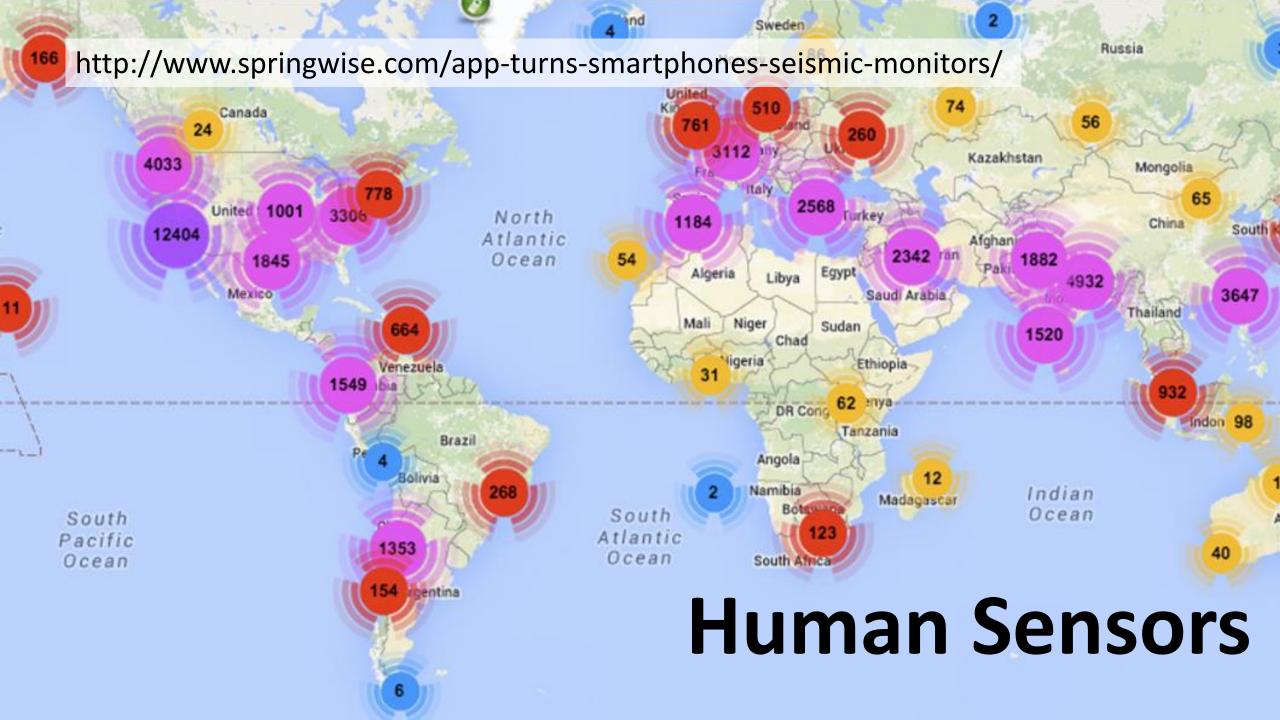


https://www.statista.com/st

https://www.statista.com/st atistics/273018/number-ofinternet-users-worldwide/



Source: Omer Ali and Mohamad Khairi Ishak 2020 J. Phys.: Conf. Ser. 1529 042076 Figure 1: IoT Connected devices installed base worldwide.









# Smart Dike

De IJkdijk

5

#### Internet of (Nano) Things

#### in our Bodies

ntificamerican.com/article/the-internet-of-things\_roes-nano/ ectedly.com/wireless-charging-innovation-brings-smaller-implantable-sensors-body

# **Sensing** Nature

www.tuinadvies.nl/tuinwinkel/product/852



https://www.theguardian.com/scienc 1/brain-implant-controls-robotic-arm-with power-of-thought

(ILLIC

The Guardian May 2015

Brain implant controls robotic arm with the power of thought

#### Cost of Genome sequencing

From \$ 2.7 bn by 2003 to \$ 1000 dollars today heading for \$100 (Illumina)

https://techcrunch.com/2017/01/10/illumina-wants-to-sequence-your-whole-genome-for-100/ https://biodesign.asu.edu/sites/default/files/news/981505908359351bdbde29935f7067f6.jpg

#### CRISPR

HERE COMPANY IN

https://www.the-scientist.com/?articles.view/articleNo/49621/title/Was-a-Drop-in-CRISPR-Firms--Stock-Warranted-/

# Hyper Intelligence

\$0

**Ö IEMWATSON** 

**ДУМАЙ** 

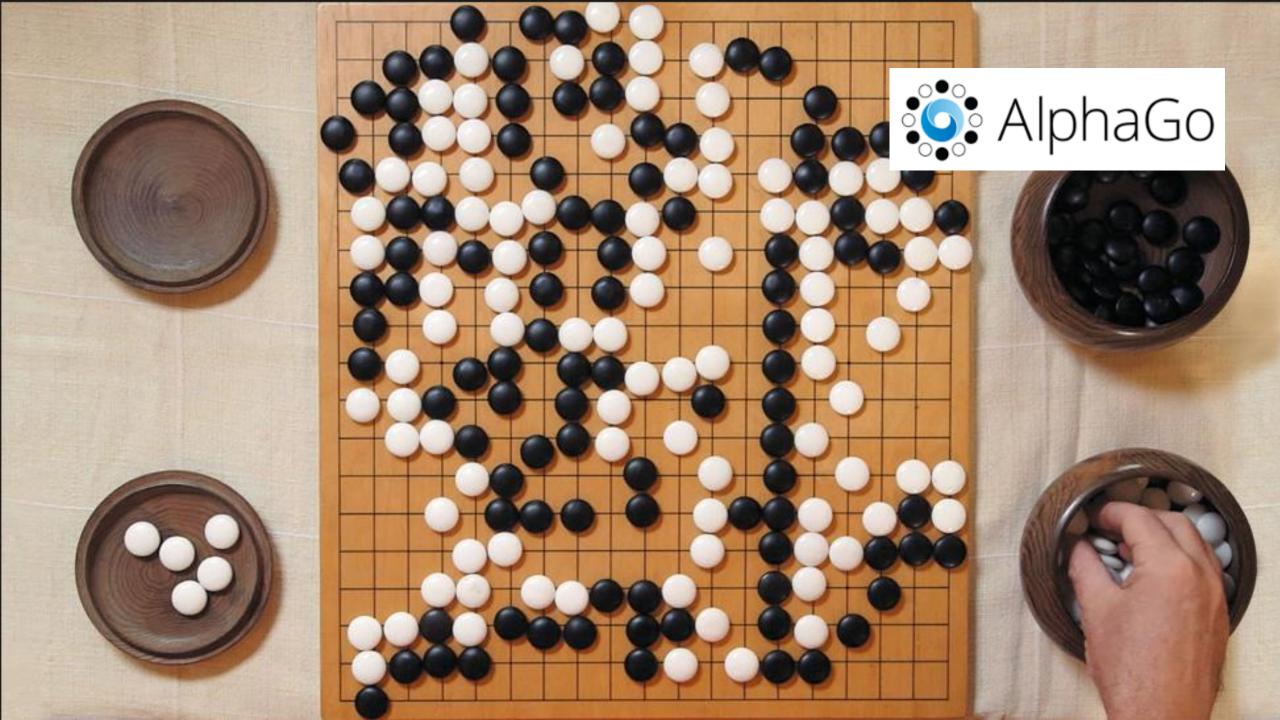
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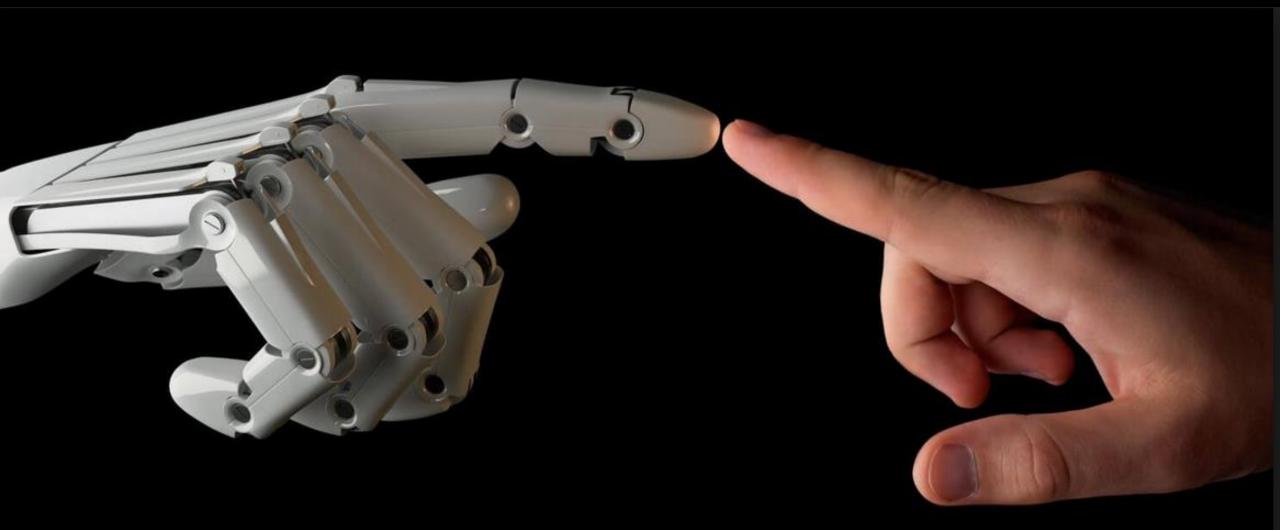
EN

