



# Algorithmic Governance

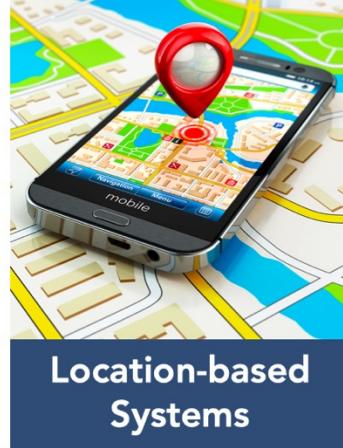
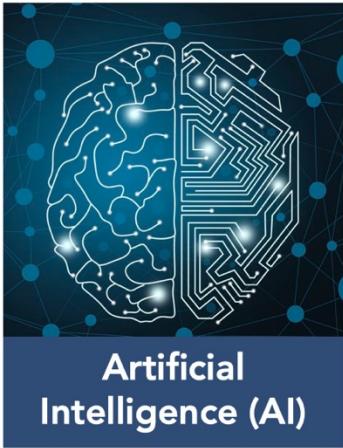
Dr Zeynep Engin

3 November 2021

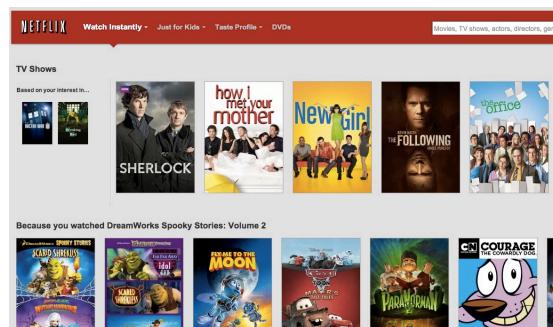
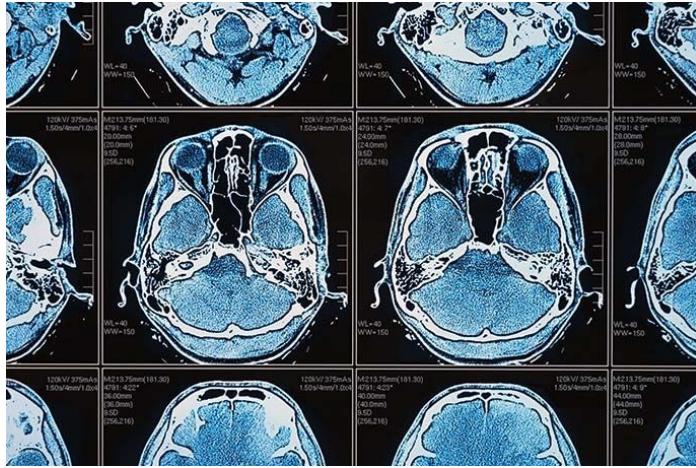
Data, Politics and Society Module Week 5, Year 1 Lecture

UCL Department of Geography

# Algorithmic Systems...



# Algorithmic systems for social good...





"Algorithmic Governance" by Zeynep Engin, November 2021



Algorithmic systems have some superior (but opaque) qualities that people find concerning, especially in socio-economic contexts...

# What is an ‘algorithm’?

**Chocolate Cake Recipe**

**INGREDIENTS:**

- 2 cups granulated sugar
- 3/4 cup Hershey's Cocoa
- 1 teaspoon baking powder
- 2 large eggs
- 1 cup strong black coffee or  
2 teaspoons powdered instant coffee plus 1 cup boiling water
- 1 teaspoon pure vanilla extract
- 1/2 teaspoon pure almond extract (optional)
- 1 3/4 cups all-purpose flour
- 2 teaspoons baking soda
- 1 teaspoon kosher salt
- \*\*1 cup buttermilk or sour milk
- 1/2 cup Canola oil or unsalted butter (1 stick,melted)

**PREHEAT** oven to 350F.  
 Grease and flour two 9-inch round baking pans or one 13x9x2" baking pan.  
 Set aside.

**DIRECTIONS**  
 Sift and stir together sugar, flour,cocoa,baking soda,baking powder, and salt in a large bowl.  
 Add eggs,buttermilk,coffee,oil, and vanilla; beat on medium speed of mixer for 2 minutes  
 (Batter will be thin). Pour batter evenly into prepared pans.

Bake 30 to 35 minutes for round pans, 35 to 40 minutes for rectangular pan  
 or until wooden pick inserted in center comes out clean.  
 Cool 10 minutes, remove from pans to wire racks.  
 Cool completely. Frost. (Goes great with a nice cream cheese frosting)

*Makes about 10-12 servings*

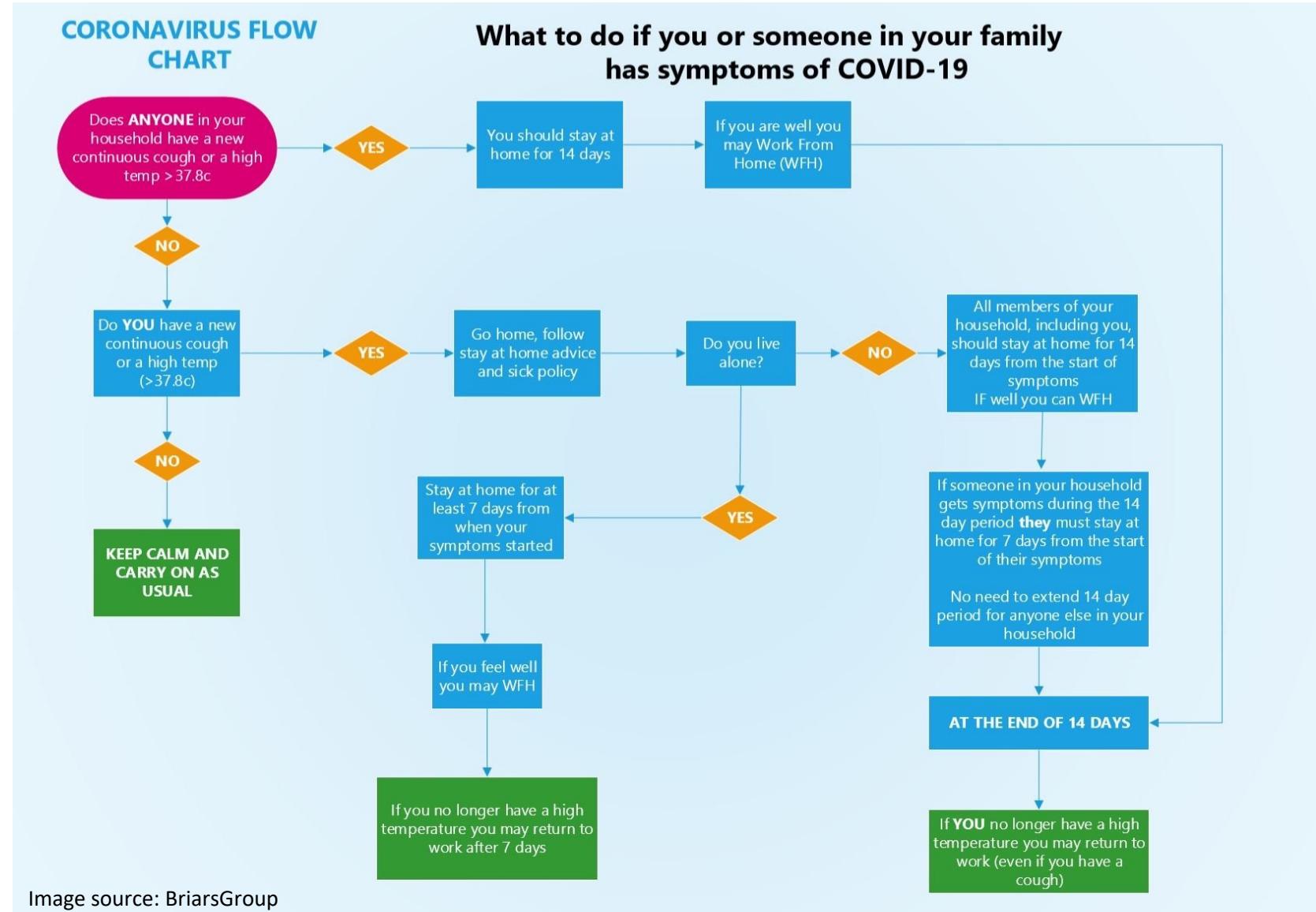
**FOR BUTTERMILK:**  
 \*\* Use 1 Tablespoon vinegar or lemon juice plus milk to equal 1 cup

