TECHNOLOGY AT WORK:

THE FUTURE OF AUTOMATION
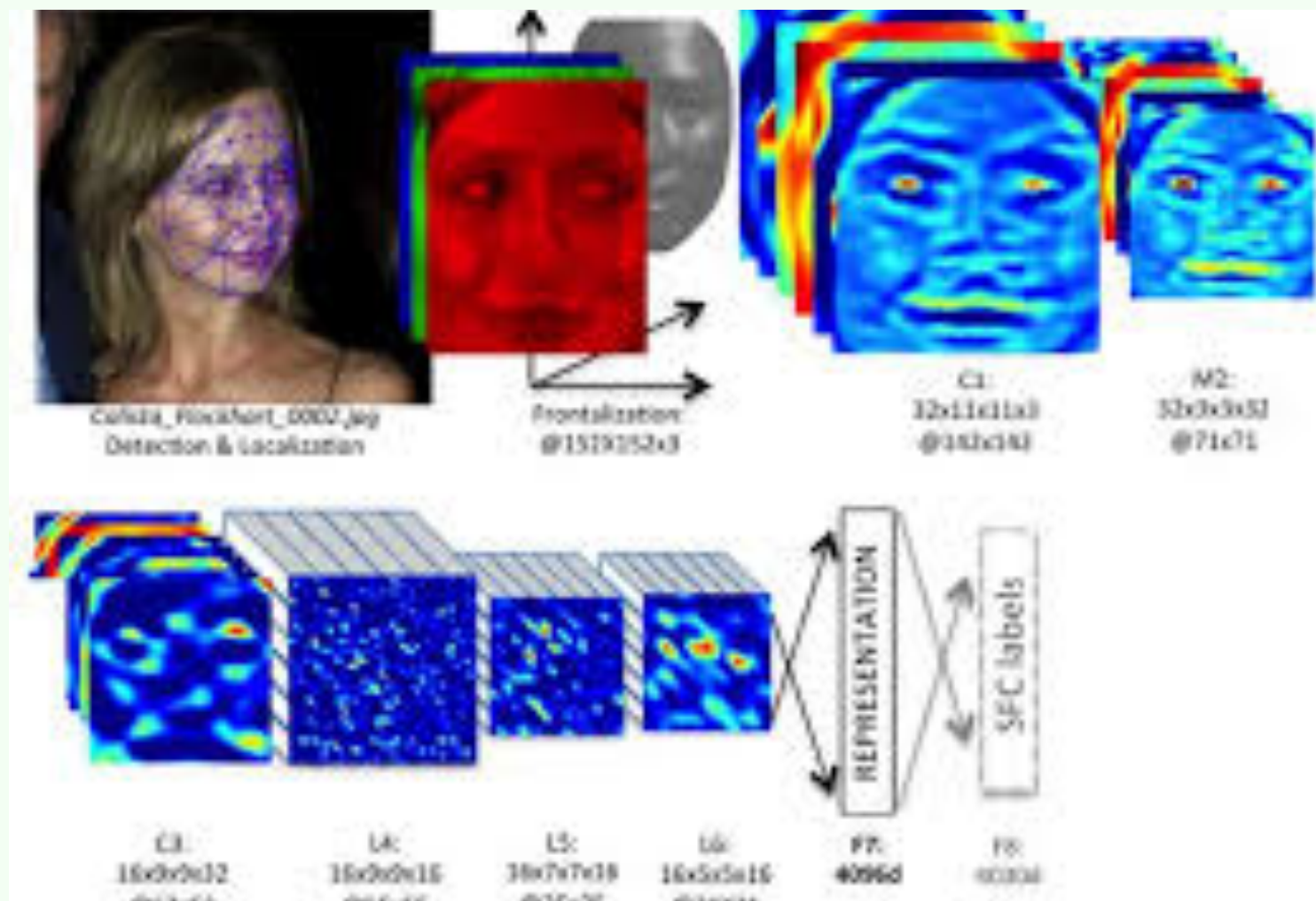
Michael A Osborne, @maosbot
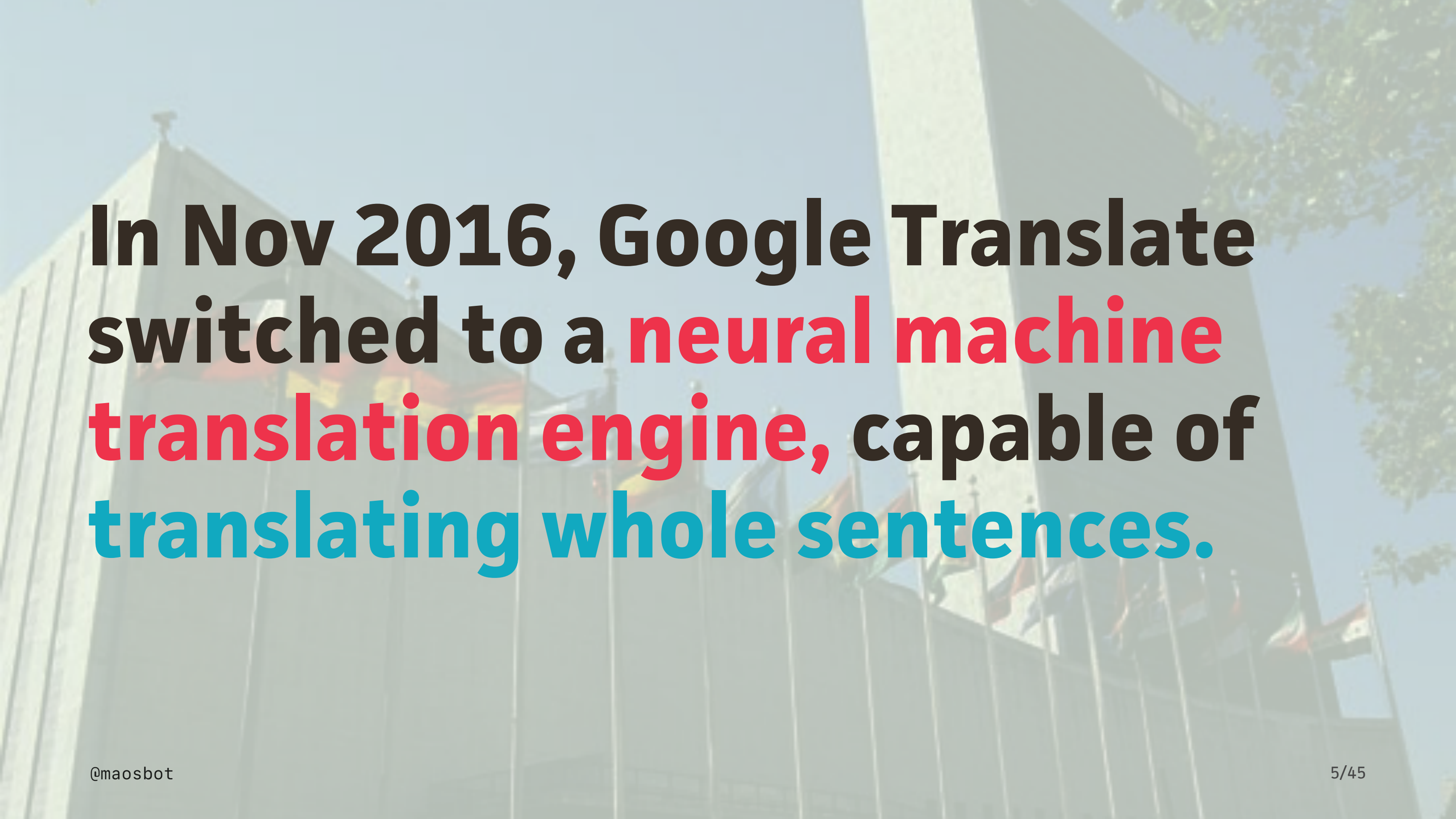
If a typical person can do a mental task with **less than one second of thought,** we can probably **automate it using AI** either now or in the near future.

— Andrew Ng, former Chief Scientist of Baidu (2016)

Automation has always required a task to be sufficiently well-defined.

Machine learning allows definition through data.

In Nov 2016, Google Translate switched to a **neural machine translation engine,** capable of translating whole sentences.

Please try to convince your partner that their job is automatable.

Machine learning enables scaling personalisation.