\$1,200

WATSON



## **Emotional Intelligence**



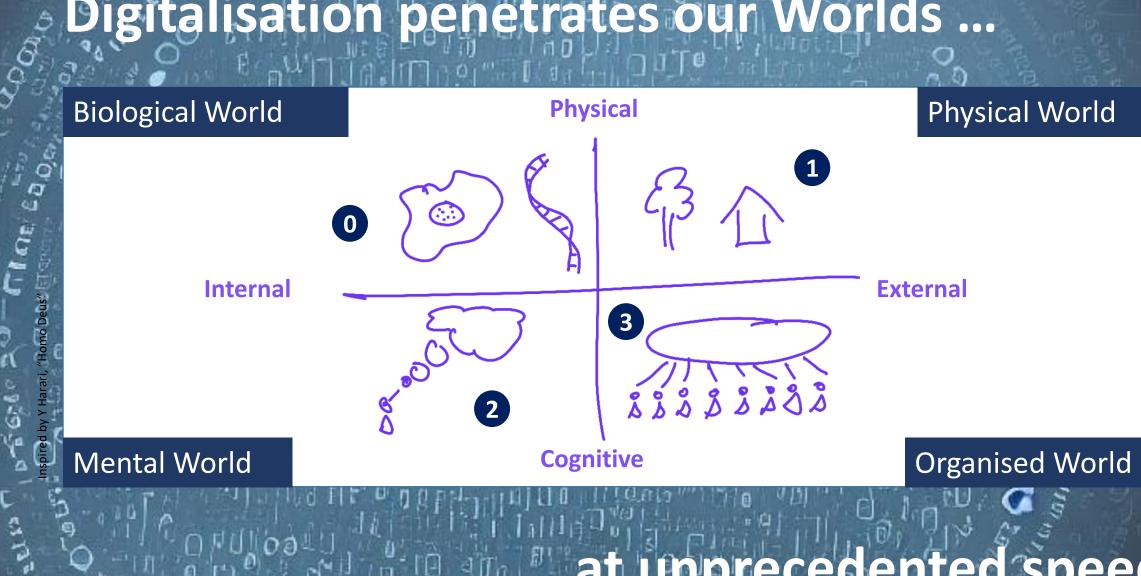
https://singularityhub.com/2016/01/17/anticipating-your-needs-emotional-intelligence-is-the-key-to-smarter-gadgets,

#### Data is the oil of the 21st century ...

y[a], use\_wy: length - 1].b, inp\_arrow verse(); b = m(a, " "); -1

... and Algorithms are the vehicles it fuels

# Digitalisation penetrates our Worlds ...



at unprecedented speed



#### Smart City Ecosystems

Cities account for 80% of all CO2 emissions on earth "By 2050 about 70% of MEGATROPOLIS SOK 00 33 the world's lo km , population will live in HOME cities" United **Nations** 12 % "We're waiting for the city to come to us ... " % 1 % 1800 1850 1900 1950 2000 2050

AKKAD The first cities appeared in alabikh• **Mesopotamia** some 6000

years ago

**Early Mesopotamian City-States** 

Kish

Shuruppak •

Nippur

• Uruk

Ubaid• + Ur

Tigris

Girsu

Lagash

SUMER

.Umma

ELAM

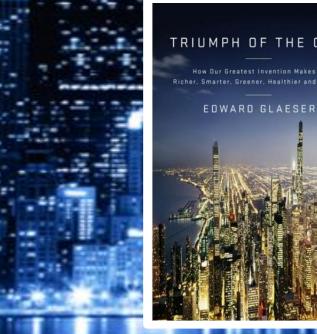
• Susa

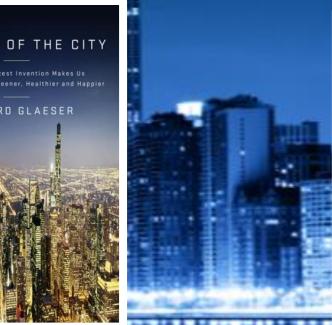
**Civilisation** comes from the Latin word "Civitas" meaning city

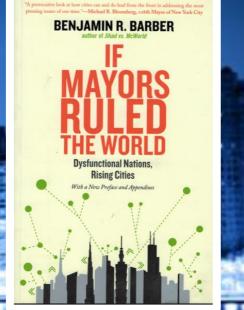
© Georg Gerster National Geographic

### Are cities our "greatest invention" ?





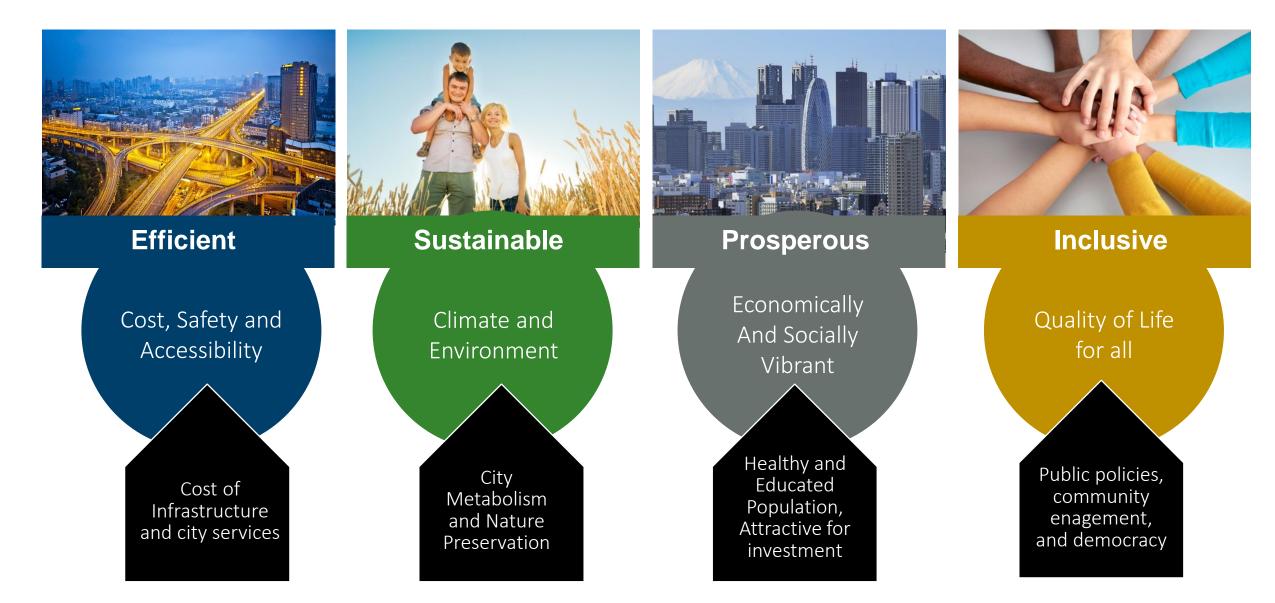




"Cities are places where ideas have sex" "... our culture, our prosperity, and our freedom are all ultimately gifts of people living, working, and thinking together – the ultimate triumph of the city" "Can cities save the world? I believe they can"

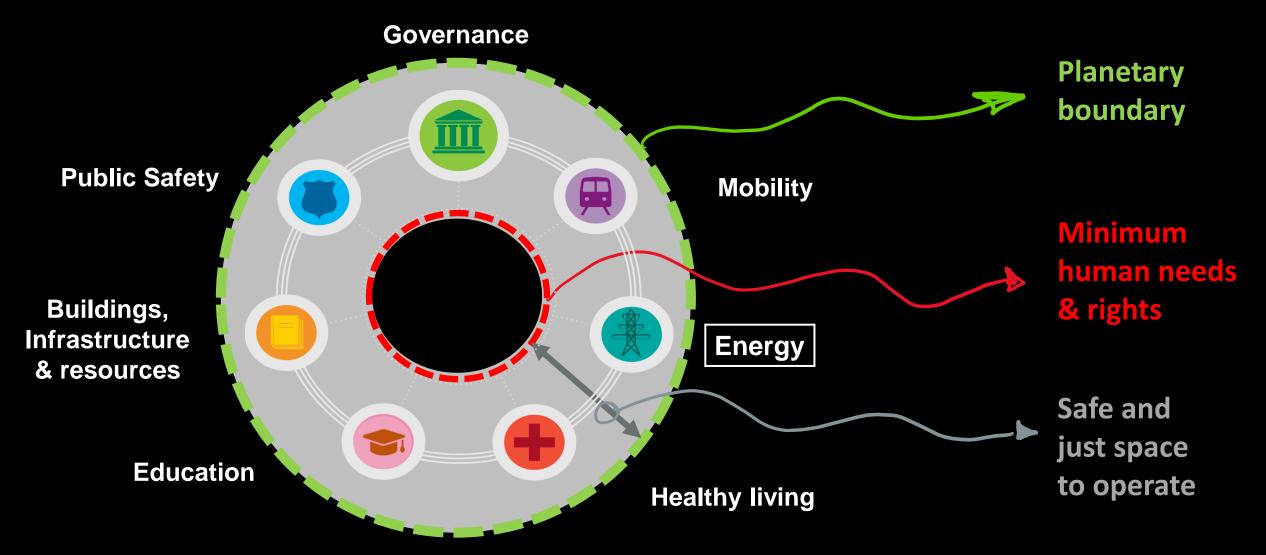


### Smart Cities are about people, planet & profit





### City: a bounded 'system of systems'





### **Energy-Efficient Smart Home Apps**





**JouleBug** 

Constellation Connect

The Energy

Detective

Honeywell





Thermostat



Nest Thermostat

Oroeco



CodeGreen Energy





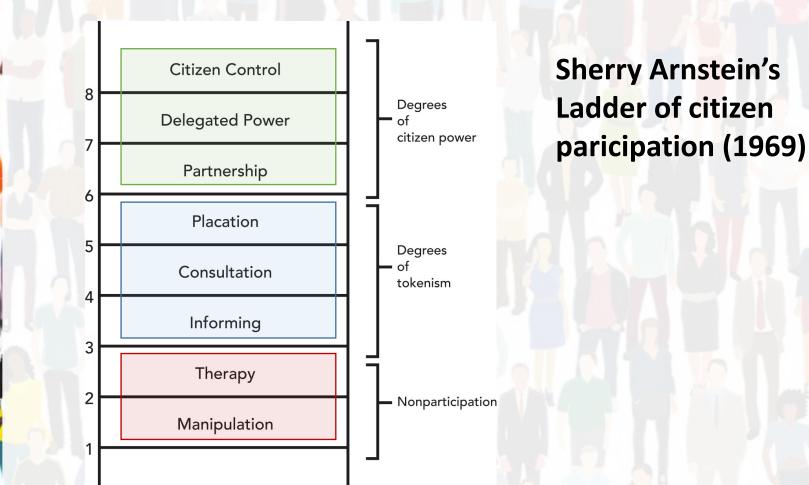
## Smart Citizens – Responsible behaviour Type ALF FM 25 2-200A 240V TA 50A 60 Hz Kh 7.2 1 PH 3W AE-1356

