

# ARTIFICIAL INTELLIGENCE & HUMAN SOCIETY

PIERRE-ALEXANDRE  
BALLAND

UTRECHT UNIVERSITY  
AI TOULOUSE INSTITUTE



# Navigating a complex AI world

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- How to benefit from AI: solve **real-world problems**
- How to protect yourself from AI: pick the **skills** of the future

**AI is taking the world by  
storm**

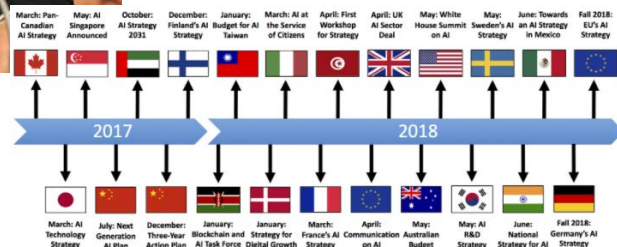


# AI is everywhere – cultural products





# AI is everywhere – national policy





**How intelligent did  
machines really become?**

# Defining AI

## 1956 Dartmouth Conference: The Founding Fathers of AI



John McCarthy



Marvin Minsky



Claude Shannon



Ray Solomonoff



Alan Newell



Herbert Simon



Arthur Samuel



Oliver Selfridge



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Trenchard More

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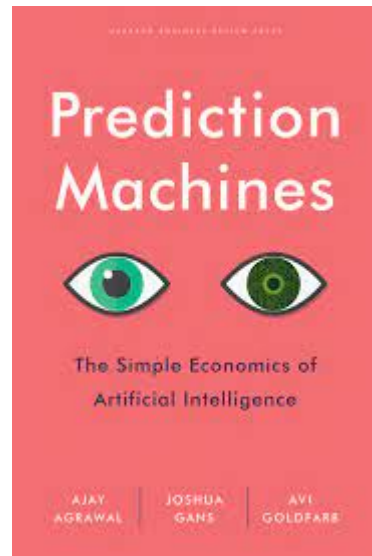
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Above this stage is **superintelligence & singularity**

# The state-of-the-art

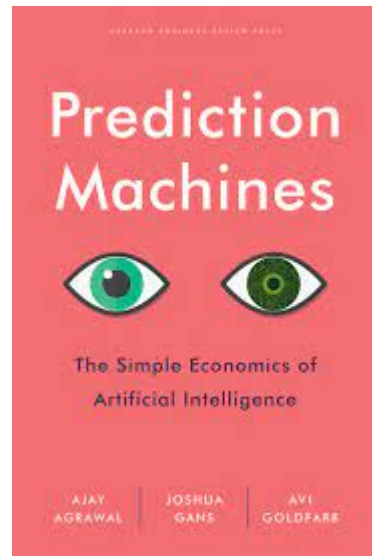
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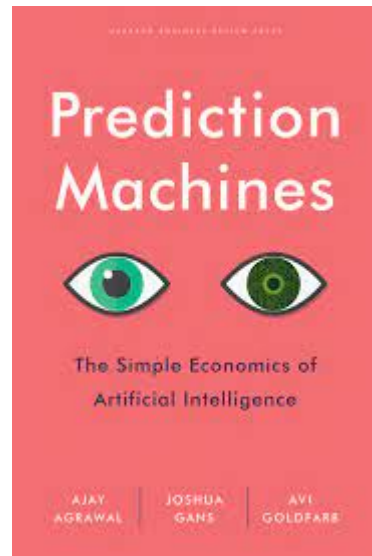
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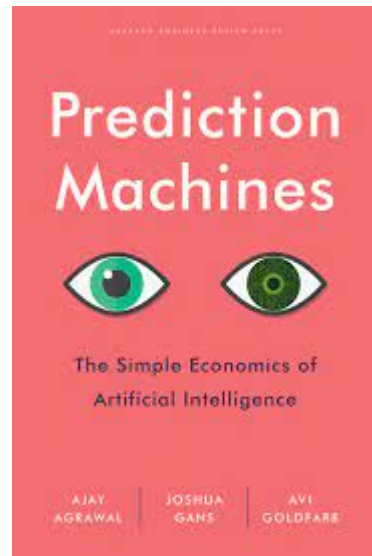
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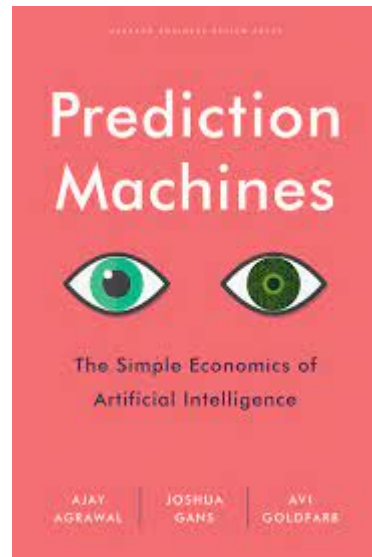
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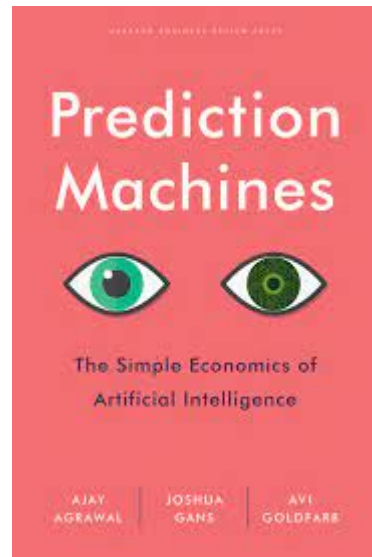
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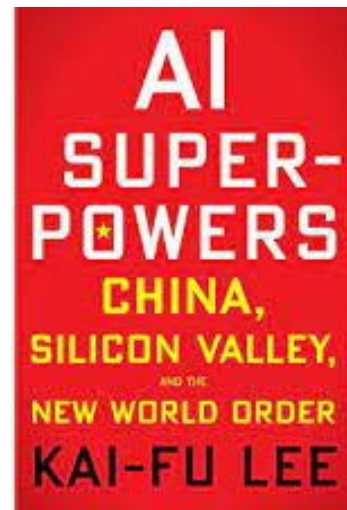
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- Singularity is likely to happen but far, far away



