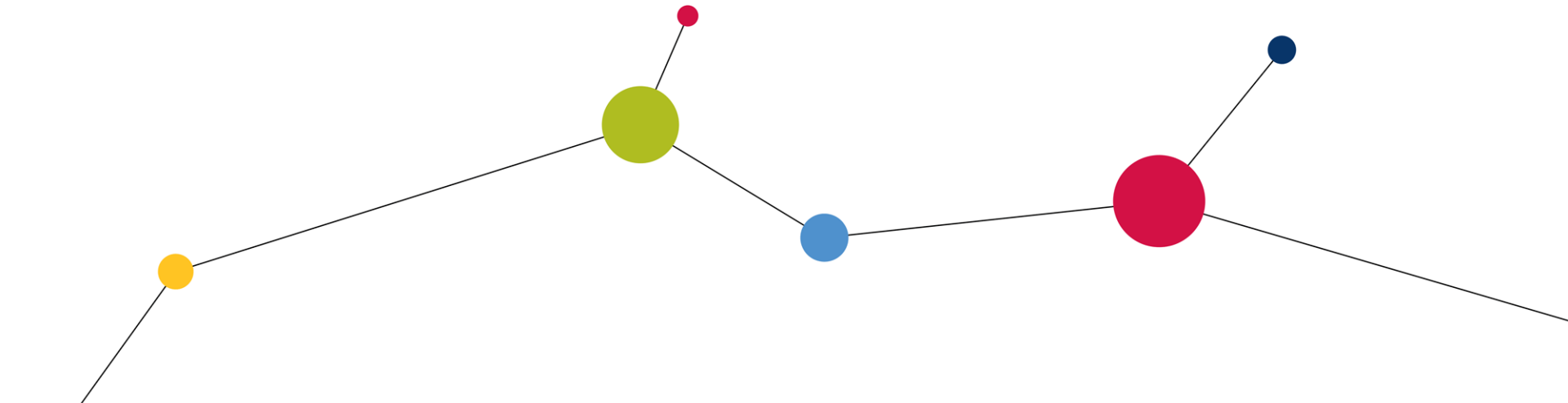
Digitaliseringens konsekvenser och framtidens arbetsmarknad

Carl Benedikt Frey



Computers are increasingly a cheaper alternative to human work.