## **Smart Lighting – Adaptive Systems**

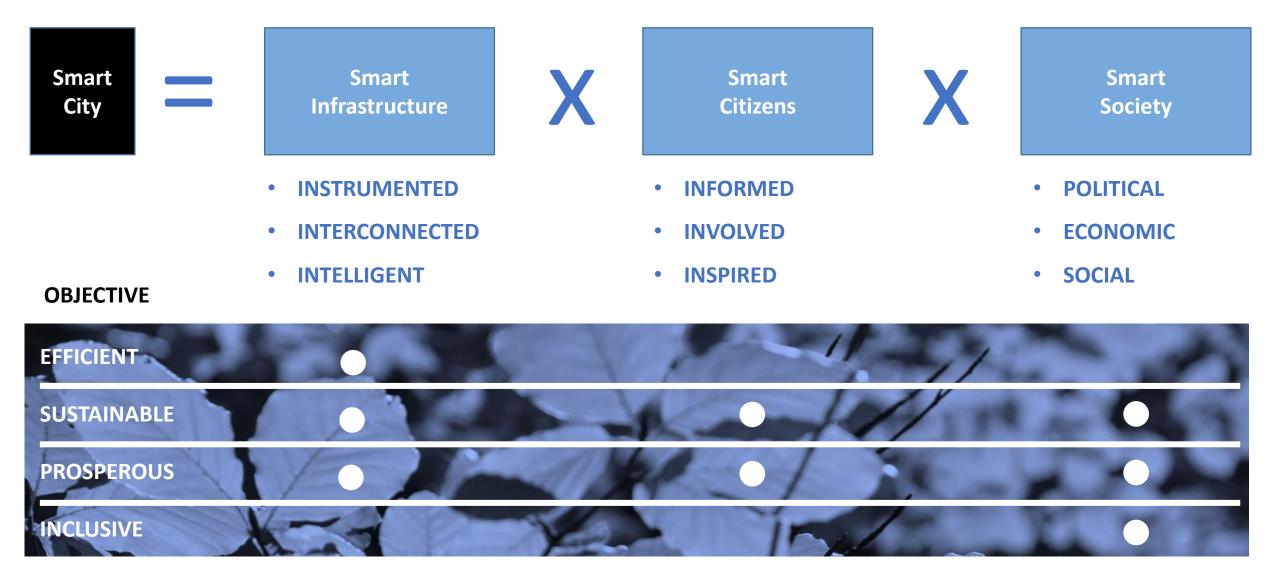


http://www.richmond-news.com/led-streetlights-become-more-feasible-for-city-1.1068801

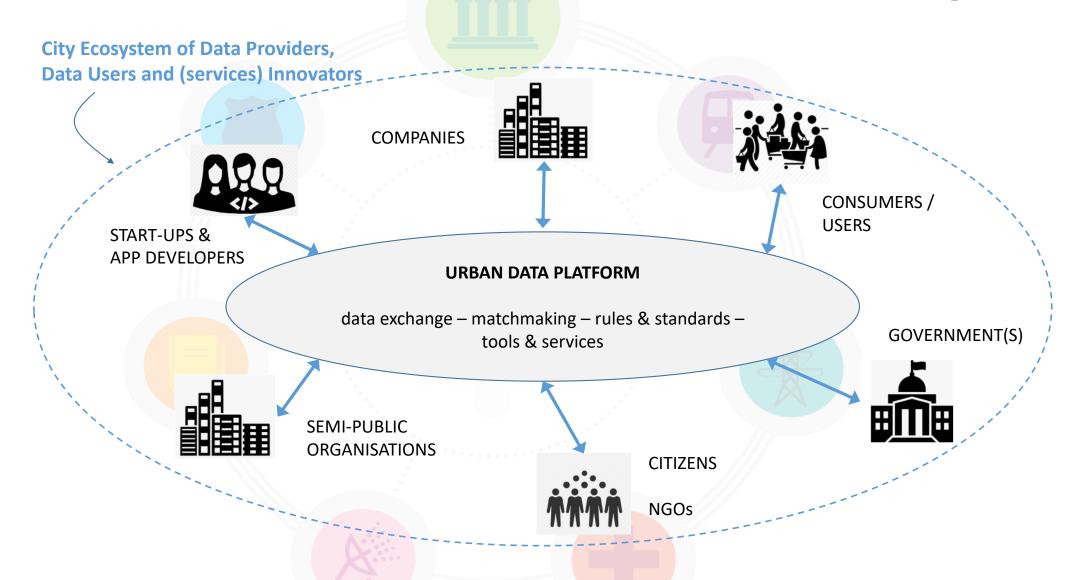
## **Smart Citizens - Participation**



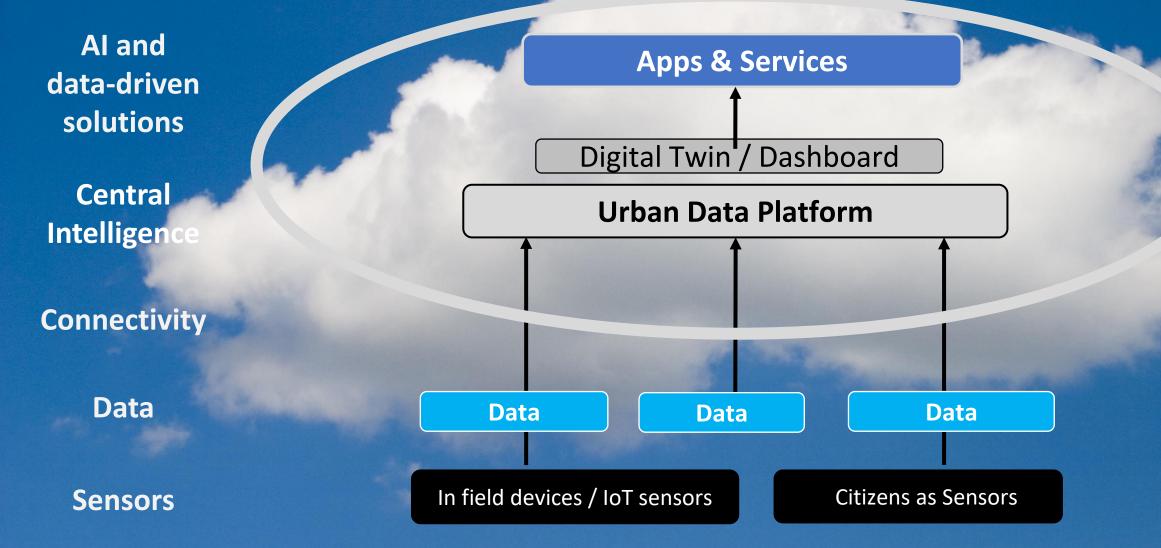
### The three Smart City subsystems



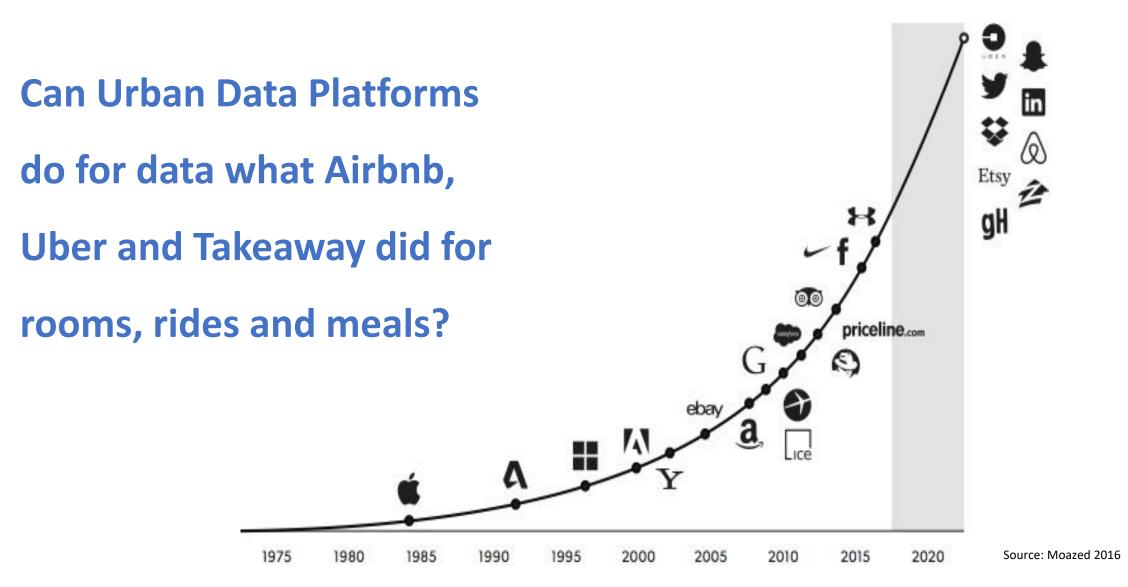
### **Urban Data Platforms for scaling?**



Source: Sheombar et al (2020) "Governance, Trust and Smart City Business Models: the Path to Maturity for Urban Data Platforms" | Ruggedised EU project



Source: Sheombar et al | Ruggedised





## Just Imagine ...!



















# Broken Promises



Sidewalk Labs' proposed neighbourhood remainsa lightning rod for privacy concernsMay, 2018

Sidewalk Labs' advisory panel member resigns citing 'profound concern' about project October, 2018

## Sidewalk Toronto faces growing opposition, calls to cancel project February, 2019



"It is with great personal sadness and disappointment that I share that Sidewalk Labs will no longer pursue the Quayside project" Daniel Doctoroff, CEO of Sidewalk Labs , Google May 2020

