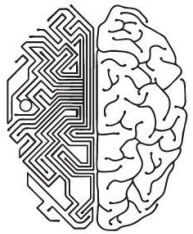
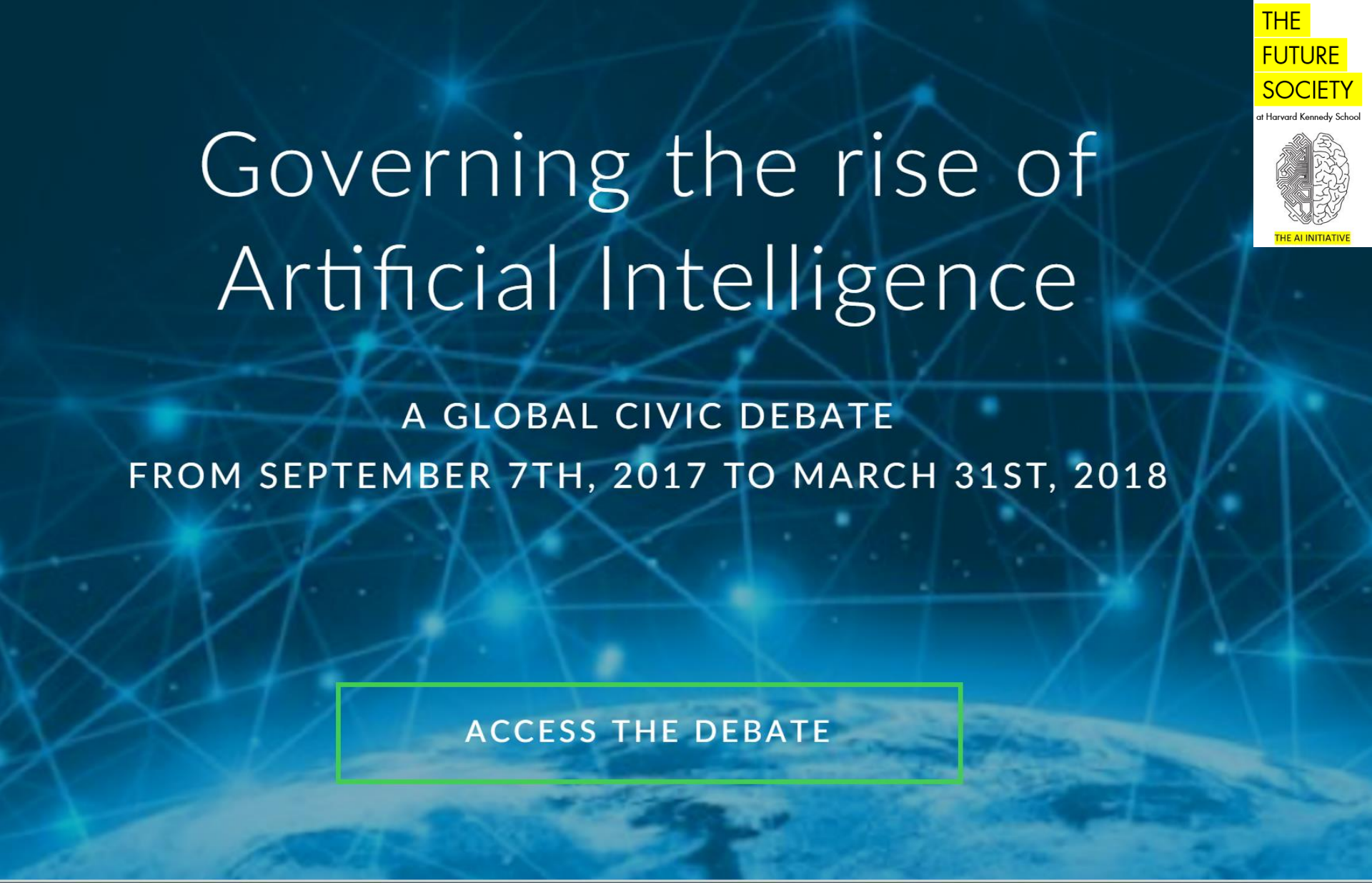
THE FUTURE SOCIETY
at Harvard Kennedy School



