

The Future of Employment: How Susceptible are Jobs to Computerization

Long Finance, 3 July 2014

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INSIDE: A 14-PAGE SPECIAL REPORT ON TECH STARTUPS

The Economist

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economist.com

If the French ran America

China cracks down on microblogs

New opportunities for organised crime

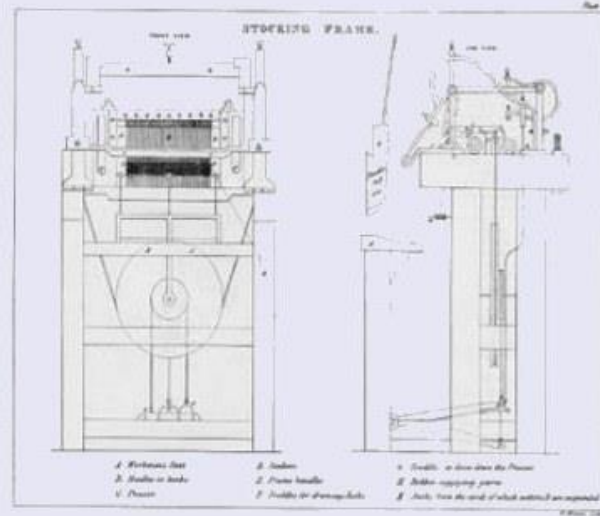
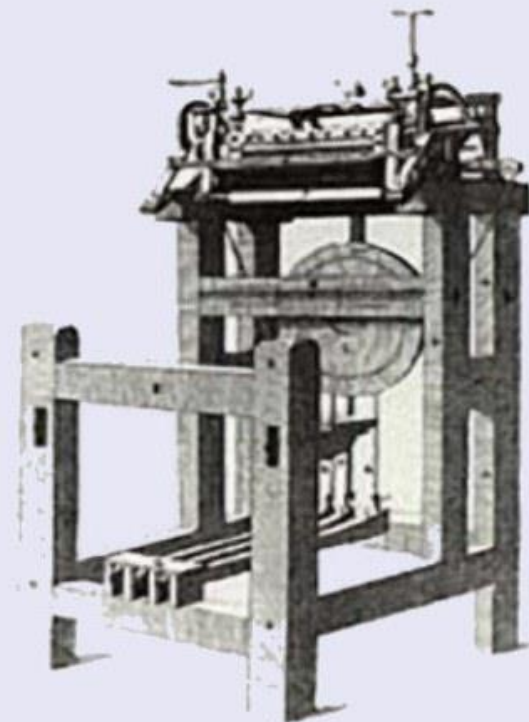
Regulators go soft on Europe's banks

Google and the internet of things

Coming to an office near you...

What today's
technology will do to
tomorrow's jobs







“Thou aimest high, Master Lee. Consider thou what the invention could do to my poor subjects. It would assuredly bring to them ruin by depriving them of employment, thus making them beggars” (cited in Acemoglu and Robinson, 2012, p. 182f).

