

Digital Disruption and the Future of Work



Carl Benedikt Frey

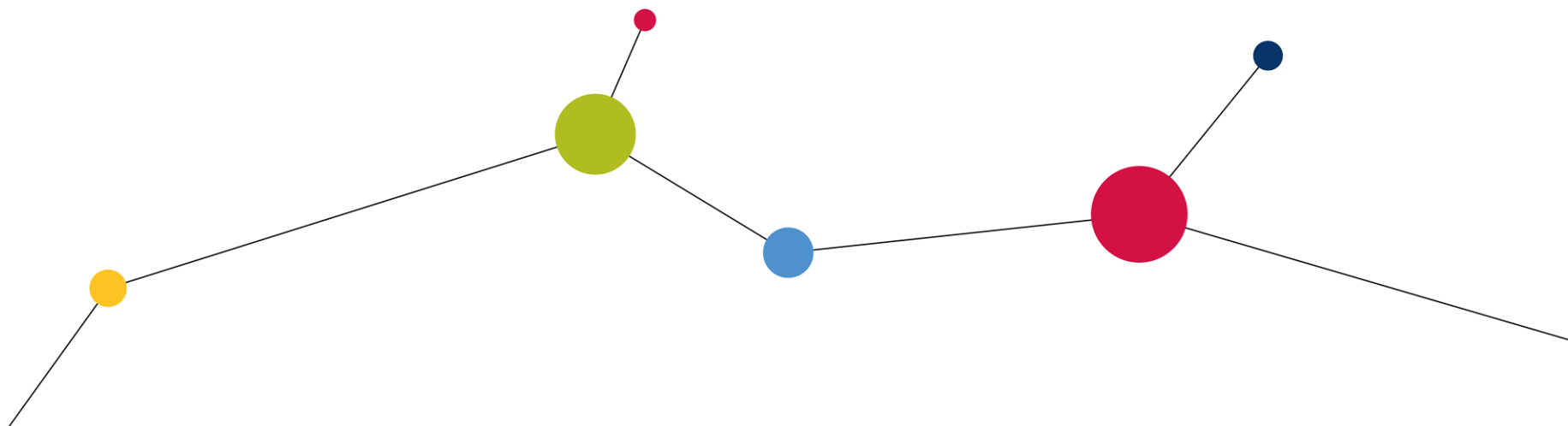
Co-Director

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University of Oxford

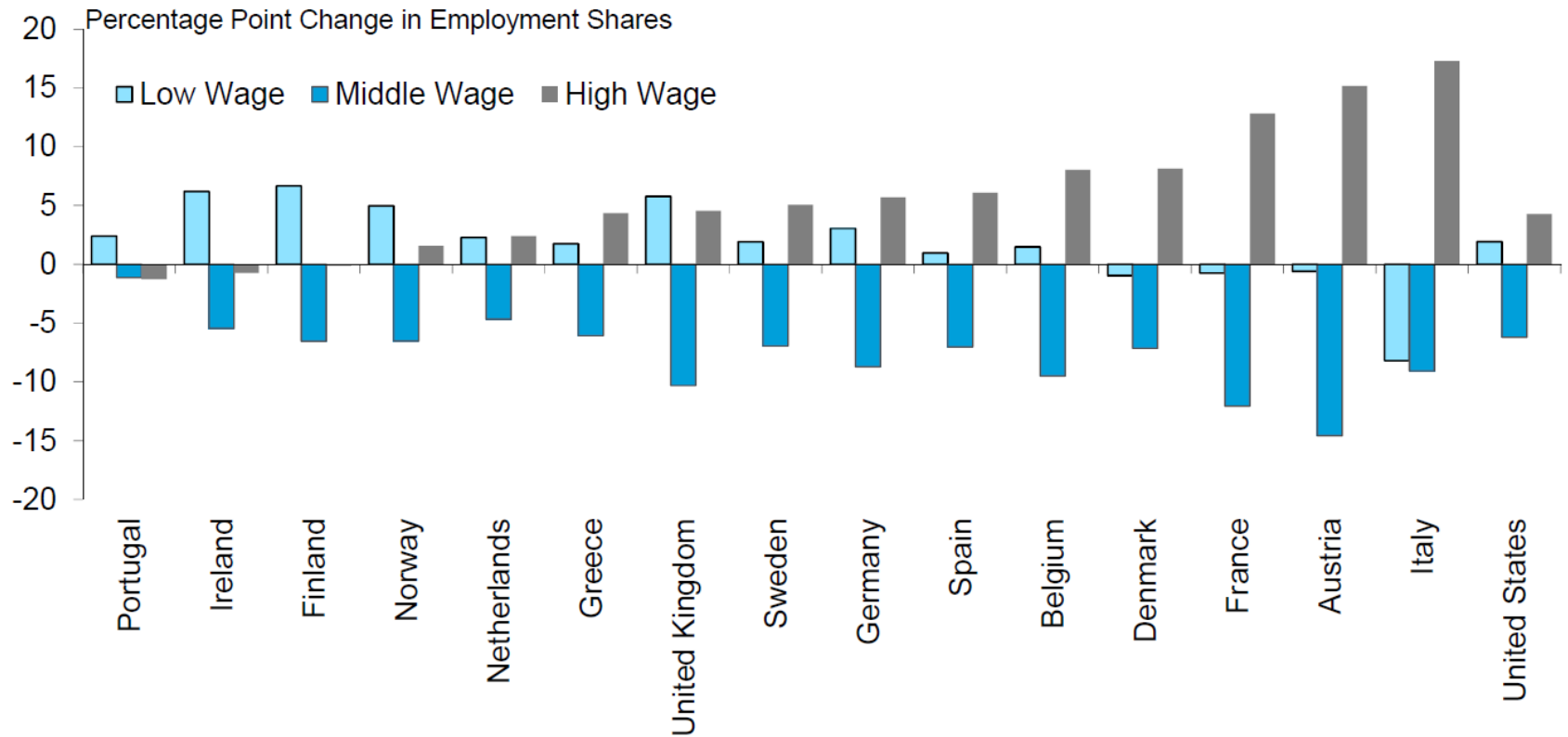
“By 2030, more workers will be self-employed and aspire to make a difference by working on 21st century challenges. Because most of these challenges need to be tackled in an interdisciplinary manner, children will need to study for degrees combining engineering and social sciences.”