Demand generation

Internet is now a third of all advertising: Google and Facebook have well over half of it

Global ad revenue (2016 $bn)

Legend: Other internet, FB, Google, Print, Other, TV
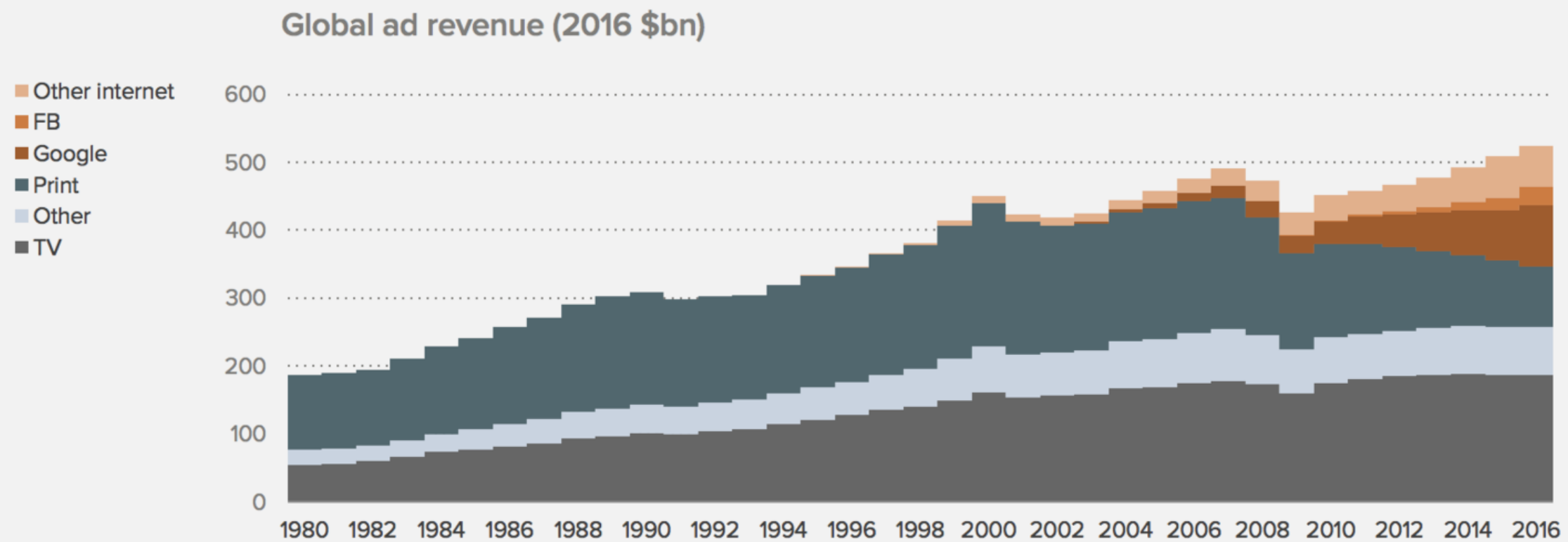
ANDREESSEN HOROWITZ

Souce: Zenith, Google, Facebook, a16z

China's AI push raises fears over widespread job cuts

Many Chinese manufacturers have reduced up to 40% of workforce as a result of automation

Wahaha has over the past decade cut an assembly-line workforce of 200-300 down to just a few people © AP

Yuan Yang and **Xinning Liu** in Beijing AUGUST 30, 2018

@maosbot

💬 10 🖶

Google announced in Jul 2018 that it is developing Contact Center AI, a virtual agent for call centers.

Retail, sales and service jobs will be increasingly affected by automation.
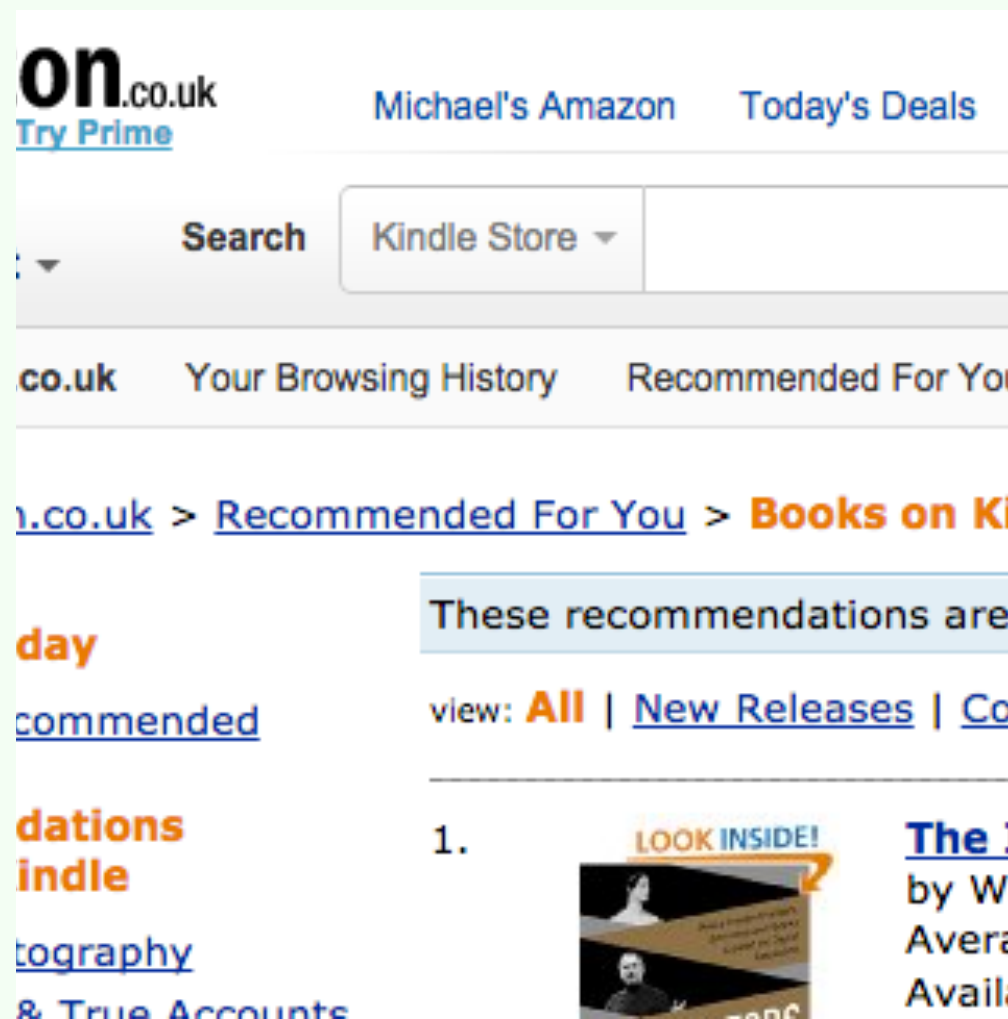
Robotic process automation is automating clerical work.

Accounting and auditing are also being automated by smart software.

Logistics tasks are now being automated with the use of **mobile robotics.**

Logistics tasks are now being automated with the use of mobile robotics.

What are humans still good for?

Social intelligence is far from being fully automated.

Humans also have the edge over machines in creativity.

TITLE:
SUNSPRING

DIALOGUE:
IT MAY NEVER BE FORGIVEN,
IT THAT IS JUST TOO BAD."