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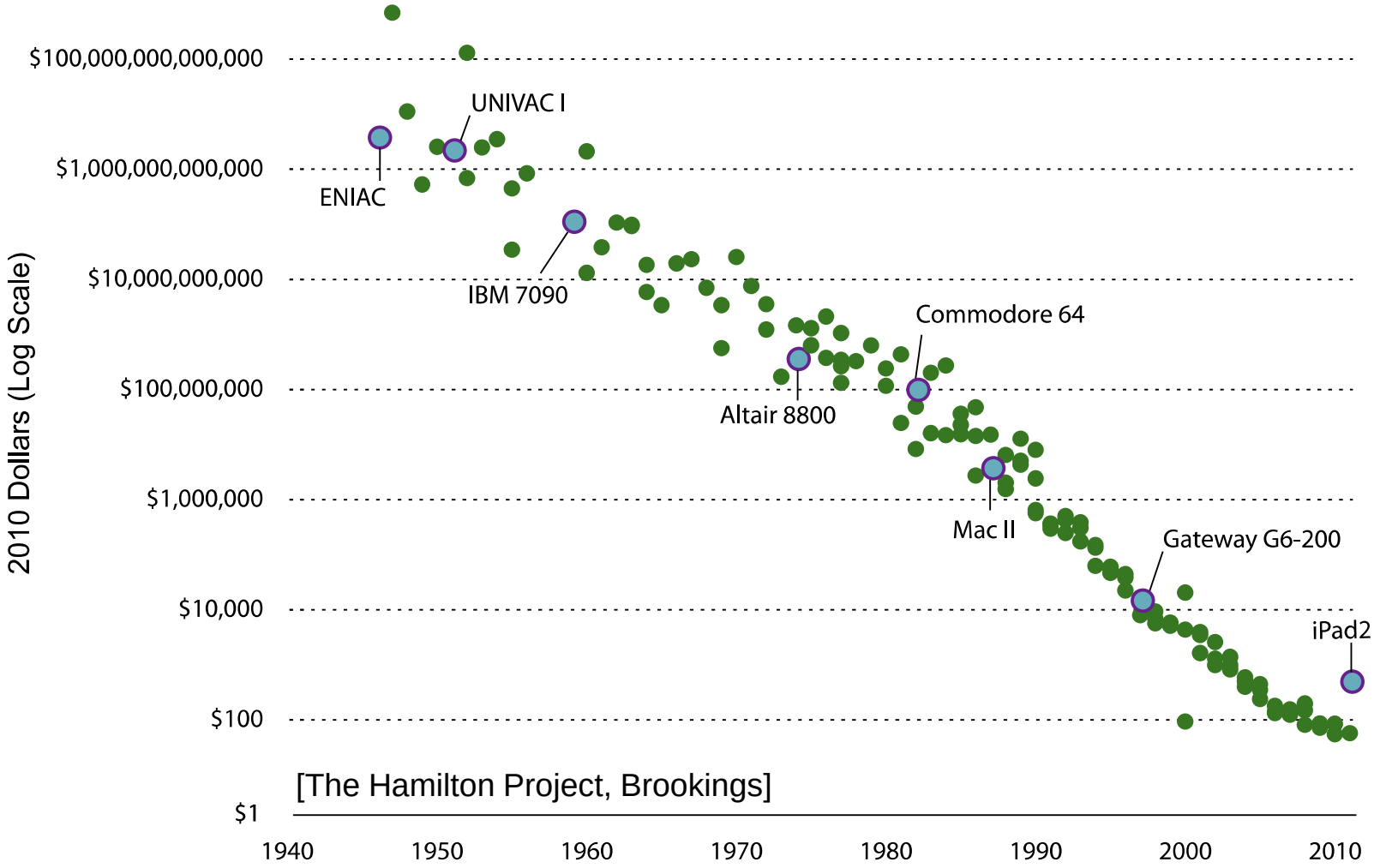