# The 4 waves of AI

- 1: Building **recommendation systems** with **internet data**
- 2: Using **private data** for **decision-making**
- 3: Integrating prediction machines with sensors  
= **perception AI**
- 4: Fully-autonomous AI

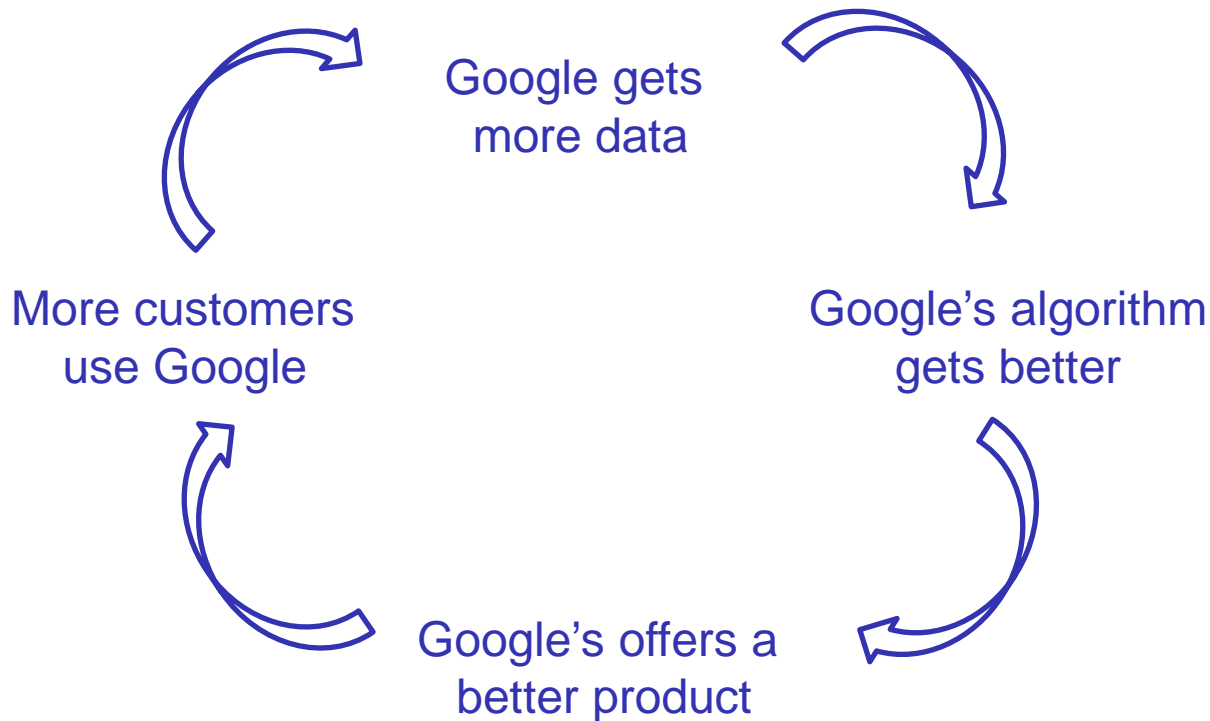


# Champions of the first AI wave



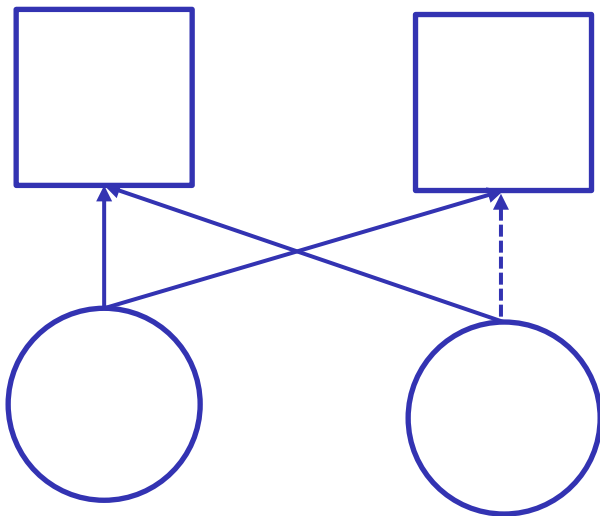