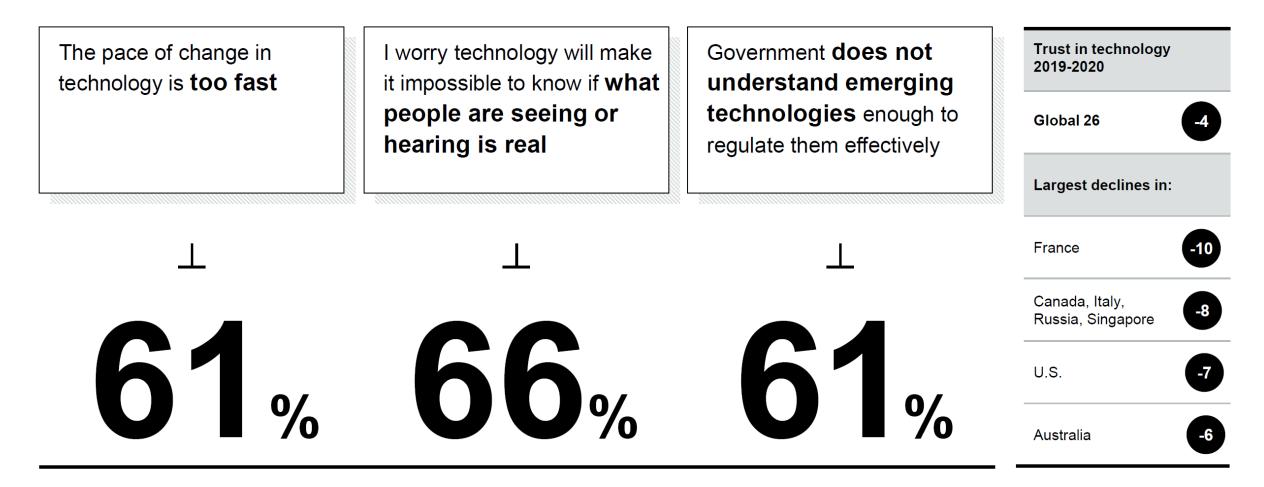
### Smart Cities – still a long way to go

- Different agendas and speed by Companies, Government, and Universities
- Lack of Trust makes collaboration on the Urban Data Platform hard
- Ownership of data?
- Scaling of pilots still difficult
- Municipalities do not know how to engage citizens



### WORRY TECHNOLOGY IS OUT OF CONTROL

Percent who agree



Edelman Trust Barometer 2020





#### Percent who worry about...

Job loss

(net)



57

+6

Experiencing

prejudice or

racism

Climate

change

Hackers and

cyber-attacks

Losing my

freedoms as

a citizen



2022 EDELMAN TRUST BAROMETER

#### **Speed of Capital**

Loss of Identity & Need for Local

Winners and Losers

https

## Globalisation?

## Sustainability?

Uncertainty

**Climate driven Migration** 

**Criticized lifestyles** 

## Digitalisation?

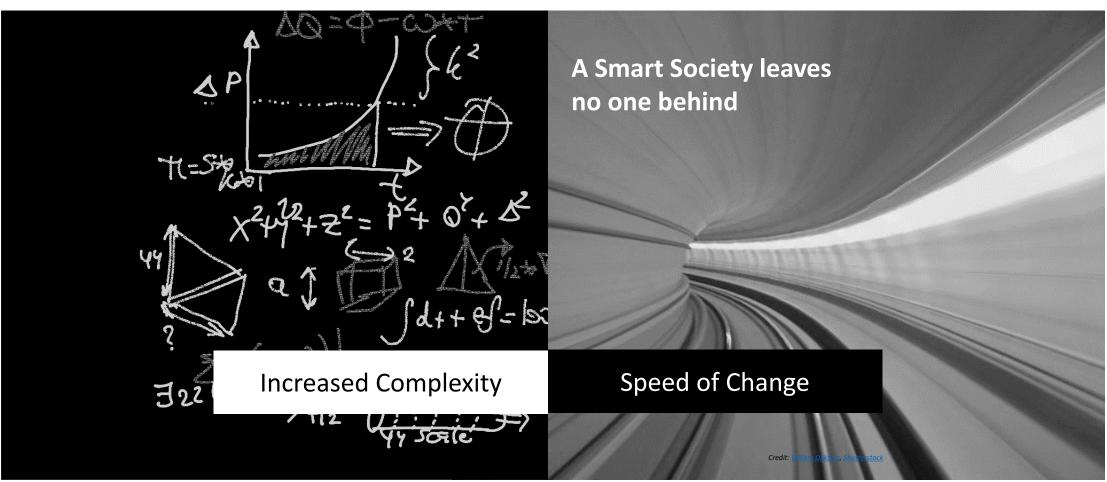
**Competing against machines** 

**Losing Control to Algorithms** 

**Privacy and Security Concerns** 

Photograph: Alamy

# Not everyone can cope: "tech is scary and dangerous" \*



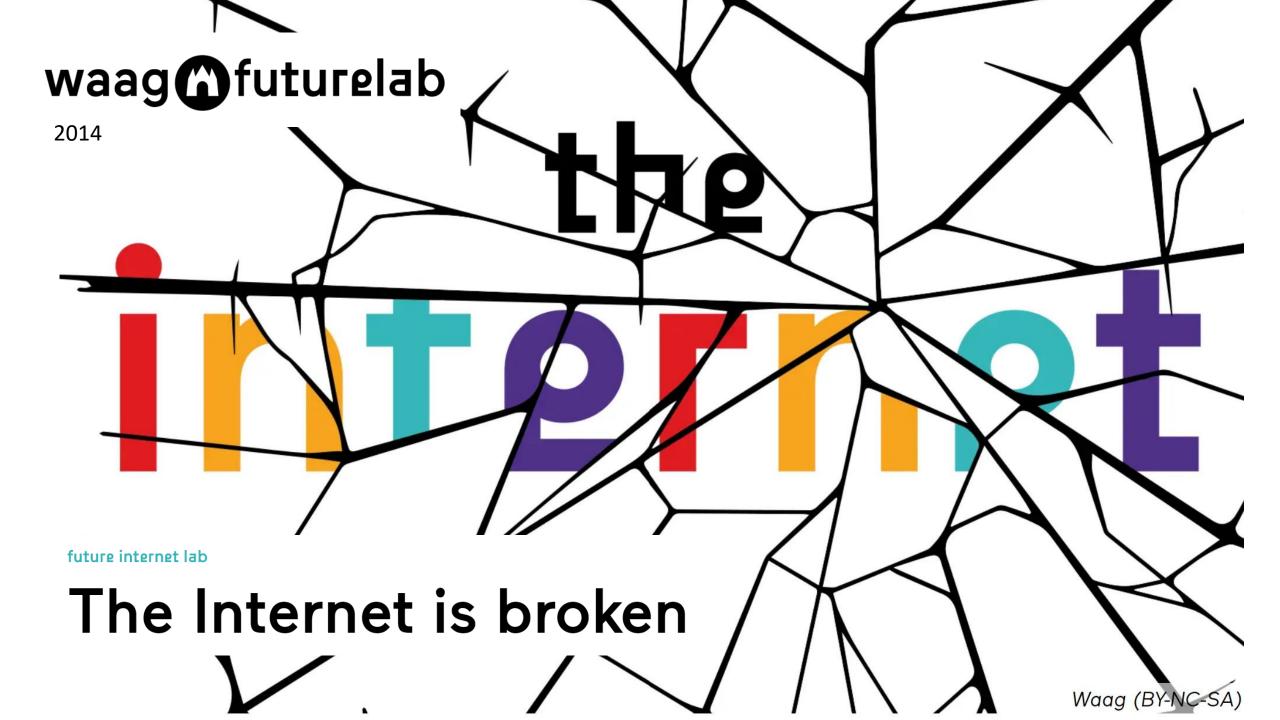
\* Source: O-MOOC #2 Digitale Inclusie

Bron: www.kankantree.com

#### A Smart Society needs Engaged Citizens .... while our World is "Gappy"



1



## The big tech backlash



2018

## Tech giants are drawing political fire over fake news and Russian meddling



Facebook, Apple, Google and other major players in the tech world are facing increasing scrutiny from politicians, big business and the media.

### The New York Times

## The Internet Is Broken. How Do We Fix It?

May 27, 2022

## Erik Brynjolfsson Andrew McAfee Race Against The Machine



How the Digital Revolution is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and the Economy A Sunday Times bestseller

THE AGE OF SURVEILLANCE CAPITALISM

THE FIGHT FOR A HUMAN FUTURE AT THE NEW FRONTIER OF POWER

SHOSHANA ZUBOFF

'Groundbreaking, magisterial ... unmissable' FT

A WALL STREET JOURNAL BESTSELLER

The Age of Al

> Henry Kissinger x Eric Schmidt

Daniel Huttenlocher

'Should be read by anyone trying to make sense of geopolitics today' Financial Times



## Are we heading of Utopia or Dystopia?





## Personal Data (Vaults)

### General Data Protection Regulation - GDPR

• EU Regulation, since May 2018

Transparency, Compliance, Punishment (up to 4% of Revenue or E20mio)

- New rights for individuals, e.g.
  - Right to erasure (article 17)
  - Right to **data portability** (article 20)
  - Right to restriction of processing (article 18)





Personal

**Data Vault** 

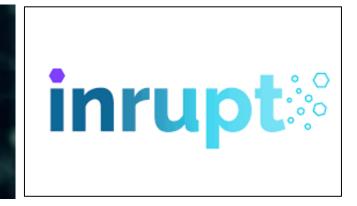
### He Created the Web. Now He's Out to Remake the Digital World.

Tim Berners-Lee wants to put people in control of their personal data. He has technology and a start-up pursuing that goal. Can he succeed?

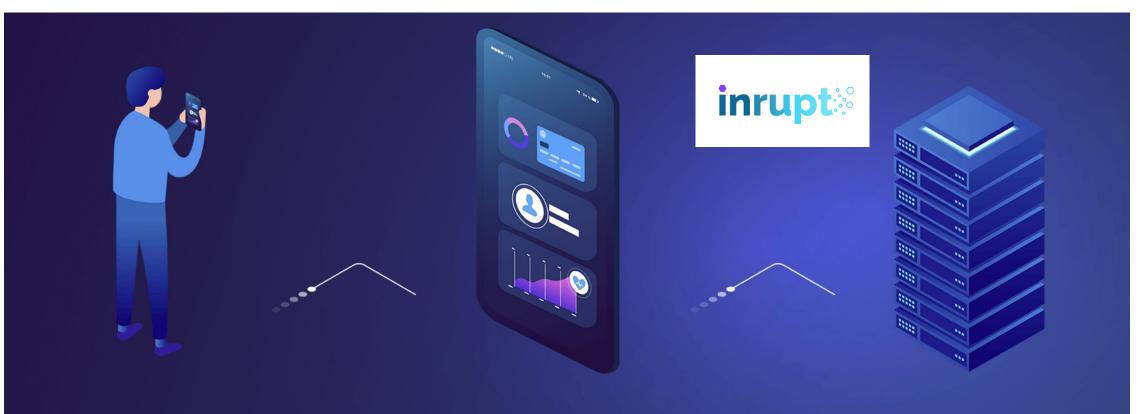
The New York Times, 10 January 2021

Inrupt is delivering Sir Tim Berners-Lee's original vision of a web of shared benefit, for

everyone



Source: inrupt.com



#### Users

Users control which entities and apps can access their data.