THE AI INITIATIVE

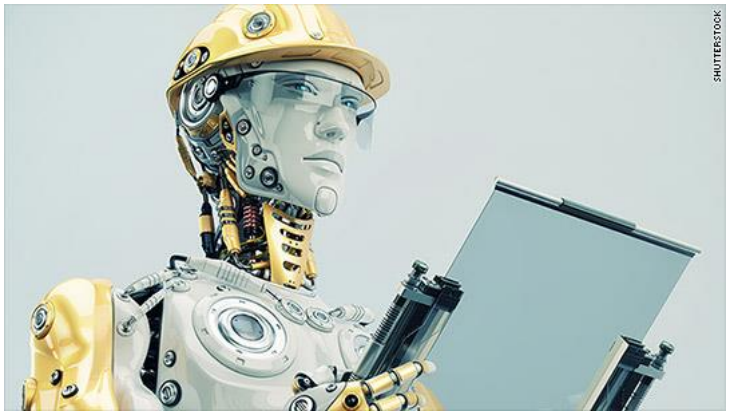
Governing the rise of AI

September 2017

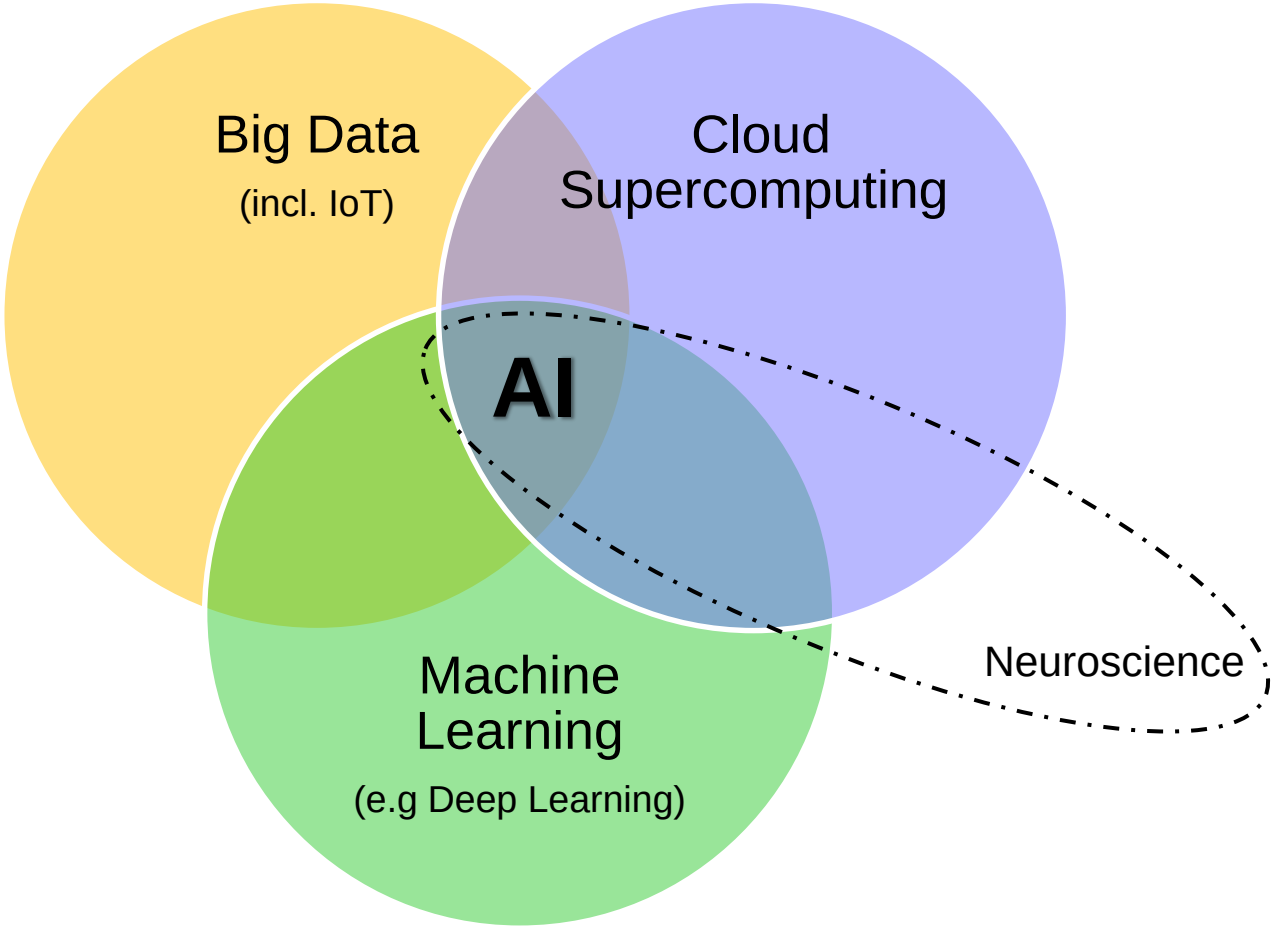


https://assembl-civic.bluenove.com/ai-consultation/home

AI = a collective imaginary



What is Artificial Intelligence?

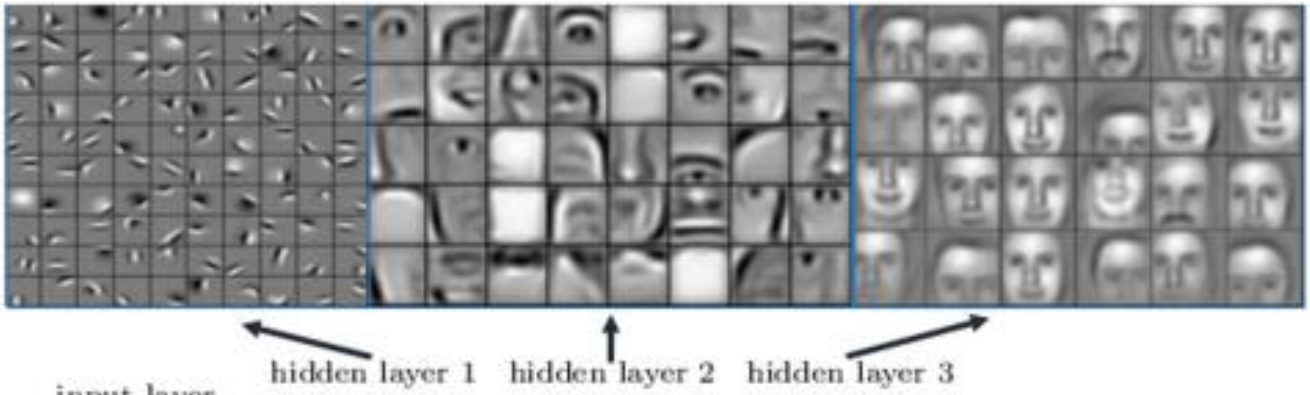


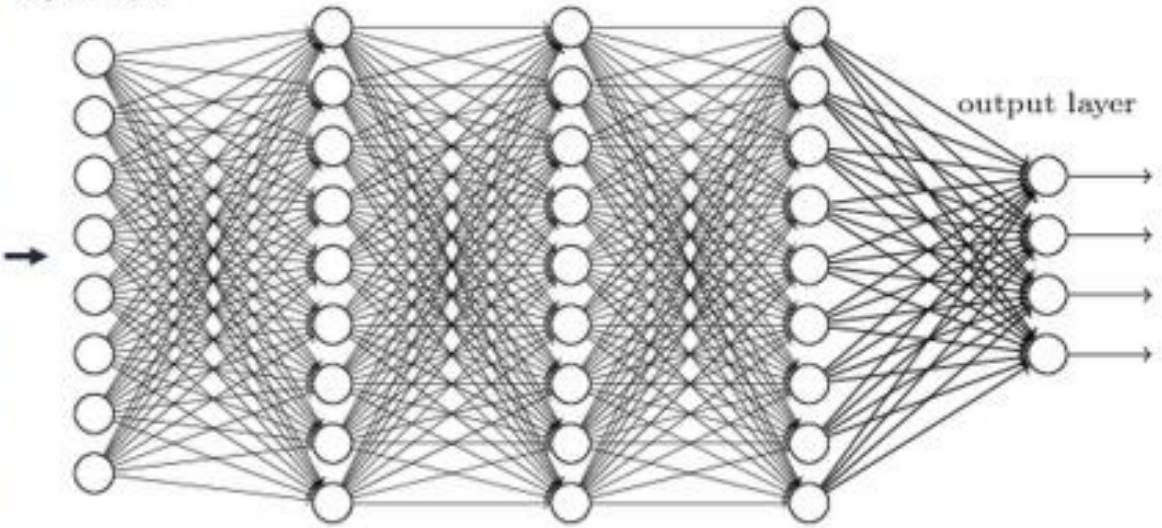
Intelligent 'agents' (computer systems) able to learn, adapt and deploy successfully in dynamic and uncertain environments

MOSTLY IMMATERIAL ("machines without motor function")

What is “Deep Learning”?