# Reinforcing Feedback Loops in AI



Exploiting the network  
**structures** (matrices) to make  
**predictions**

# What AI can predict

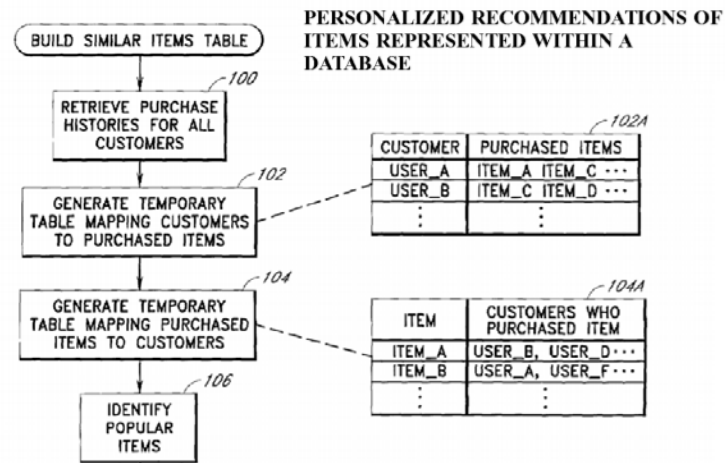


U.S. Patent

Sep. 26, 2006

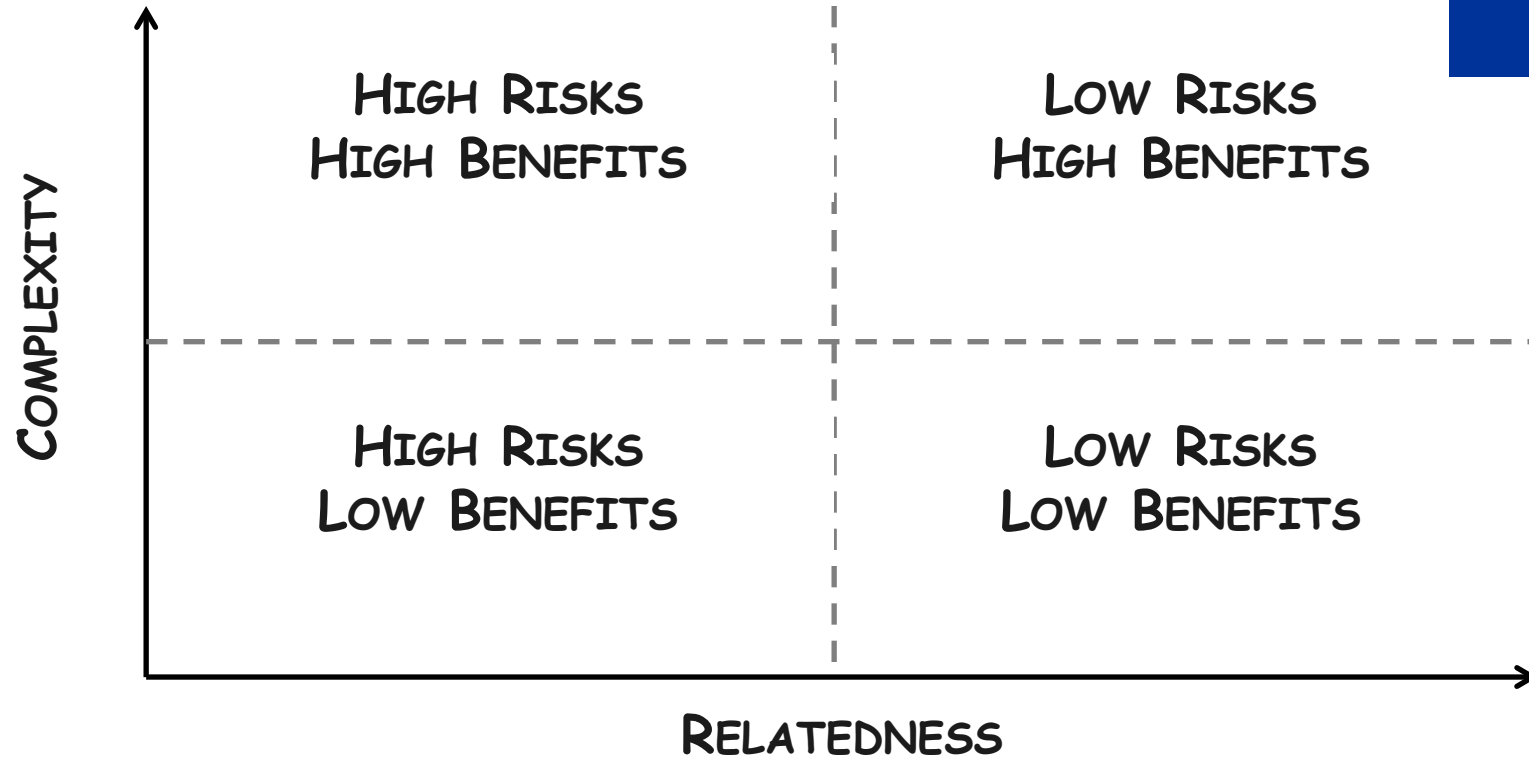


US 7,113,917 B2



Modern **AI** techniques are good at predicting the evolution of **simple** network structures