Job polarization is evident across most industrial economies

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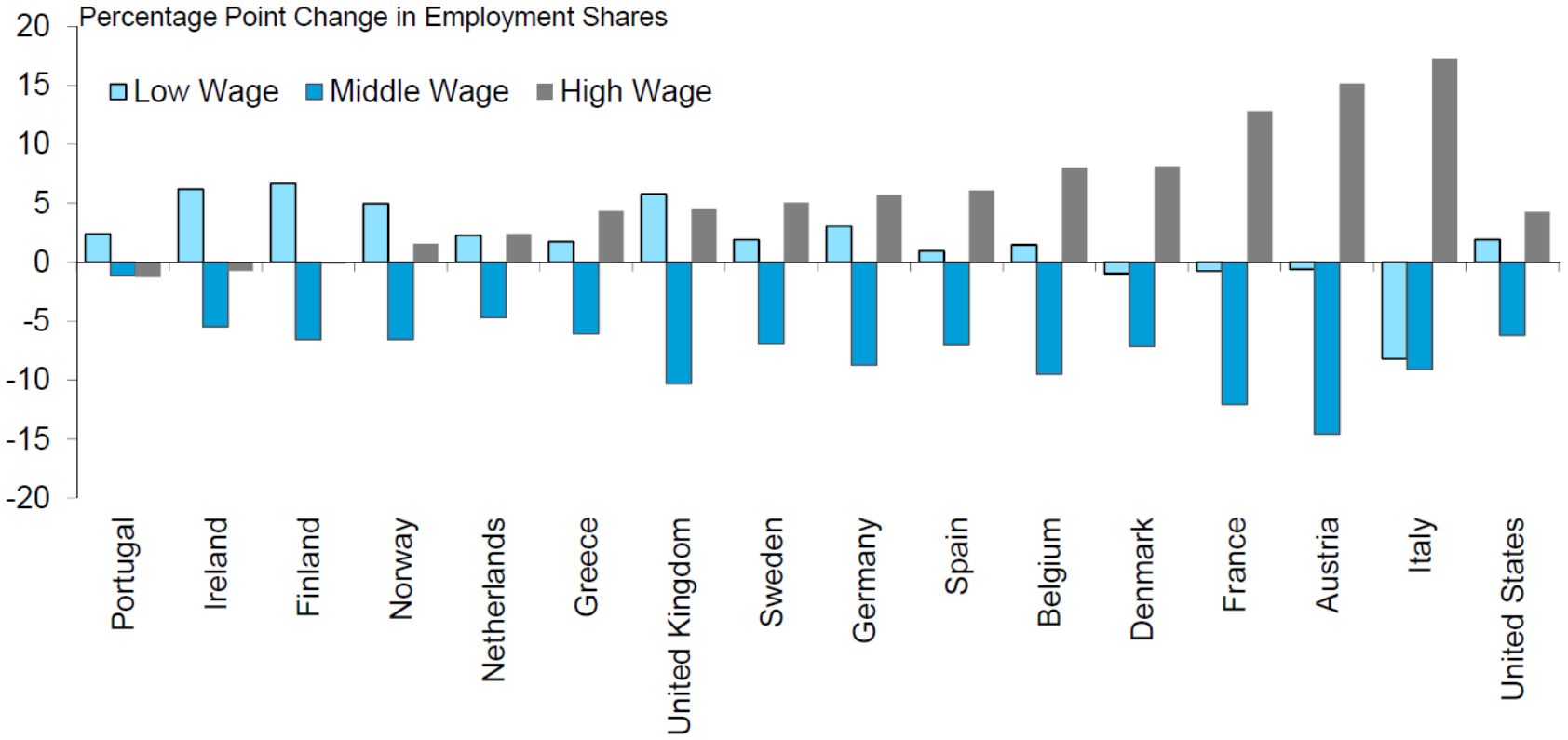

Source: David Autor (2010), "The Polarisation of Job Opportunities in the U.S. Labor Market: Implications for Employment and Earnings," Center for American Progress and The Hamilton Project. Wage categories are based on average wage levels at the start of the period measured

The scope of computerization is rapidly expanding

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	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

Source: Autor, Levy and Murnane (2003)

We live in the age of big data.

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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)

Source: UC Berkeley School of Information, 2003; Cisco Visual Networking Index, 2011

Big data is leading to the automation

of translation work

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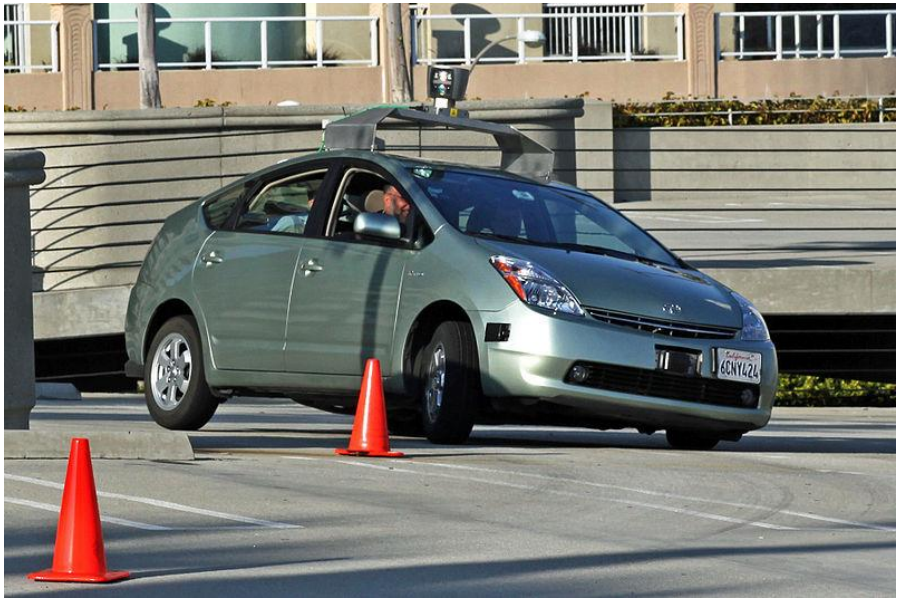
Google Translate

Break through language barriers.