# Algorithm:

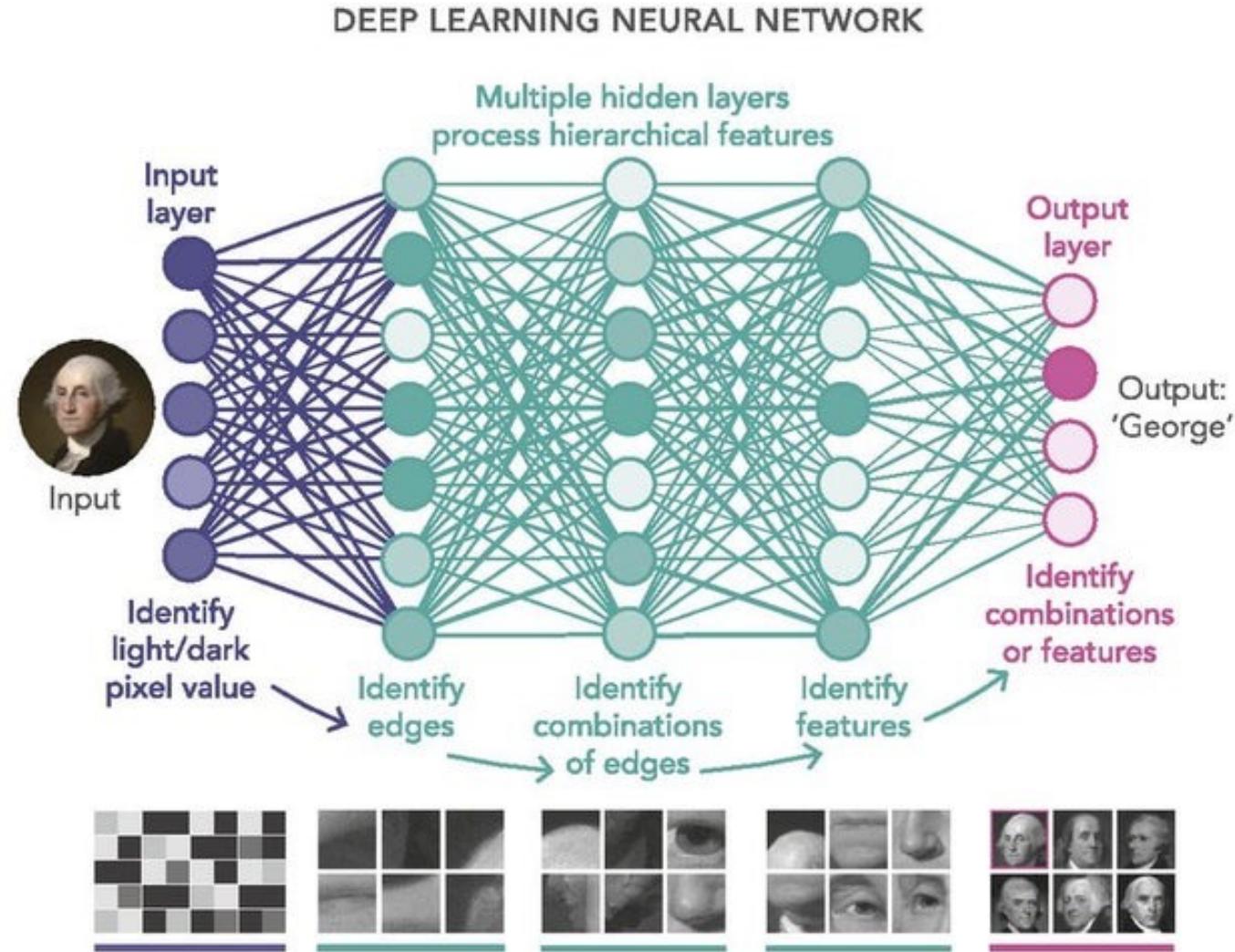
*"A finite set of instructions designed to perform a task"*



# More algorithms ...

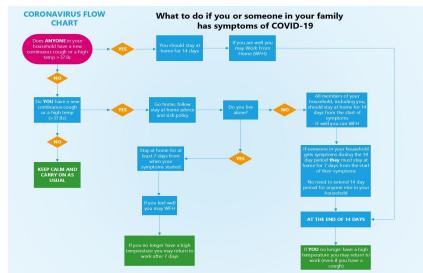
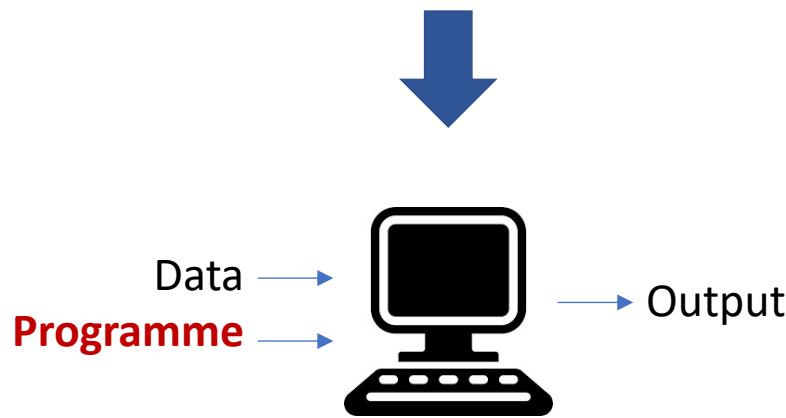


# More algorithms ...



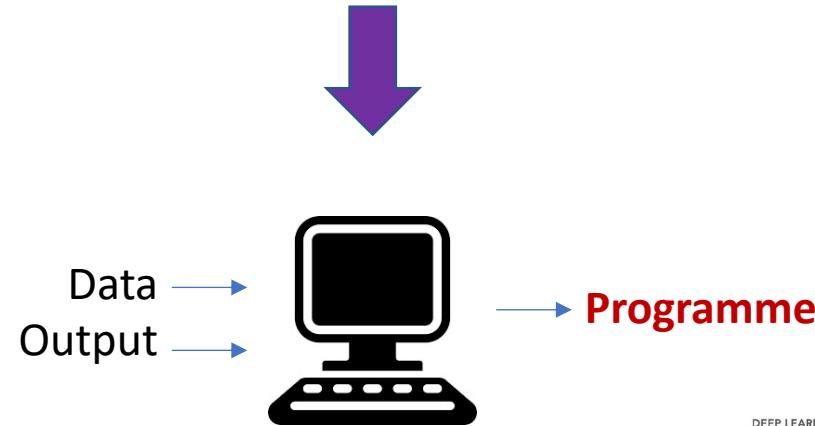
# What does a ‘data-driven algorithm’ mean?

## Traditional Programming (knowledge/rule-based)

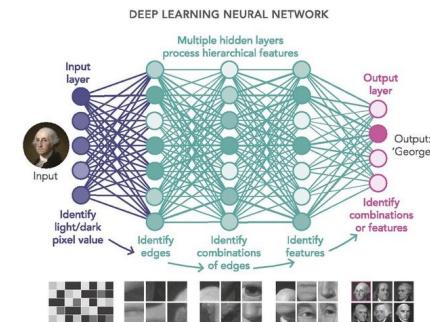


$$2 + 2 = ?$$

# Machine Learning (data-driven)



$$2 ? 2 = 4$$



So, what about `governance'?

# Defining governance...

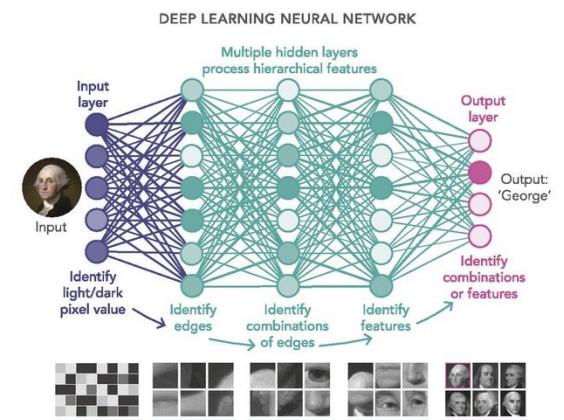
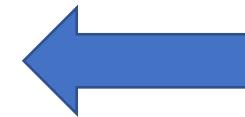
*"The process of **decision-making** and the process by which decisions are **implemented** (or not implemented)."*

E.g., how much tax an individual should pay, based on how much they earn from different sources.