Deep neural networks learn hierarchical feature representations





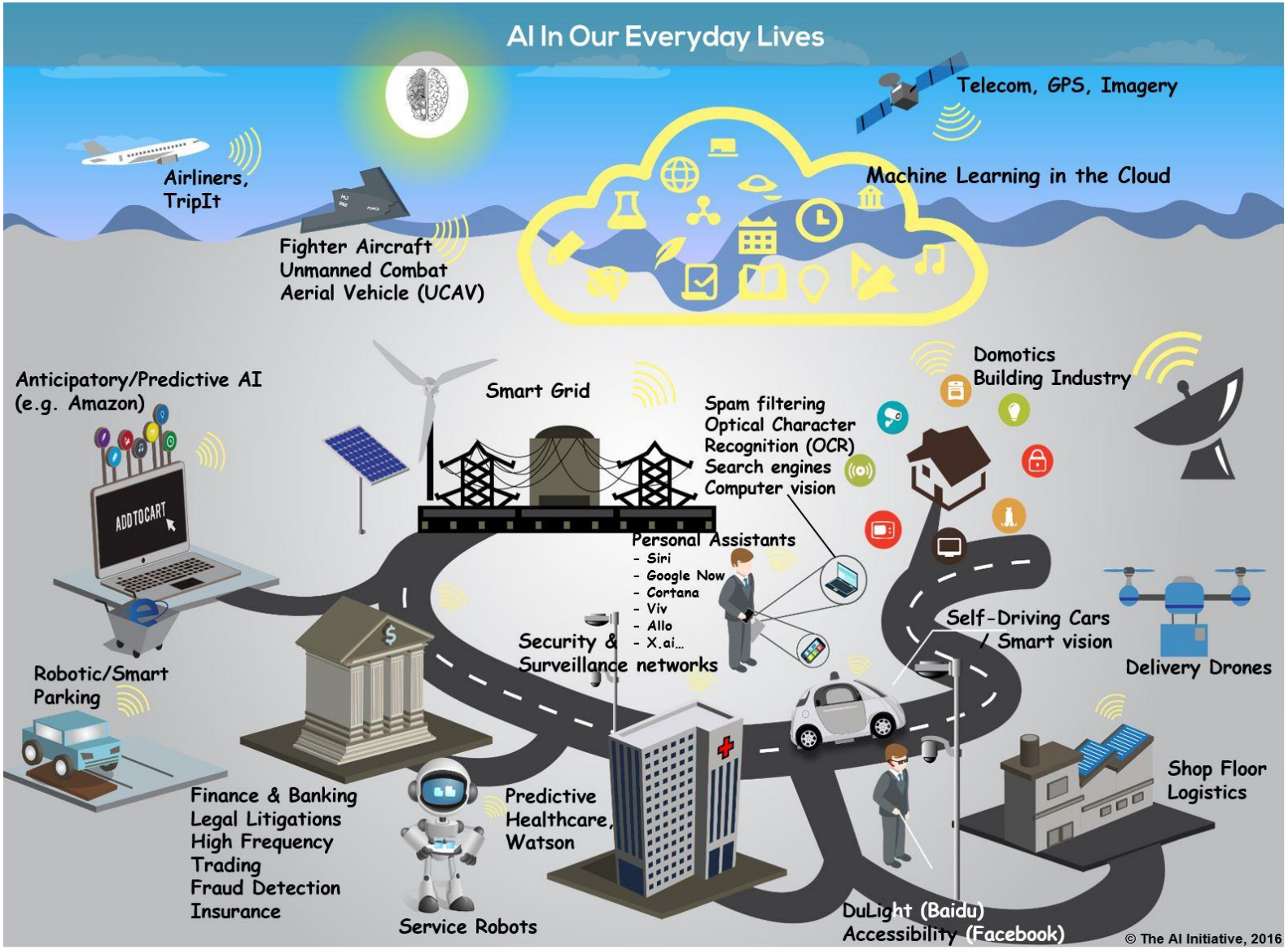
What is "Deep Learning"?

- A branch of AI:
  - ✓ relies on complex statistical models / algorithms (Artificial Neural Network) with multiple layers
  - ✓ which runs on powerful computers (GPUs)
  - ✓ These systems are both self-learning and trained

- Not new!
  - ✓ Artificial Neural Networks were theorized in the 50s

- But could only be unleashed meaningfully in the era of Big Data and affordable supercomputing (cloud and embedded)
  - ✓ several hundreds layers now typically used
  - ✓ They loosely model the way a biological brain works (nodes)

AI is getting into our lifes…..