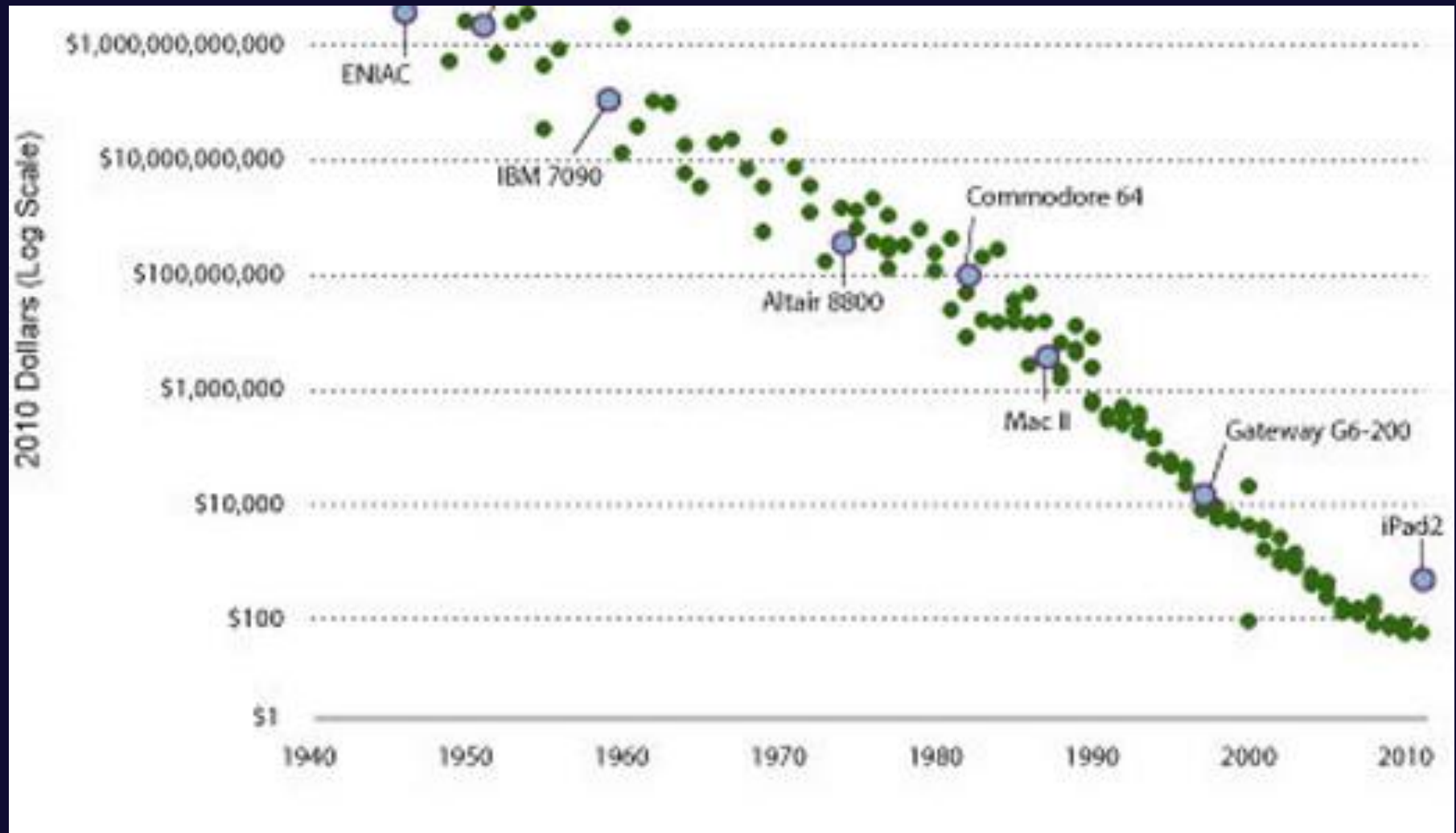


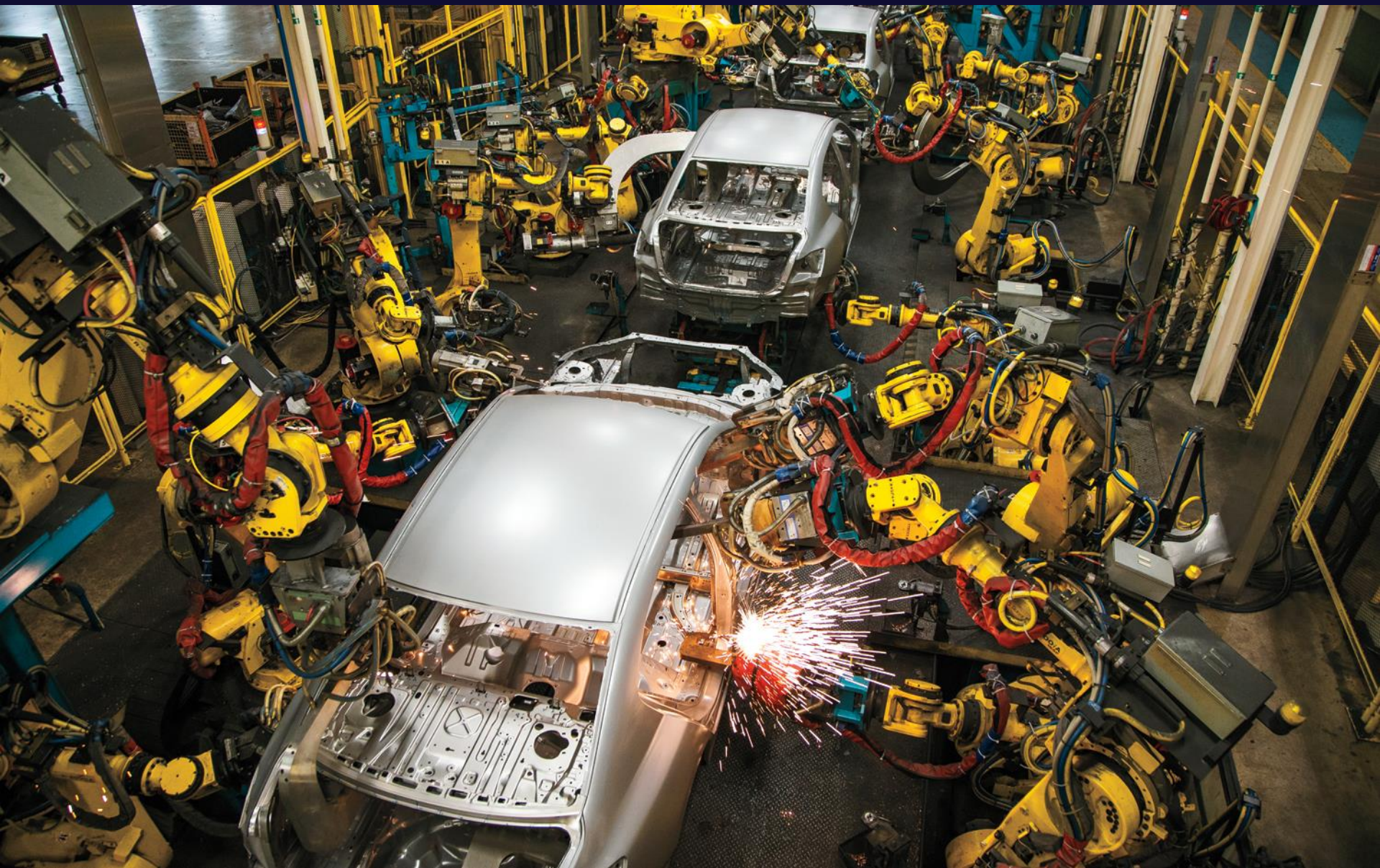




| | Plows | | Muslin shirts | |
|------------------------|--------------|---------|---------------|---------|
| | Artisan shop | Factory | Artisan shop | Factory |
| Number of workers | 2 | 52 | 1 | 230 |
| Total hours per output | 118 | 3.75 | 10 | 1.3 |
| Number of tasks | 11 | 97 | 25 | 39 |

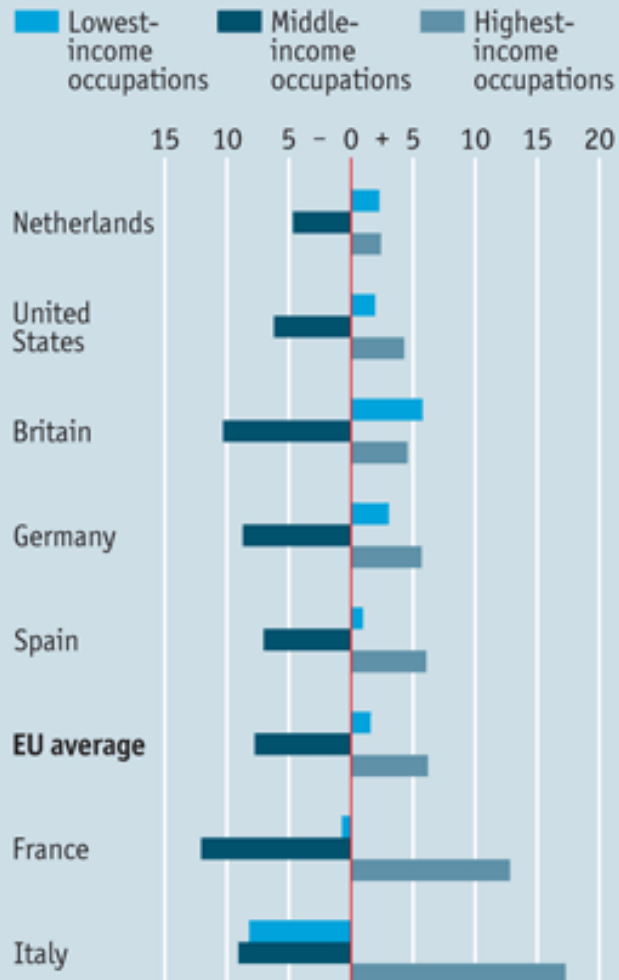
With the declining costs of computing, **computers are increasingly a cheaper alternative** to labour.





