




Job transitions, labour divisions and automation: A networks perspective

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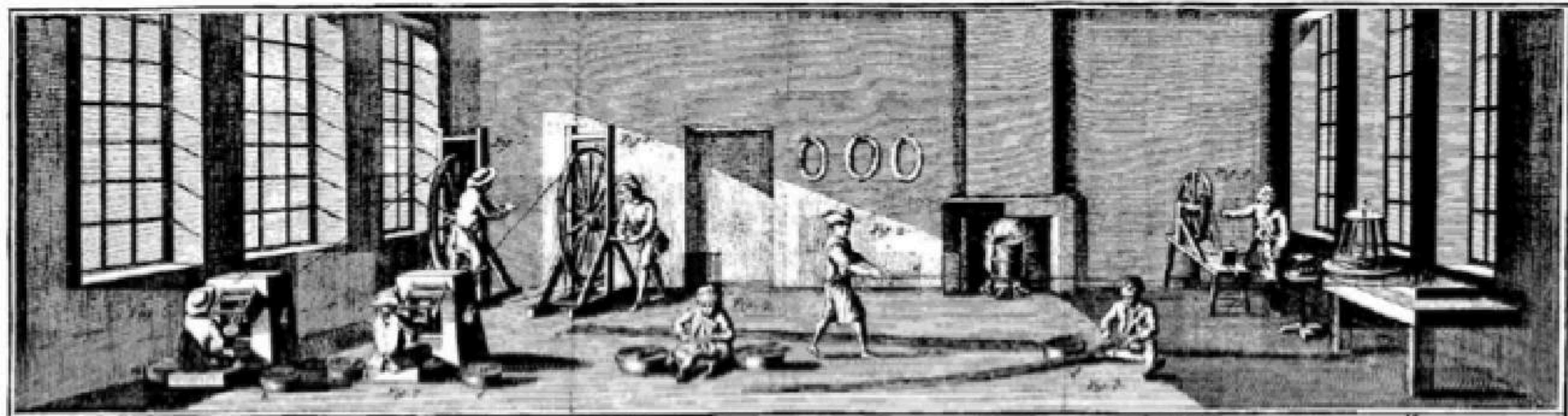
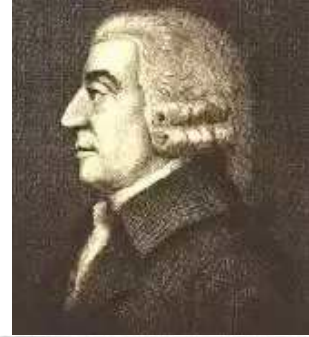


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The division of labour is a key driver of productivity



The greatest improvement in the productive powers of labour, and the greater part of the skill, dexterity and judgment which it is any where directed, or applied, seem to be the effects of the division of labour”