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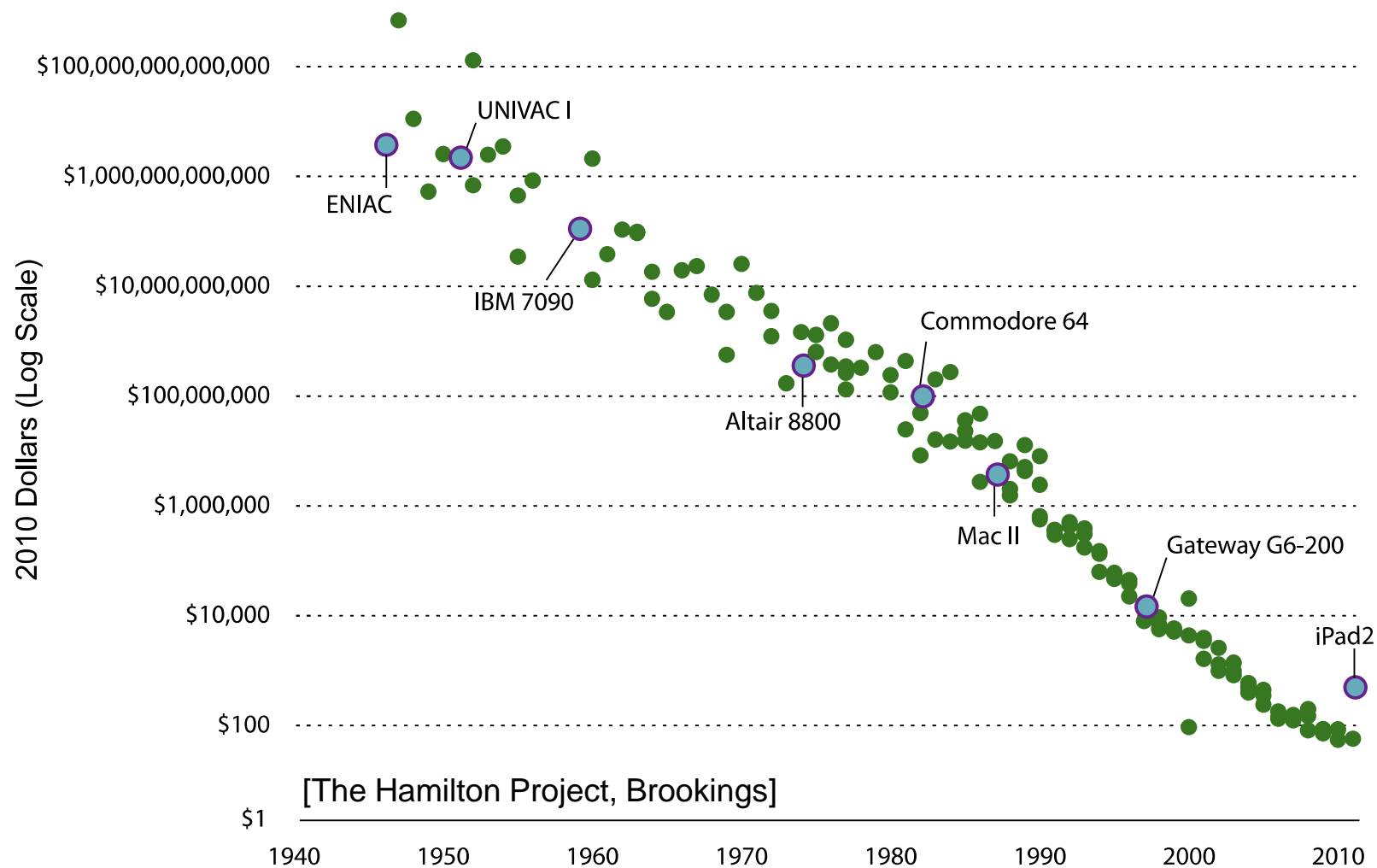