The rise of "AI": a case of the NBIC tech acceleration & convergence

Nanotechnology

Biotechnology

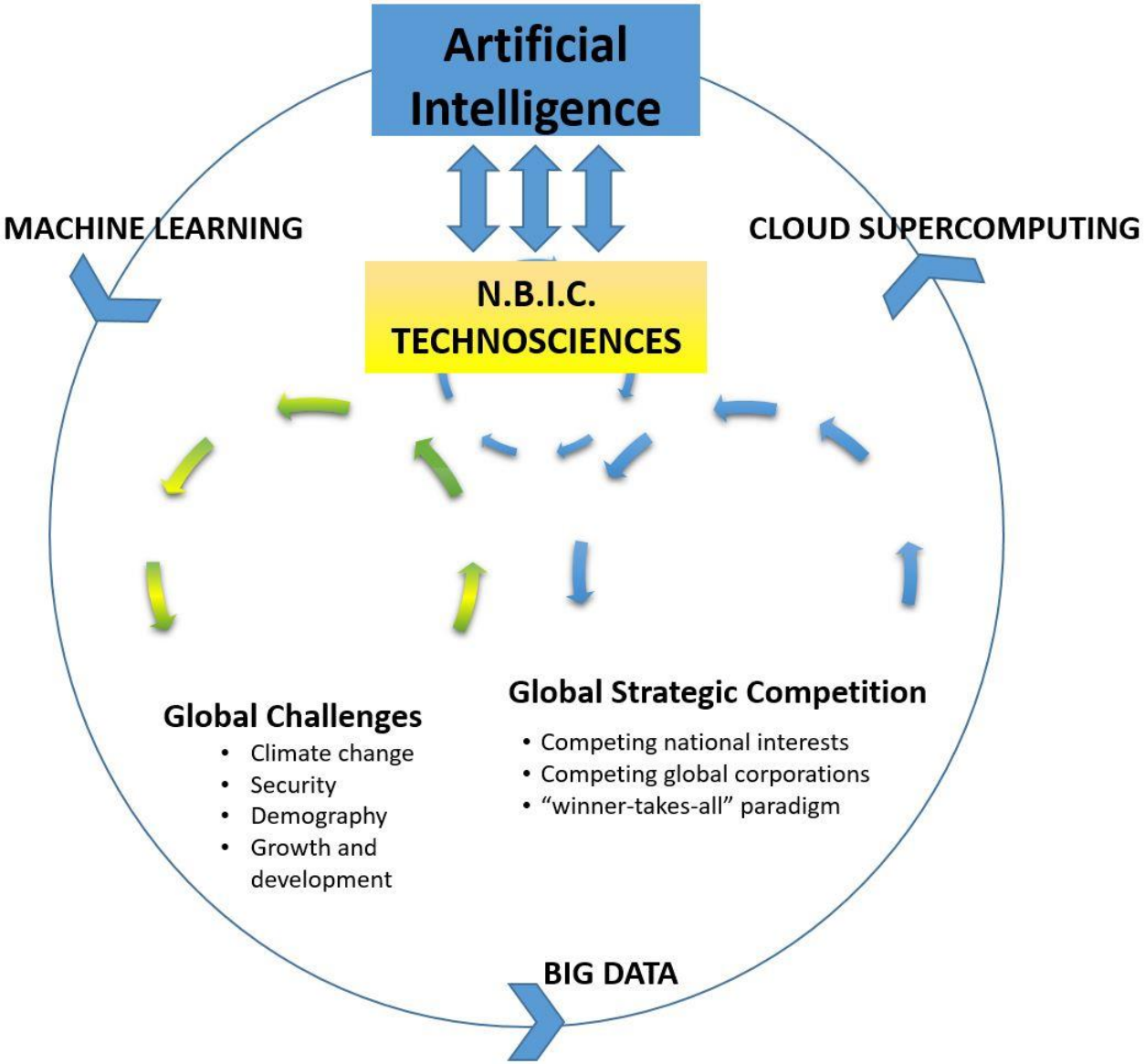
Information Technology

Cognitive Science

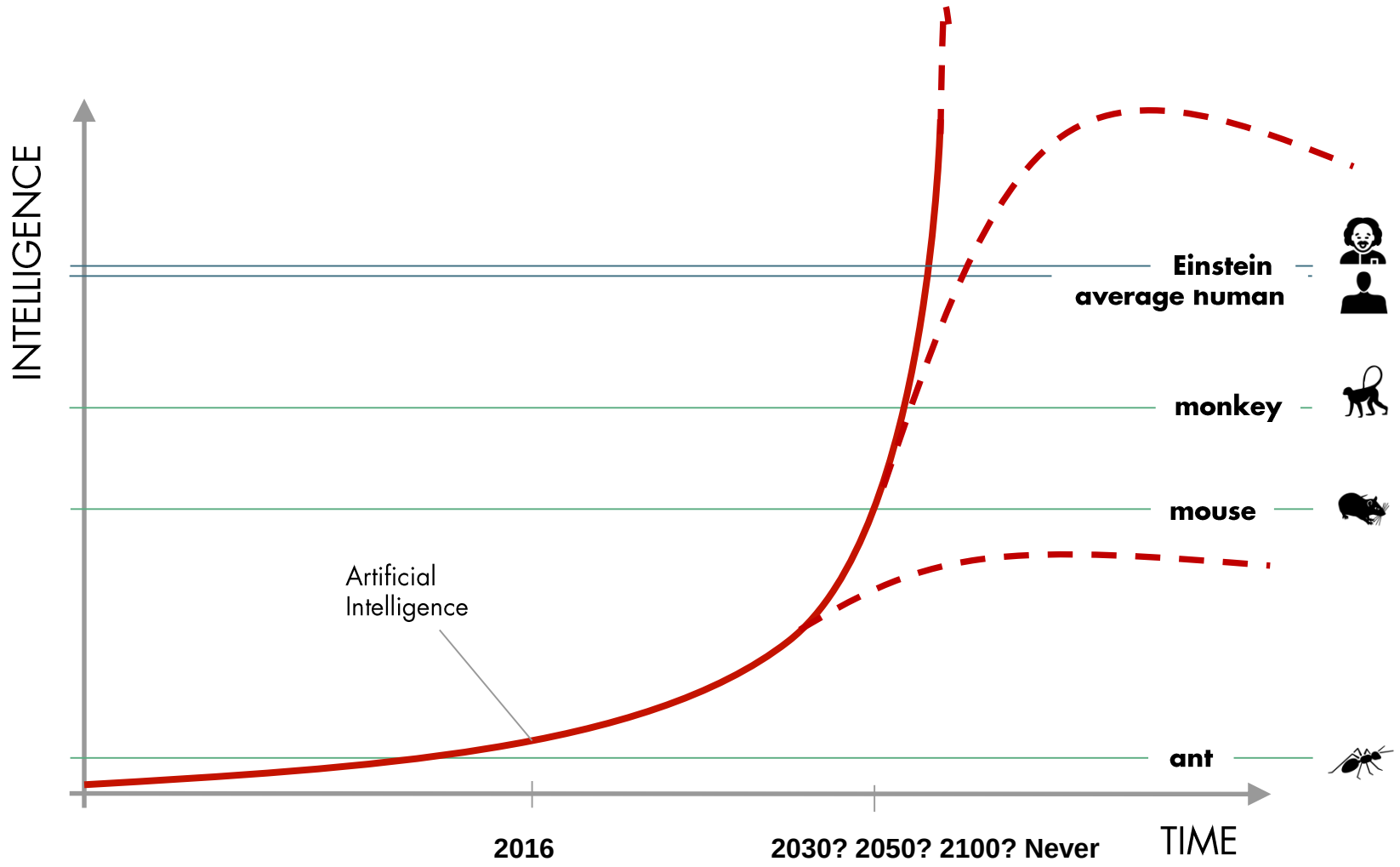
The rise of "Brain Science": another case of NBIC tech acceleration & convergence

Nanotechnology
Biotechnology
Information Technology
Cognitive Science

A Global AI race? 4th Industrial Revolution?



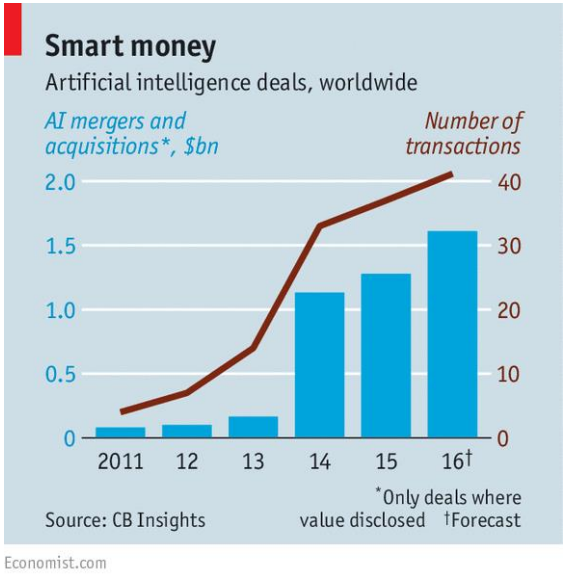
The March towards Artificial General Intelligence (AGI), i.e. "Strong AI" ?



Towards an dissymetric global oligopoly?

Global race to become to the go-to AI platform

- Consumer facing platforms for open data – i.e.*Google Tensor Flow*
- Business facing platforms for sensitive data (e.g. healthcare) – e.g. IBM Watson, Google DeepMind
- $8.5 billion spent on deals/investments in AI in 2015
- $40 billion by 2020