# EU smart specialization (\$120 billion )



**Balland, P.A., Boschma, R., Crespo, J. and Rigby, D. (2019)** Smart Specialization policy in the EU: Relatedness, Knowledge Complexity and Regional Diversification, *Regional Studies*

# Private data for decision-making



**AT&T**

IBM

**Watson  
Health**



**CHASE**

 Palantir

# Integrating digital & physical

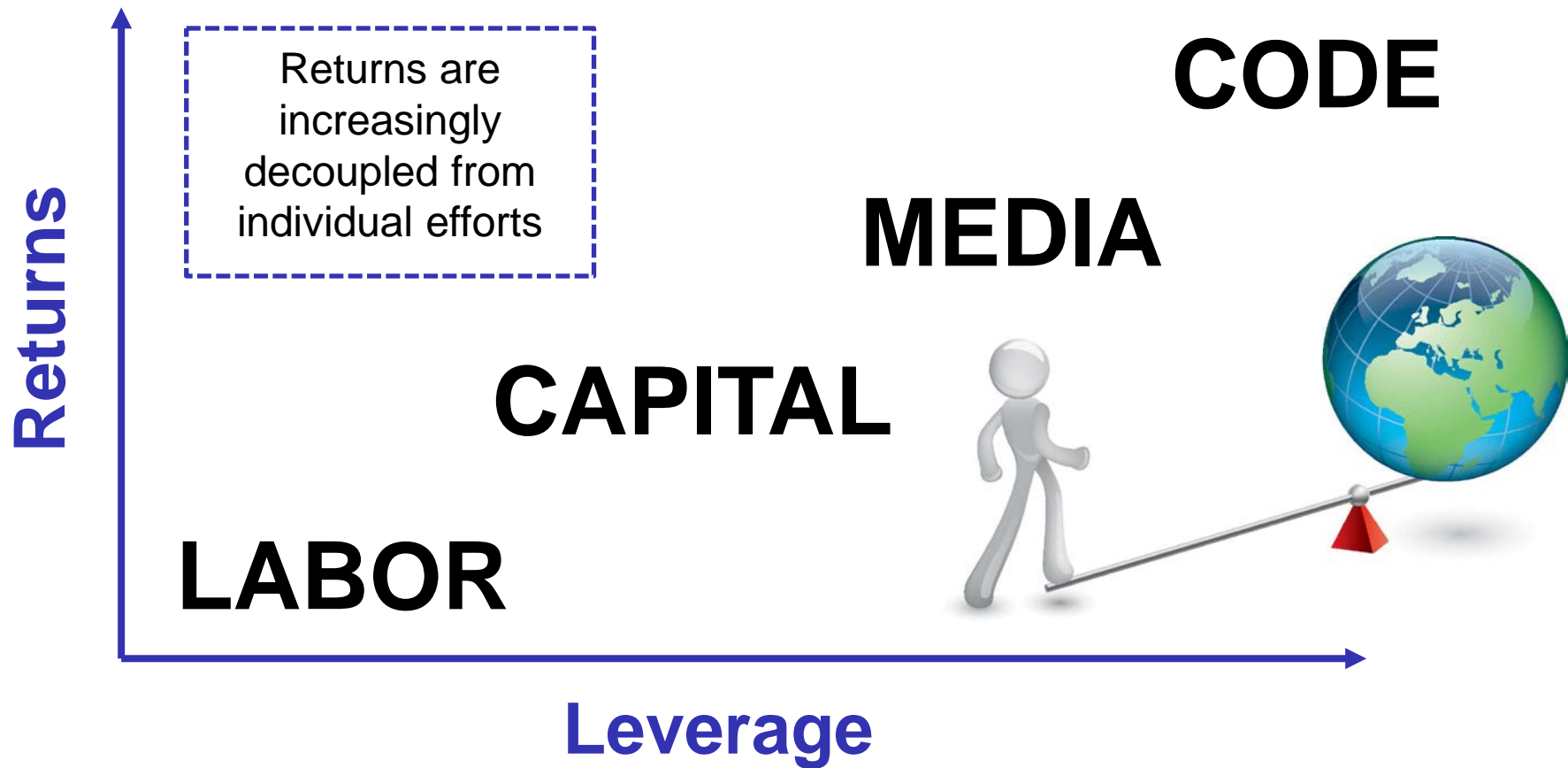


# AI in healthcare

- X-ray analysis, tumor detection
- Fully automated clinical diagnosis
- Predicting future health based on medical records & genetics
- Personalized medication
- Automated surgical robots (Smart Tissue Autonomous Robot)
- AI-enabled dynamic prosthetics (Hugh Herr, Media Lab)