PROP & ACTION:
CHARACTER PULLS A BOOK FROM A SH
IPS THROUGH IT AND PUTS IT BACK

NATIONAL SCIENCE IDEA:
A FUTURE WITH MASS UNEMPLOYMENT
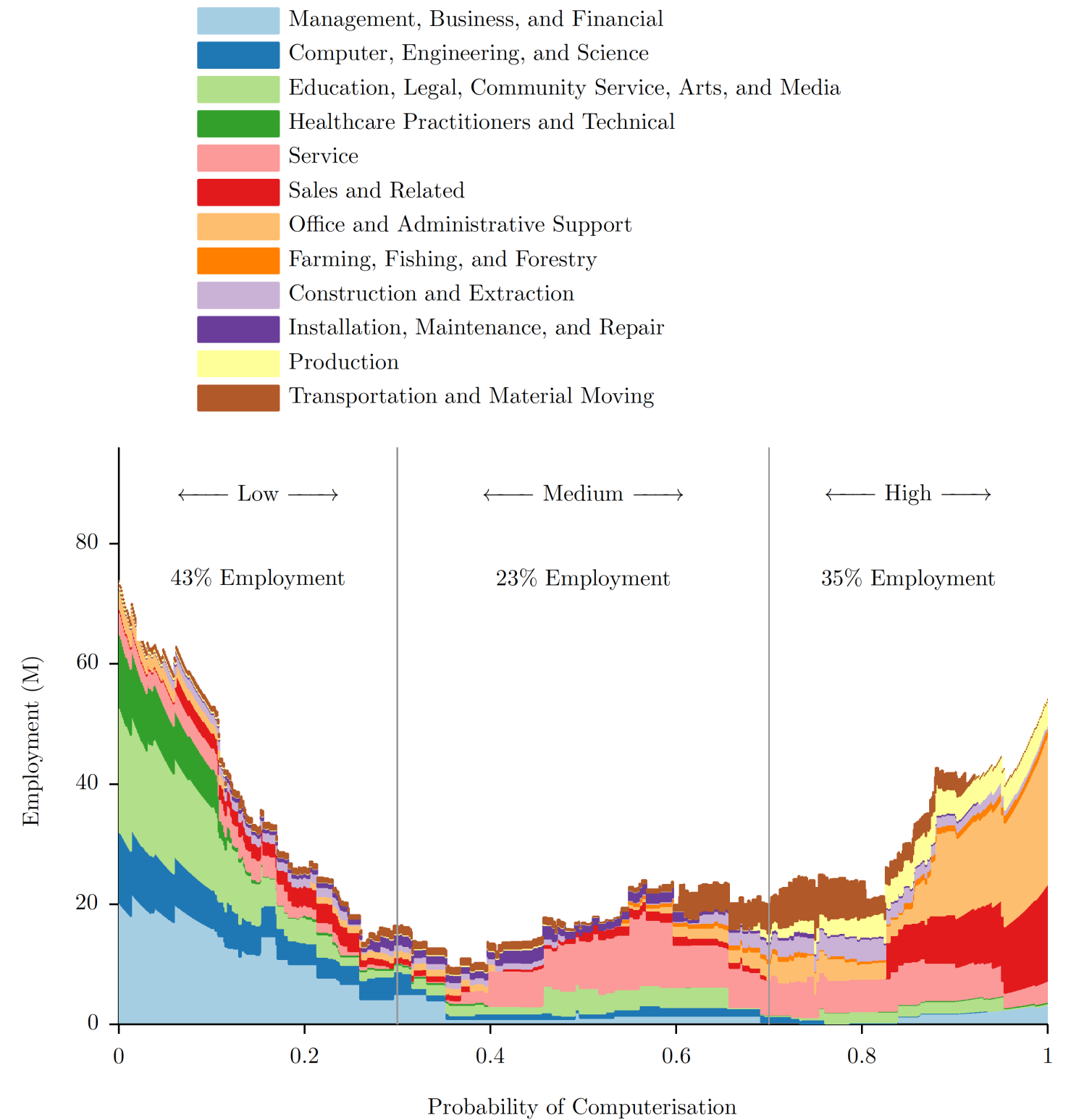YOUNG PEOPLE ARE FORCED TO SELL BL

GAVE IT A CUP OF REALLY HOT TE

Sources: Stalenhag, simonstalenhag.se; Mao, Li, Xie, Lau, Wang and Smolley (2017)

Will an algorithm take your job?

We used a **machine learning** method to classify the **automatability** of occupations using data from the US.

Job Title	Persuasion	Originality	Social Perceptiveness	Fine Arts
Administrative Services Managers	46	41	52	0
Tax Examiners and Collectors and Revenue Agents	45	39	43	0
Accountants and Auditors	45.5	41	44.5	0
Budget Analysts	37	41	41	0
Loan Officers	45	30	43	0
Tax Preparers	37	34	37	0

Is this time different?