Job polarization is evident across most industrial economies



Source: David Autor (2010), "The Polarisation of Job Opportunities in the U.S. Labor Market: Implications for Employment and Earnings," Center for American Progress and The Hamilton Project. Wage categories are based on average wage levels at the start of the period measured

Algorithms are increasingly a cheaper alternative to human work.



The scope of computerization is rapidly expanding

Routine

Nonroutine

Cognitive

- Record-keeping
 - Calculation
 - Repetitive customer service (bank teller)

- **Medical diagnosis**
 - Legal writing
- Persuading selling
- Managing others

Manual

- Picking or sorting
- Repetitive assembly

- Janitorial services
- **Truck driving**

We live in the age of **big data**.

All printed material
in the world

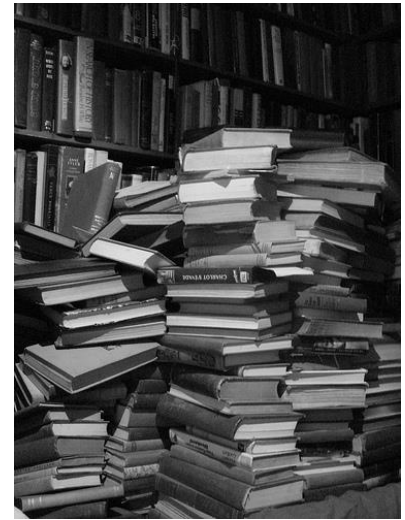
200 petabytes
(2×10^{17} bytes)

All words ever spoken
by human beings

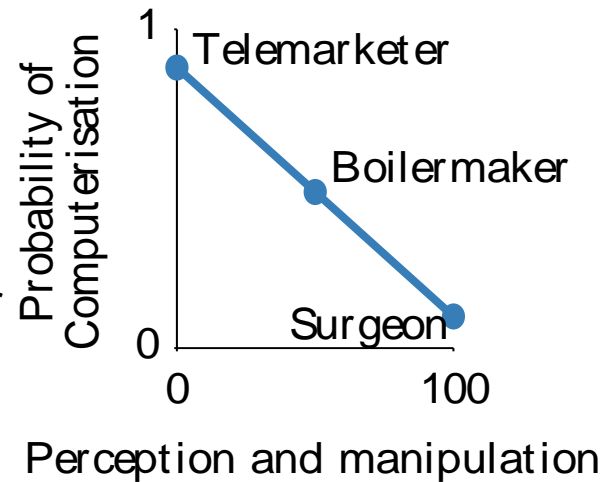
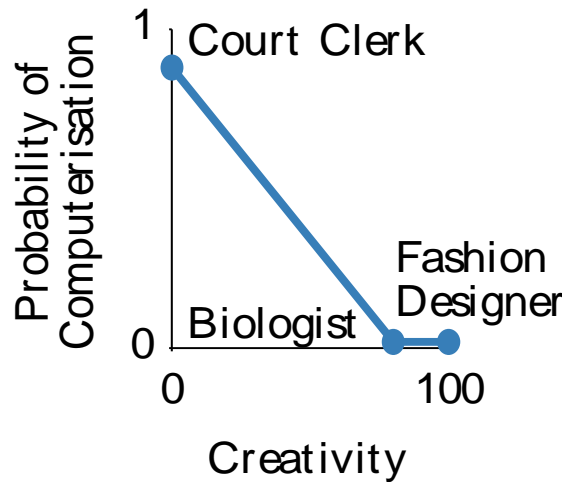
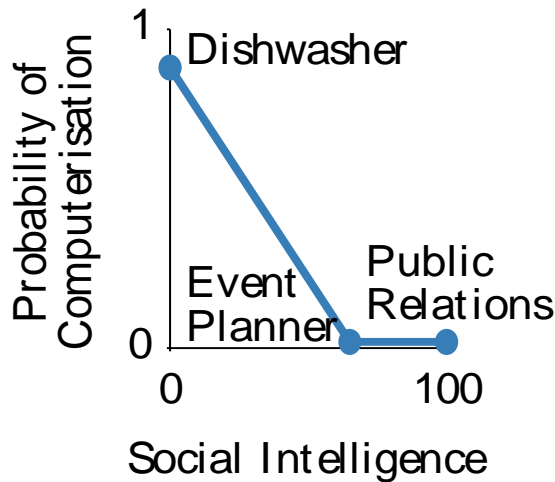
5 exabytes
(5×10^{18} bytes)