Adam Smith, *The Wealth of Nations*, 1776



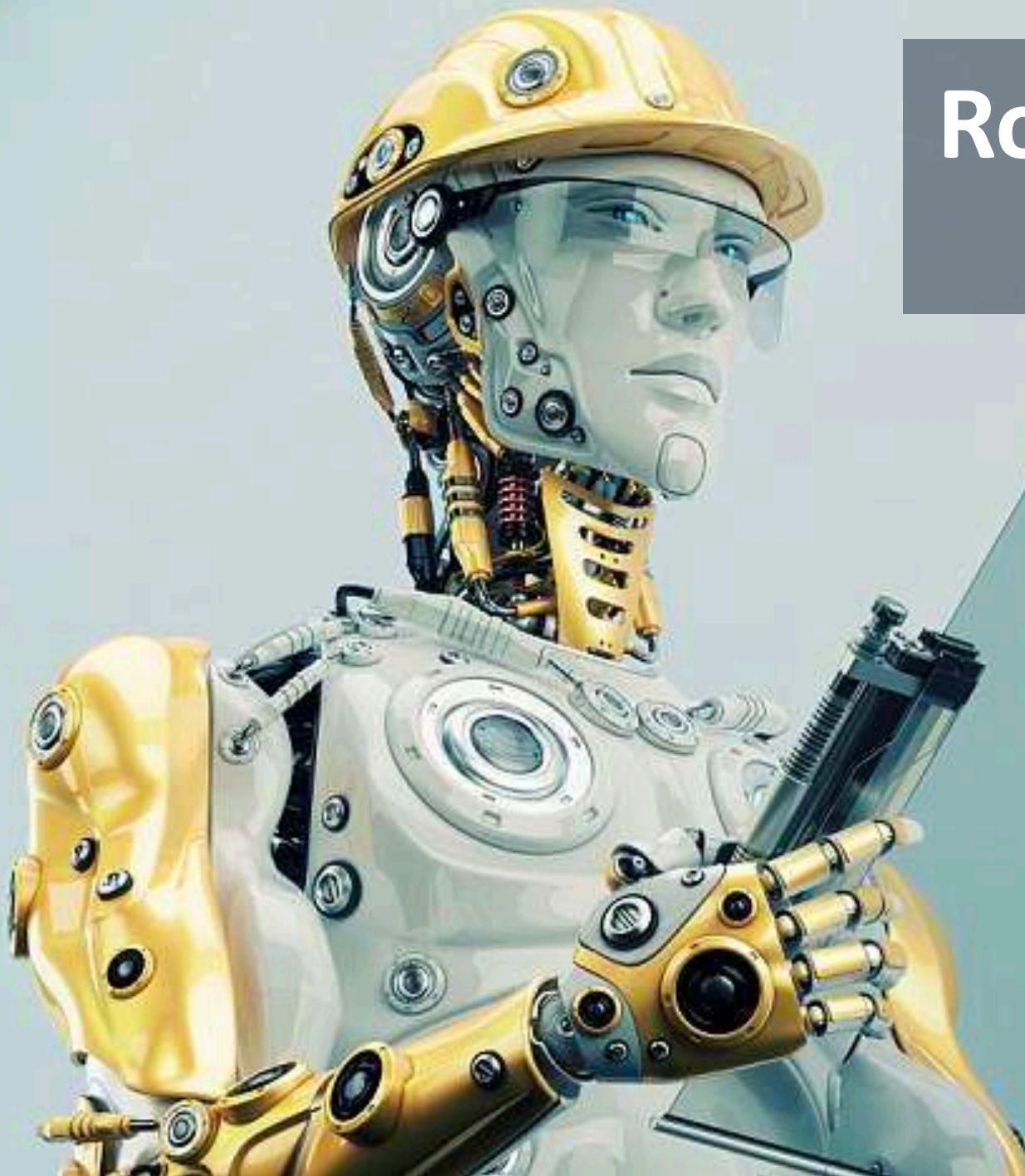
Specialising in different jobs increases output at an **aggregate** level

A close-up photograph of a woman with long, wavy brown hair and black-rimmed glasses. She has a nervous or anxious expression, with her hands clasped near her mouth, biting her nails. Her eyes are wide and looking directly at the camera. The background is a plain, light-colored wall.

But on an **individual** level...