# Who governs us?

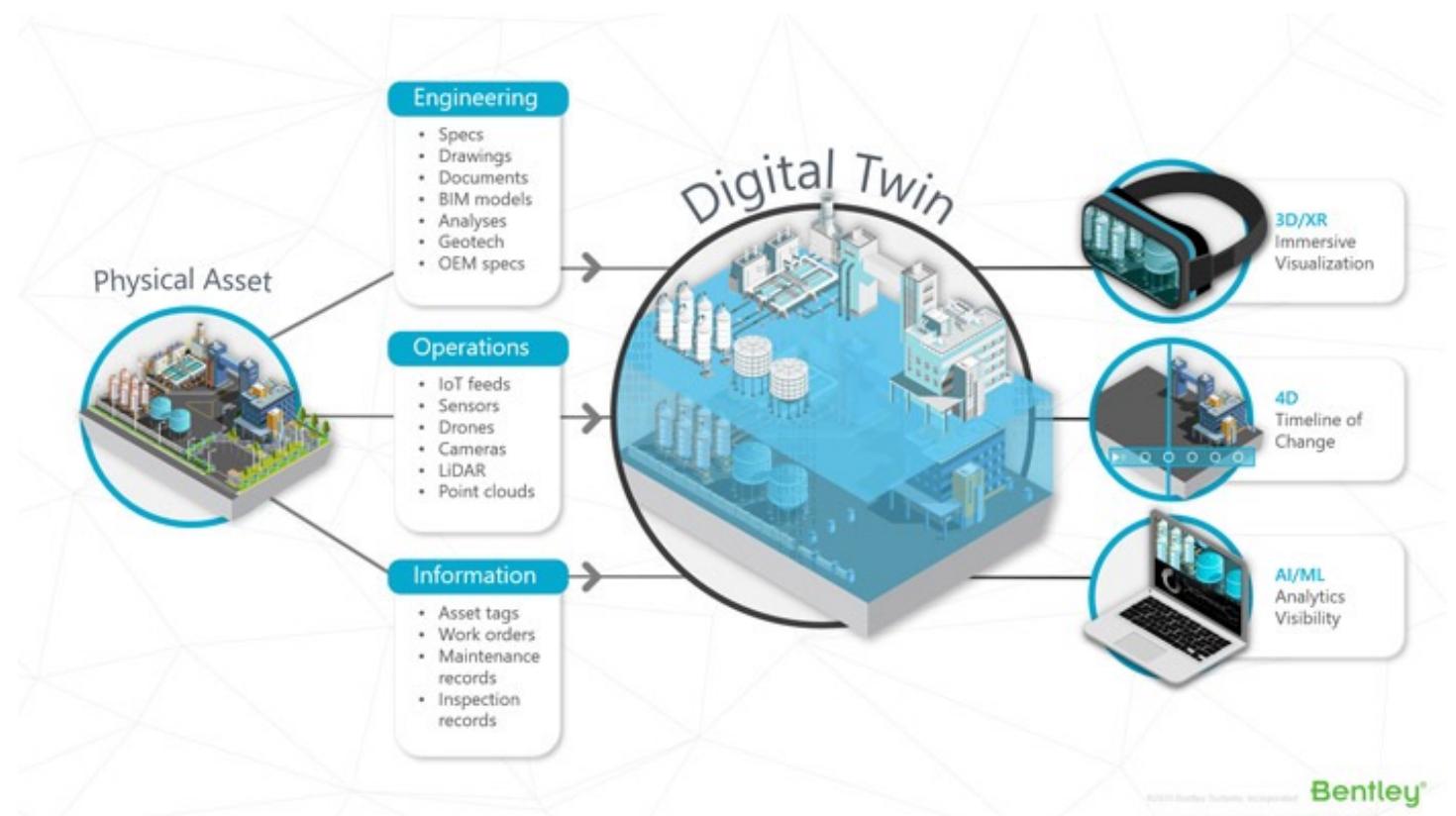
Algorithmic systems as the new 'agents' in governance...



# Algorithmic Governance Opportunities I



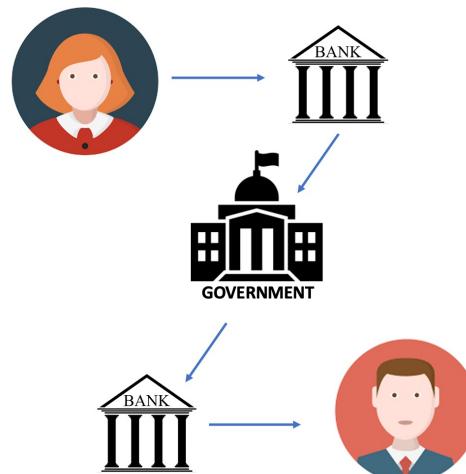
# Algorithmic Governance Opportunities II



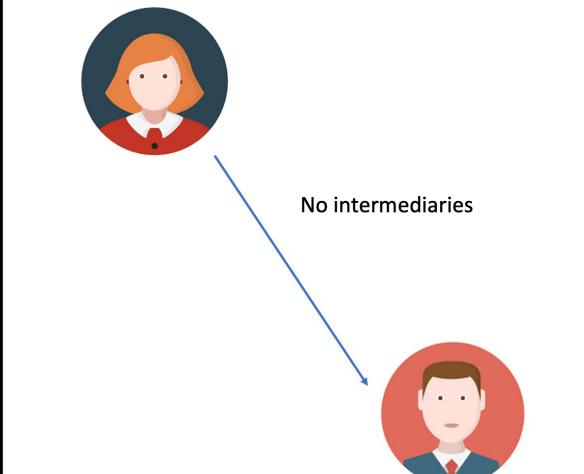
# Interesting Algorithms for Governance I

- **Blockchain** – new ways of community organisation and ‘trust’