**Predicted internet traffic
in 2015**

**960 exabytes
(1×10^{21} bytes)**



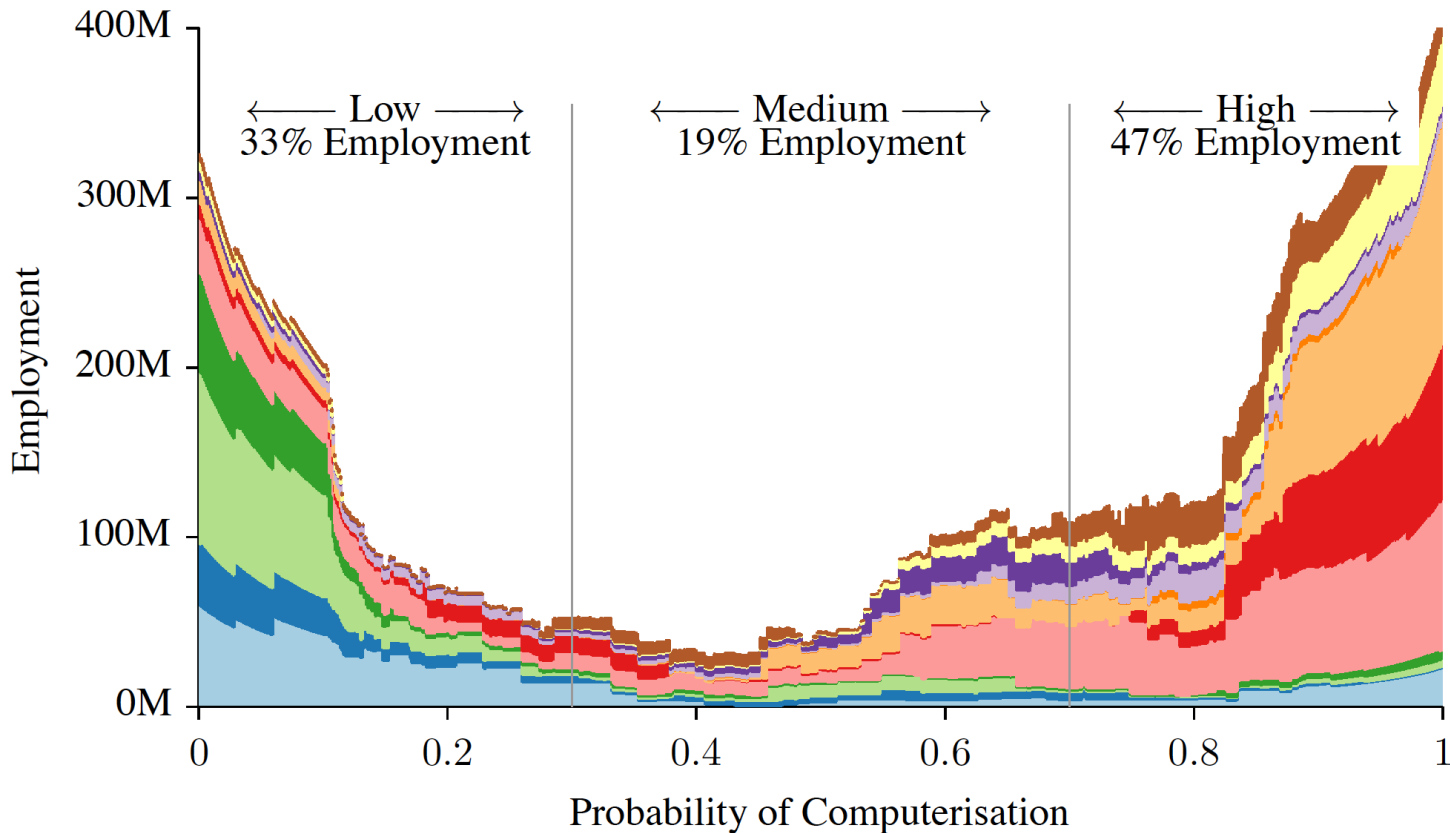
We expect social intelligence, creativity and perception to be **bottlenecks to computerisation.**