- Levy and Murnane (2004): “executing a left turn against oncoming traffic involves so many factors that it is hard to imagine discovering the set of rules that can replicate a driver's behaviour”.



- In 2012, Nevada issued a driving license to a fully autonomous Google car.

The QC-Bot is automating logistics in hospitals, delivering medicines, materials and meals.

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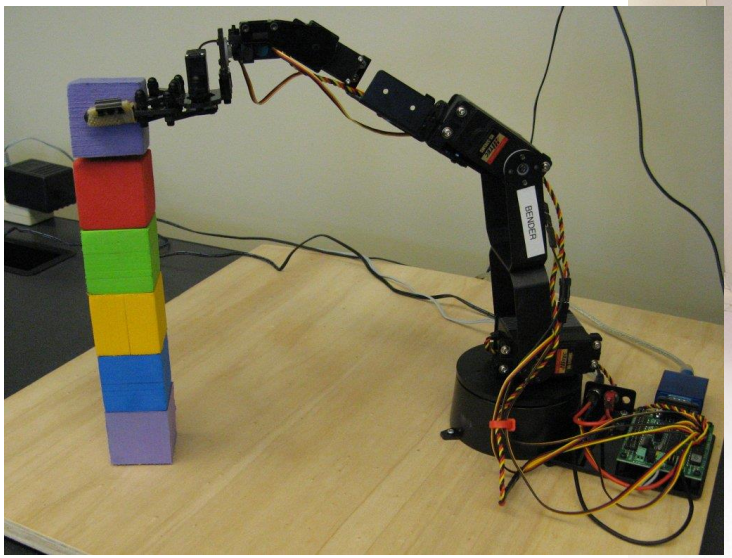
Essentially all logistics tasks are imminently automatable; we will see autonomous

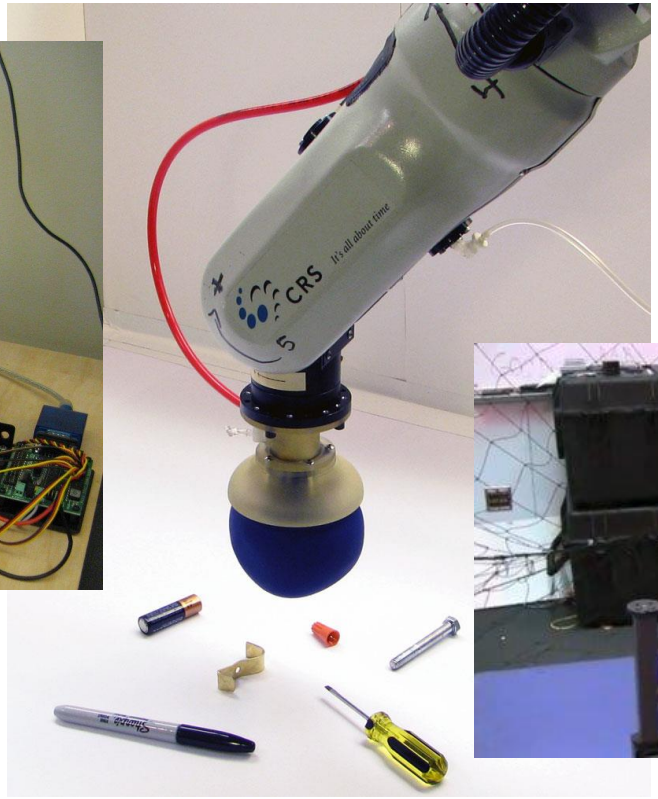
So, if machines can drive, serve customers, and look through data as well as humans, what are humans still good for? In short,

creativity

and social intelligence.