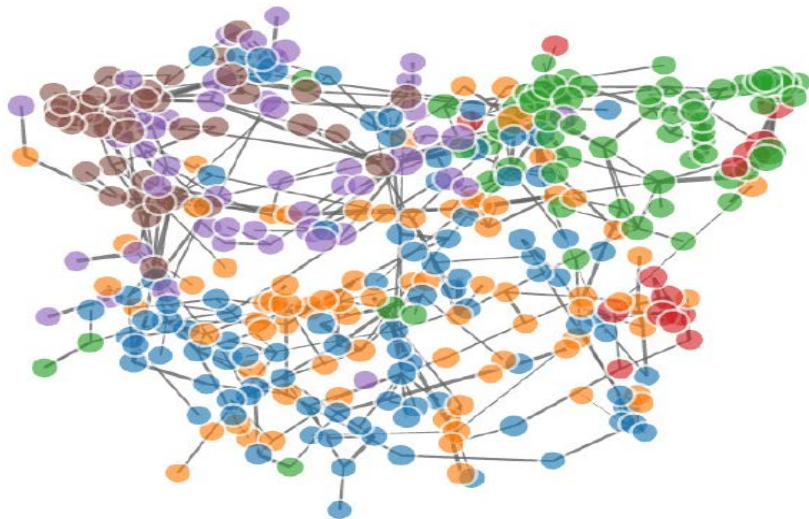


# Leveraging complex networks



# Beyond CS skills

$$v_i = \frac{1}{\lambda} \sum_j A_{ij} v_j$$

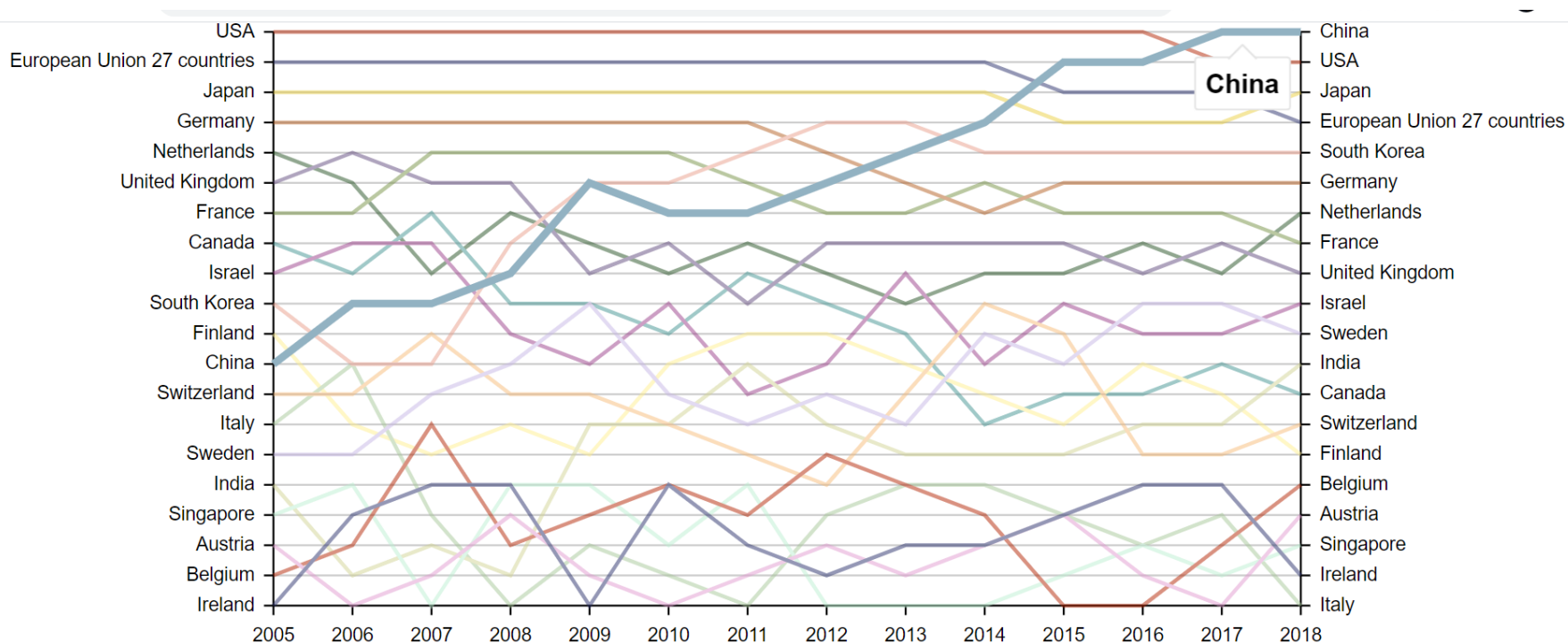


**The ability to identify business problems and re-frame them as a data science solution is as important as the programming skills needed to develop AI tools**