We're more **anxious** about
our jobs than ever before

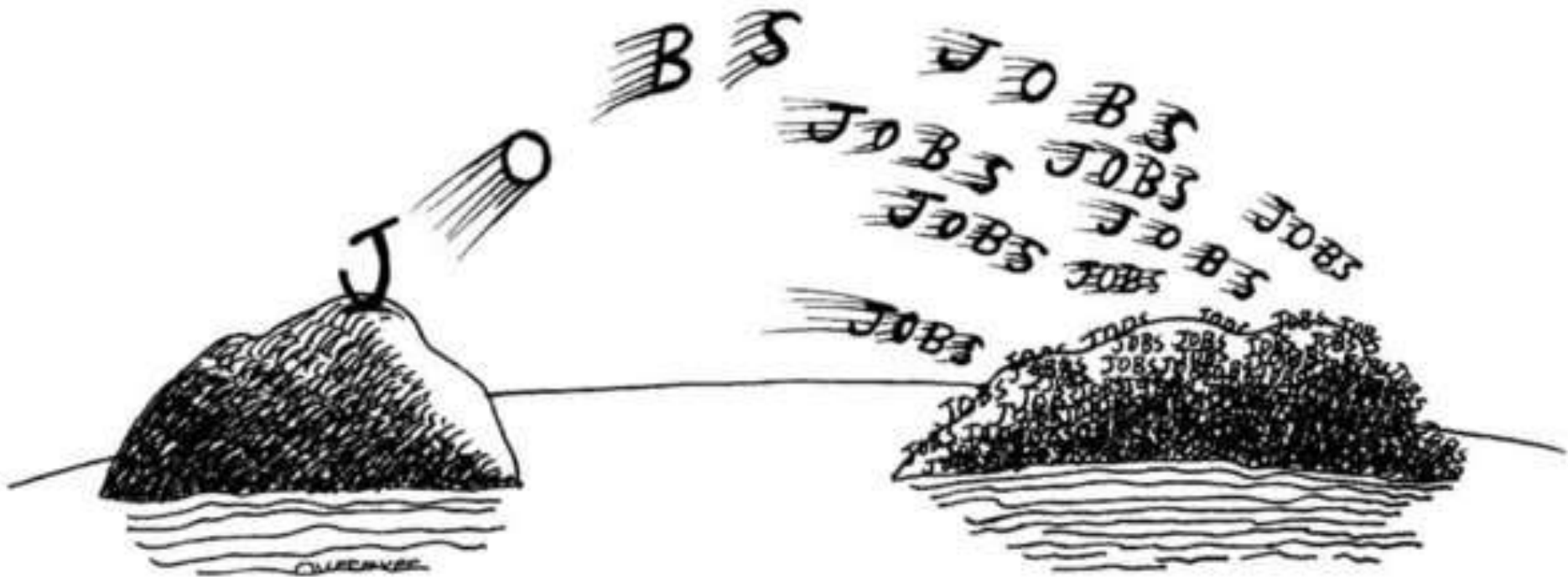
Robots might
steal it



Climate policy might threaten it



Or it might get
off-shored



Overview

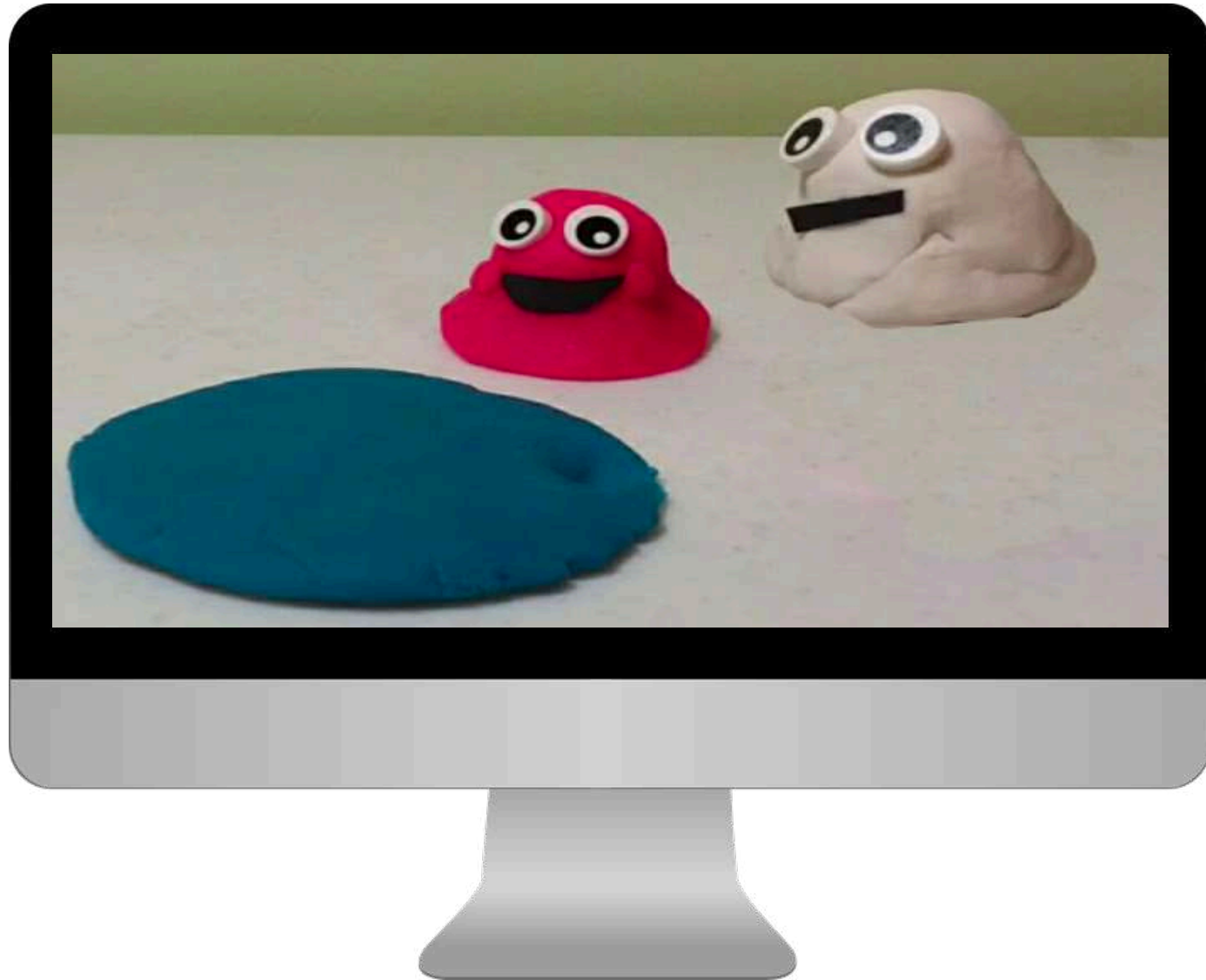
- 1) Job transitions and occupational mobility
- 2) Divisions in the US labour market
- 3) Potential impact of automation