#### Apps

Apps can access rich stores of data from any Pods, with user permission.

#### Pods

Pods store user data in an interoperable format and provide users with permissioning controls.

#### Source: inrupt.com

28/10/2022



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731198.



## <u>Governance, Trust and Smart City Business Models:</u> The Path to Maturity for Urban Data Platforms

Dr. Haydee Sheombar (Erasmus University Rotterdam)

Dr. Marcel van Oosterhout (Erasmus University Rotterdam)

Ir. Devin Diran (TNO)

Dr. Samaneh Bagheri (Erasmus University Rotterdam)

Dr. Claus Popp Larsen (RISE)



Erasmus University Rotterdam

Frafino

### Survey: State of development in Europe 2020



鸓

#### Exploring & Planning for Urban Data Platform (44%)

Alexandroupolis Alkmaar Amsterdam Bassano del grappa Berlin Budapest Cluj-Napoca Derry Eskişehir Essen

Genth Gothenburg Graz Kerava Leon Maia Manchester Oostende Parma

Évora

Porto Rennes Reykjavik Riga Santa Cruz de Tenerife Skellefteå Suceava Smolyan The Hague Umeå



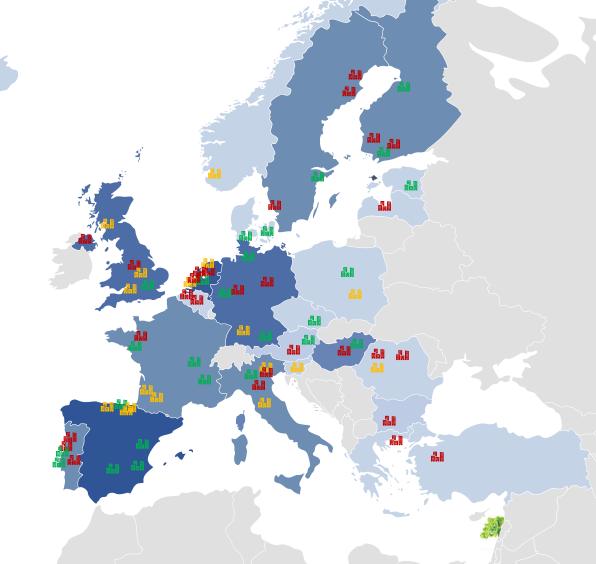
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#### Building & Implementing Urban Data Platform (25%)

Alba Iulia	Maribor	Stuttgart
Bilbao	Nottingham	Trento
Bordeaux	Pamplona	Tampere
Bristol	Rotterdam	Firenze
Groningen	Saint-Quentin	Glasgow
Lublin	Santander	
Linköping	Stavanger	

#### Operational Urban Data Platform (31%)

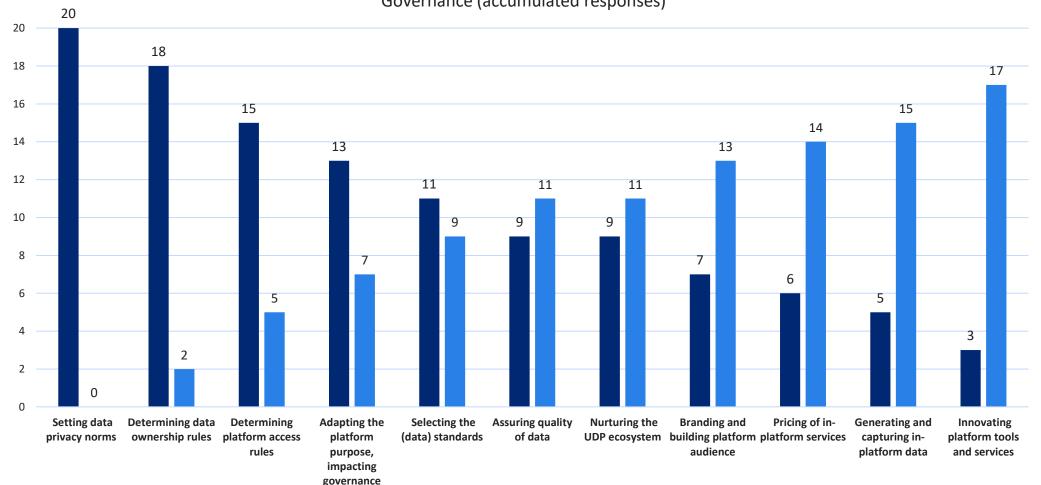
Albacete	Lisboa	San Sebastian
Barcelona	London	Sonderborg
Brno	Lyon	Stockholm
Cologne	Matosinhos	Tartu
Copenhagen	Milan	Utrecht
Grenoble	Munich	Valenica
Hamburg	Nantes	Vienna
Helsinki	Oulu	Warsaw



RUGGED SE



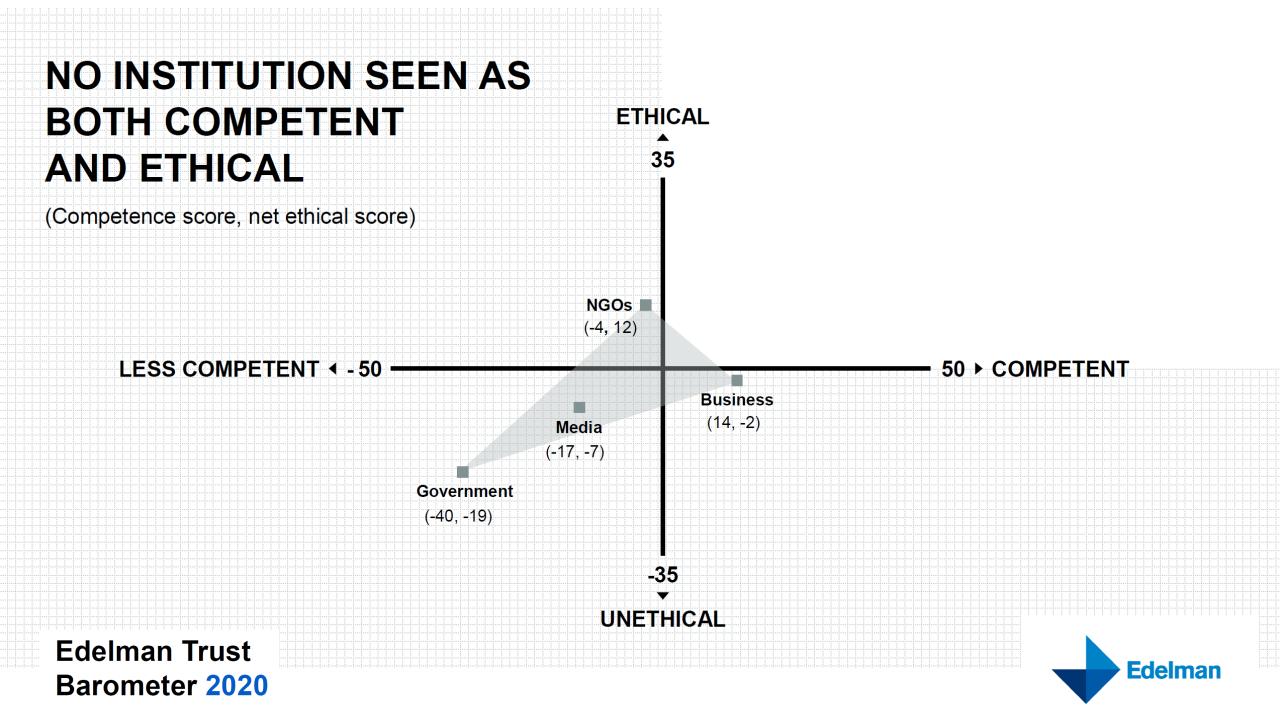
#### Which participant in a joint public-private setup is most suited to control the following components of governance?



Governance (accumulated responses)