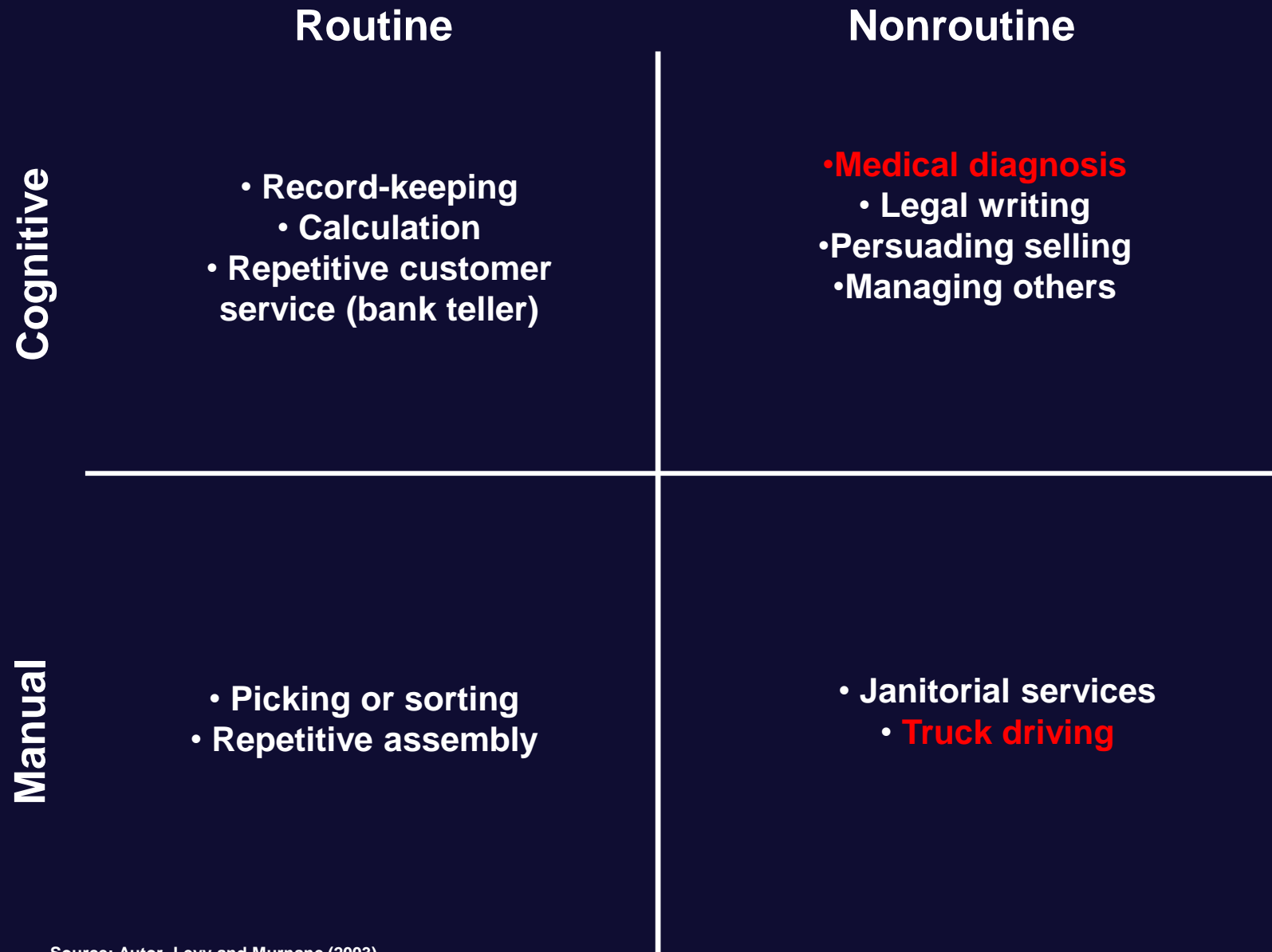
The disappearing middle

Share of total hours worked, change between 1993 and 2006, percentage points



Source: "Job Polarisation in Europe", by Maarten Goos, Alan Manning & Anna Salomons, *American Economic Review*, 2009

The Expanding Scope of Computerization



A consequence of cheaper computing (and sensing) is that we are entering 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)

Total stored information in
1999

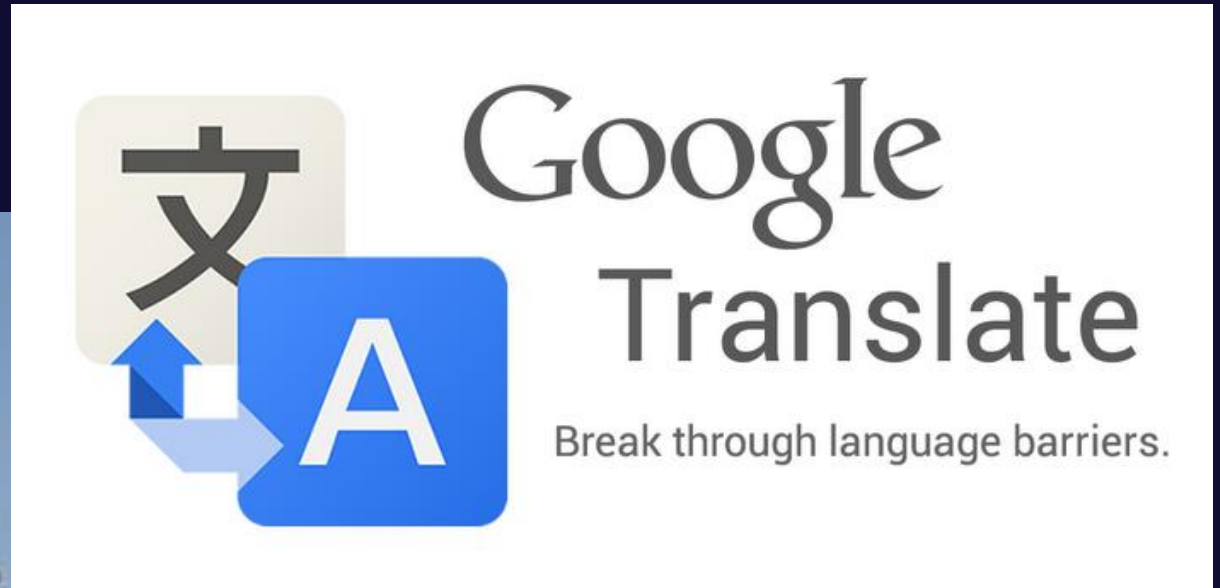
12 exabytes
(1×10^{19} bytes)

**Predicted internet traffic in
2015**

**960 exabytes
(1×10^{21} bytes)**



Big data is leading to the automation of jobs that were traditionally seen as secure from automation.