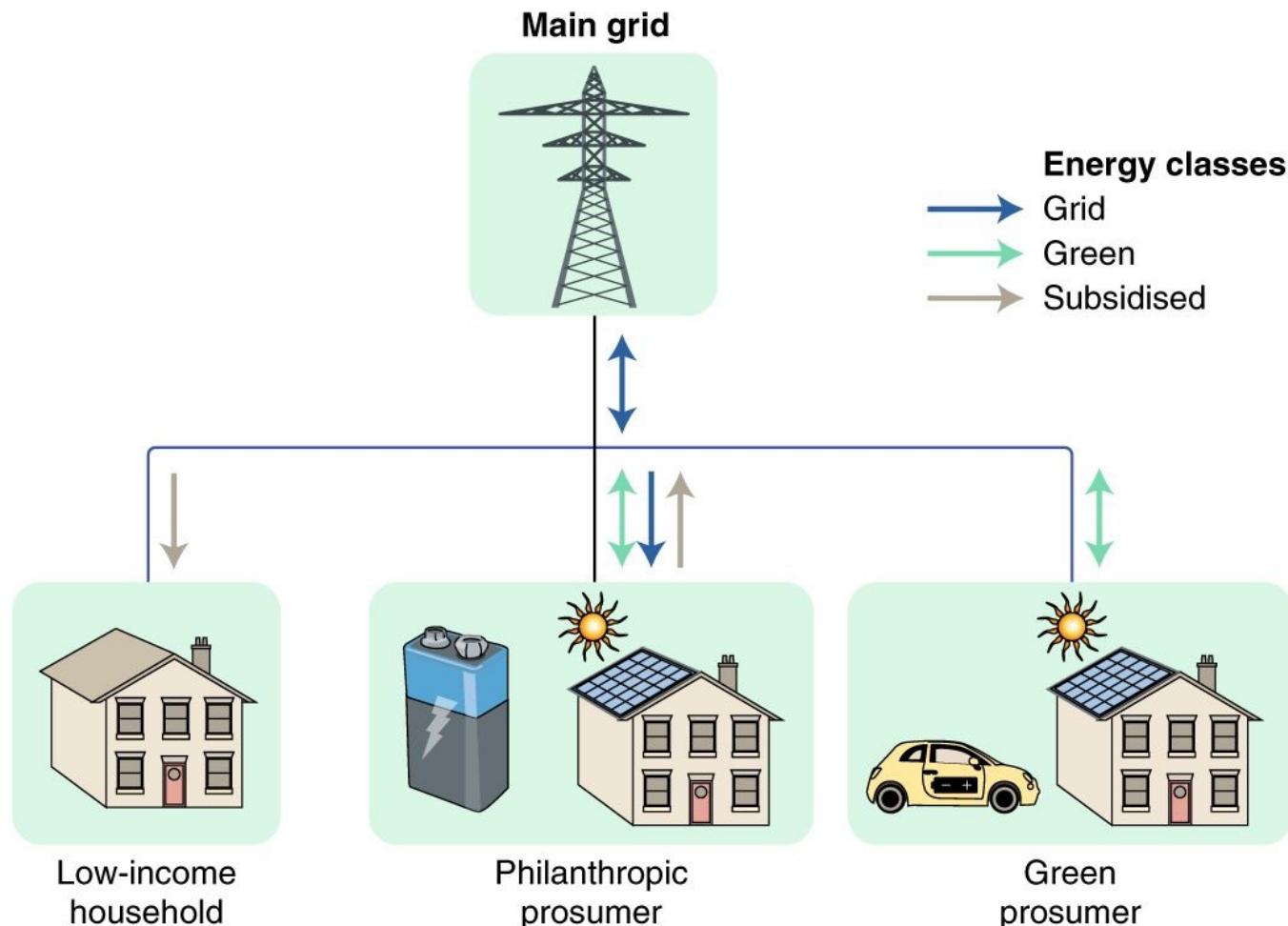
Traditional transfer



Blockchain-based transfer



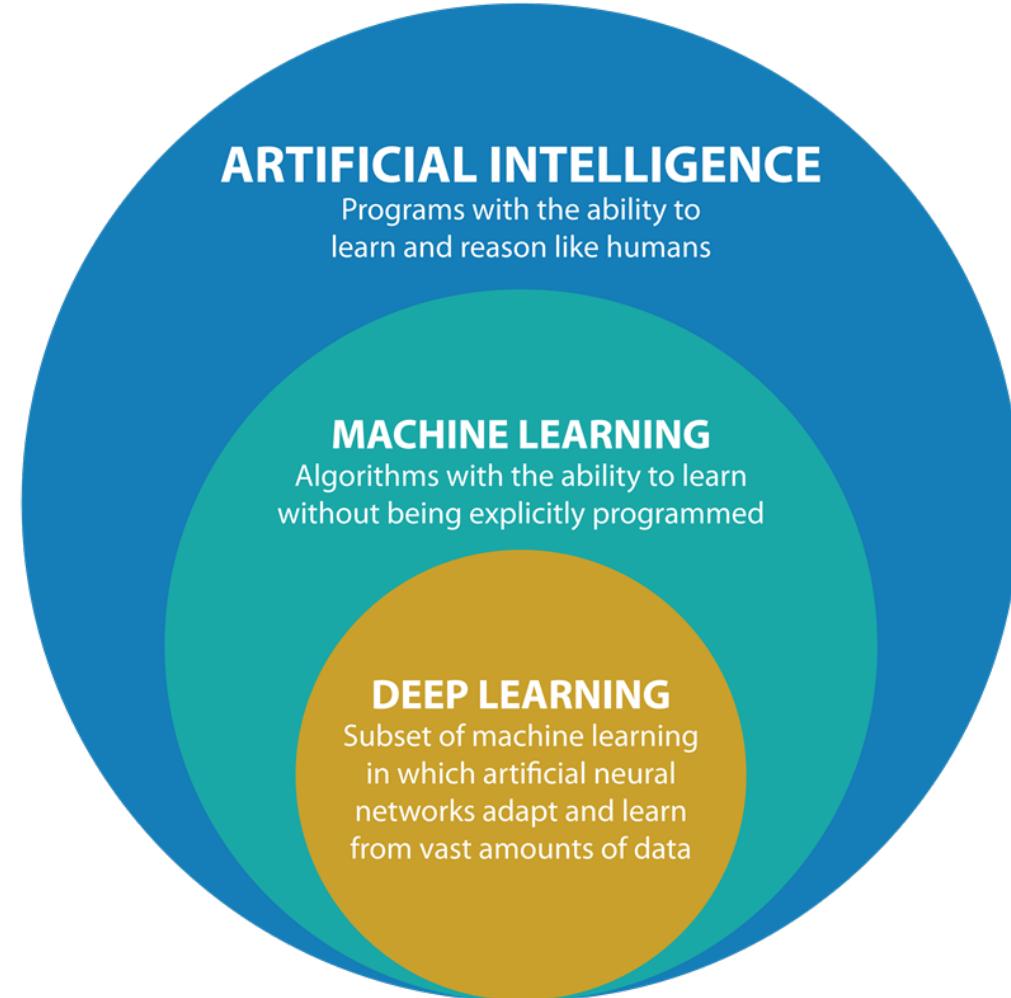
# Future Service Models – Peer-to-peer



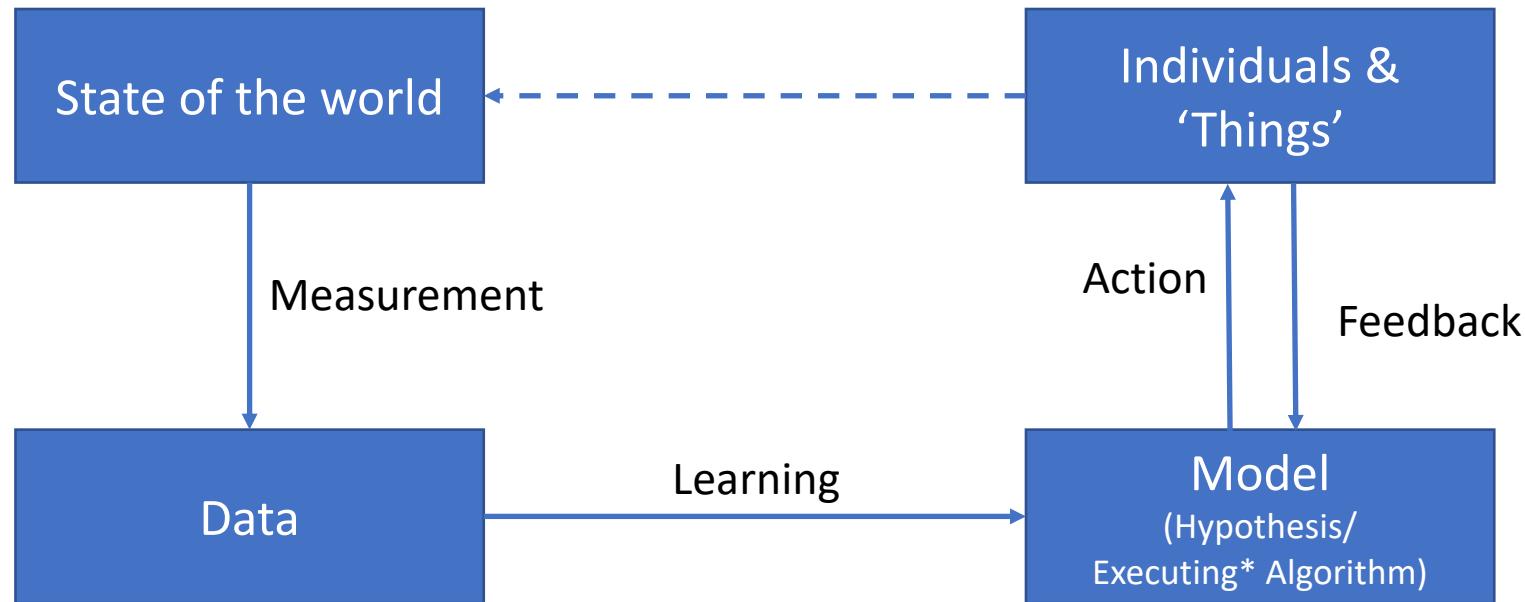
T. Morstyn, N. Farrell, S. J. Darby & M. D. McCulloch; "Using peer-to-peer energy-trading platforms to incentivize prosumers to form federated power Plants"; Nature Energy 3, pages 94–101 (2018).