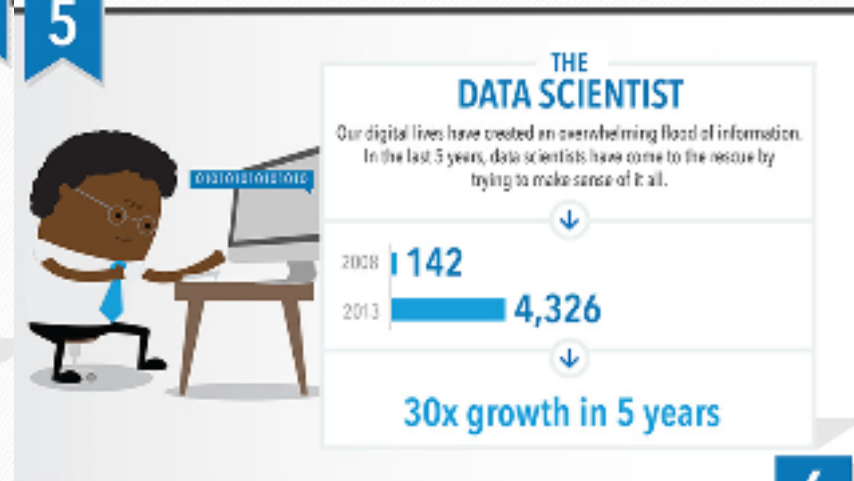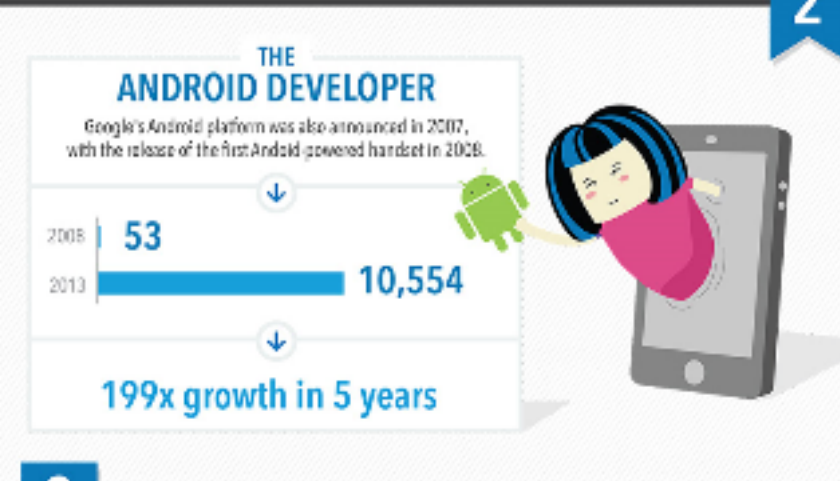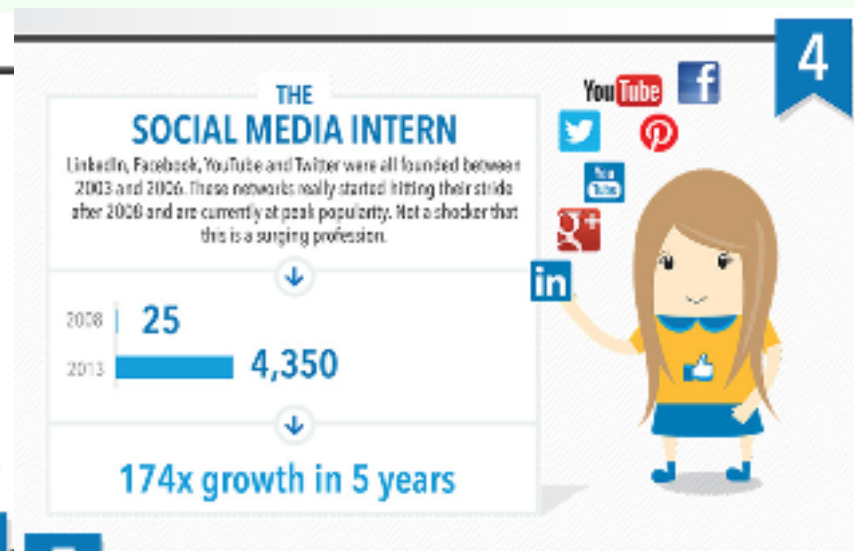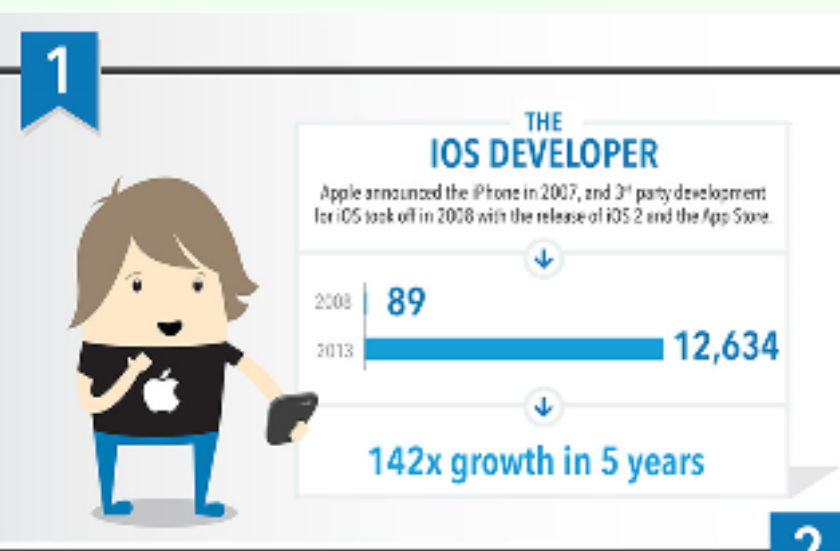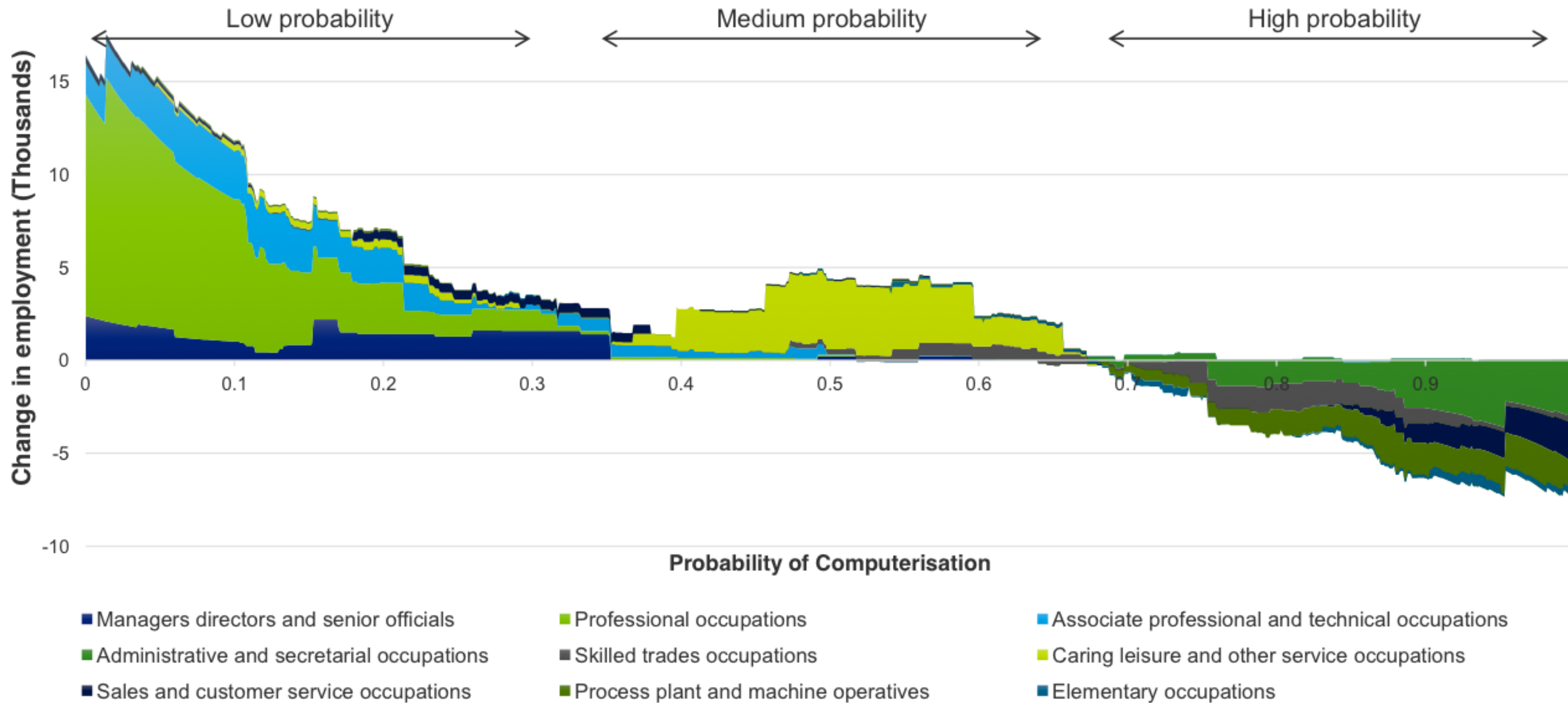Will new technologies threaten the historical pattern of **employment resisting technological change?**

@maosbot

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.

| 2008 | 89 |
| 2013 | 12,634 |

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.

| 2008 | 53 |
| 2013 | 10,554 |

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 US.

| 2008 | 16 |
| 2013 | 6,331 |

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.

| 2008 | 25 |
| 2013 | 4,350 |

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.

| 2008 | 142 |
| 2013 | 4,326 |

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.

| 2008 | 159 |
| 2013 | 3,509 |

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.

| 2008 | 0 |
| 2013 | 3,440 |

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.

| 2008 | 0 |
| 2013 | 3,360 |

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.

| 2008 | 195 |
| 2013 | 3,314 |

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!)

| 2008 | 166 |
| 2013 | 2,886 |

17x growth in 5 years

Automation can create jobs.

Effect	Change in European jobs 1999-2010
Displacement by technology	- 10M
Increased demand	+ 9M
Multiplier effect	+ (6 ± 2)M

Source: Gregory, Salomons and Zierahn (2016)

Low probability → ← Medium probability → ← High probability →

Change in employment (Thousands)

Probability of Computerisation

- ■ Managers directors and senior officials
- ■ Administrative and secretarial occupations
- ■ Sales and customer service occupations
- ■ Professional occupations
- ■ Skilled trades occupations
- ■ Process plant and machine operatives
- ■ Associate professional and technical occupations
- ■ Caring leisure and other service occupations
- ■ Elementary occupations

UK data, 2000–2015, source: Deloitte LLP

We consider:

★ Technological change;

★ Globalisation;

★ Demographics

★ Environmental sustainability;