GAFAMI **vs.** **BATX**

Google

facebook

amazon

Microsoft

IBM

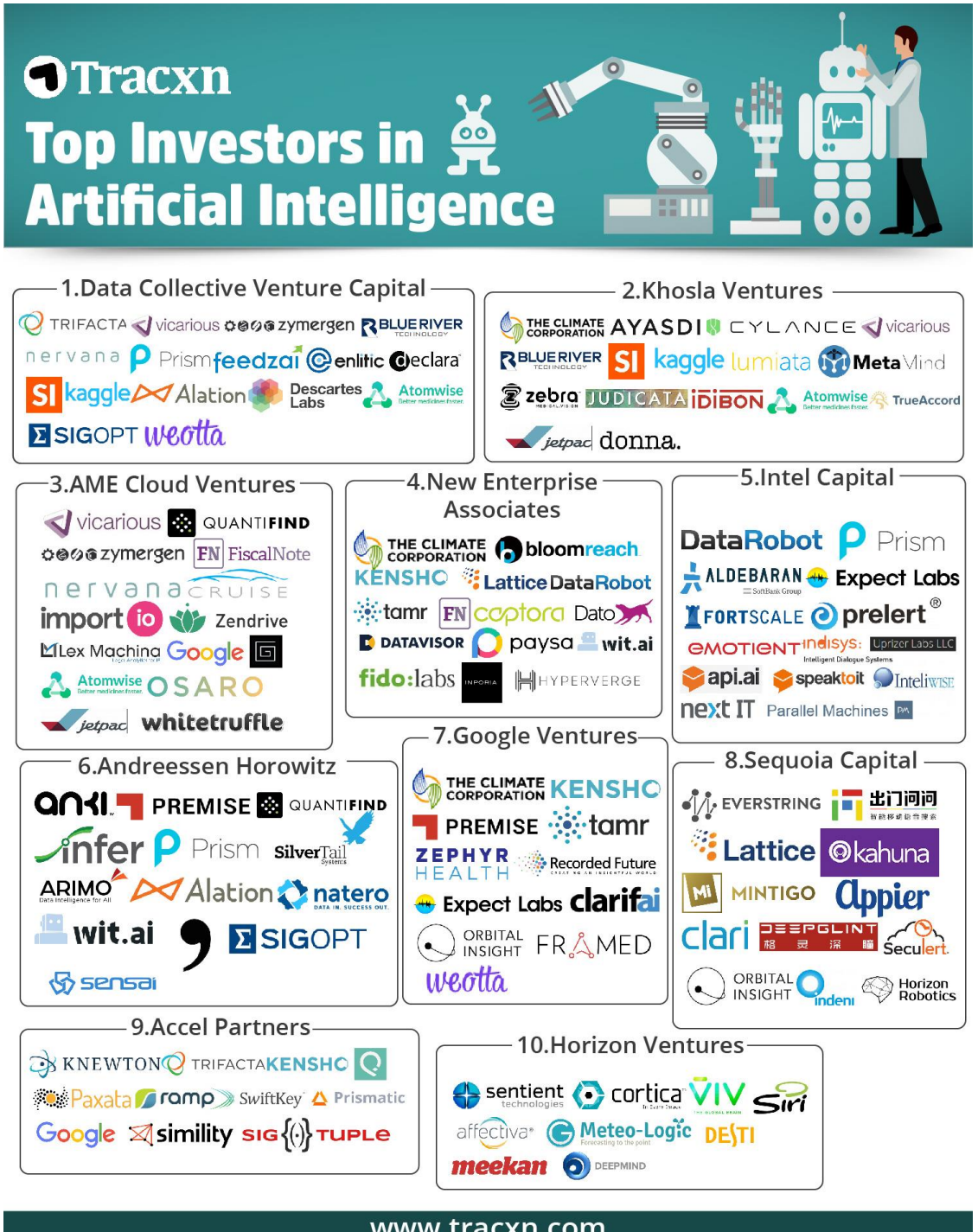
Baidu 百度

Alibaba Group

Tencent 腾讯

XIAOMI

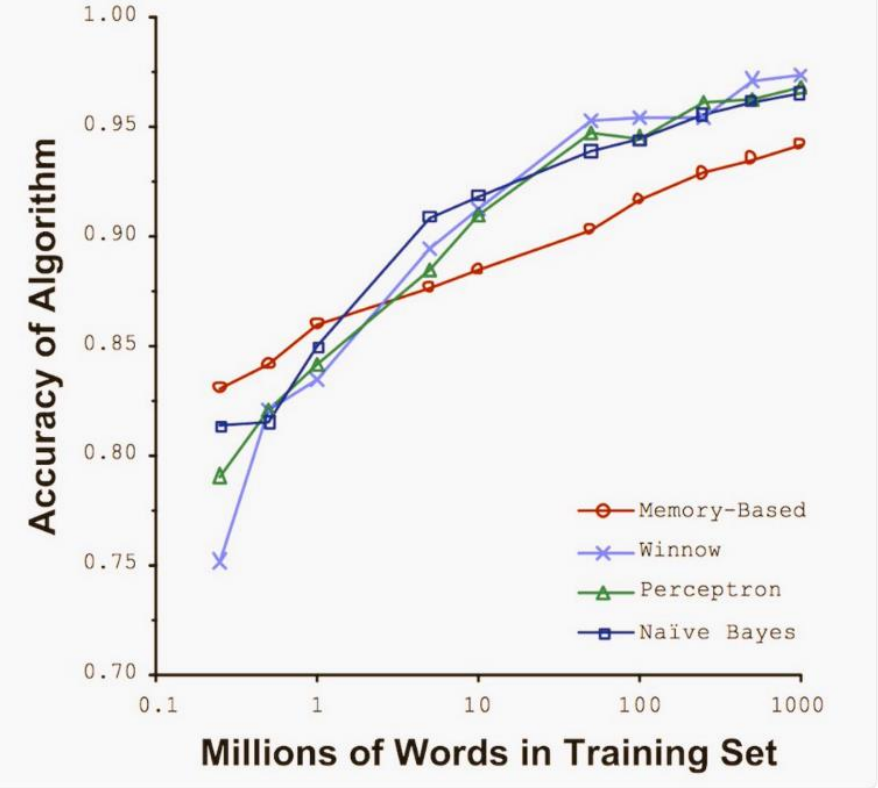
AI start-up landscape



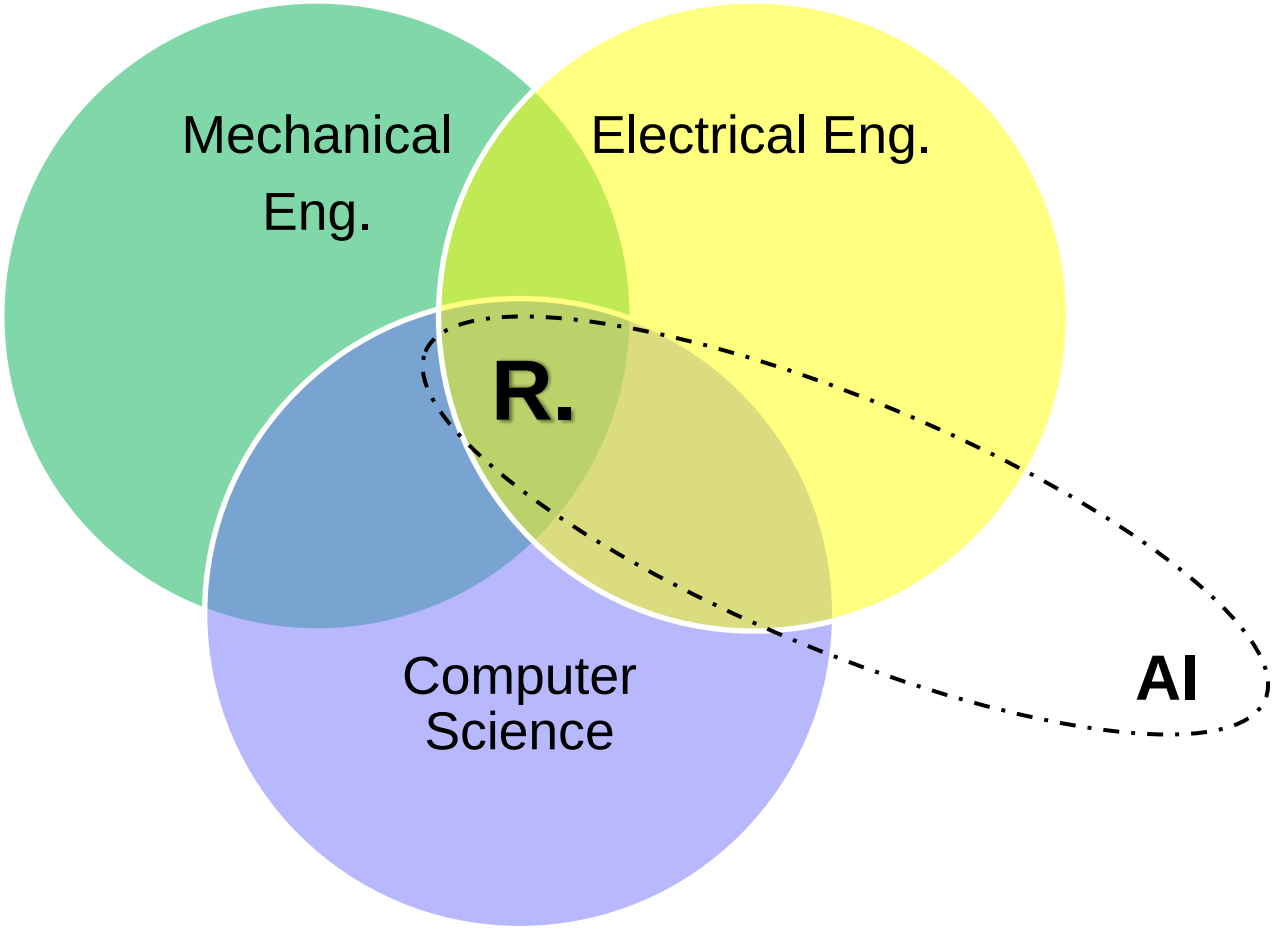
The new data ecology = fueling the rise of AI

- Regulating the **free flow of high resolution/personal data** will be key **enabler or barrier** to the development of high performance AI platforms

- ✓ **Market Critical Mass** (integrated EU digital market vs. US vs. China vs. India vs. Russia vs. Brazil)
- ✓ **Portability of data** (key for latecomers to 'catch-up')
- ✓ **Regulation** of **personal data collection/storage/processing/ownership** (EU vs. US, China, India, Russia…)