Source: 2020 Expert panel by EUR on UDPs among 30 global experts

72

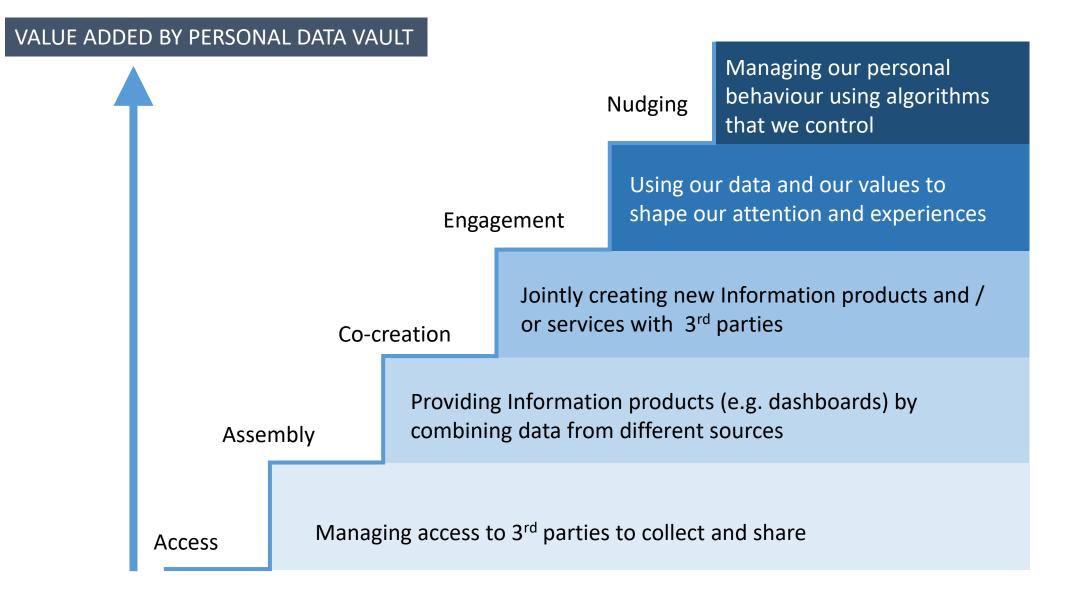


### 9 8 6.4 6.0 4.3 3.7 3.5 **Engage citizens** 3.0 3.0 2.1 1.7 as entrepreneurs Λ Engage Citizens in Engage Citizen in Engage Citizens as Engage Citizen in Engage citizens to Engage Citizens to Engage Citizens to **Engage Citizens to** Engage Citizens to and/or help the design of the the co-design of the help manage their self-improve their contribute personal make their voices help manage their policy making and entrepreneurs them to platform itself and/or help them to services and apps social communities quality of living/life and/or sensor data data privacy and urban planning heard and thus monetize their that use the using data from the to the platform data ownership strengthen the monetize their democratic society personal data platform platform personal data **Government responses** 9 8 7.0 5.5 4.7 4.6 4.2 3.9 2.4 2.0 1.5 Engage Citizens as Engage Citizens to **Engage Citizens to** Engage citizens to Engage Citizens to Engage Citizen in Engage Citizens to Engage Citizens in Engage Citizen in entrepreneurs help manage their make their voices help manage their self-improve their the design of the contribute personal policy making and the co-design of the and/or help them to social communities platform itself and/or sensor data heard and thus data privacy and quality of living/life urban planning services and apps strengthen the data ownership using data from the to the platform monetize their that use the personal data platform platform democratic society

### Rank these categories of citizen engagement from the most to least valuable

**Company responses** 

Source: 2020 Expert panel by EUR on UDPs among 30 global experts



Source: H.S. Sheombar, Engaging Citizens in the Smart City, Power-gen Europe Conference, Milan 2016

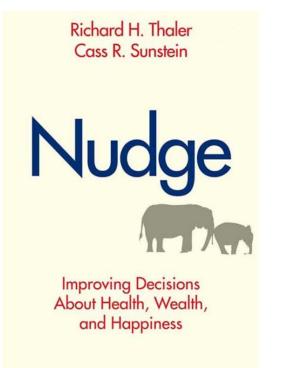
"We could change the situation we are now in.

Probably not by technologizing our way out

of it, but by radically changing our **behaviour**"

Stephen Emmott, "10 Billion", 2013

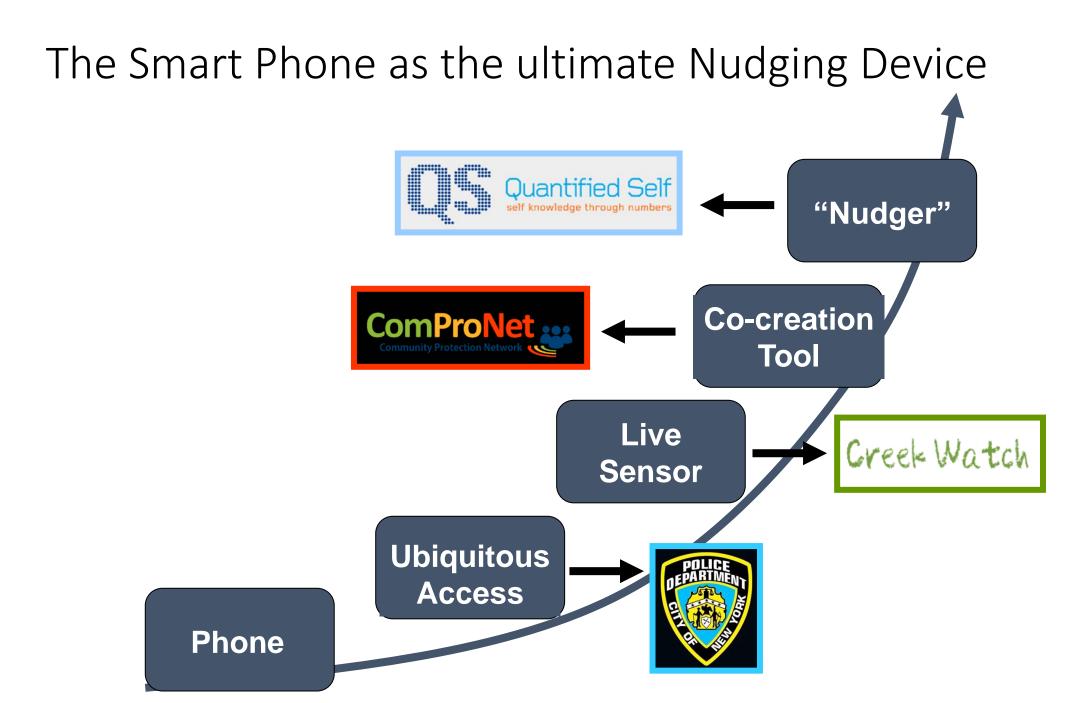
### To nudge or not to nudge?



2017 Nobel Prize for Economics Richard H Thaler



### "FREE WILL? -- I THINK THEY NEED MORE STRUCTURE THAN THAT."



### City $\rightarrow$ "InterSpace" $\rightarrow$ Metaverse?



### Intelligent sidewalk



# Piano Stairs in Stockholm

### Meet Elliot and Elisa

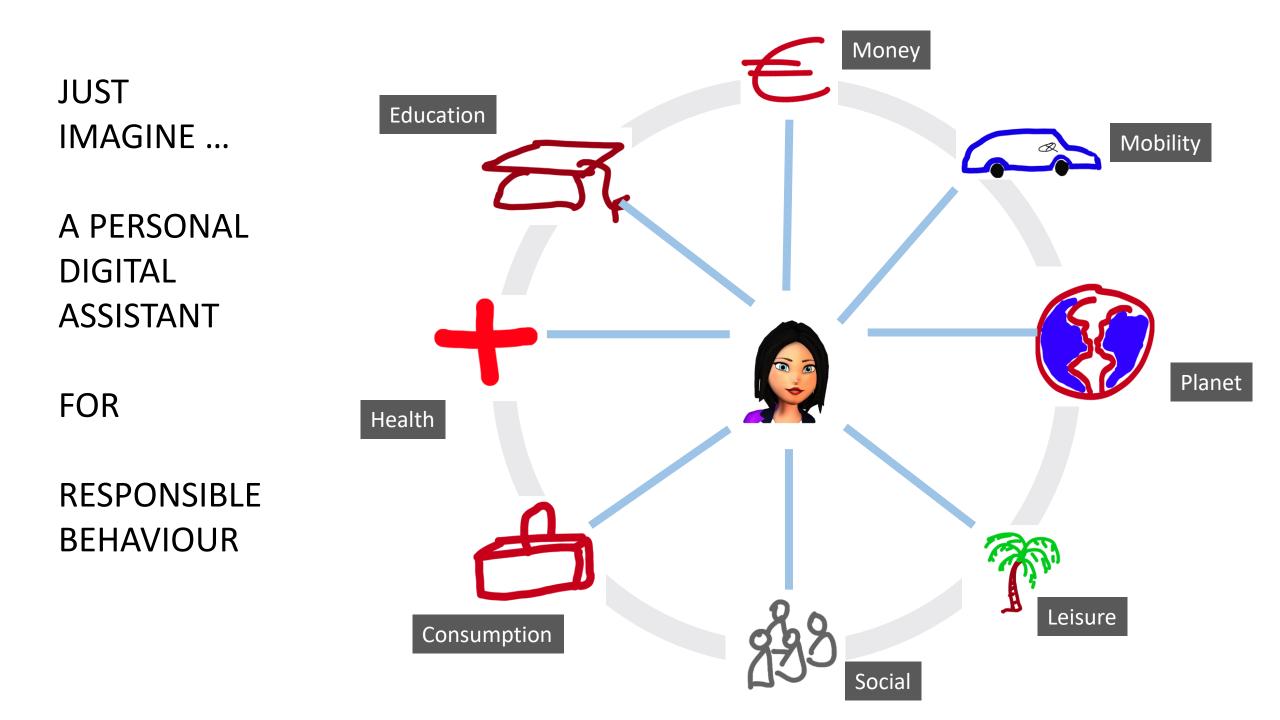
Good Morning, Elliot! Are you ready for your Big Day?

More than just a User interface ...

... but a personal advisor and digital avatar ...







### Can you imagine Elliot 's Digitally Assited Life?

Elliot is woken up by Elisa, his digital personal advisor, who is playing his favourite song "Give it all you've got" which is appropriate for the action packed day ahead. Sitting on the rim of his bed, his diary is read to him by Elisa: an important meeting with the bank, a Doctor's appointment, a strategy presentation to the Board and at the end of the day, squash with Marc.