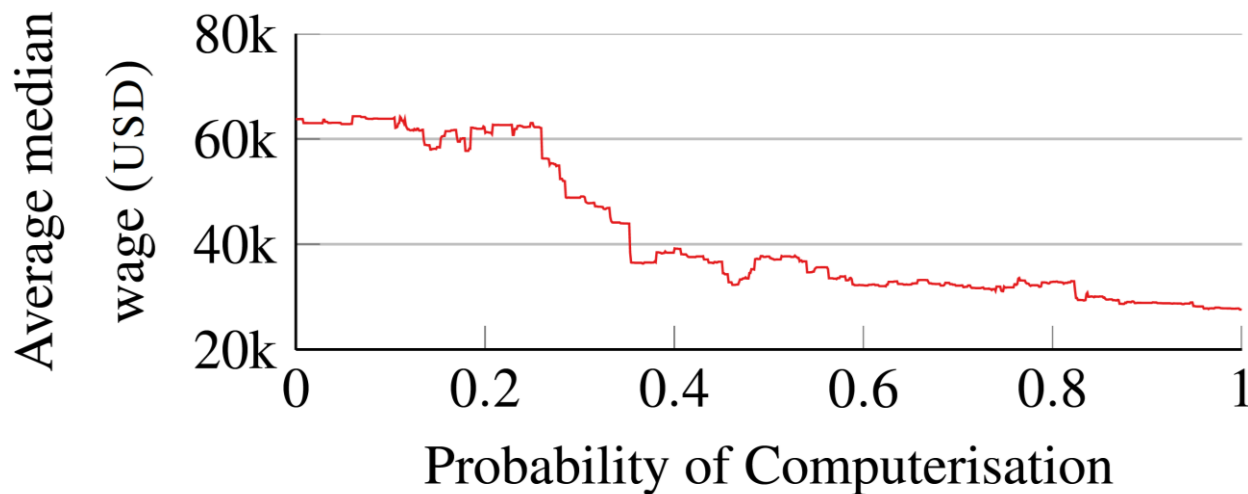
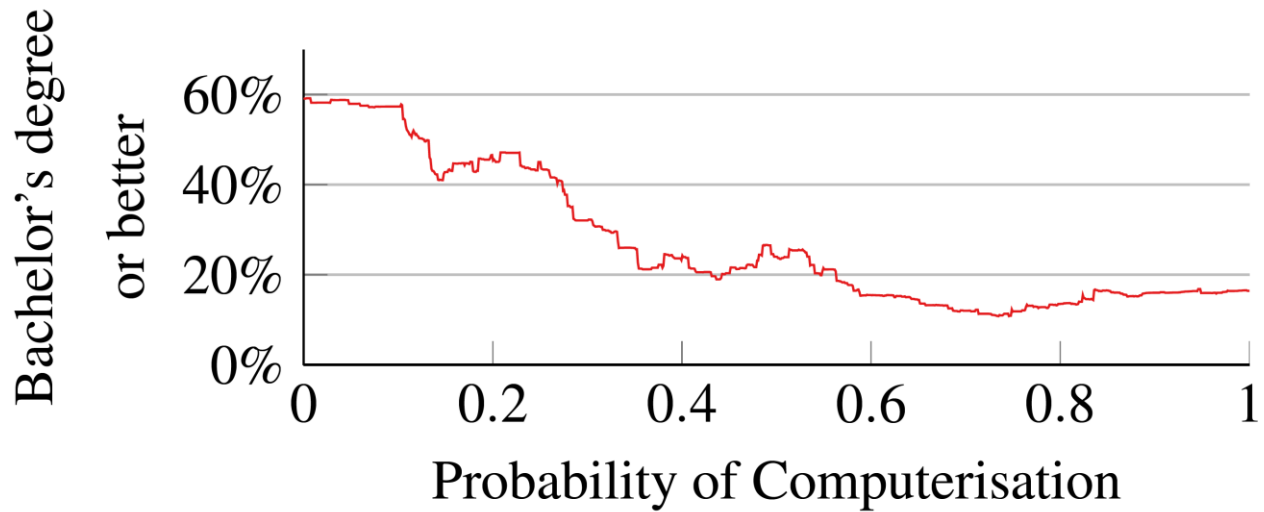
We used a dataset of 702 occupations, giving job features (e.g. requirements for finger dexterity and persuasion) to **predict automatability by 2030.**

- Management, Business, and Financial
- Computer, Engineering, and Science
- Education, Legal, Community Service, Arts, and Media
- Healthcare Practitioners and Technical
- Service
- Sales and Related
- Office and Administrative Support
- Farming, Fishing, and Forestry
- Construction and Extraction
- Installation, Maintenance, and Repair
- Production
- Transportation and Material Moving