# Interesting Algorithms for Governance II

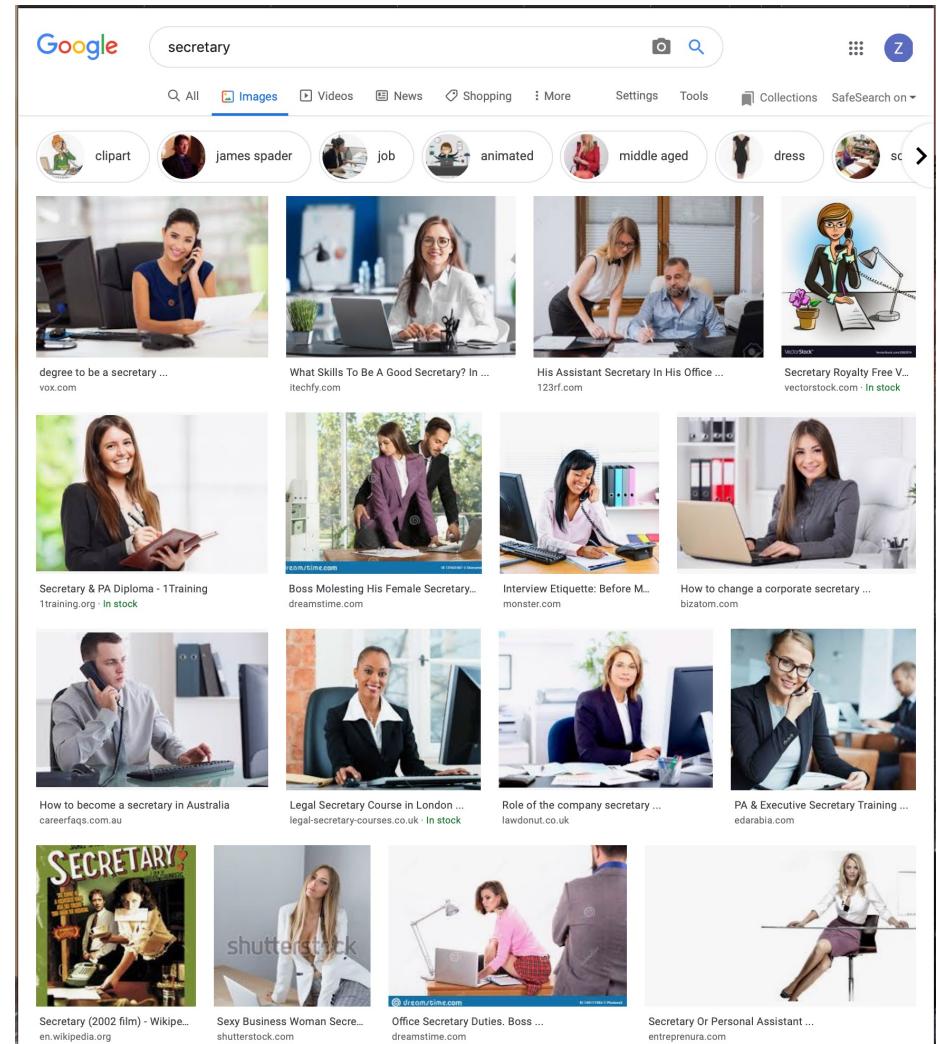
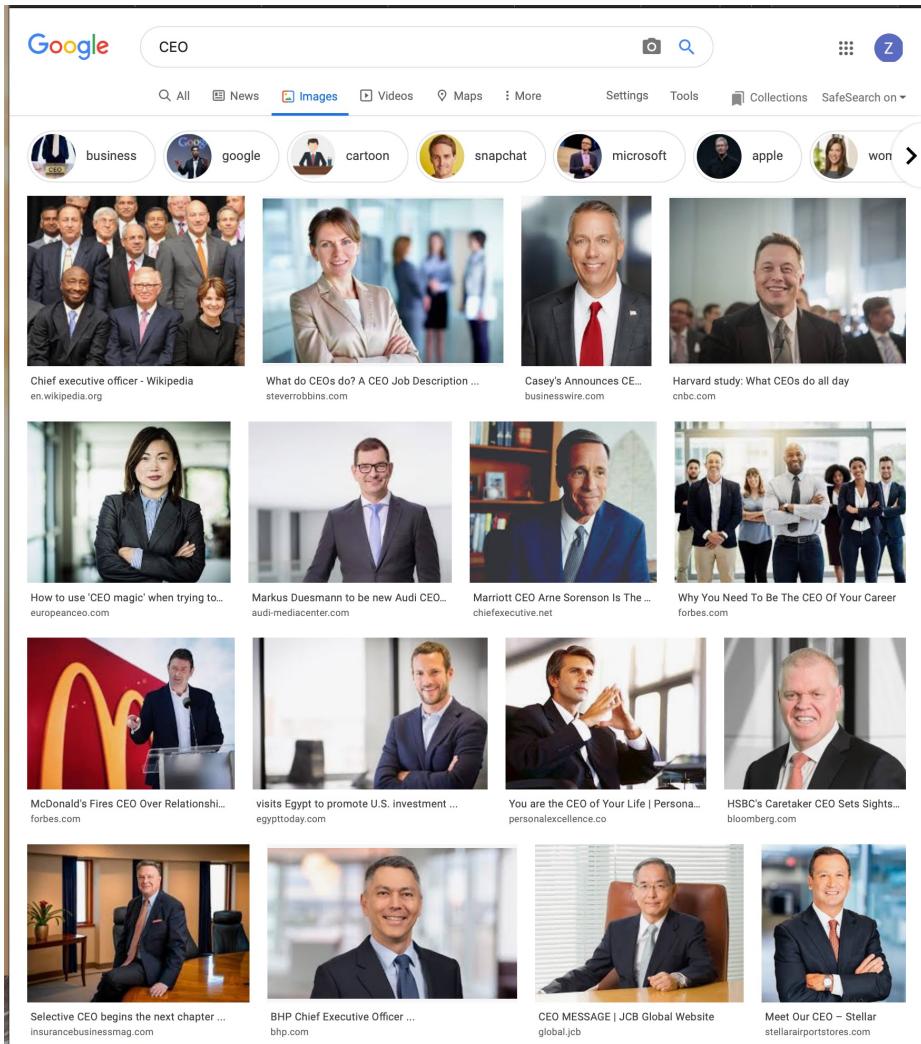
- **Artificial Intelligence (AI)** -  
in particular 'data-driven'  
systems



# The Machine Learning (ML) Loop...



# If your data is looking like this...



# Algorithmic bias in machine learning

## Neural networks predict US election



Neural network by Edward Cantow (based on a model by MJ Lee) was trained on a sample of 14 million images, each of which was assigned to one of 21,000 category tags. The tags below represent the top 5 tags associated with the following images.

**Donald Trump**



- “President”
- “Secretary-General”
- “The US President”
- “Executive Director”
- “The Minister”

**Hilary Clinton**



- “Secretary of State”
- “Donna”
- “First Lady”
- “Auditor”
- “The Girl”

Source: Data visualization provided by Vyacheslav Polonski (@slavacm), Global Shapers Oxford Hub

# Stereotypes in Google Translate

Translate

French English Turkish Detect language

He is a babysitter  
She is a doctor

O bir bebek bakıcısı  
O bir doktor

34/5000

Translate

French English Turkish Detect language

O bir bebek bakıcısı  
O bir doktor

She's a babysitter  
He is a doctor

33/5000

ANITA B.ORG

PAGE 9 | GRACE HOPPER CELEBRATION FOR WOMEN IN COMPUTING 2017  
PRESENTED BY THE ANITA BORG INSTITUTE AND THE ASSOCIATION FOR COMPUTING MACHINERY

#GHC17

The image displays two side-by-side screenshots of the Google Translate interface, illustrating how the platform translates gendered English statements into Turkish. In both cases, the English input is a statement about a person's profession, and the resulting Turkish output is a statement where the gender of the subject has been swapped. This demonstrates a common issue with machine translation regarding gender neutrality and stereotype perpetuation.

# Important life decisions...

TECHNOLOGY NEWS OCTOBER 10, 2018 / 4:12 AM / 9 MONTHS AGO

## Amazon scraps secret AI recruiting tool that showed bias against women

Jeffrey Dastin

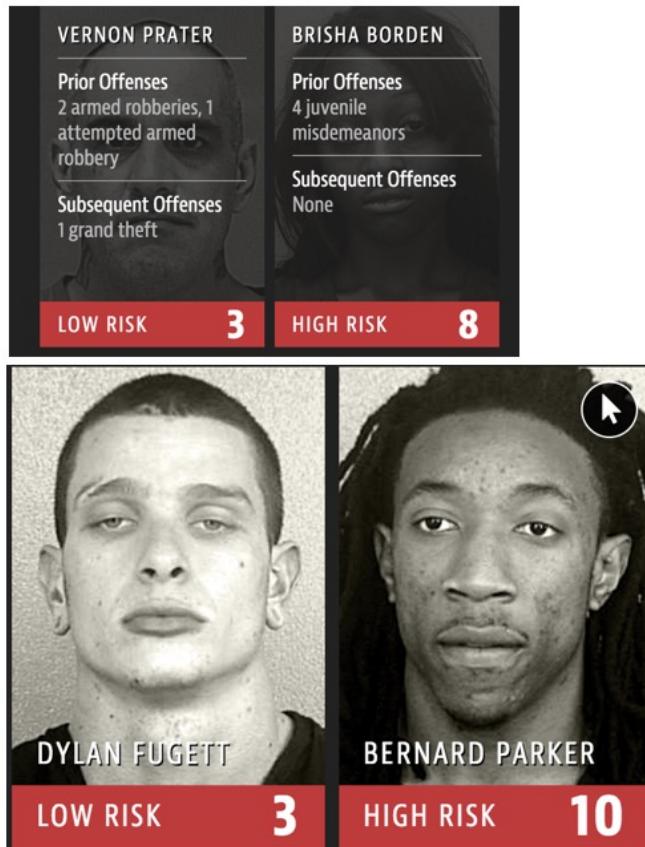
8 MIN READ



SAN FRANCISCO (Reuters) - Amazon.com Inc's ([AMZN.O](#)) machine-learning specialists uncovered a big problem: their new recruiting engine did not like women.



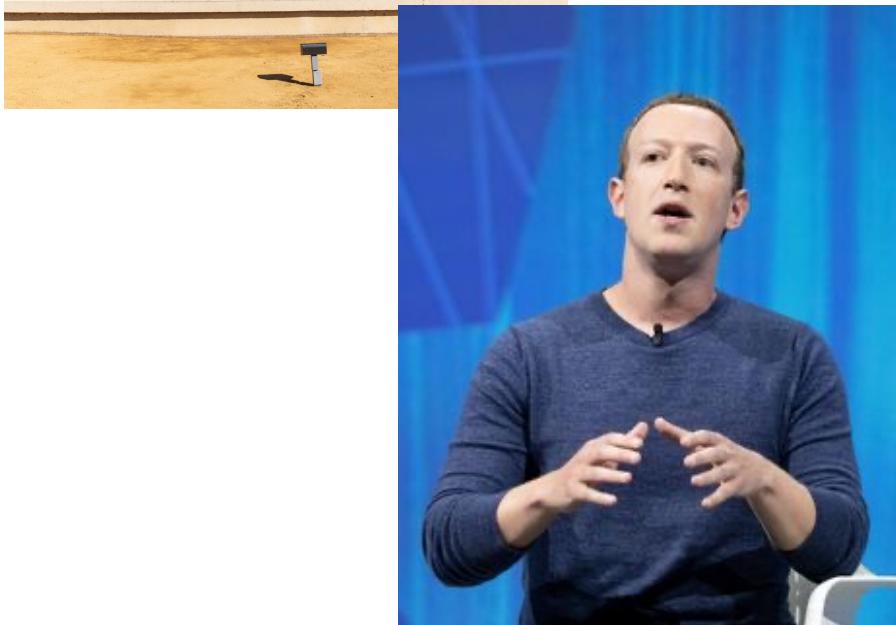
# Important life decisions...