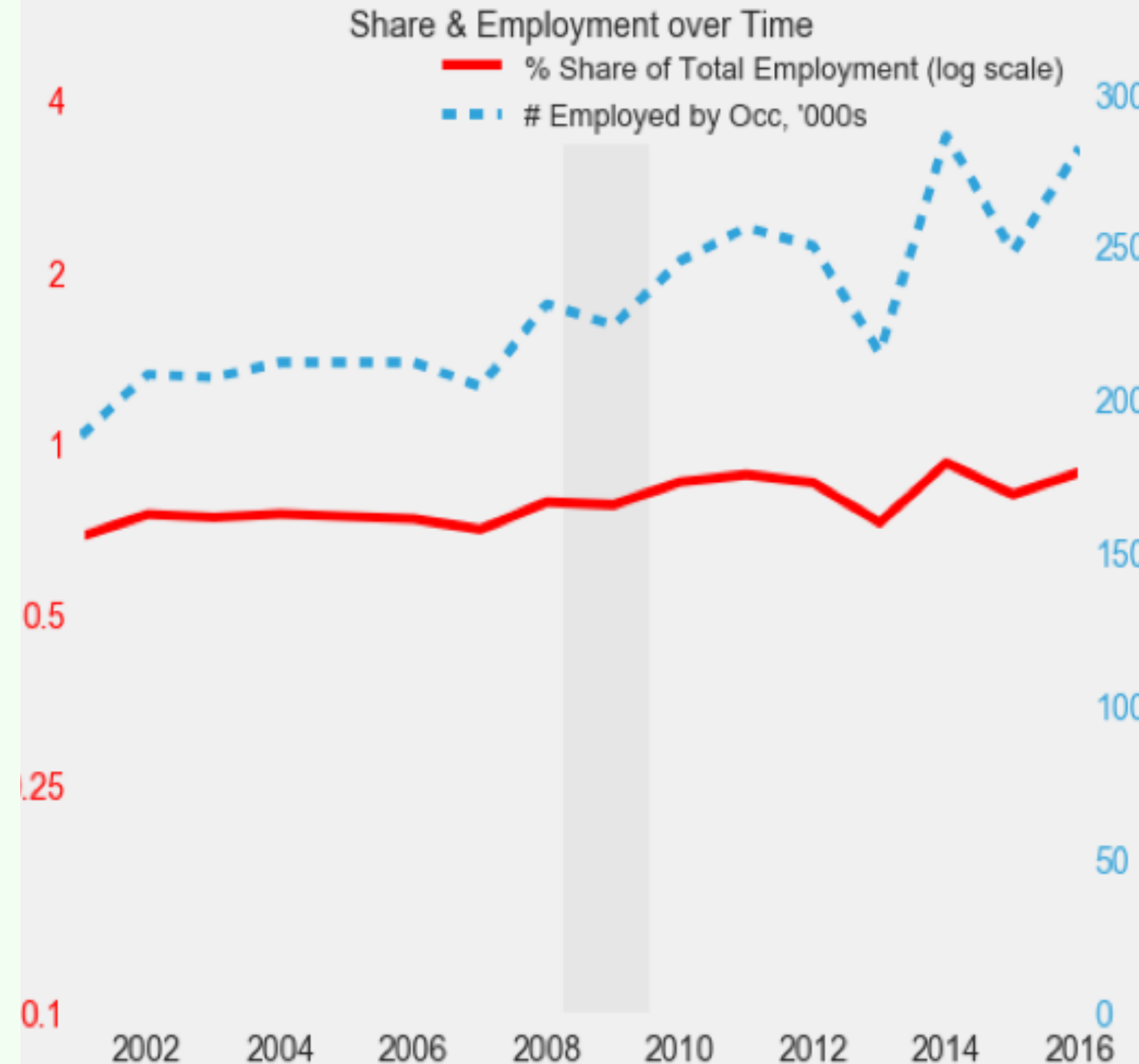★ Urbanisation;

★ Increasing inequality; and

★ Political uncertainty.

What is the probability of increased future demand for UK van drivers?

1. Between 0.00 and 0.25.

2. Between 0.25 and 0.50.

3. Between 0.50 and 0.75.

4. Between 0.75 and 1.00.
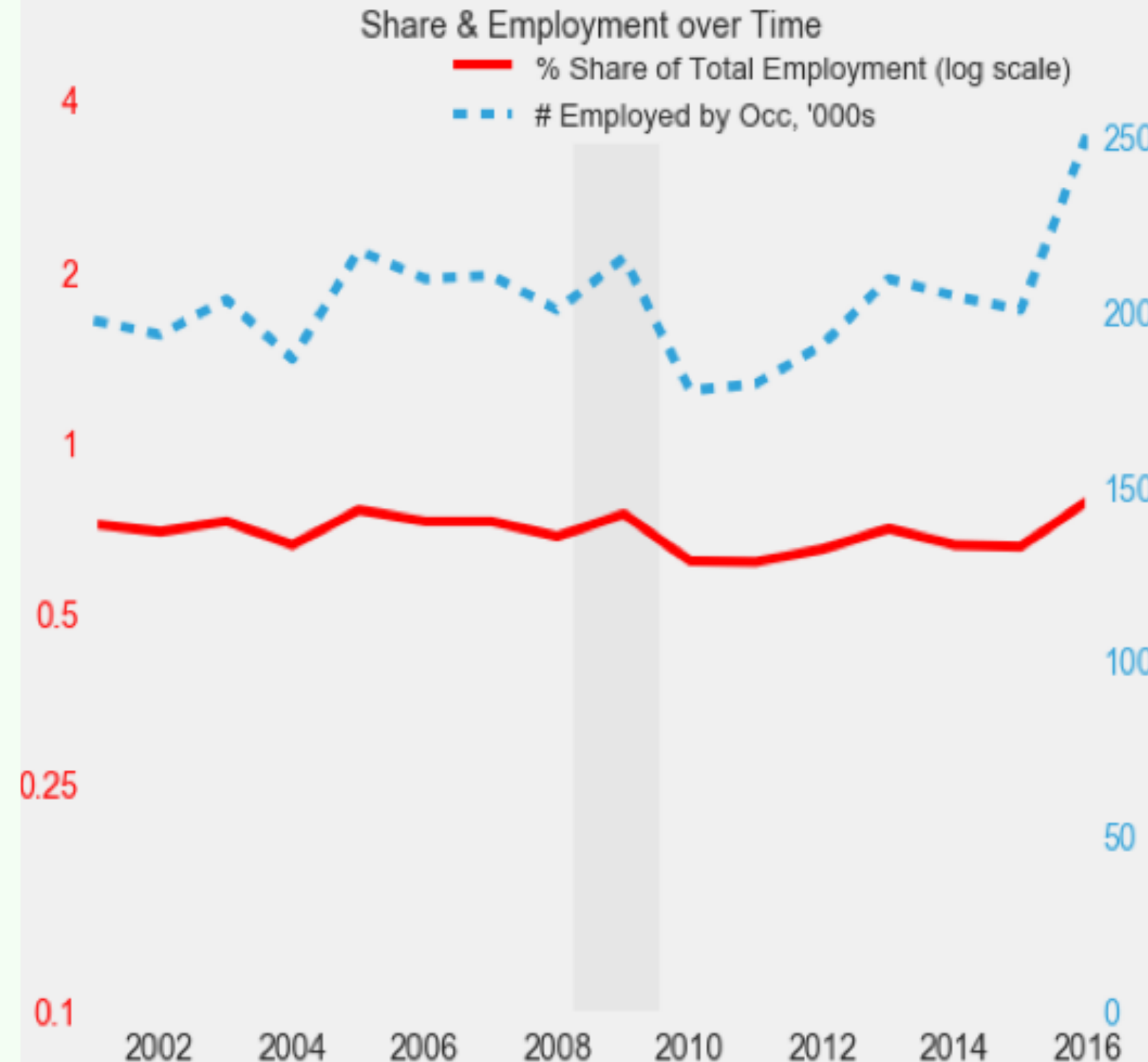
What is the probability of increased future demand for UK waiters and waitresses?

1. Between 0.00 and 0.25.

2. Between 0.25 and 0.50.

3. Between 0.50 and 0.75.

4. Between 0.75 and 1.00.

What is the probability of increased future demand for UK waiters and waitresses?

1. Between 0.00 and 0.25.

2. Between 0.25 and 0.50.

3. Between 0.50 and 0.75.

4. **Between 0.75 and 1.00: the probability is 0.77.**

@maosbot

EMPLOYMENT SHARES

Share & Employment over Time
— % Share of Total Employment (log scale)
····· # Employed by Occ, '000s

Waiters and waitresses are predicted to increase in demand despite automatability.

★ "In theory: more automation; in practice, waiters are the human face of the business which commands premiums as a result."