Big data analysis is automating of **paralegal, contract law and patent law** tasks.



“a lot of people who used to be allocated to conduct document review are no longer able to be billed out,” said Bill Herr, who as a lawyer at a major chemical company used to muster auditoriums of lawyers to read documents for weeks on end [NYTimes, 2011].

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



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

taxis,

forklifts,

trucks,

tractors,

and cargo handlers.



Retail and sales jobs will be increasingly affected by automation.



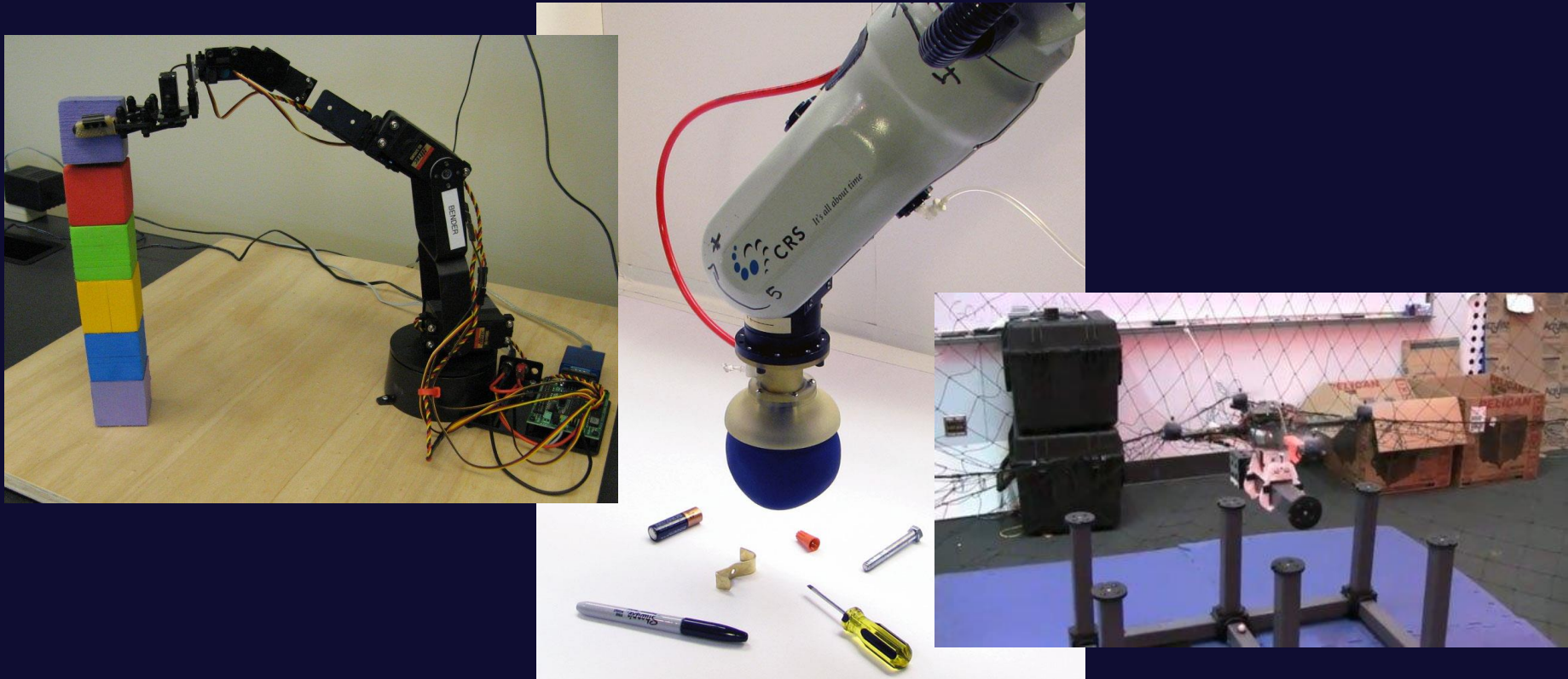
amazon.com®

creativity



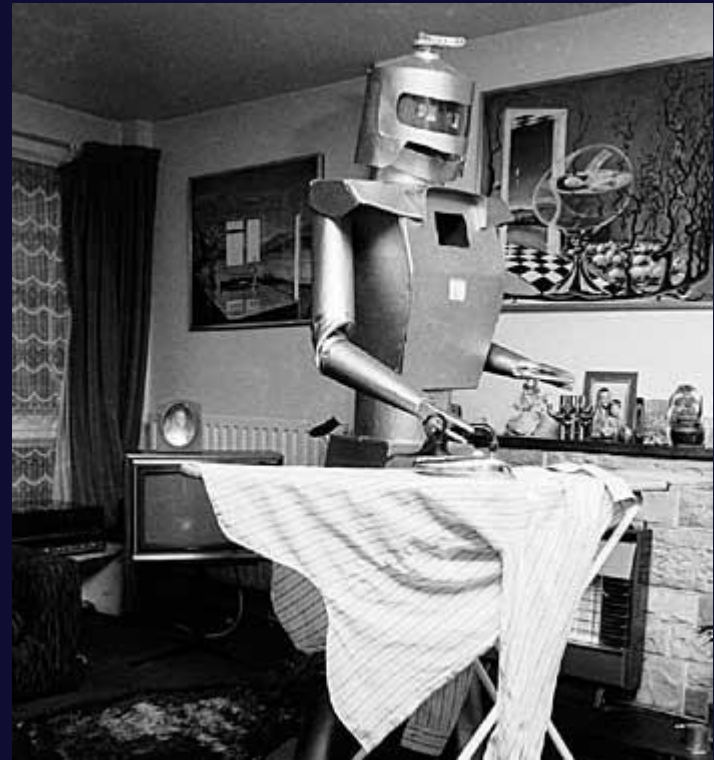
and social intelligence.