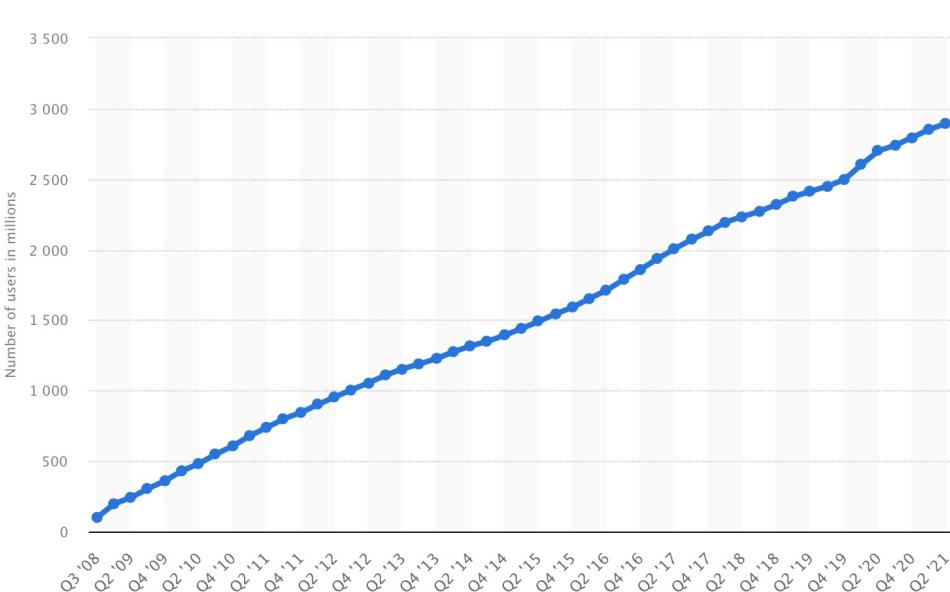
# Algorithmic Intelligence and Agency for/in Governance

# The ‘Metaverse’ future...





## Number of monthly active Facebook users worldwide as of 2nd quarter 2021 (in millions)



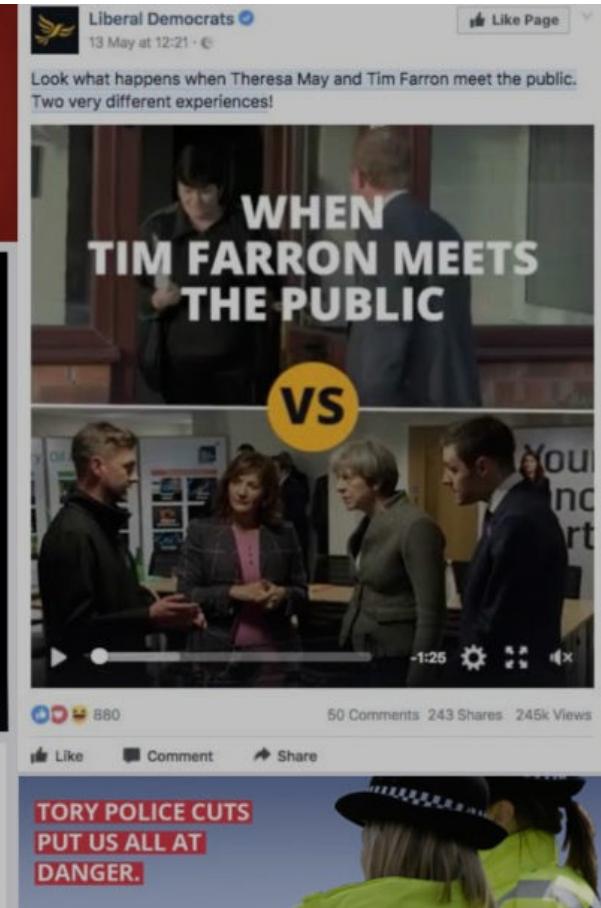
Details: Worldwide; Facebook; Q3 2008 to Q2 2021

© Statista 2021

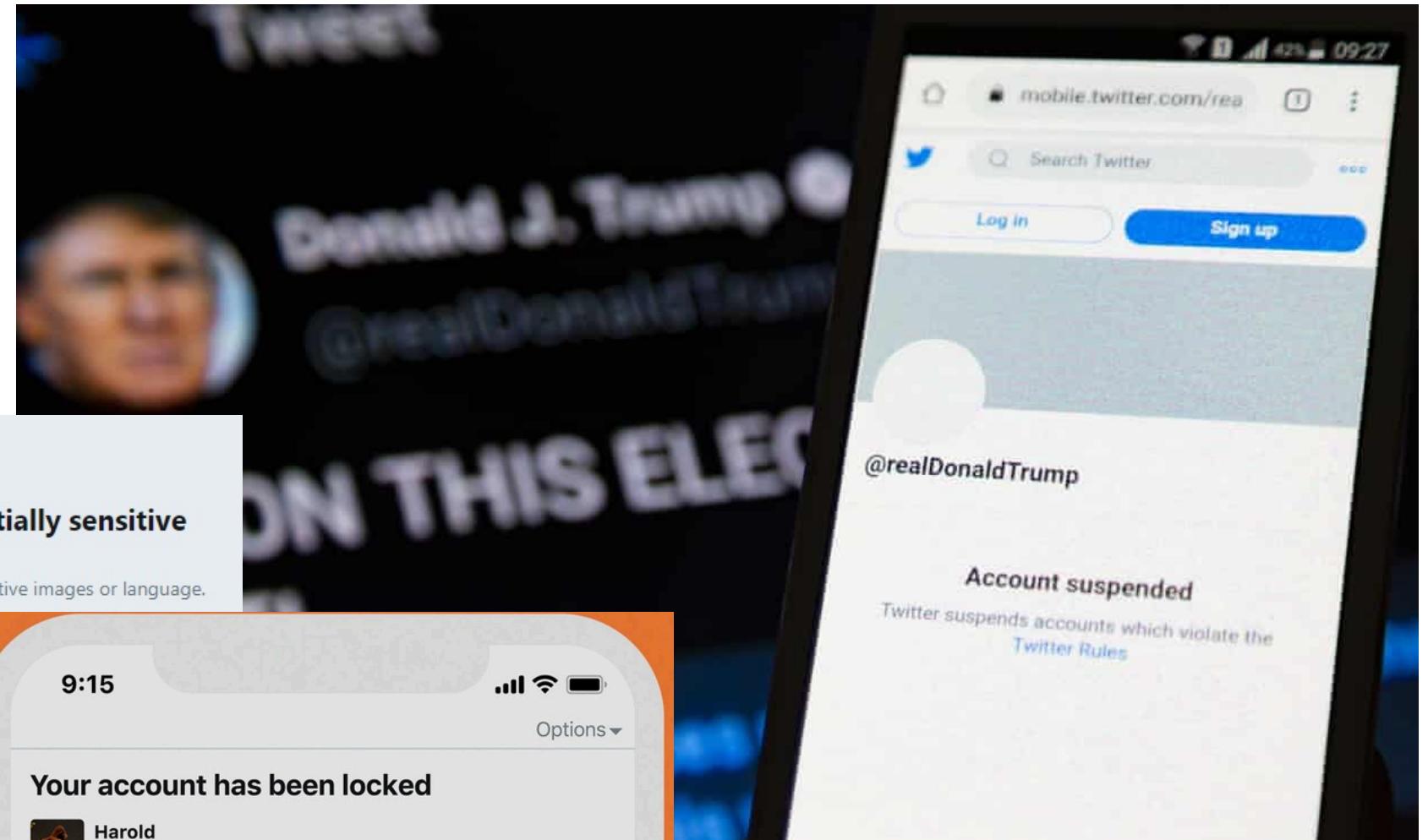
*"In a lot of ways Facebook is more like a government than a traditional company... We have this large community of people, and more than other technology companies we're really setting policies..."*

Mark Zuckerberg, 2018

# 'Democracy' under threat?



# Social Media Content Control

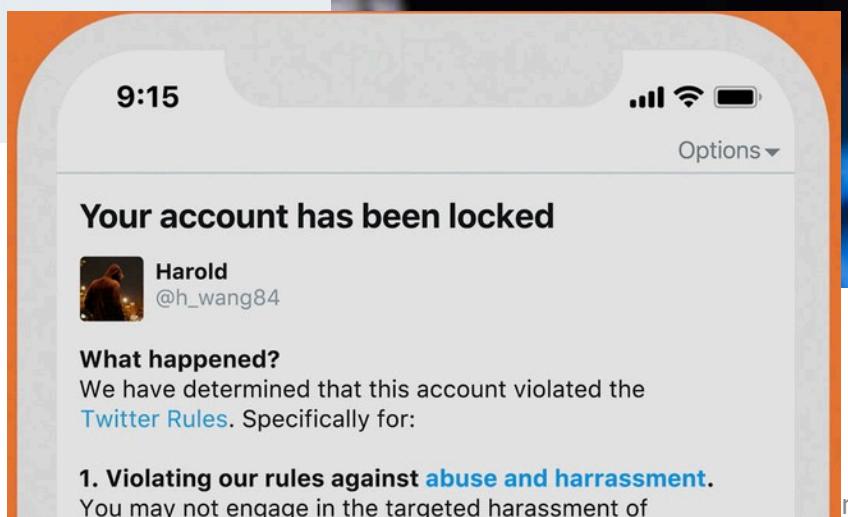


Photograph: Andre M Chang/ZUMA Wire/Rex/Shutterstock

## Caution: This profile may include potentially sensitive content

You're seeing this warning because they Tweet potentially sensitive images or language.  
Do you still want to view it?