# The future of work

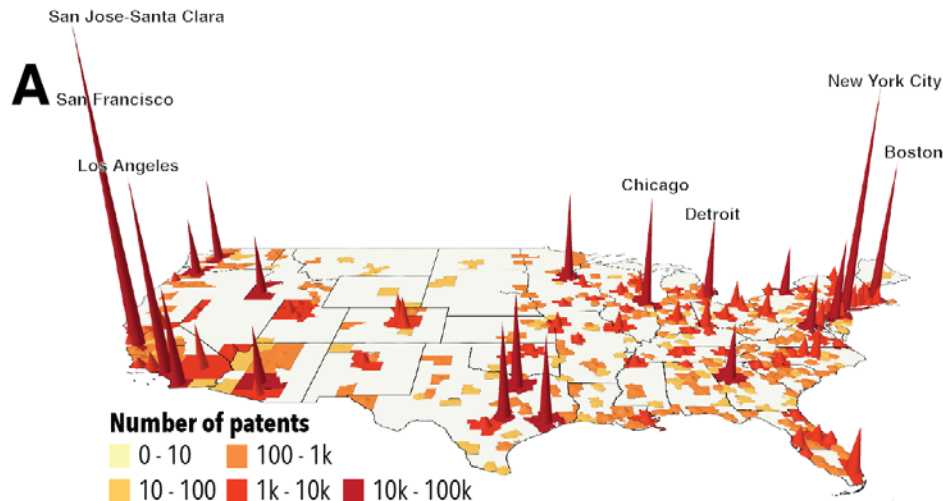
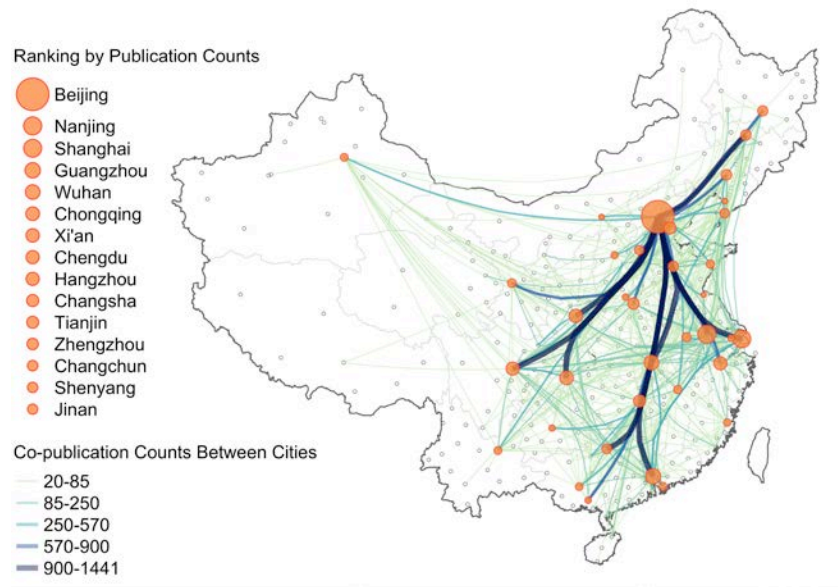
- These skills are the **foundation** of an AI world:
  - complex decision-making
  - creative content
  - business-technology interface
  - inter-human relationships
  - programming language
- They are:
  - hard to automate
  - requires new modes of education (hard to train at scale)
  - requires the re-invention of corporate culture, work ethics and lifestyle