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

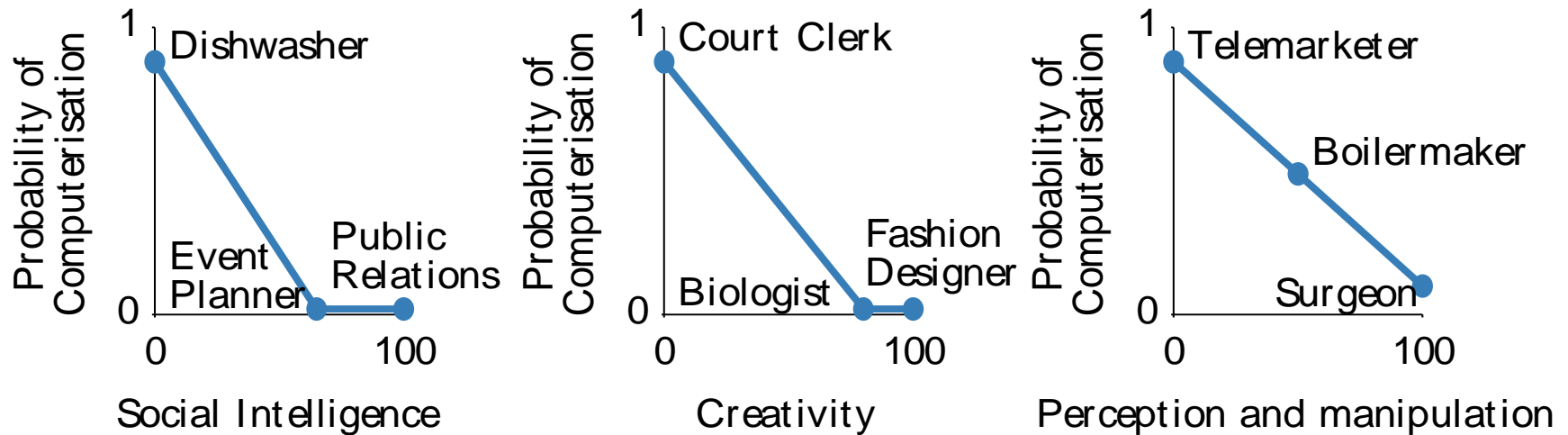


Nonetheless, some construction, truck-loading and shelf-stacking tasks may be automated.

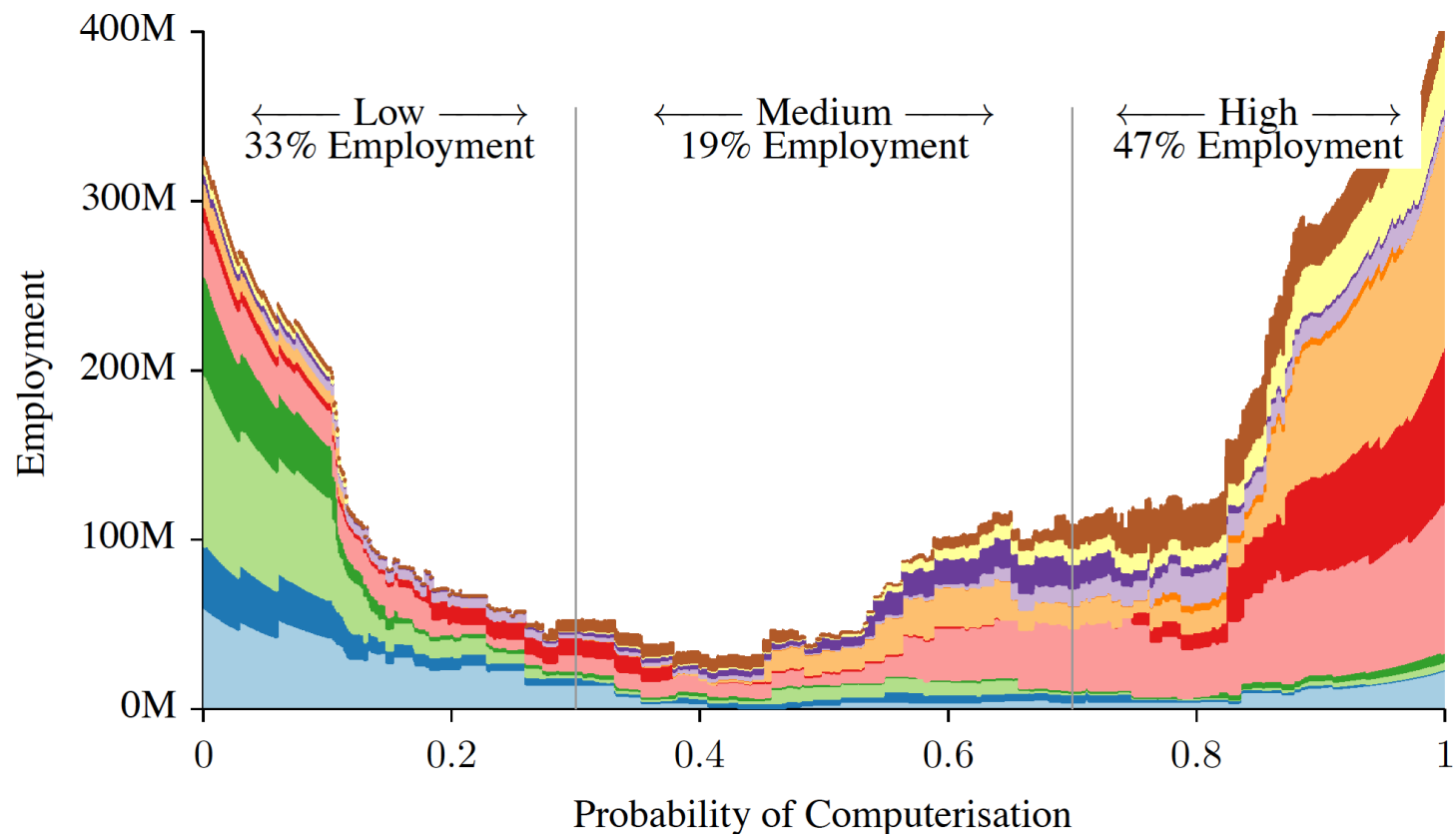
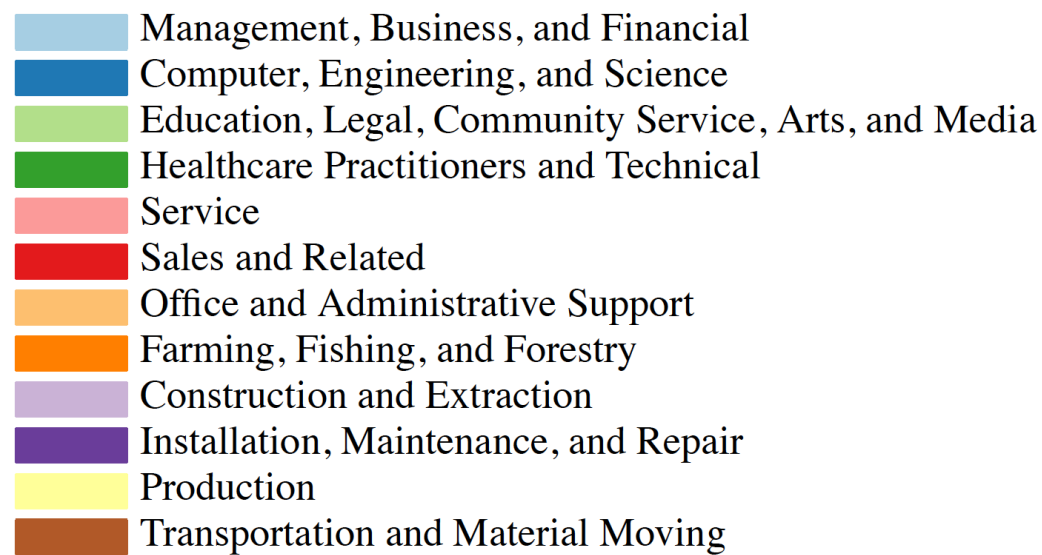
Unstructured environments are also difficult to automate: warehouses, hospitals and airports are likely to host automated workers long before the home or office.