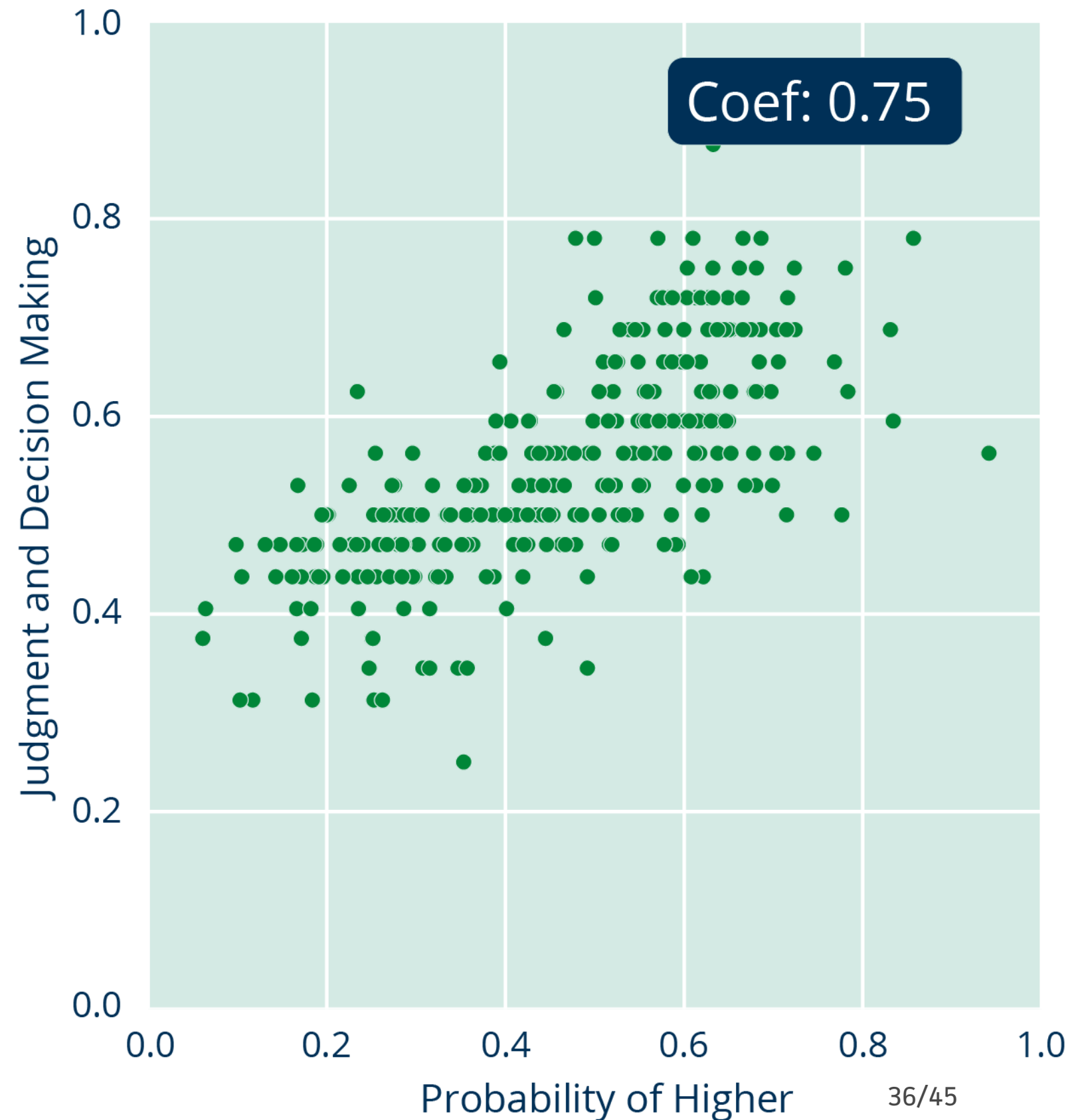★ **"Cheaper than robots, demand for hospitality increases"**
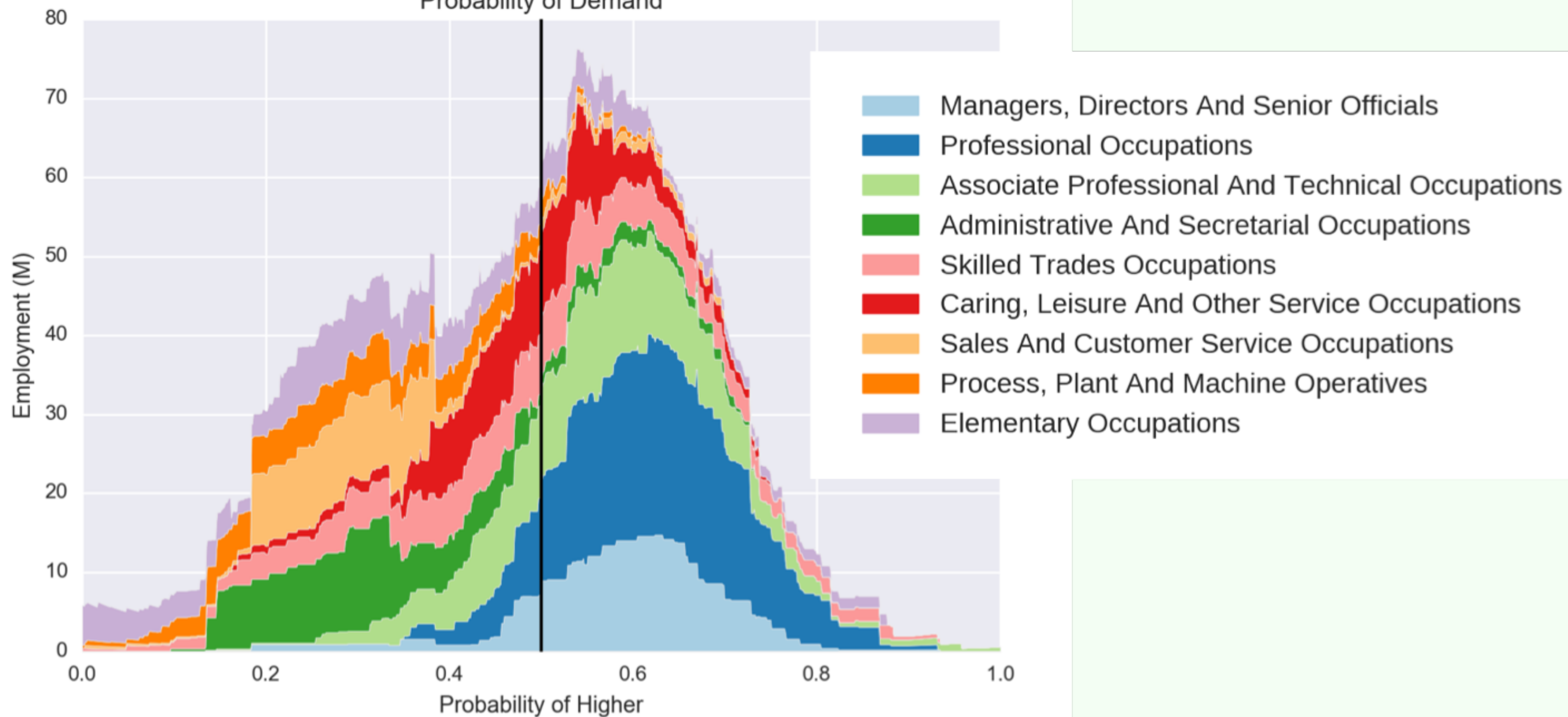
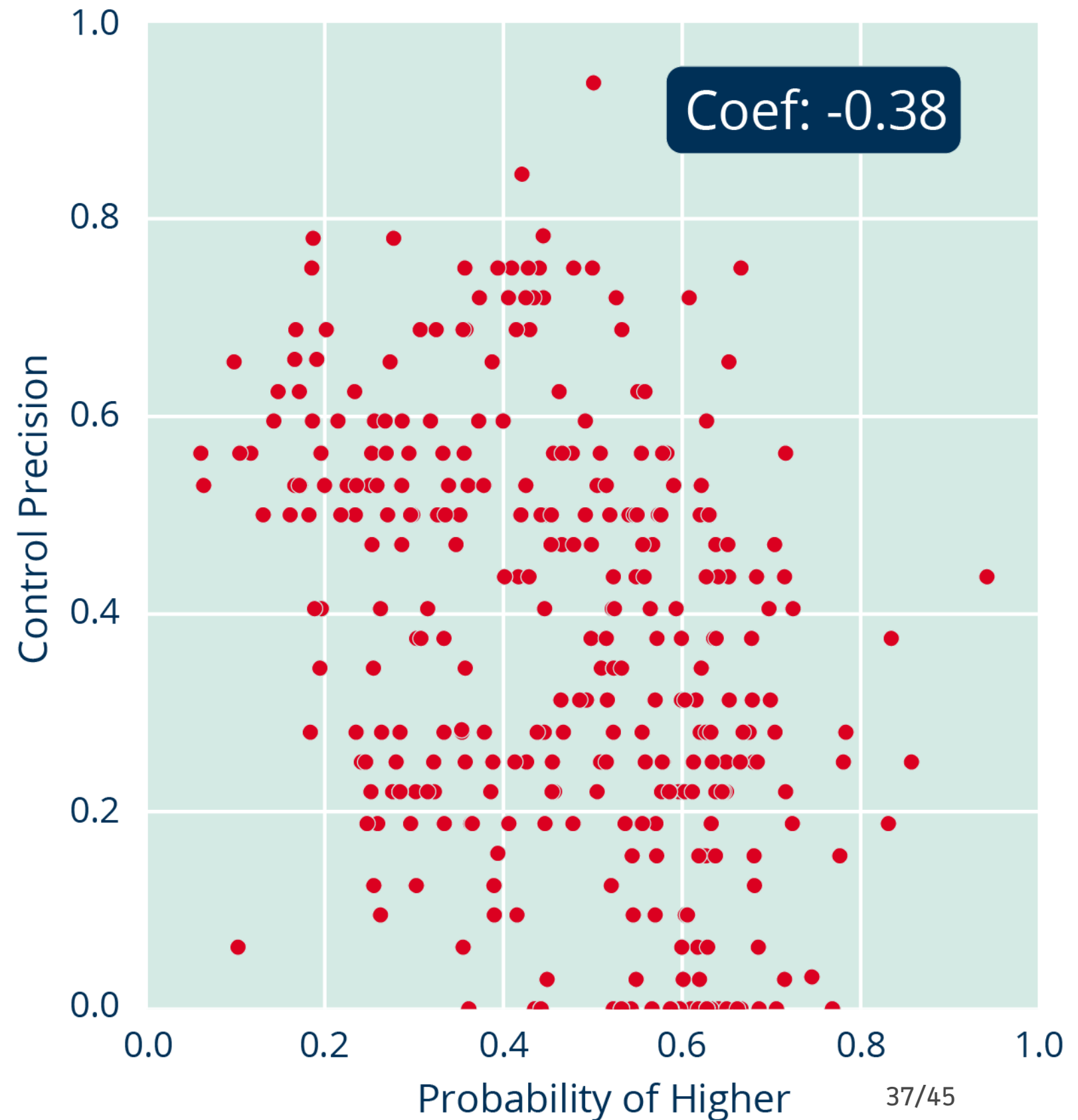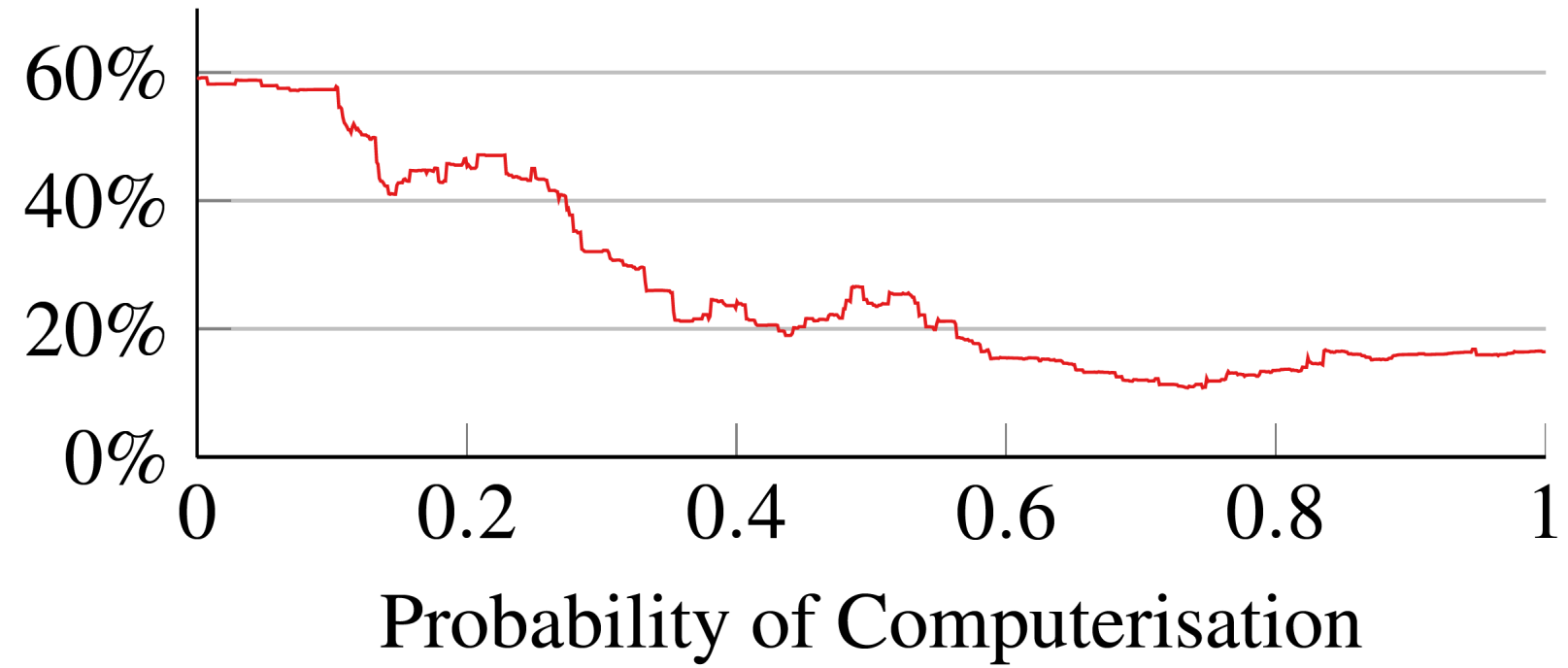# What can you do now to **prepare for AI?**
Which **skills** will be needed?