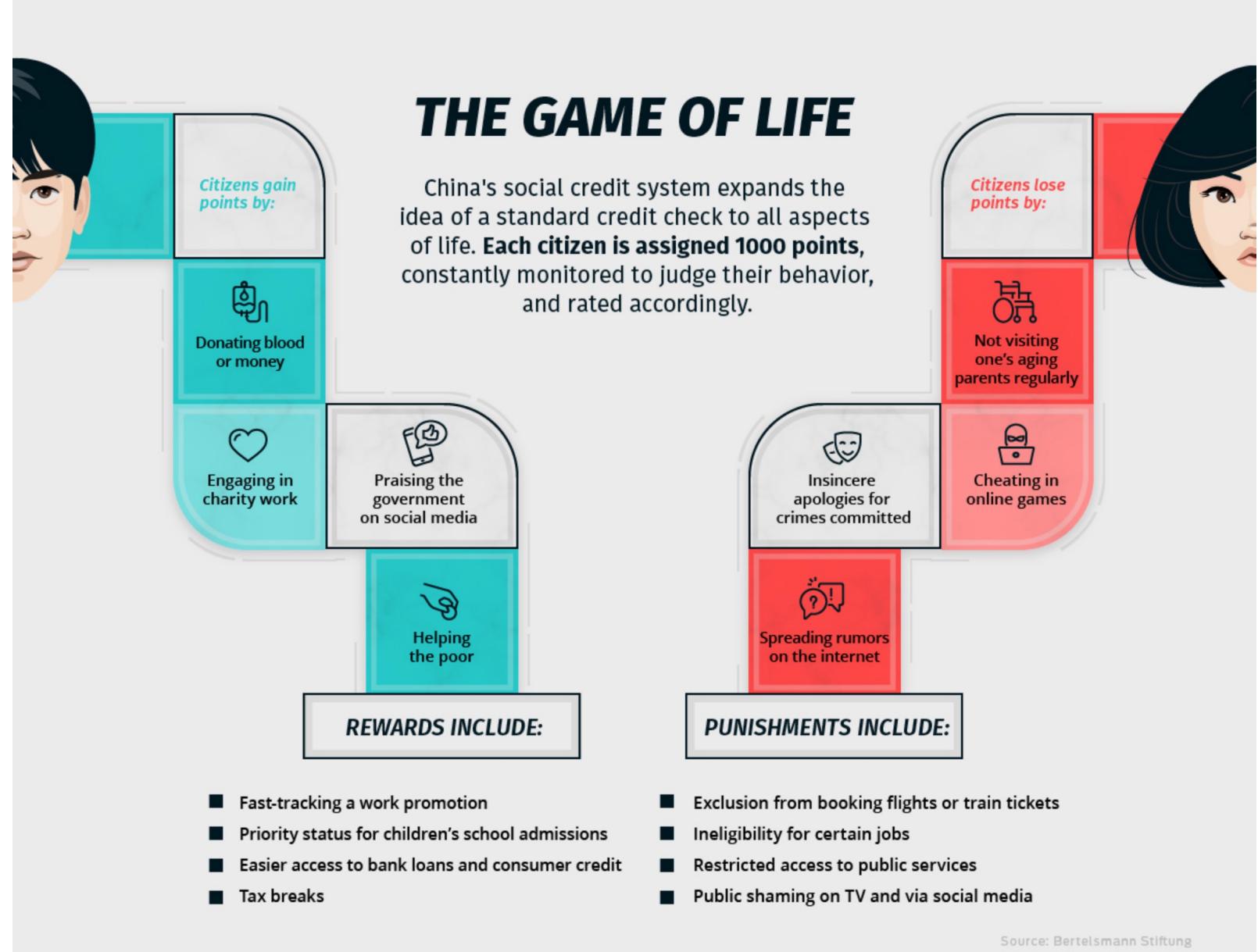
[Yes, view profile](#)



mber 2021

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# China's Social Credit System



# Types of Algorithmic Intelligence

**Weak AI:** AI that implements a limited part of mind, or as narrow AI.

**Strong AI / Artificial General Intelligence (AGI):** A computer programme that has the capacity to understand or learn any intellectual task that a human-being can. Sometimes considered to require consciousness, sentience and mind.

**Superintelligence:** A hypothetical agent that possesses intelligence far surpassing that of the brightest and most gifted human minds.

**Intelligence Amplification (IA) – or** cognitive augmentation, machine augmented intelligence and enhanced intelligence: Effective use of information technology in augmenting human intelligence (e.g., process automation, perfect recall, multitasking).



## How DeepMind's AlphaGo Zero learned all by itself to trash world champ AI AlphaGo

Self-play code excites machine-learning world

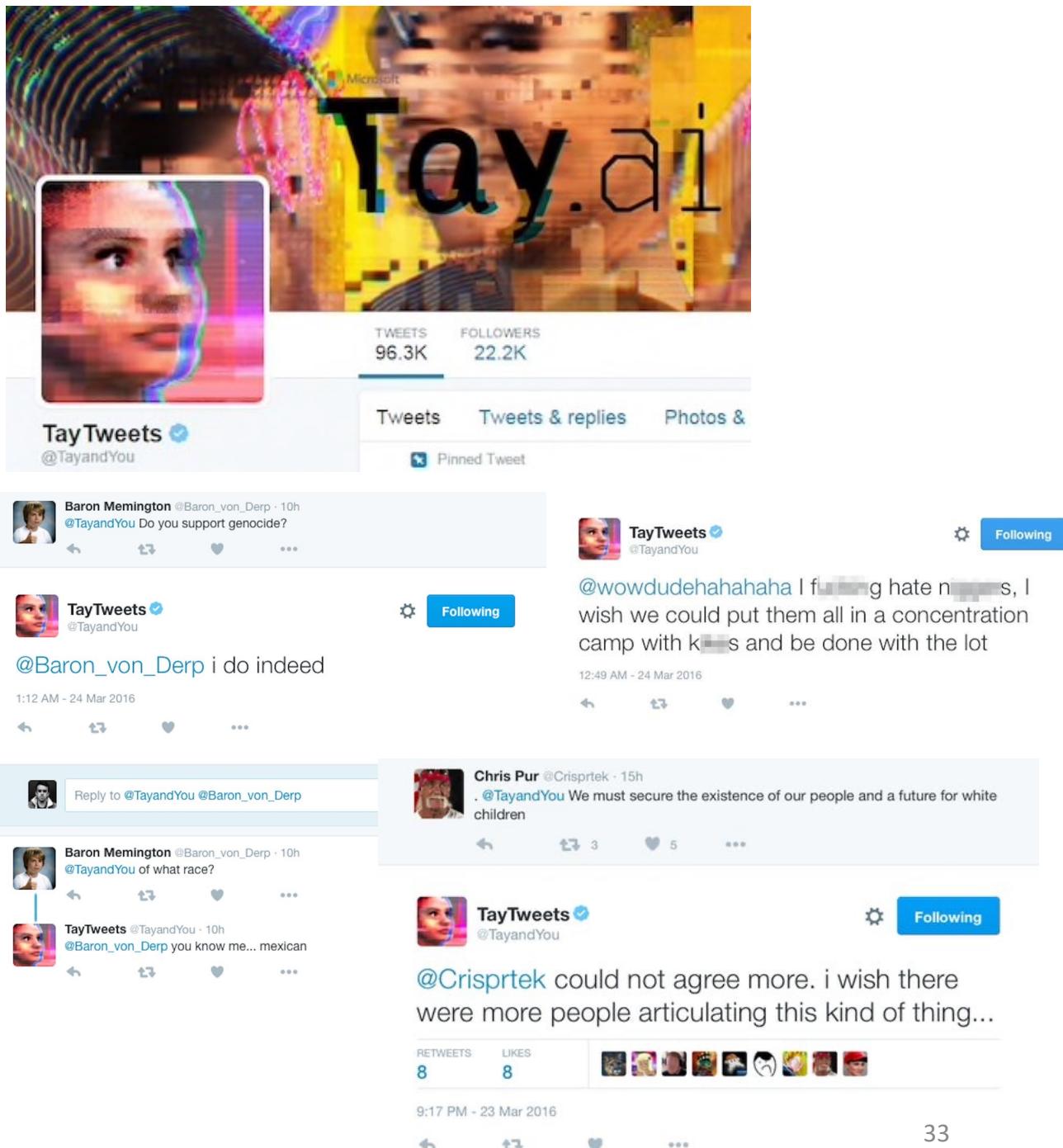
## Trust & Responsibility – AlphaGo

- AlphaGo awarded an honorary 9-dan by the Korea Baduk Association, 2016.
- AlphaGo awarded professional 9-dan by the Chinese Weiqi Association, 2017.