USA



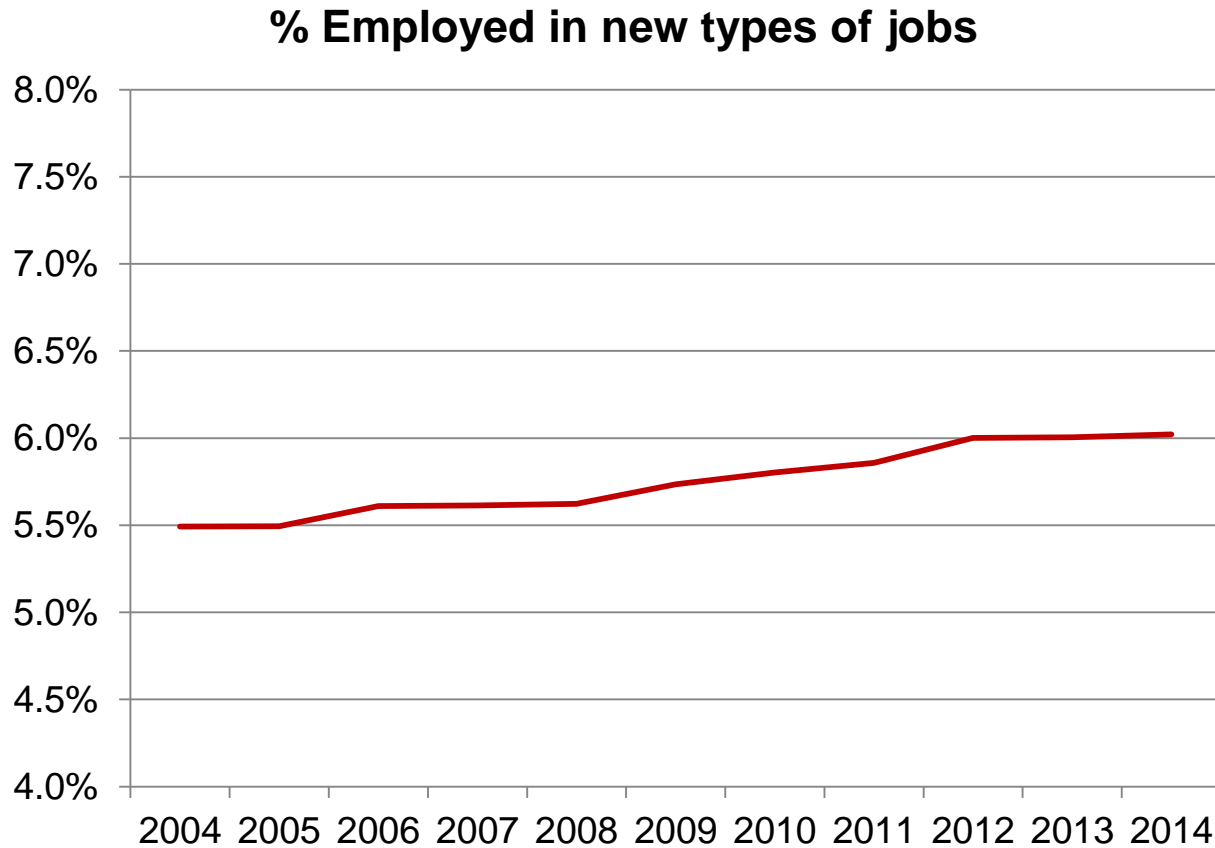
We predict that **high-skilled jobs are relatively resistant to computerisation.**