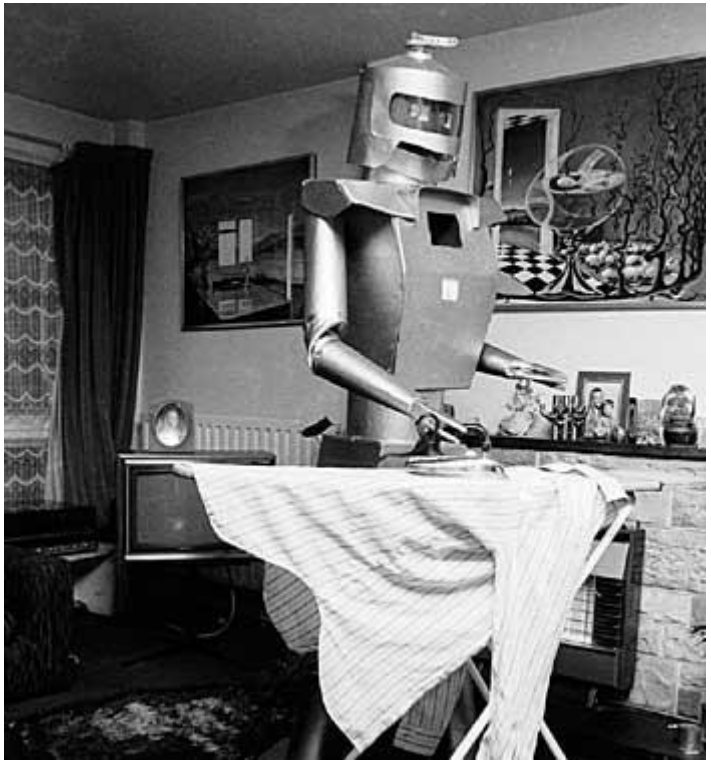
Autonomous manipulation is also hard, largely due to the difficulties involved in perception.



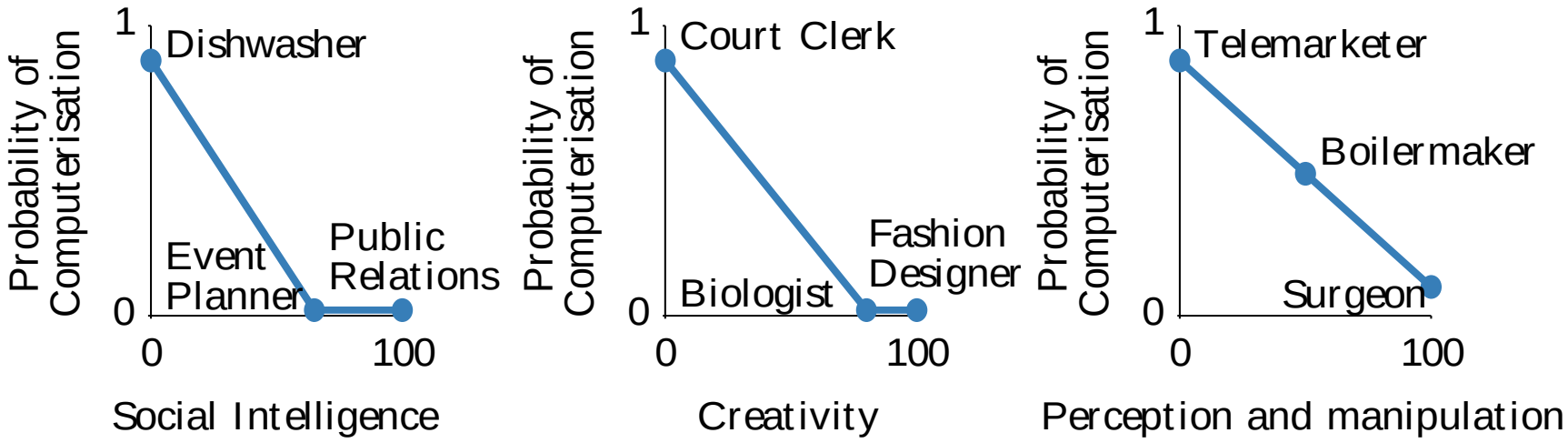


Nonetheless, some construction, truck-loading and shelf-stacking tasks may be automated.