# The geography of AI patents



Source: Balland (2021) – Report for DG Grow

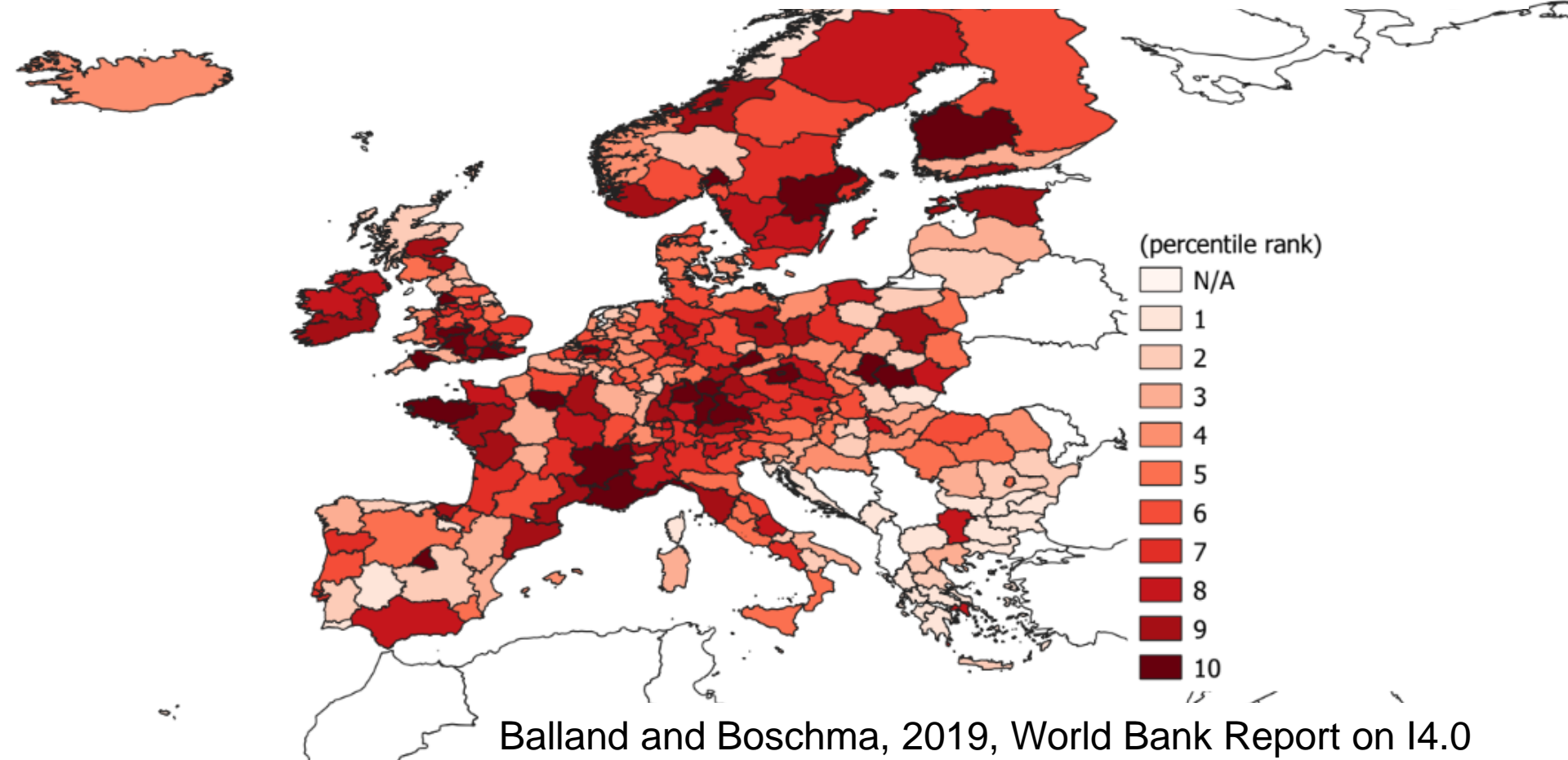
# Being in the right place matters (more)



Balland et al. (2020):

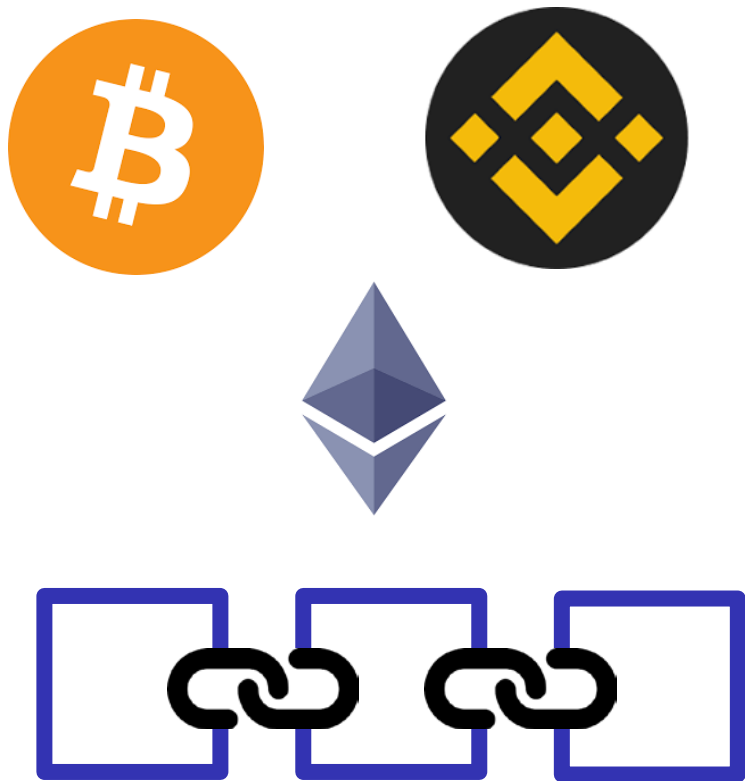
[nature.com/articles/s41562-019-0803-3](https://www.nature.com/articles/s41562-019-0803-3)