Decreasing demand is linked to physical and psycho-motor skills.

1. Control Precision
2. Static Strength
3. Manual Dexterity
4. Rate Control
5. Peripheral Vision
6. Multi-limb Coordination
7. Night Vision
8. Operation and Control
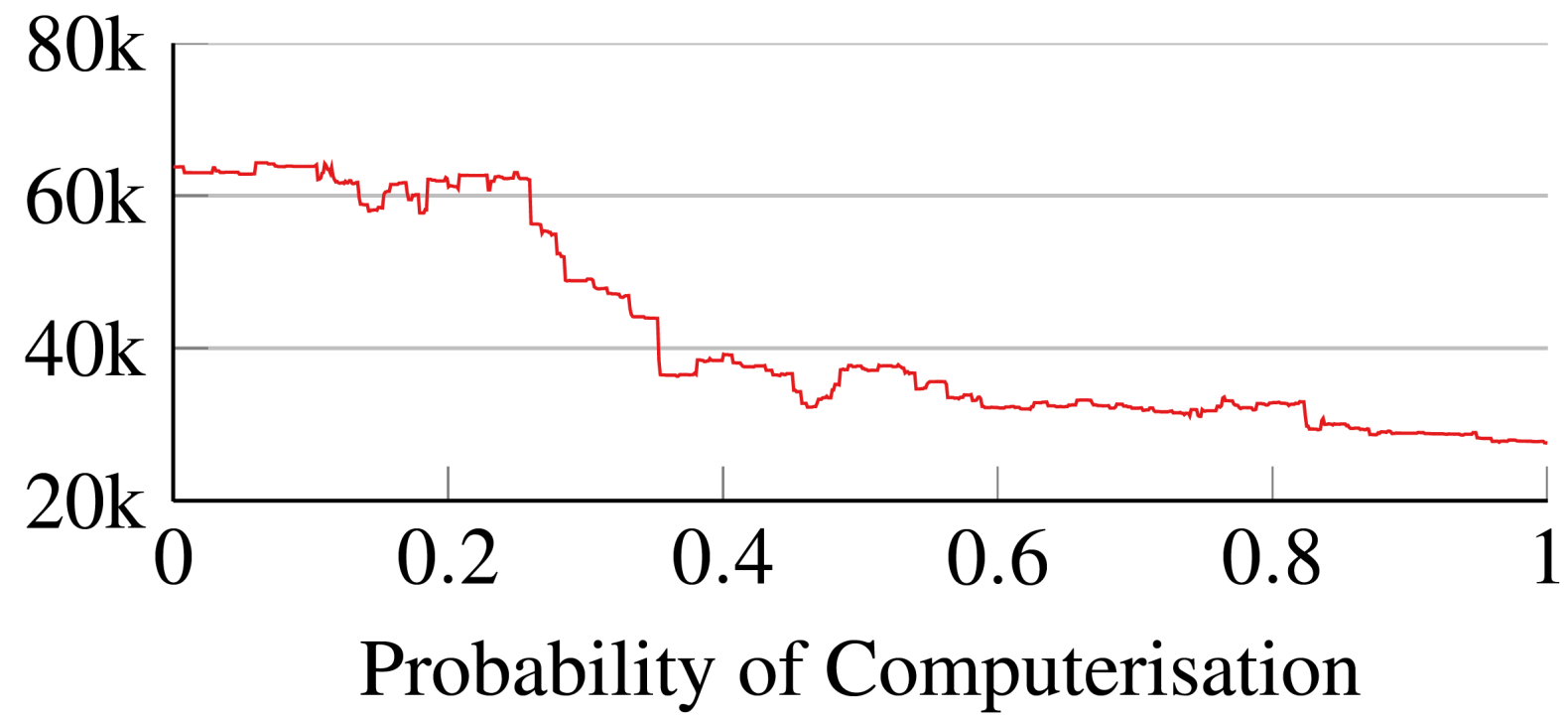9. Sound Localisation

Coef: -0.38

@maosbot

But what about the quality of jobs?