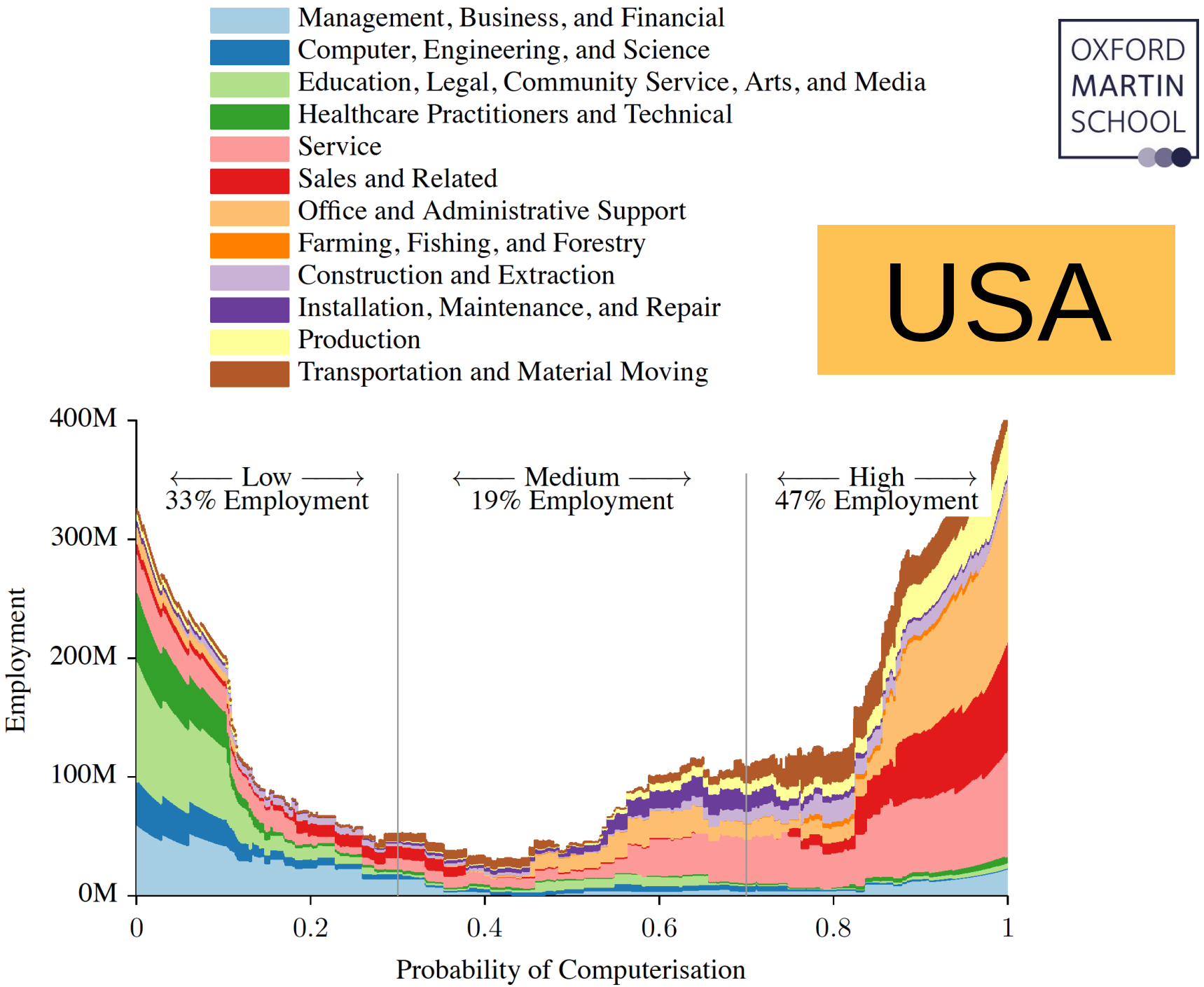
Unstructured environments are also difficult to automate: warehouses, hospitals and airports are are likely to host automated workers long before the home or office.