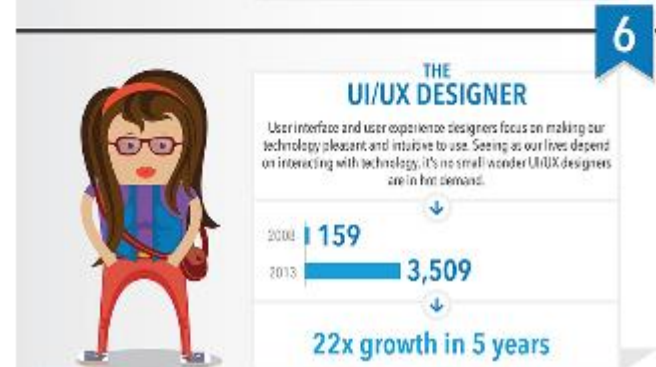
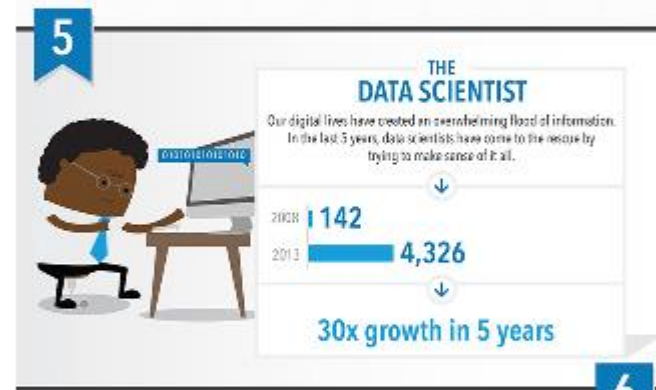
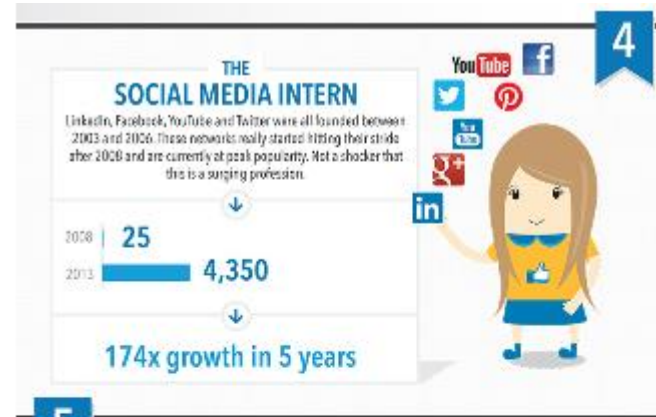
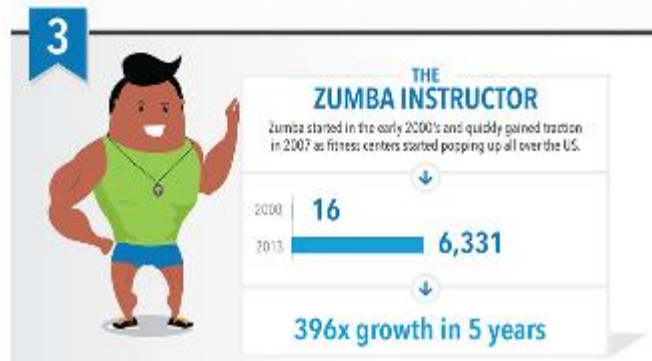
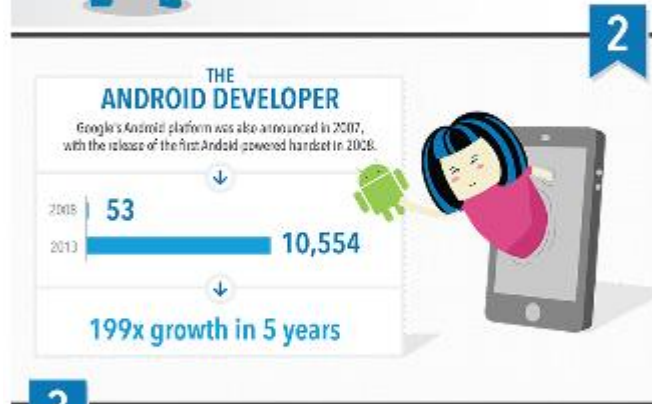
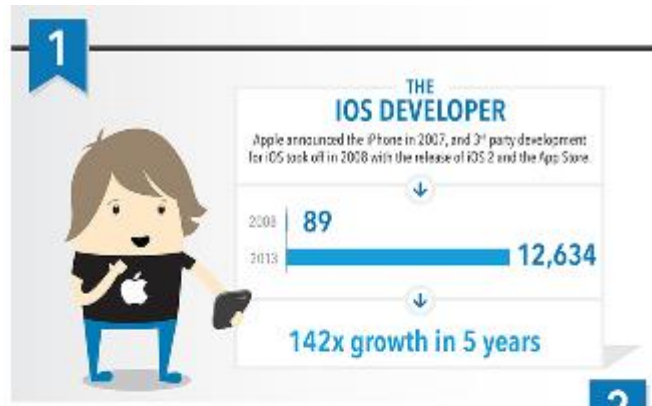
8 of the 10 occupational categories with the highest proportion of new job types that did not exist in 1990 were directly related to **computer technologies**

Categories	New job types (%)
Computer Software Engineers	80.0
Database Administrators	78.6
Network and Computer Systems Administrators	78.1
Computer and Information Systems Managers	76.5
Computer Support Specialists	71.4
Computer Programmers	59.1
Miscellaneous Personal Appearance Workers	50.0
Logisticians	50.0
Computer Hardware Engineers	50.0
Physical Therapists	50.0

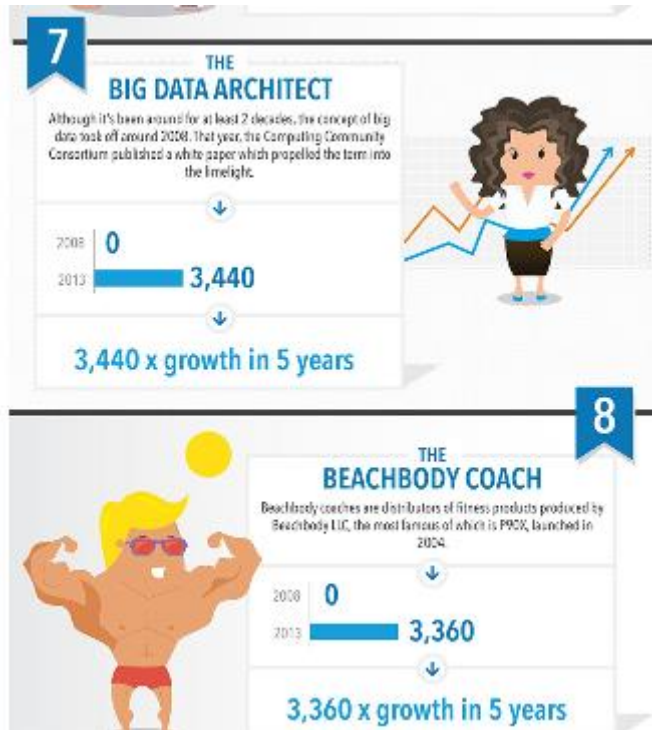
New job creation in the UK has stagnated over the past decade