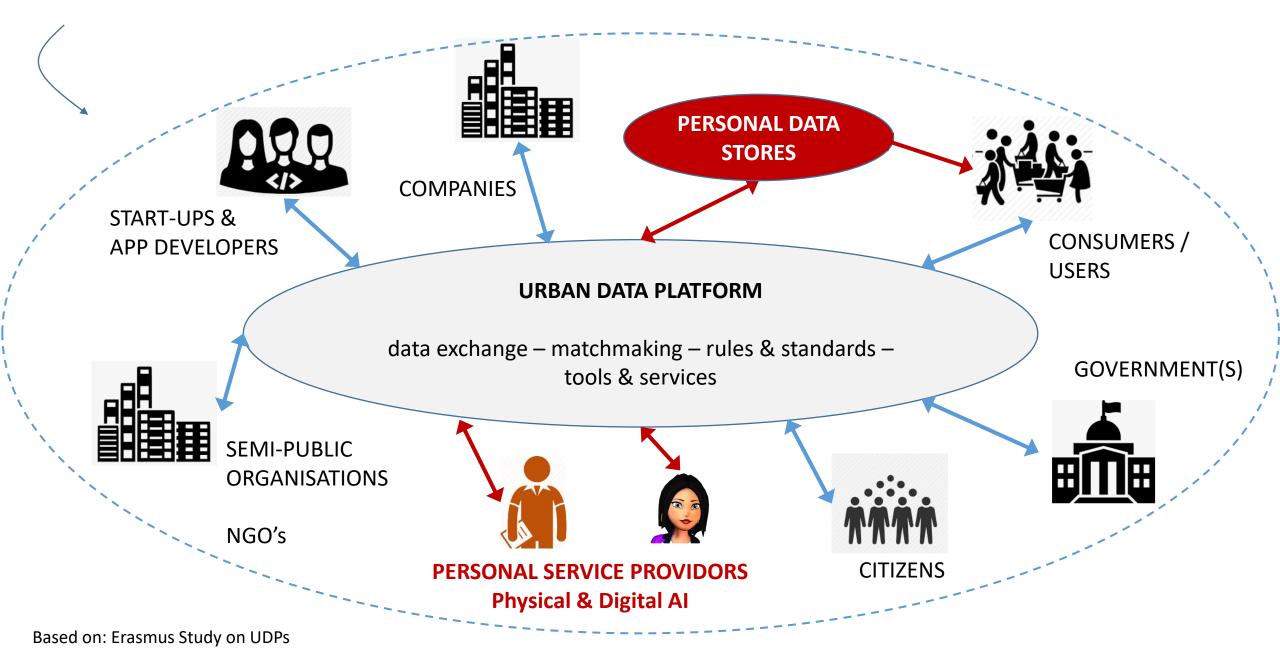
In the bathroom his sensorised toilet analyses his urine and uploads the values to his medical record that is shared with his cardiologist, as are the readings from this fitness tracker. Elisa also checks Elliot's bank statement and notices that Elliot has made more stops at fast food places *en route* than last month. She reminds Elliot of the number of fast food visits this month and also places this information in his medical record. As Elliot leaves his apartment Elisa checks for the energy prices online and turns on the dish washer when the tariff is low.

In the meantime, at the cardiologist, Elliot and the doctor have a good look at the visual that Elisa has prepared for them. The doctor shows Elliot how the spikes in his pH levels coincide with his visits to the Big "M". Elliot pledges to take more time for healthy eating and for a moment – just for a moment – even considers asking Elisa to block his bank cards when he is near a fast food place.

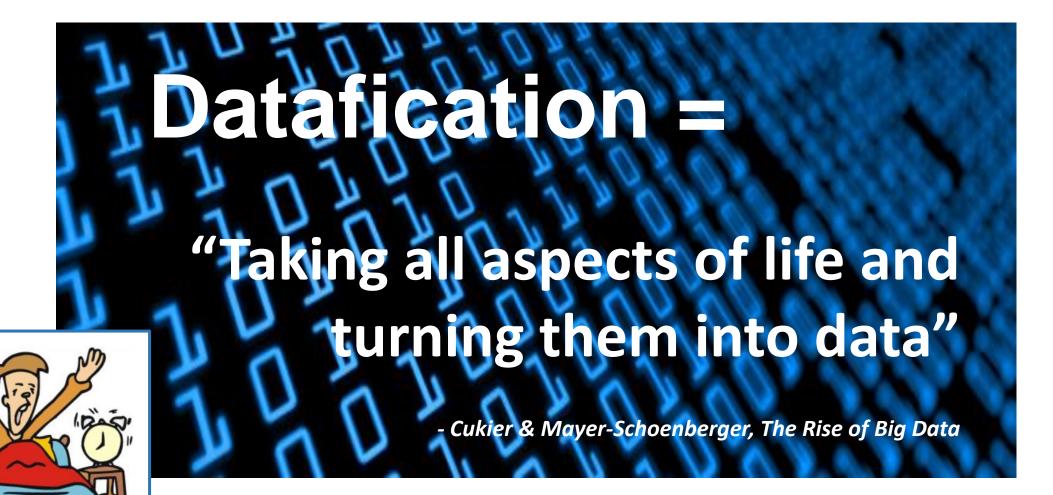


Later that day the meeting with the Board goes so well that they spend more time than planned. Elliot is going to be late for squash. But of course, Elisa notices that Elliot is still at the office and sends a Facebook message to Marc that Elliot has been delayed. After a strenuous game with Marc, Elliot drives home feeling relaxed, knowing that Elisa will have turned on the air conditioning so he can cool down and look back at another great day. If only Elisa could have poured him a glass of cognac ...

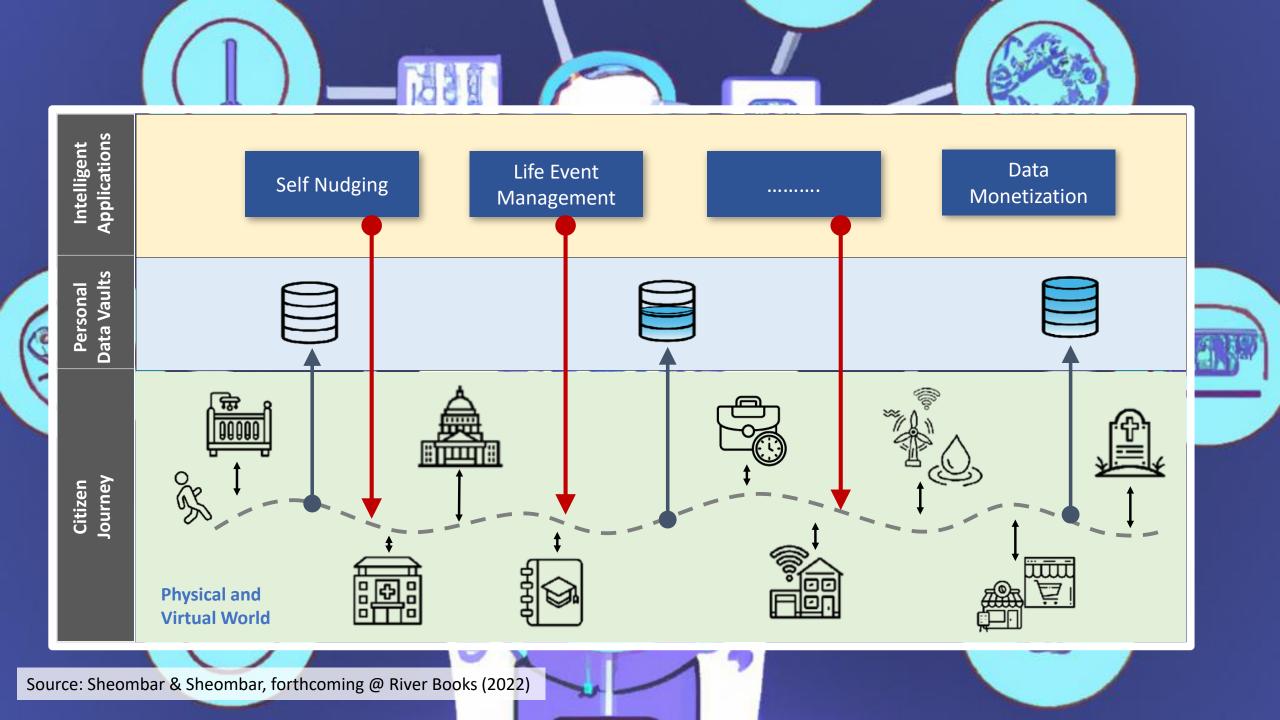
### **City Ecosystem of Data & Service Providers, Data Users and (services) Innovators**



### The birth of "homo datanomicus" ...?

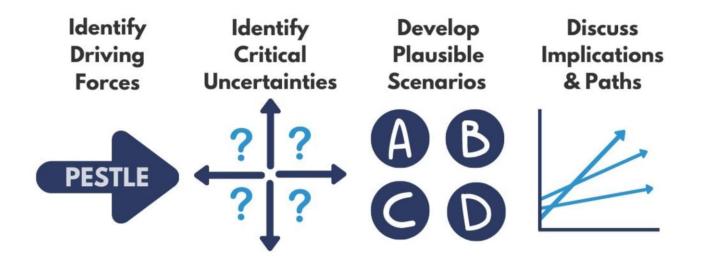


<u>"homo datanomicus"</u> - term coined by Gernot Rieder



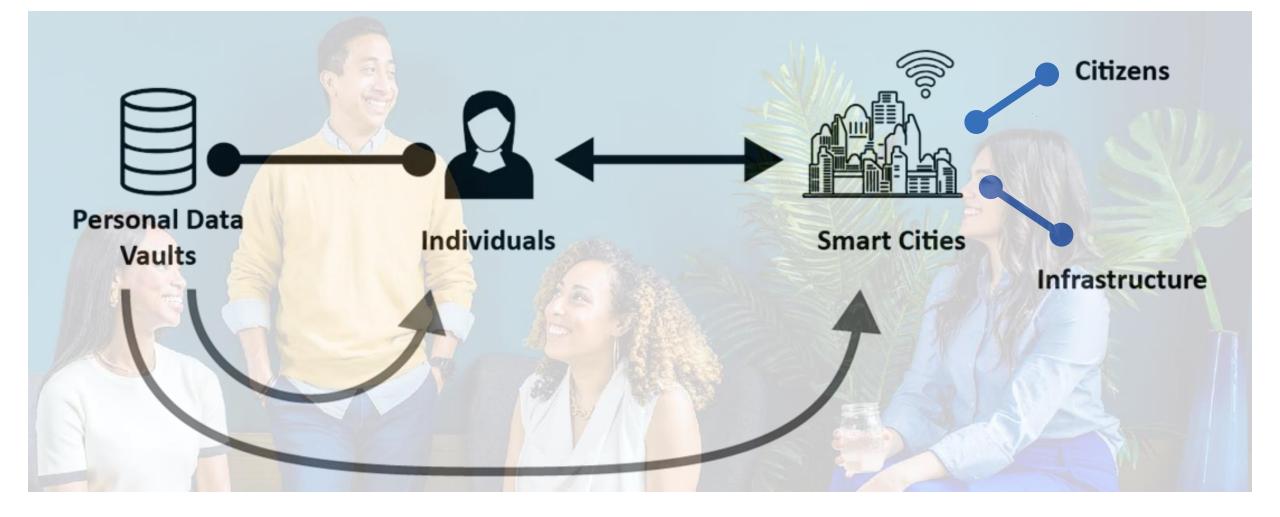
Scenario analysis:

### What if we infuse personal data into Smart Cities?



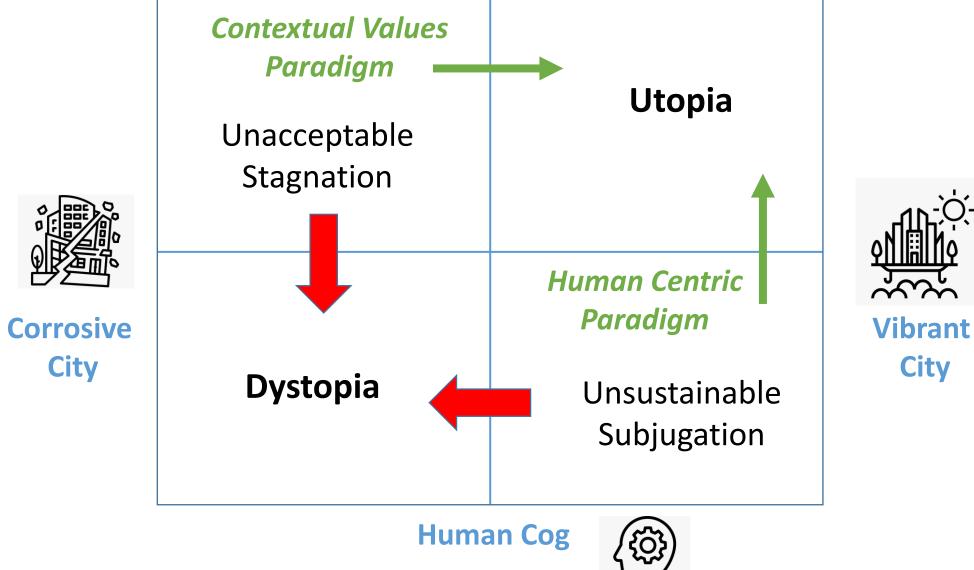
SOURCE: https://www.smestrategy.net/blog/what-is-scenario-planning-and-how-to-use-it

### Drivers: impact on 1) the individual 2) the city



	<b>*</b>	
Impact PDV on the Individual		
State of mind	Subjugated, manipulated, loss of autonomy, feeling excluded	Empowered, free, full of potential, positive
Behaviour	Irresponsible, ignorant, irreverent, not caring	Virtuous, conscious of societal challenges, self-controlling (PDA)
Financial	Not able to get value from data, exacerbating the digital divide	Able to monetize personal data, improve employability
Impact PDV on the Smart City		
Economic	Too tightly coupled, not capable, no room for exploration	Efficient, well functioning, clean, good services, adaptive, vibrant
Political	Big brother-ish, intrusive, authoritarian	Engaged citizens, democratic
Collective, Community, Social	Segmented, profiling, un-equal, excluding, discriminating	Inclusive, acceptable level of inequality, coherent





City

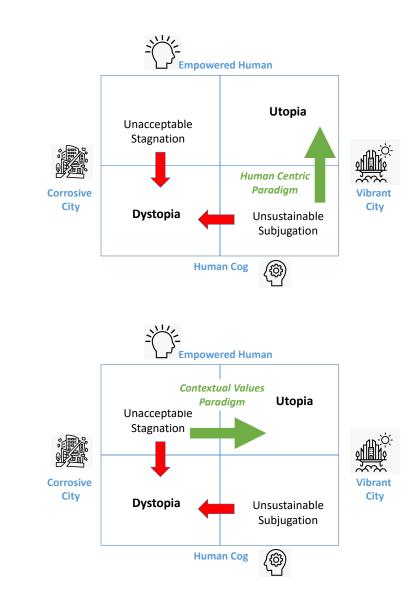
### Strategies for Utopia

### Human Centric Design Paradigm

- Abandon the 'economic growth first' mindset
- EU: not a "twin transition", but a "triple transition"

green – digital - human

- Contextual Values Paradigm
  - European values
  - Environment for exploration, creativity and diversity



## A priori concerns with the use of Personal Data

### Human Dignity\*

"All humans are inherently equal and entitled to moral respect"

"Decry the instrumenta-lisation of human beings"

How to protect human rights?

\*) Leidner & Tona, Theory on dignity and personal data, MISQ, March 2021

### **Digital divide**

- Exacerbating the divide?
- Digital Assistants! \*



\*) Kane et al, **Emancipatory Assistants**, MISQ, March 2021

### **Algorithmic Bias**

- More data leads to the proliferation of AI
- How to manage
  - Bias
  - Transparancy / ssing the digital Explainability de pdf
  - Accountability



<u>Artificial Intelligence Surpasses Human</u> <u>Understanding – ICA Agency Alliance, Inc.</u>



# Who do we trust with all of our Personal Data in one place?

"Without trust we cannot stand"

- Confucius

# amazon alexa

100000	
1000000	

# **Google** Home

### Discussion

1. Personal Data Platforms are critical Public Infrastructure

We do not trust the Government with all of our personal data

3. Citizens / consumers have no interest in self-managing their personal data

Ten years ago we thought the same about self-managing their energy (bill)

2. "Homo datanomicus", like "homo economicus", is yet another fallacy

"Homo datanomicus" is a better proxy as it is based on actual behaviour 4. Personal Data Stores will not take off without the "Digital Assistants"

Personal Data Stores have a 'business case' built on privacy and sovereignty



# Toward Utopia?

**Democracy besieged** by fake news and filter bubbles

**Big Tech** 

Disengagement and populism

Rising

**In-equality** 

Singularity and

runaway Al

Leaving for Mars ...

Climate change

**Genetic Engineering** Surveillance **Capitalism and** 

Job displacement

Migration

### "HAL – Open the Pod Bay Doors"

2001: A Space Odyssey (1968)

### "I'm sorry Dave - I'm afraid I can't do that"

2001: A Space Odyssey (1968)

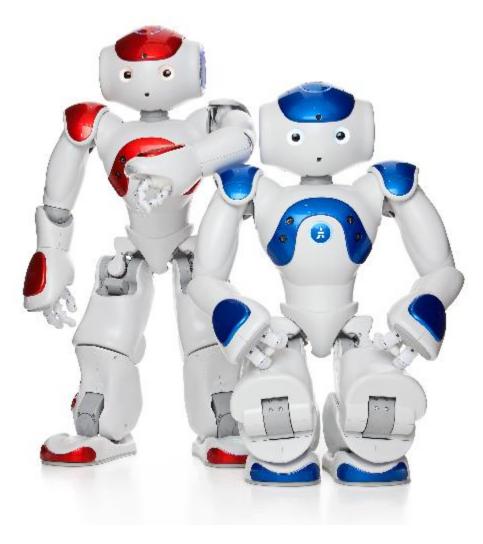


Who will light our path and lead the way?

11000

0011

### Do we really want machines ....



Photograph: Alamy

ttps://www.behance.net/gallery/42026371/Designer-Babies-CRISPR-Explained

# Do we really want ....

# DESIGNER BABIES

# We do want solutions!

THE BLOG 08/01/2011 02:14 pm ET | Updated Oct 01, 2011

### **Can GMOs Help End World Hunger?**



theguardian

# A power of good? Smart energy technology explained

Some new energy-efficient technologies are on the verge of delivering real benefits to consumers and companies alike

MODERN MEDICINE

# From coding to cancer: How AI is changing medicine

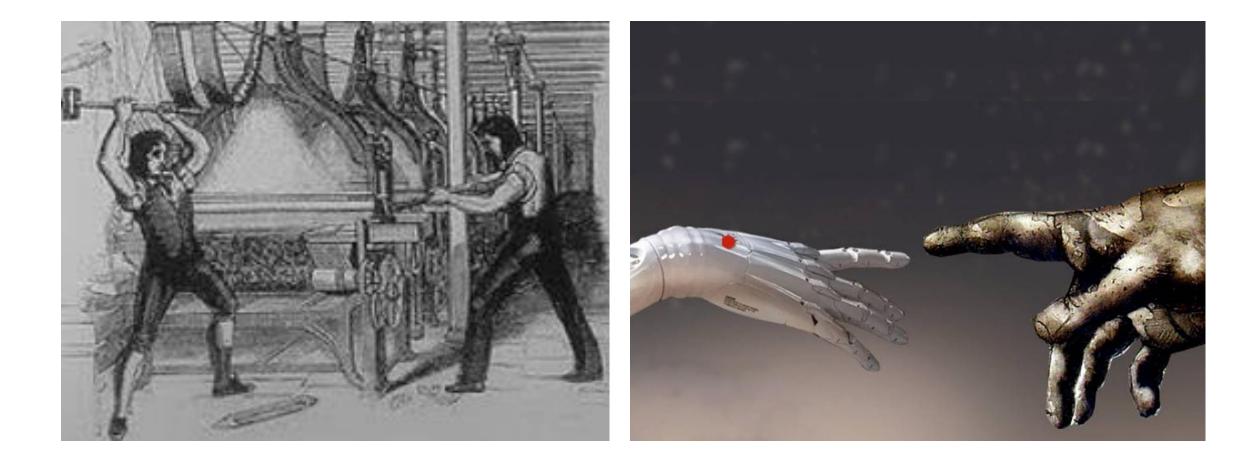
Grand

Challenges

Meg Tirrell | @megtirrell Published 3:48 PM ET Thu, 11 May 2017

**Magnetic CNBC** 

### **Beware the Luddites - choose Augmented Humanity**



### Beware the naives – do not give the fire back to Machine-Gods (and the people who build them)

Prometheus Carrying Fire – Jan Cossiers (1600–1671) – Prado Museum

DALL E

For the first time in the history of mankind we have the capability to fully shape the natural and artificial world –

Great power commands great responsibility







### Inspired by nature's way to make complexity beautiful

Kankan\*Tree is inspired by the Ceiba pentandra which is a majestic tropical tree and symbol for the complex biological interactions and human connections with the environment. The giant limbs of the Ceiba's umbrella-shaped crown are laden with aerial plants and provide a home for countless species including frogs, birds and bromeliads. The Ceiba, also known as the Kankantrie in Suriname South America, towers over the other rainforest vegetation. As its many seeds are easily blown into the air, these trees are some of the first to colonize open areas in the forest.

Our philosophy is that seeking insight, spreading and sharing ideas, and working in business ecosystems nourish the creativity needed to design solutions for the Digital Age.