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
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USA
400M
300M
200M
100M
0M
Employment
Low
33% Employment
Medium
19% Employment
High
47% Employment
0
0.2
0.4
0.6
0.8
1
Probability of Computerisation

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

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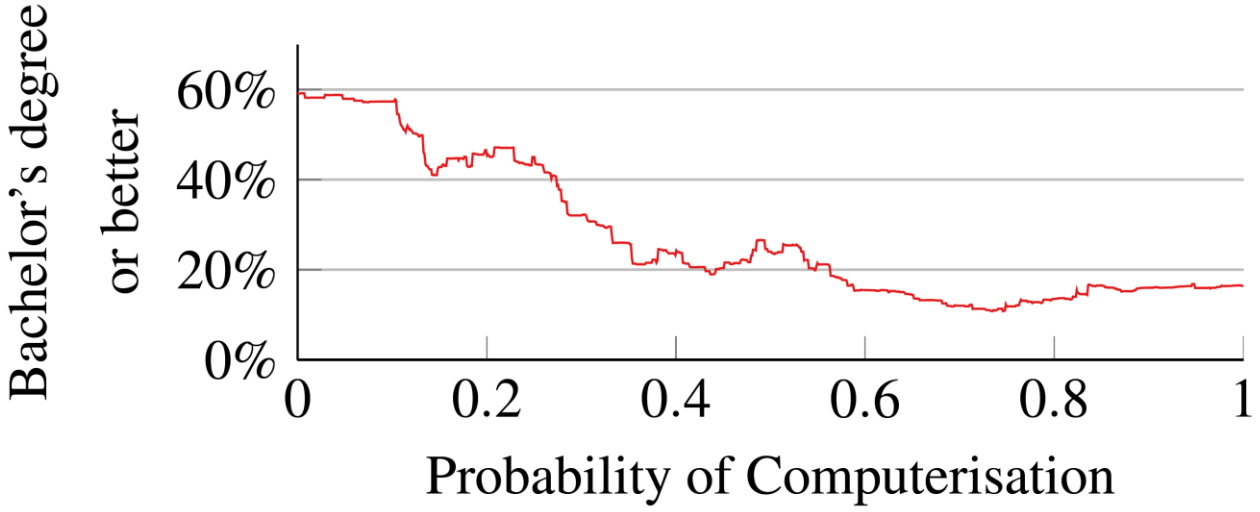
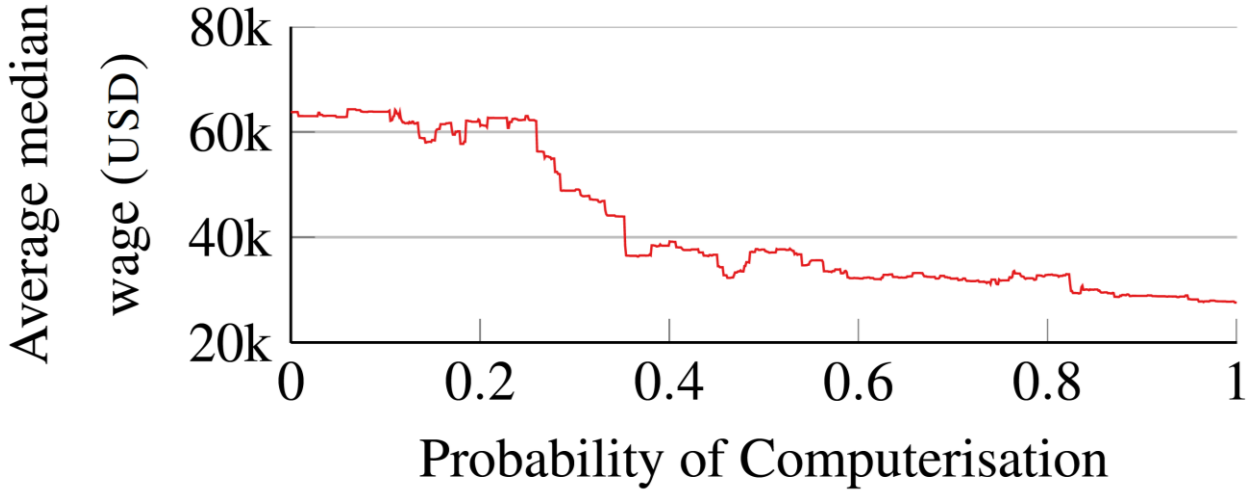