➤ with Maria del Rio Chanona, Francois Lafond, Mariano Beguerisse & Doyne Farmer

Job transitions and occupational mobility



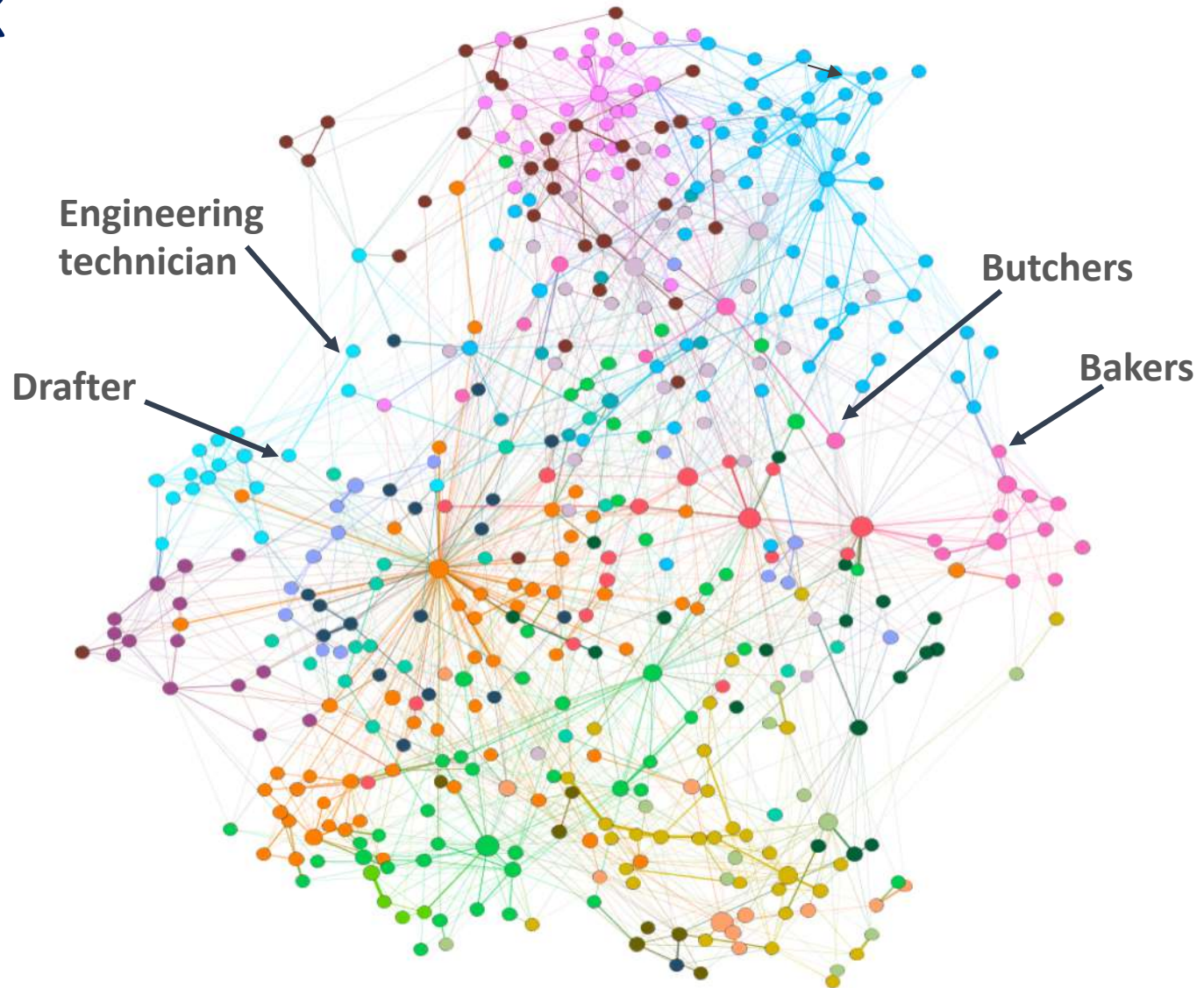
In economic models, we often assume labour is very flexible...