- ✓ Technical **standards** governing data sharing (W3C)



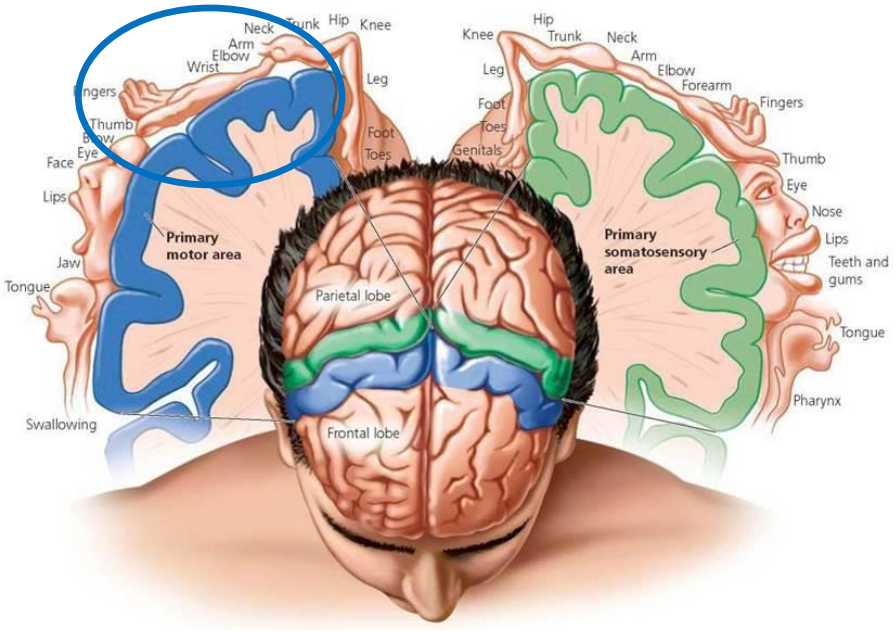
What is Robotics?



Autonomous Machines

MOSTLY MATERIAL (…but an algorithm is a robot!)

The March of Robotics



VERSATILE MOBILITY

average human

monkey

mouse

ant

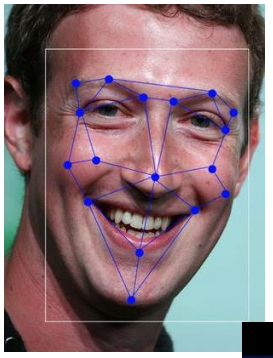
2016

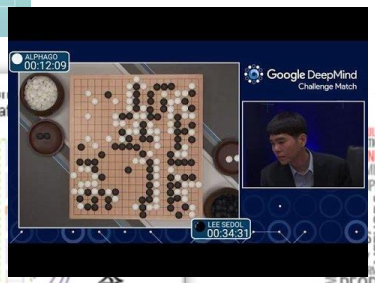
2030

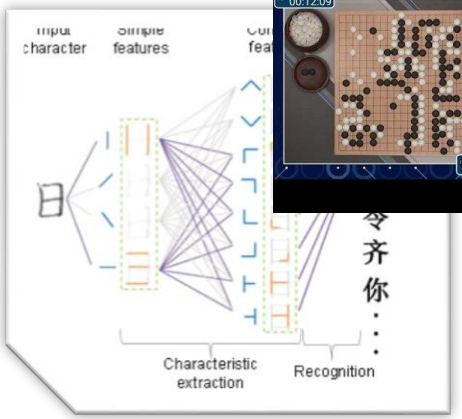
TIME

The march towards automation 1/2

Single cognitive Function
MATURE







Multiple cognitive function
EARLY STAGE

?

The march towards automation 2/2

Very **complex**
motor functions
(3D, hands, legs…)
EARLY STAGE

Very **simple**
motor functions
(2D, wheels…)
RIPE

Fairly **simple**
motor functions
(3D, actuators)
MATURE

What's at stake?