8 of the 10 occupational categories with the highest proportion of new job types that did not exist in 1990 were directly related to computer technologies

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

Source: Lin (2011); calculations by Carl Frey

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

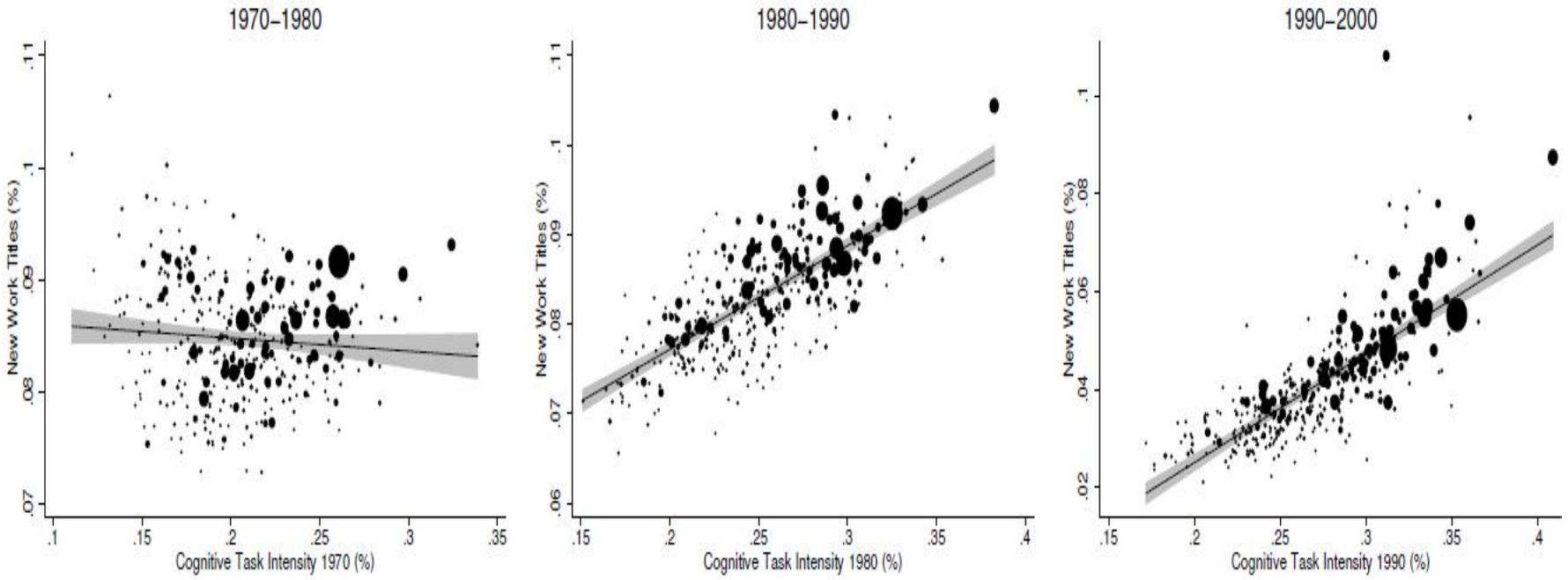
0.5 % of the US workforce is employed in new industries created in the 21st century

Source: Berger & Frey (2014)

Education and New Industries

Source: Berger & Frey (2014)

The Computer Revolution and the Shifting Fortunes of US Cities



Source: Berger & Frey (2014)

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