But this assumption isn't very realistic



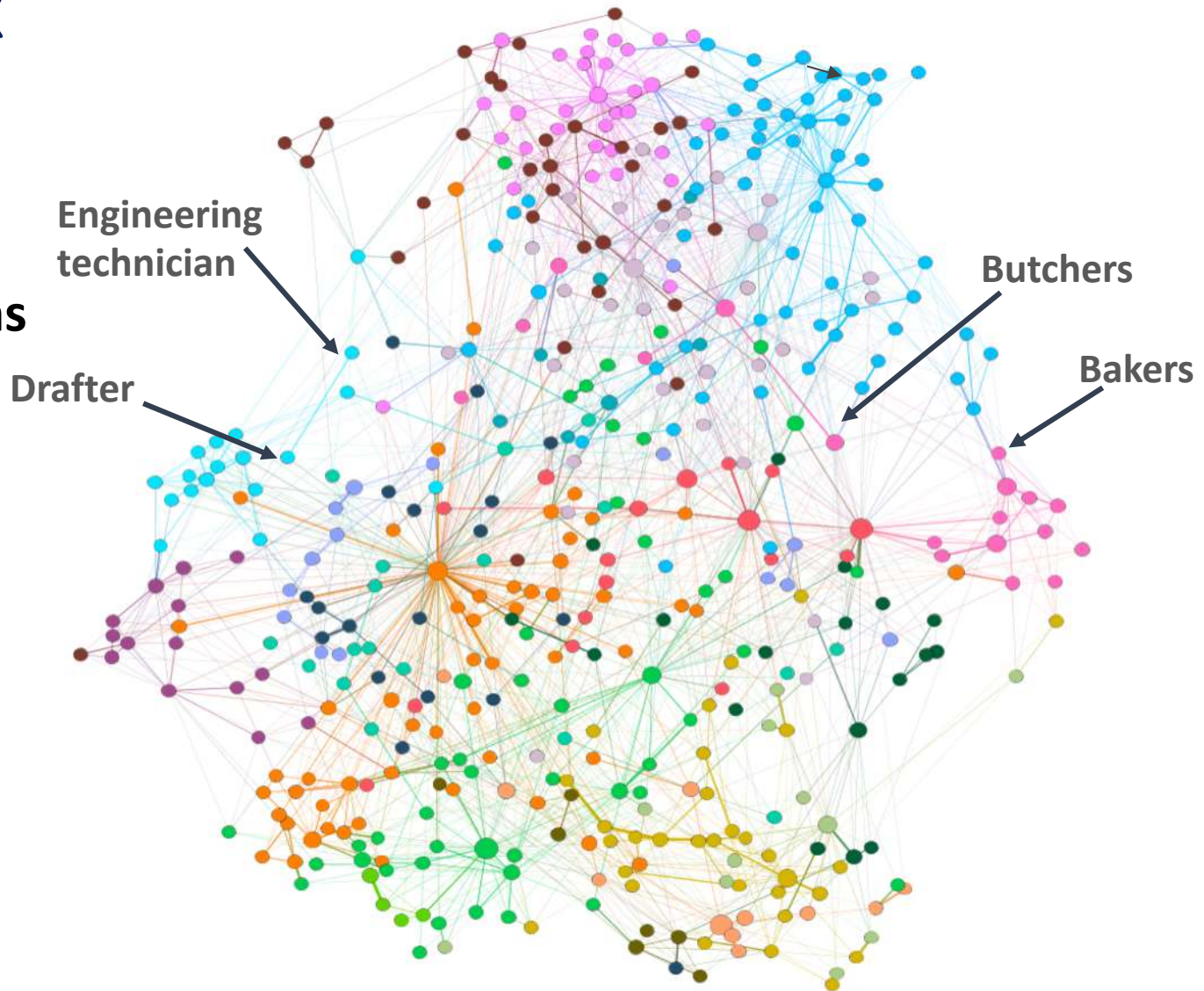
The occupational mobility network



➤ Based on job transitions in the US over 2010-2017

The occupational mobility network

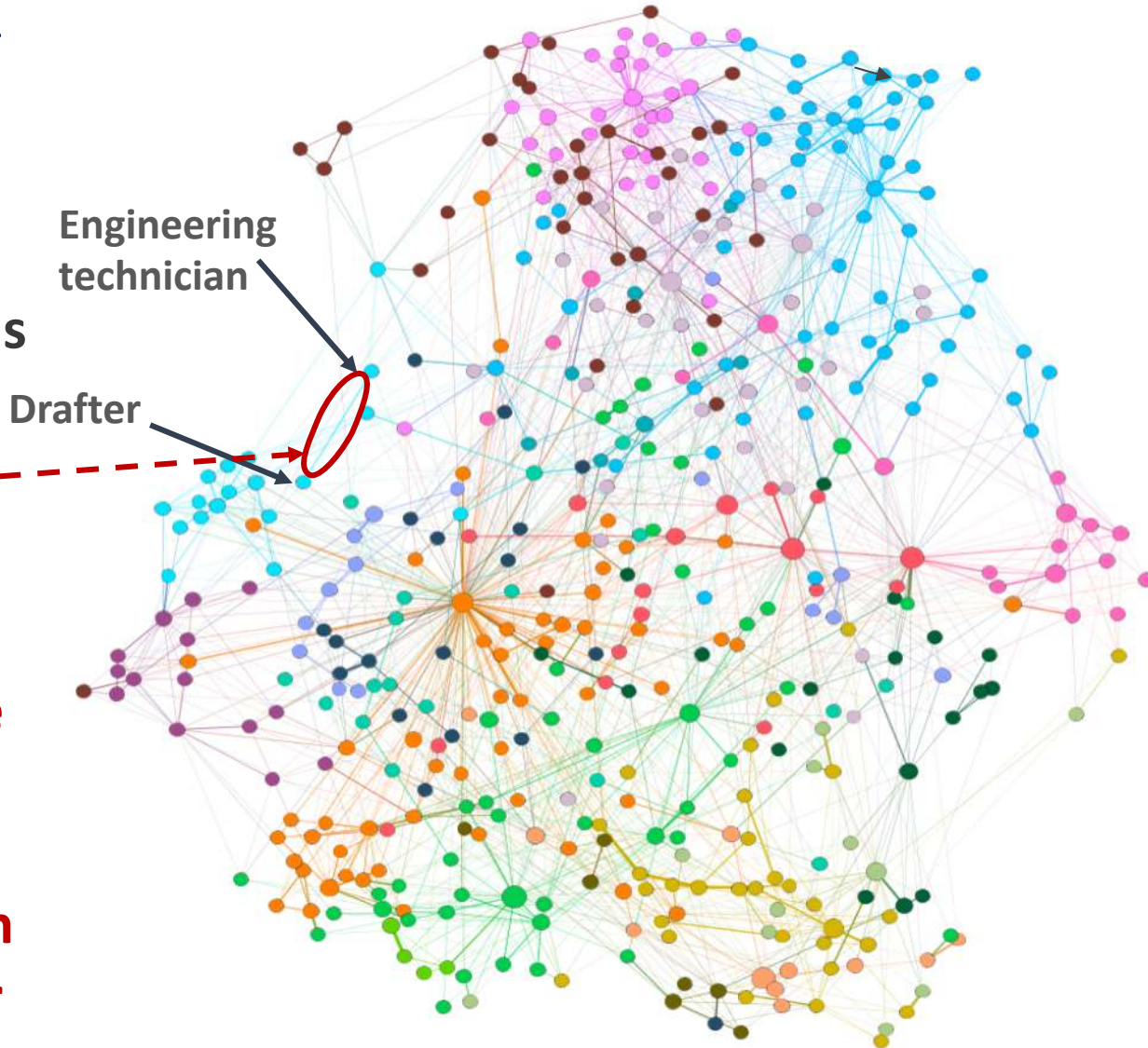
Nodes represent occupations