Opportunities & Risks are inextricably connected

PRODUCTIVITY GAINS vs. JOB DISPLACEMENT

SOCIAL WELFARE vs. WEALTH/POWER CONCENTRATION

ACCESS TO SERVICES vs. PRIVACY, FAIRNESS, AGENCY and DIGNITY

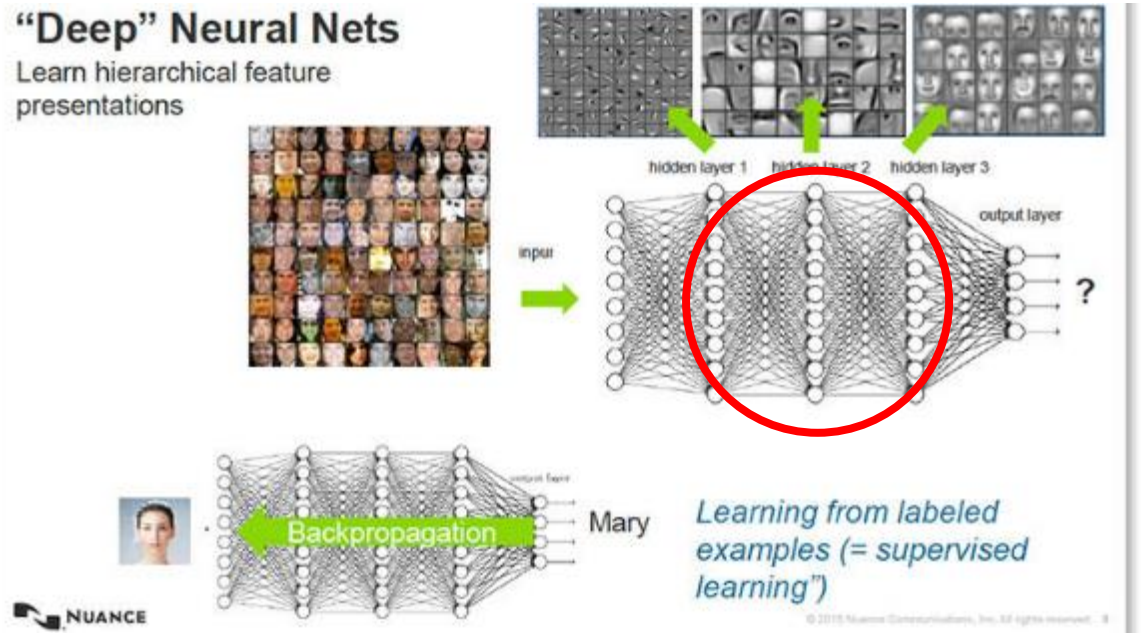
SECURITY with systems pierced by criminals and adversaries

CONTROL: democratic control of increasingly opaque and complex algorithms

The black box problem….

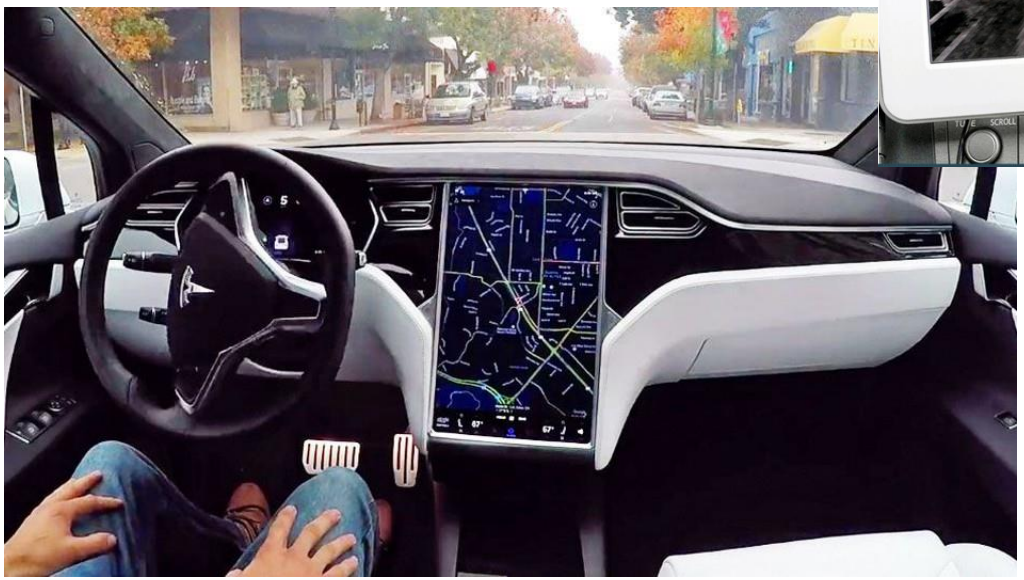
- Auditability? Certification?
- Tension between transparency and competitive dynamics
- Algorithmic bias

The Humans Working Behind the AI Curtain



Increasing delegation to machine: insurance?

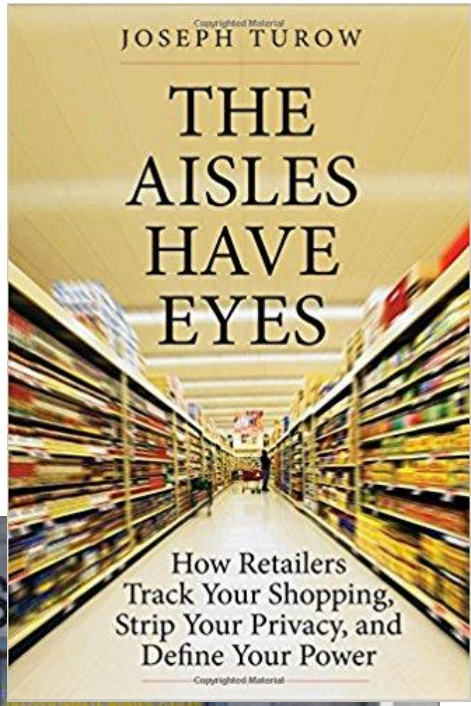
*"The types of image classification algorithm used in driverless cars could be made to ignore pedestrians or parked cars. "**I think we should worry about how we can ensure that the neural networks we put in cars are safe**,"*



DAILY NEWS 27 July 2017

Sneaky attacks trick AIs into seeing or hearing what's not there

Access VS Privacy, Bias and Control



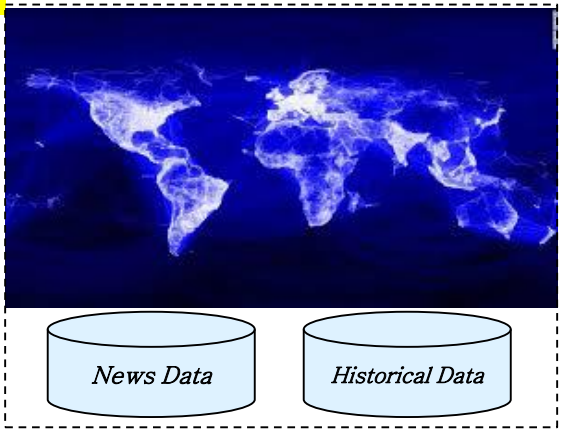
AI = predictive technology

- New ways to profile risks = new business opportunities
  - ✓ At the micro-level
  - ✓ At the macron-level

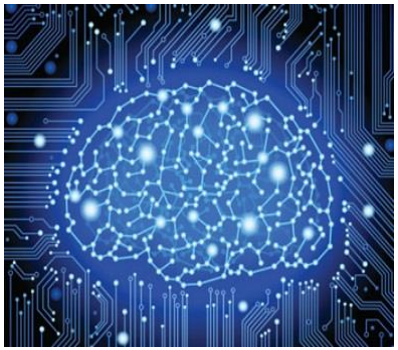
- Limits of predictive extrapolations: AI process past data to predict future outcomes

A revolution in micro-insurance?