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



We used a **dataset of 702 occupations**, for which we have employment, income and occupation features related to automatability (e.g. finger dexterity and persuasion).

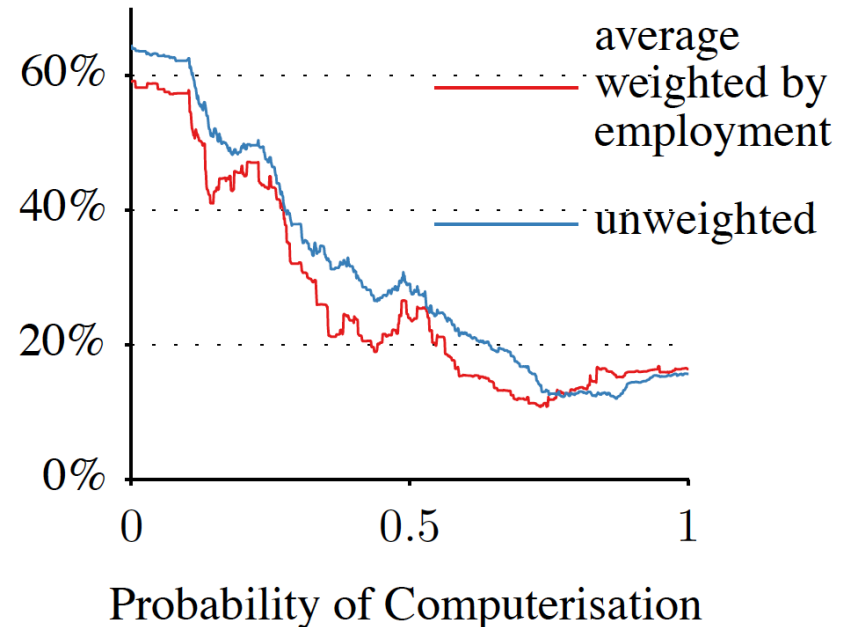
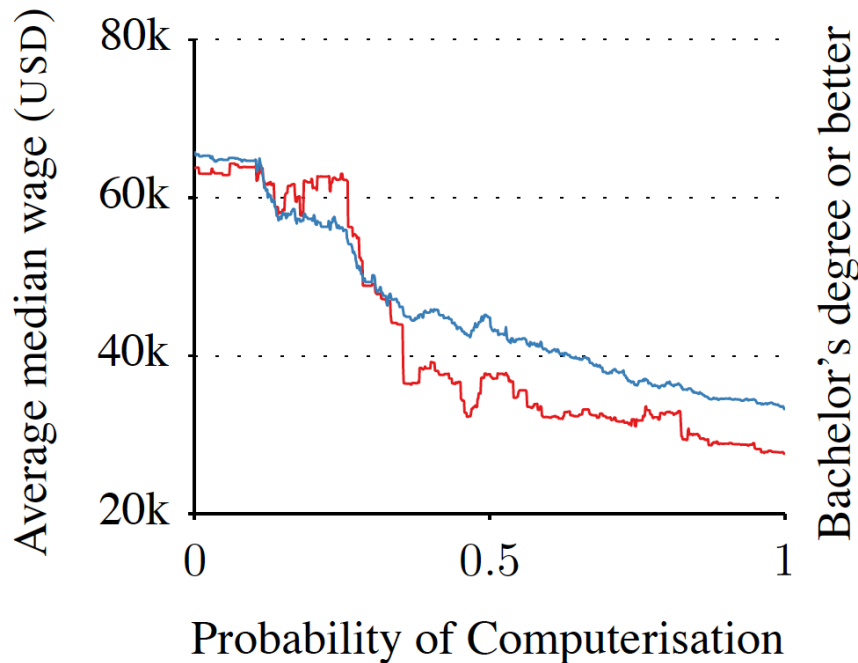


Some of the **jobs at most risk** according to our analysis: telemarketers; tax preparers; and insurance appraisers.