# European Hubs of the industries of the future



Balland and Boschma, 2019, World Bank Report on I4.0

# Blockchain is the other automation revolution



## Crypto will:

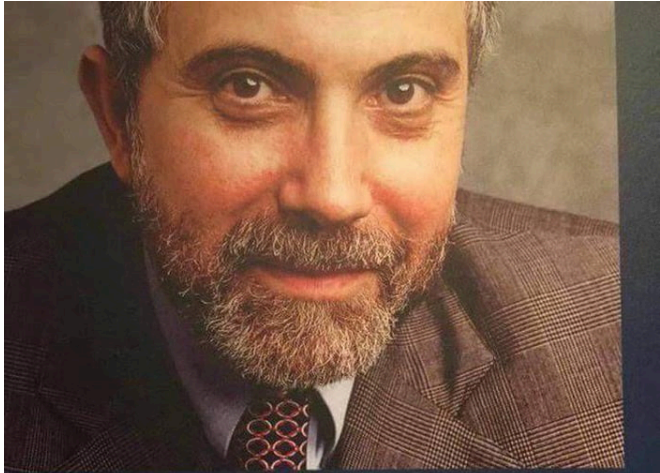
- **disrupt** every industry by automating transactions
- enable the **scaling** of AI solutions (structured + interoperable data)
- increase hyperconnectivity by providing **trust** at scale



When the **structure of our  
world is too complex:**

what machines can't predict and  
the strength of **human wisdom**

# What you can not predict in a complex world



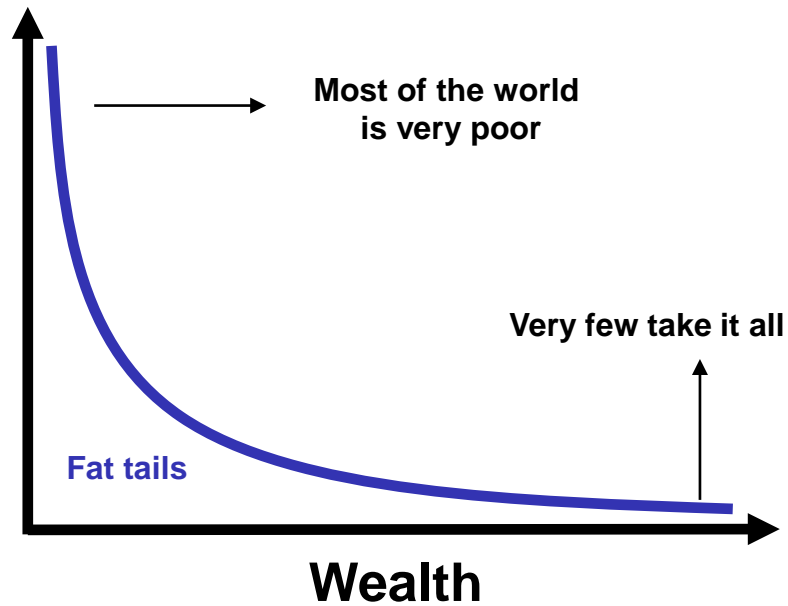
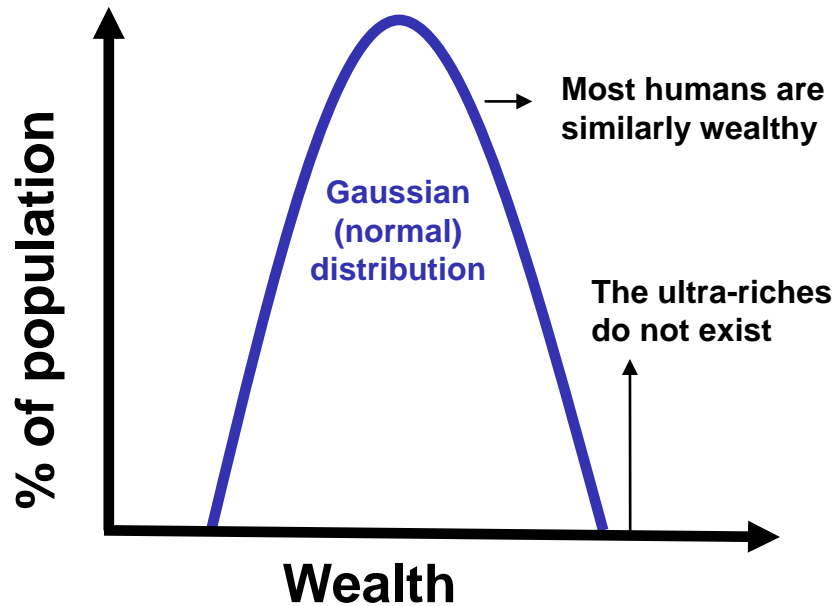
*"By 2005 or so, it will become clear that the Internet's impact on the economy has been no greater than the fax machine's."*

Nobel Prize-winning economist  
Paul Krugman

**1998**



# Complex systems are governed by fat tails



Systemic complexity generates probability distributions with relatively **high probability** of **extreme** (positive or negative) **outcomes** that even the best AI **can not predict**

# Complex systems & human wisdom

- **Complex systems heuristics**

- Leverage, optionality & redundancy
- Exposed to upside and protect from downside
- Risks/rewards come from multiplicative systemic effects

- **Evolutionary collective wisdom**

- Those who used it survived
- No science – error and feedback evolutionary loops
- You don't know you are using it