The predictive revolution?

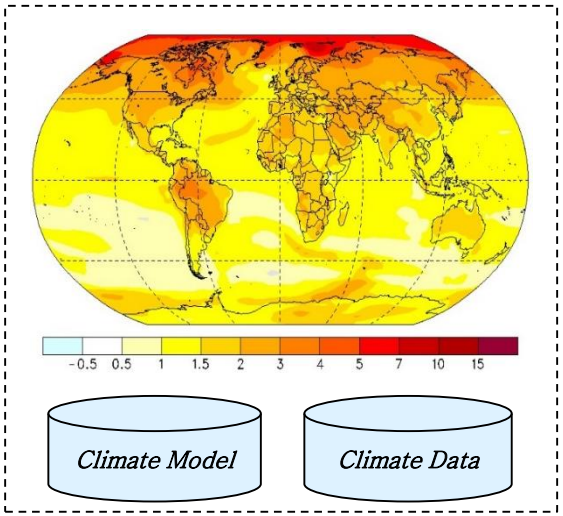


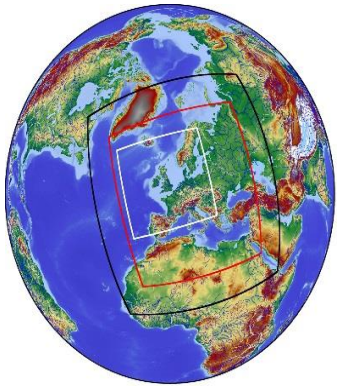
Global Coverage



Monitoring & Prediction

Decision Analysis





Climate Simulation

AI arms race…

“The Nation which becomes the leader in AI will be the ruler of the world.”

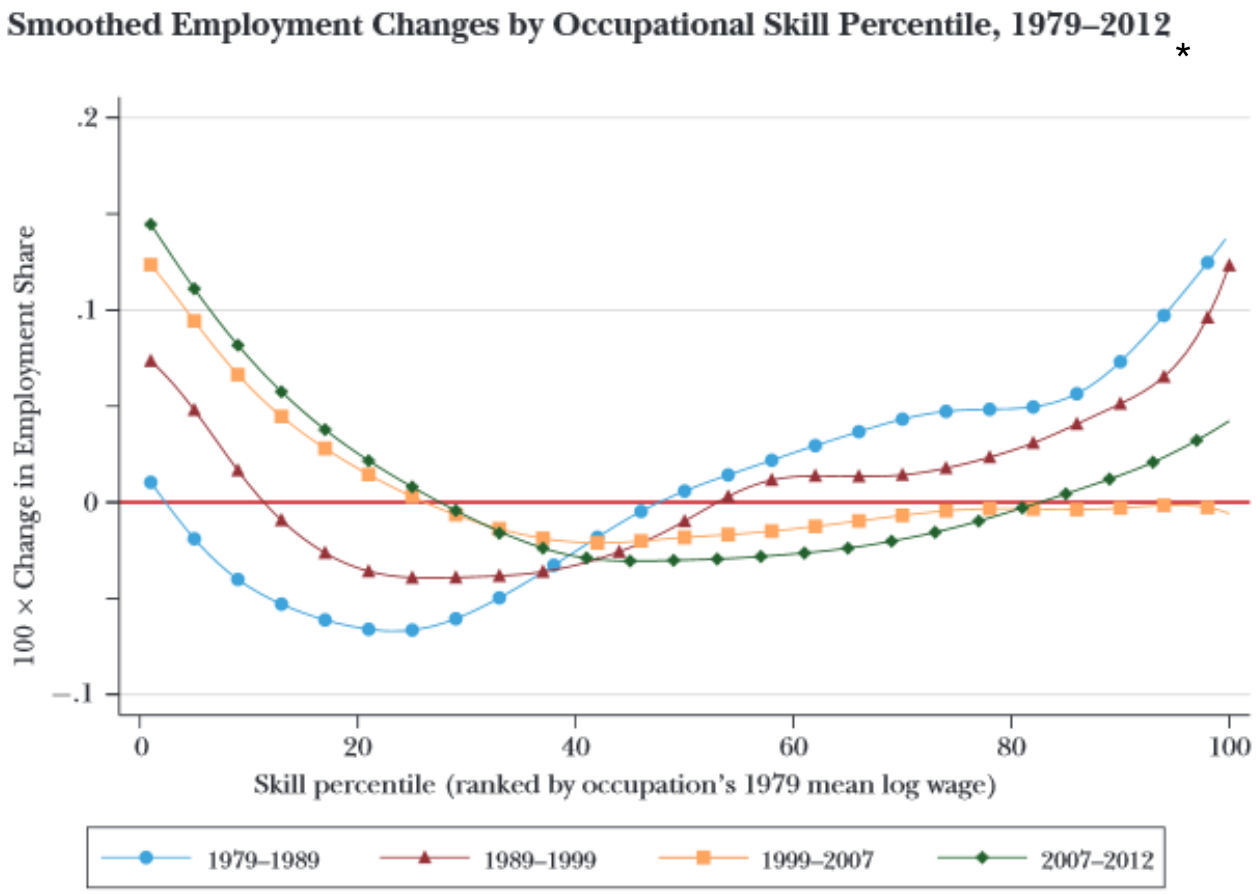
-

Vladimir Putin

September 2017

The rise of AI & Robotics

Creative destruction….. or destructive creation? (2/2)



Middle Class shifts: jobs that require between a low and high amount of skill have been disappearing => both middle and high-skill jobs being replaced with low-skill jobs

*Source: David H. Autor, MIT 2015

The example of truck drivers

ARTIFICIAL INTELLIGENCE, AUTOMATION, AND THE ECONOMY

detailed job descriptions, case studies, and surveys of existing and planned technologies for each occupation.

Table 2

Occupation	# Total Jobs (BLS, May 2015)	Range of Replacement Weights	Range of # Jobs Threatened
Bus Drivers, Transit and Intercity	168,620	0.60 – 1.0	101,170 – 168,620
Light Truck or Delivery Services Drivers	826,510	0.20 – 0.60	165,300 – 495,910
Heavy and Tractor-Trailer Truck Drivers	1,678,280	0.80 – 1.0	1,342,620 – 1,678,280
Bus Drivers, School or Special Client	505,560	0.30 – 0.40	151,670 – 202,220
Taxi Drivers and Chauffeurs	180,960	0.60 – 1.0	108,580 – 180,960
Self-employed drivers	364,000	0.90 – 1.0	328,000 – 364,000
TOTAL JOBS	3,723,930		2,196,940 – 3,089,990

Thank you.

THE
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