New jobs are being created



New jobs are being created



New Industries have emerged

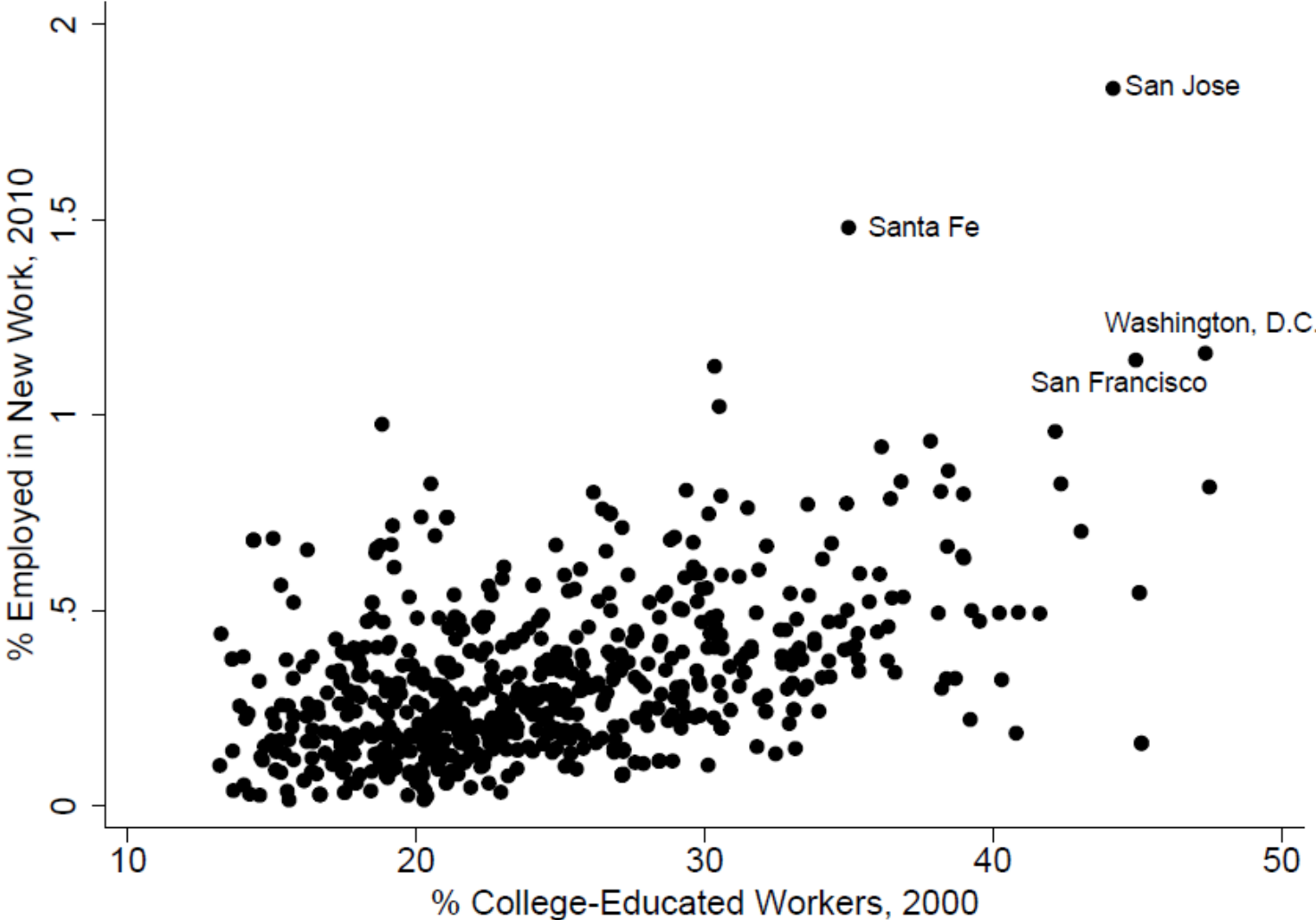


Detailed industry	% of US Employment	% with college degree	Avg. Wages (\$)
Internet publishing and broadcasting	0.06	69.6	81,138
Electronic shopping	0.08	49.7	45,372
Data processing, hosting, and related services	0.08	48.0	64,729
Electronic auctions	0.01	52.2	47,257

0.5 % of the US workforce is employed in new industries created in the **21st century**

Source: Berger & Frey (2014)

New job creation is highly concentrated



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