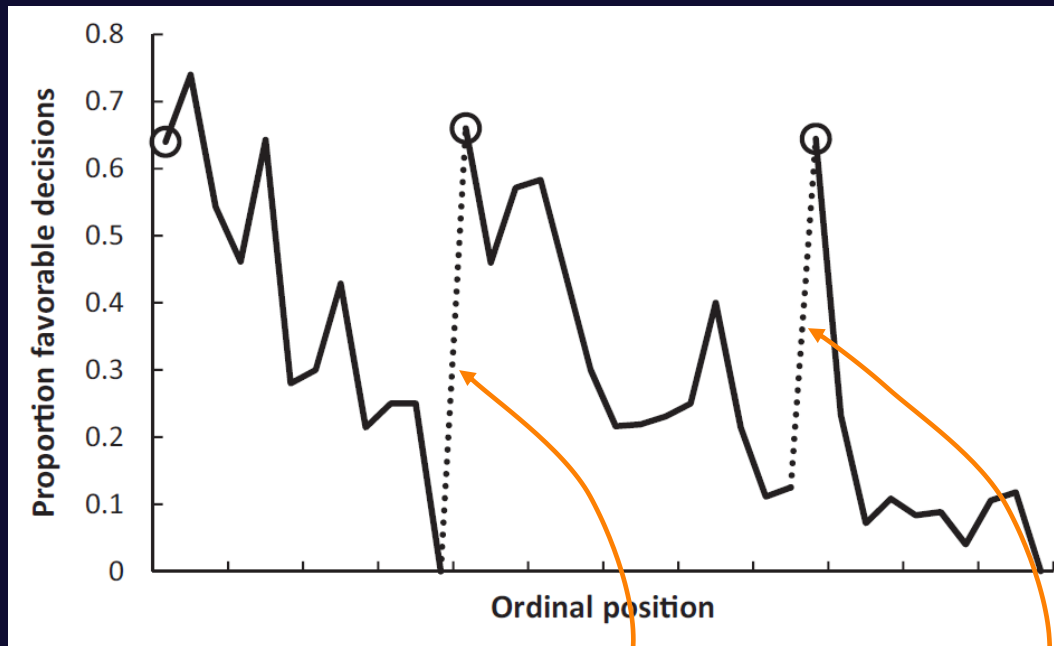


Some of the **jobs least at risk** were: occupational therapists; mental health counselors; and primary school teachers.

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



Computers offer workers free from **human heuristics and biases**.