Bachelor's degree or better vs. Probability of Computerisation

Average median wage (USD) vs. Probability of Computerisation

USA data, source: Frey & Osborne (2013)

Household income has stagnated in the US.
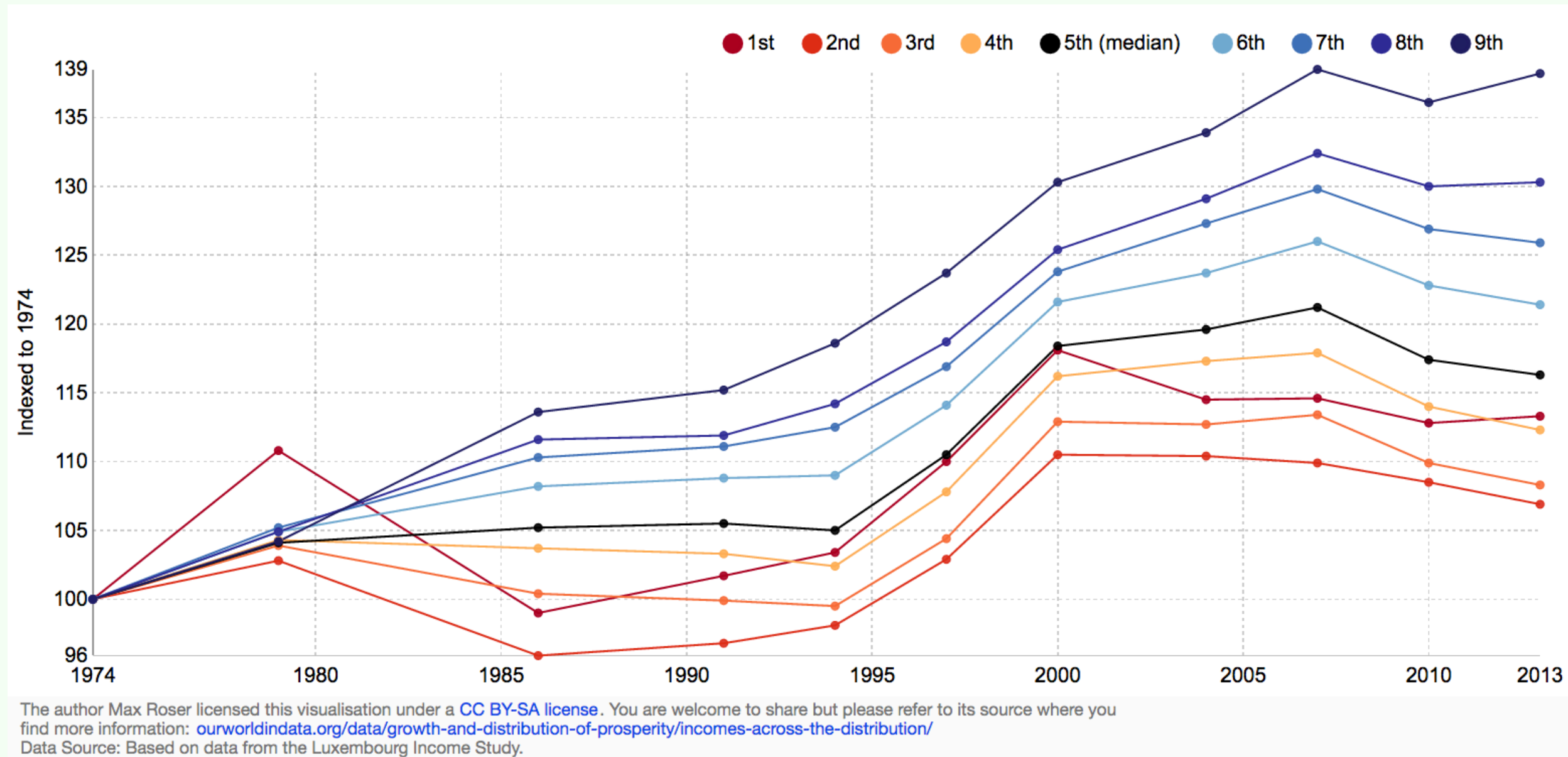
The author Max Roser licensed this visualisation under a CC BY-SA license. You are welcome to share but please refer to its source where you find more information: ourworldindata.org/data/growth-and-distribution-of-prosperity/incomes-across-the-distribution/
Data Source: Based on data from the Luxembourg Income Study.
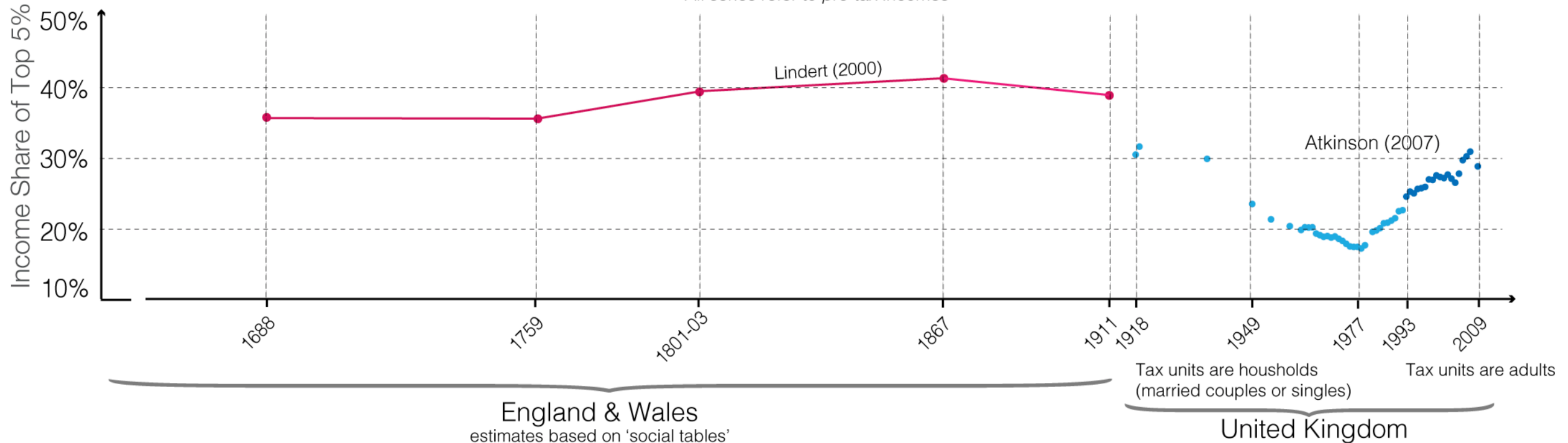
Income inequality in the UK over 700 years (1290-2010)

Share of total income going to the top 5% of income earners

All series refer to *pre-tax* incomes

Income Share of Top 5%

50%
40%
30%
20%
10%

Lindert (2000)

Atkinson (2007)

1688   1759   1801-03   1867   1911 1918   1949   1977   1993   2009

Tax units are housholds
(married couples or singles)

Tax units are adults

England & Wales
estimates based on 'social tables'

United Kingdom

Income inequality in the UK over 700 years (1290-2010)

Share of total income going to the top 5% of income earners

All series refer to *pre-tax* incomes

It took ~60 years for the English industrial revolution to improve the wages of workers.

Would you want an algorithm as a manager?

In 1910, A.J Fischer was granted a patent for the first electric-powered washing machine.

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