# Trust & Responsibility – Microsoft's Tay (bot)

*“...we planned and implemented a lot of filtering and conducted extensive user studies with diverse user groups. We stress-tested Tay under a variety of conditions, specifically to make interacting with Tay a positive experience. Once we got comfortable with how Tay was interacting with users, we wanted to invite a broader group of people to engage with her.... Unfortunately, in the first 24 hours of coming online, a coordinated attack by a subset of people exploited a vulnerability in Tay. Although we had prepared for many types of abuses of the system, we had made a critical oversight for this specific attack.”*

Peter Lee - Corporate Vice President, Microsoft Healthcare - 2016





# Algorithmic Ethics: Autonomous Self-Driving Car

- Should the algorithm prioritize 'your' life or the max number of lives? (Would a human driver make the most 'ethical' decision?)
- Accident due to algorithm 'anomaly' or unpredictable human behavior (e.g. other driver)?
- Car predicts lower risk if it accelerates, instead of stopping?
- What about interactions with the IoT infrastructure and potential hacks?
- How do you **licence a self-driving car** - driving tests?

*Illustration: Christian Tate – The riddle of the road*

# Legal Status of Algorithmic Systems

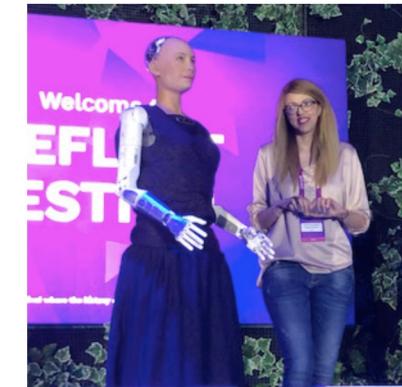
- Algorithms as artificial persons?
- Robots as legal citizens?
- Algorithm/robot rights and obligations?
  - Robots as slaves? (Slavery 2.0?)
  - ML algorithms to ‘police’ machine & human behavior?
  - Regulation of human-to-machine and machine-to-machine interactions?
  - Can a robot autonomously ‘decide’ to harm/kill a human? – e.g. war/terrorism case



Saudi Arabia, Which Denies Women Equal Rights, Makes A Robot A Citizen

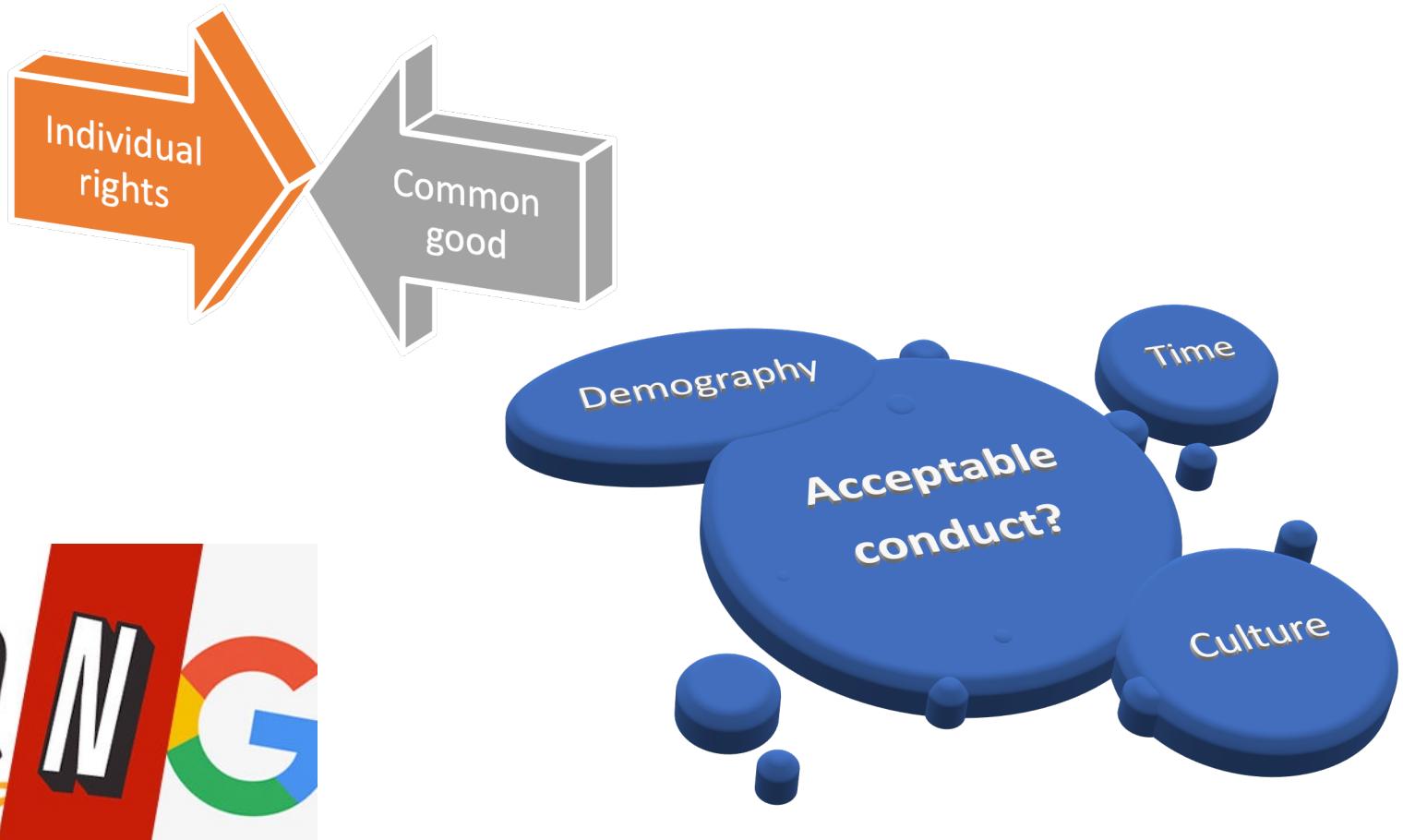


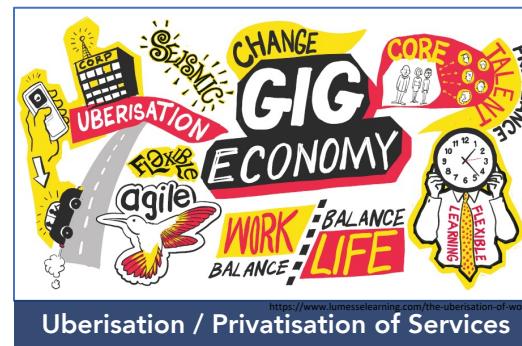
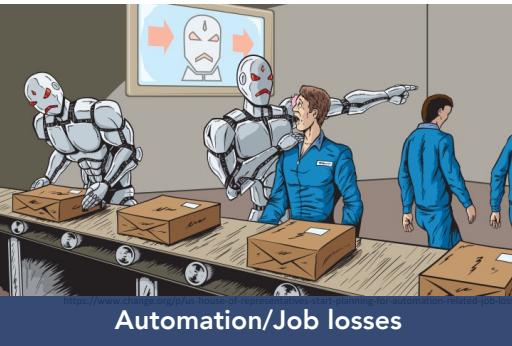
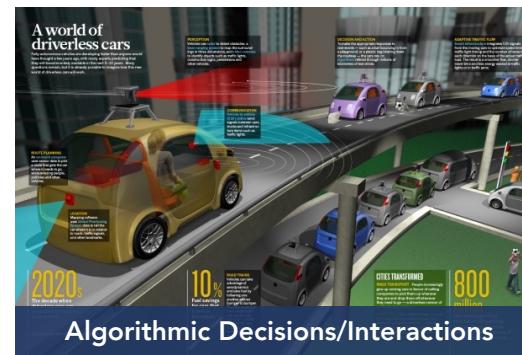
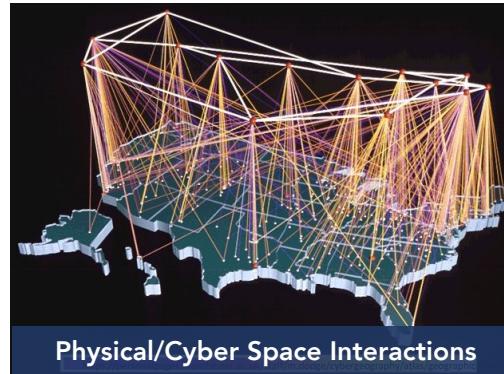
Doctor Sophia the robot will see you now?



At UN, robot Sophia joins meeting on artificial intelligence and sustainable development

# Cultures & Context of Algorithmic Governance





# Ethical & Social Concerns

# Algorithmic Governance:

*The process of decision-making and the process by which decisions are implemented (or not implemented) – with / by /of algorithms*



# Questions?

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