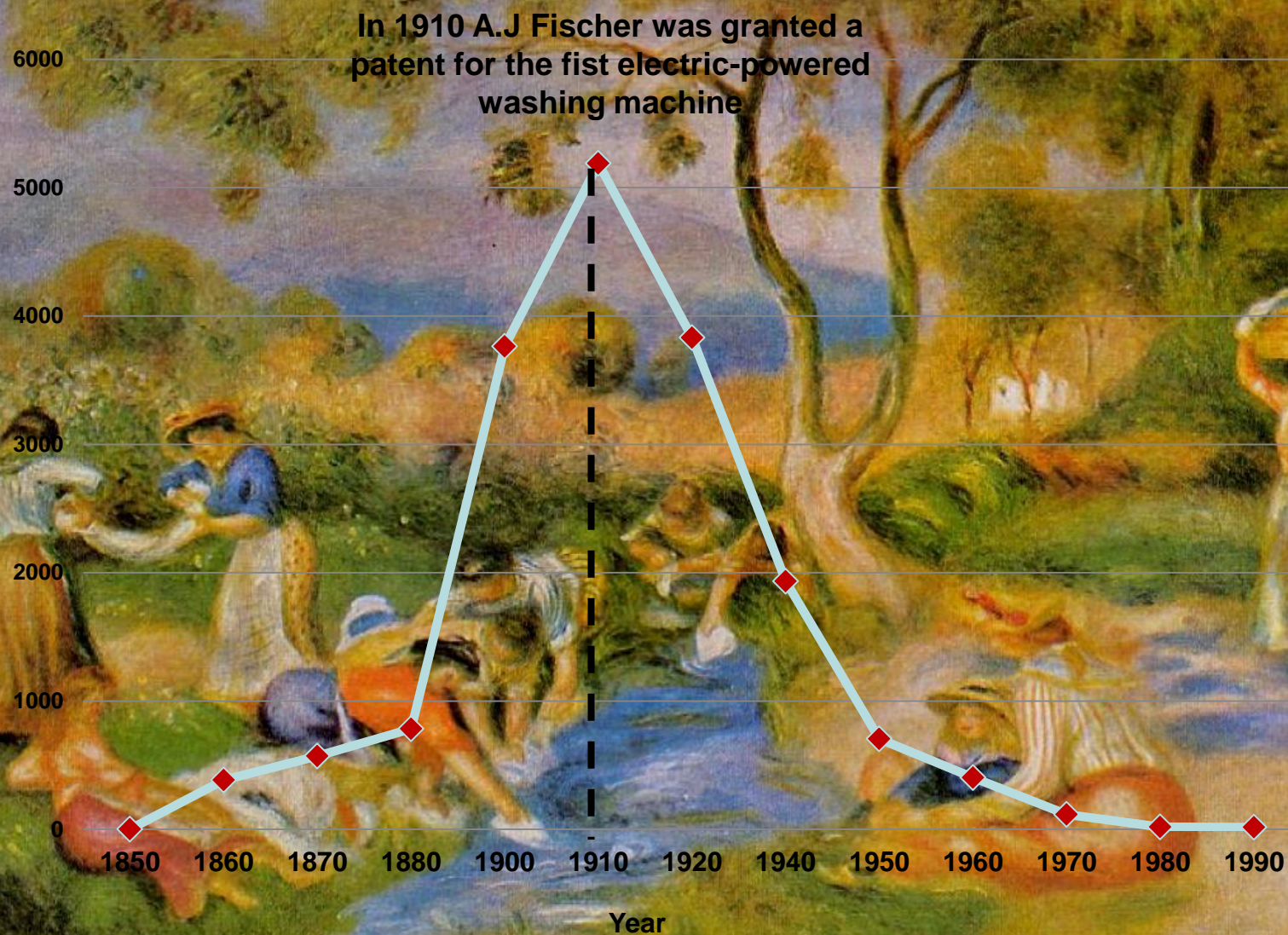


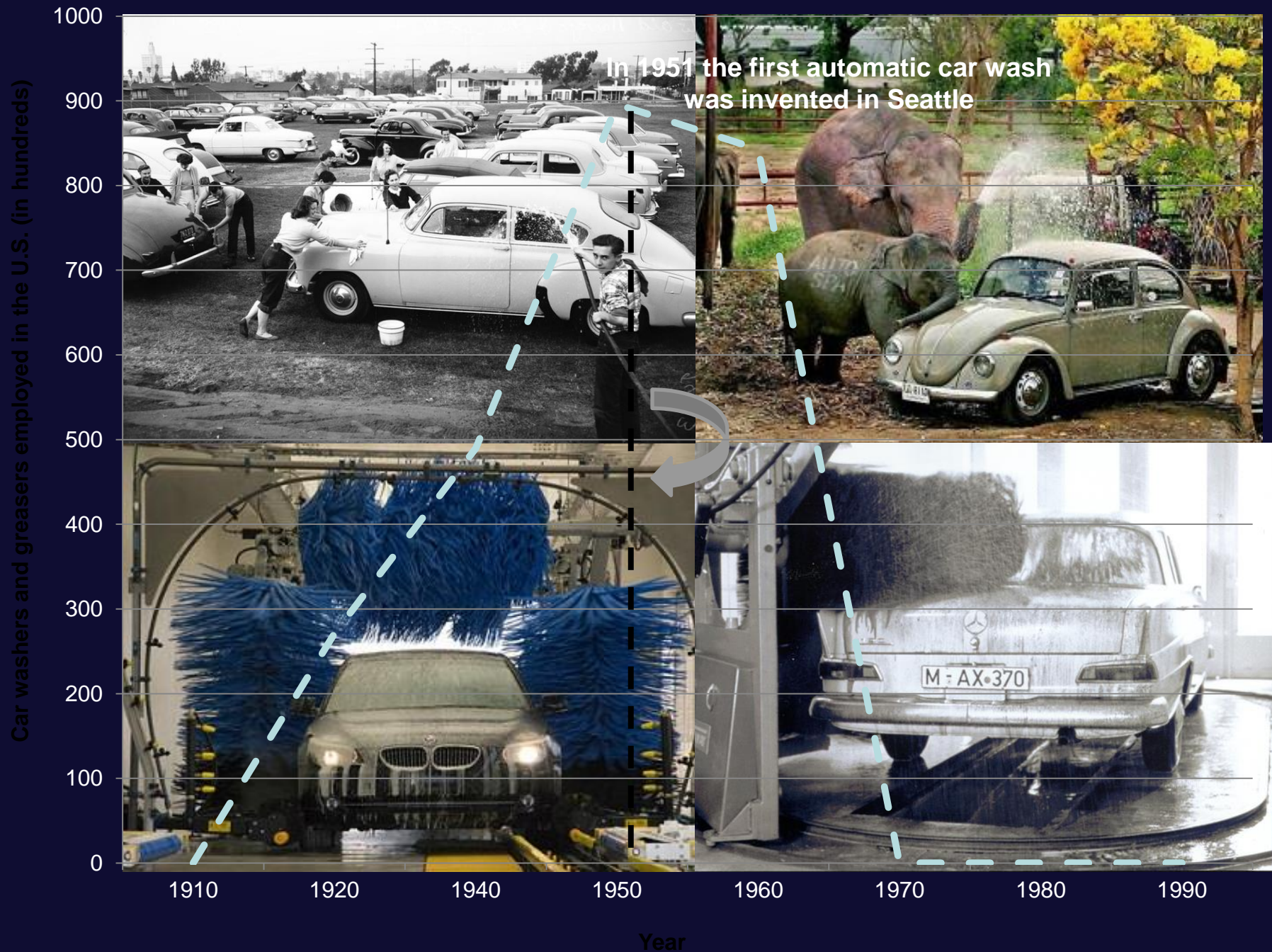
Israeli judges are significantly more lenient after a food break (Danziger et al 2011).

Morning snack

Lunch

Laundresses employed in private U.S. households (in hundreds)





Source: Sobek, Matthew , "Detailed occupations – all persons: 1850–1990 in Historical Statistics of the United States, Earliest Times to the Present: Millennial Edition.

1



THE IOS DEVELOPER

Apple announced the iPhone in 2007, and 3rd party development for iOS took off in 2008 with the release of iOS 2 and the App Store.



142x growth in 5 years

2

THE ANDROID DEVELOPER

Google's Android platform was also announced in 2007, with the release of the first Android powered handset in 2008.



199x growth in 5 years



3



THE ZUMBA INSTRUCTOR

Zumba started in the early 2000's and quickly gained traction in 2007 as fitness centers started popping up all over the U.S.



396x growth in 5 years

4

THE SOCIAL MEDIA INTERN

LinkedIn, Facebook, YouTube and Twitter were all founded between 2003 and 2006. These networks really started hitting their stride after 2008 and are currently at peak popularity. Not a shocker that this is a surging profession.



174x growth in 5 years



5

THE DATA SCIENTIST

Our digital lives have created an overwhelming flood of information. In the last 5 years, data scientists have come to the rescue by trying to make sense of it all.



30x growth in 5 years



6

THE UI/UX DESIGNER

User interface and user experience designers focus on making our technology pleasant and intuitive to use. Seeing as our lives depend on interacting with technology, it's no small wonder UI/UX designers are in hot demand.



22x growth in 5 years



7

THE BIG DATA ARCHITECT

Although it's been around for at least 2 decades, the concept of big data took off around 2008. That year, the Computing Community Consortium published a white paper which propelled the term into the limelight.



3,440 x growth in 5 years



8

THE BEACHBODY COACH

Beachbody coaches are distributors of fitness products produced by Beachbody LLC, the most famous of which is P90X, launched in 2004.



3,360 x growth in 5 years



9

THE CLOUD SERVICES SPECIALIST

Salesforce.com and Amazon were the 2 companies that introduced cloud computing to businesses throughout the early 2000s. The stark contrast in the number of jobs shows how popular and reliable cloud services have become.



17x growth in 5 years



10

THE DIGITAL MARKETING SPECIALIST

Social media and digital marketing have become significant facets of many businesses (and we're pretty glad that's the case!)



17x growth in 5 years



New Work and Economic Development

“If we were to measure the economic development rate of a city, we could not do so just by measuring its output in a year or any group of years. We would have to measure, rather, the additions of new work to its older output, over a period of time, and the ratio of the new work to the old work [...] A city’s ability to maintain a high development rate is what staves off stagnation and allows the city to continue to prosper.” (Jacobs, 1969, p.94f)