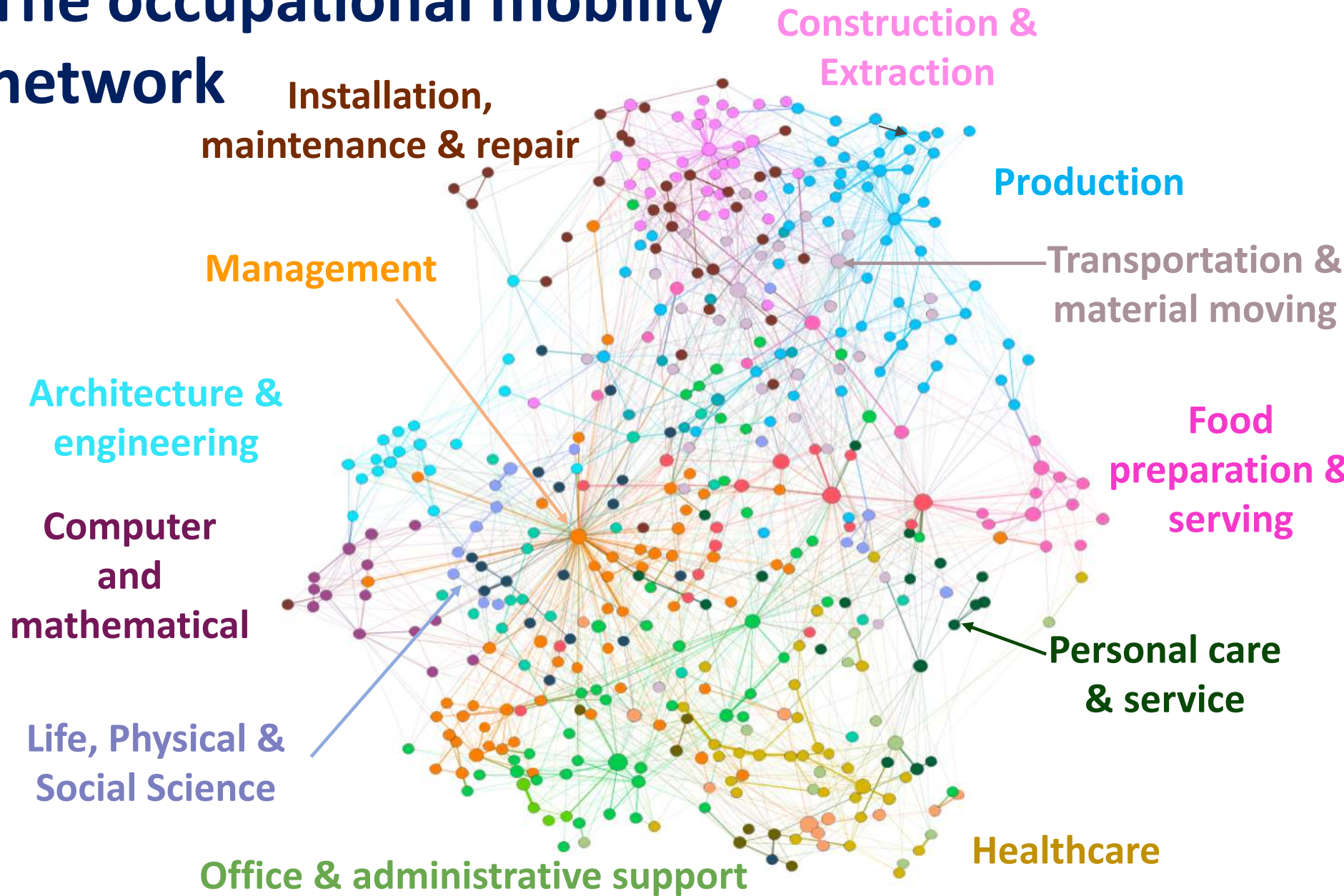
The occupational mobility network

Nodes represent occupations

Links represent how likely people are to switch from one occupation to another



The occupational mobility network



What influences job switching?



Occupations

Podiatrist

Nurse

**Police
Officer**

**Fabricate
medical
devices**

**Prescribe
medical
treatment**

**Direct
organizational
operations**

Tasks

Occupations

Podiatrist

Nurse

**Police
Officer**

**Fabricate
medical
devices**

**Prescribe
medical
treatment**

**Direct
organizational
operations**

**Investigate
criminal
matters**

Tasks

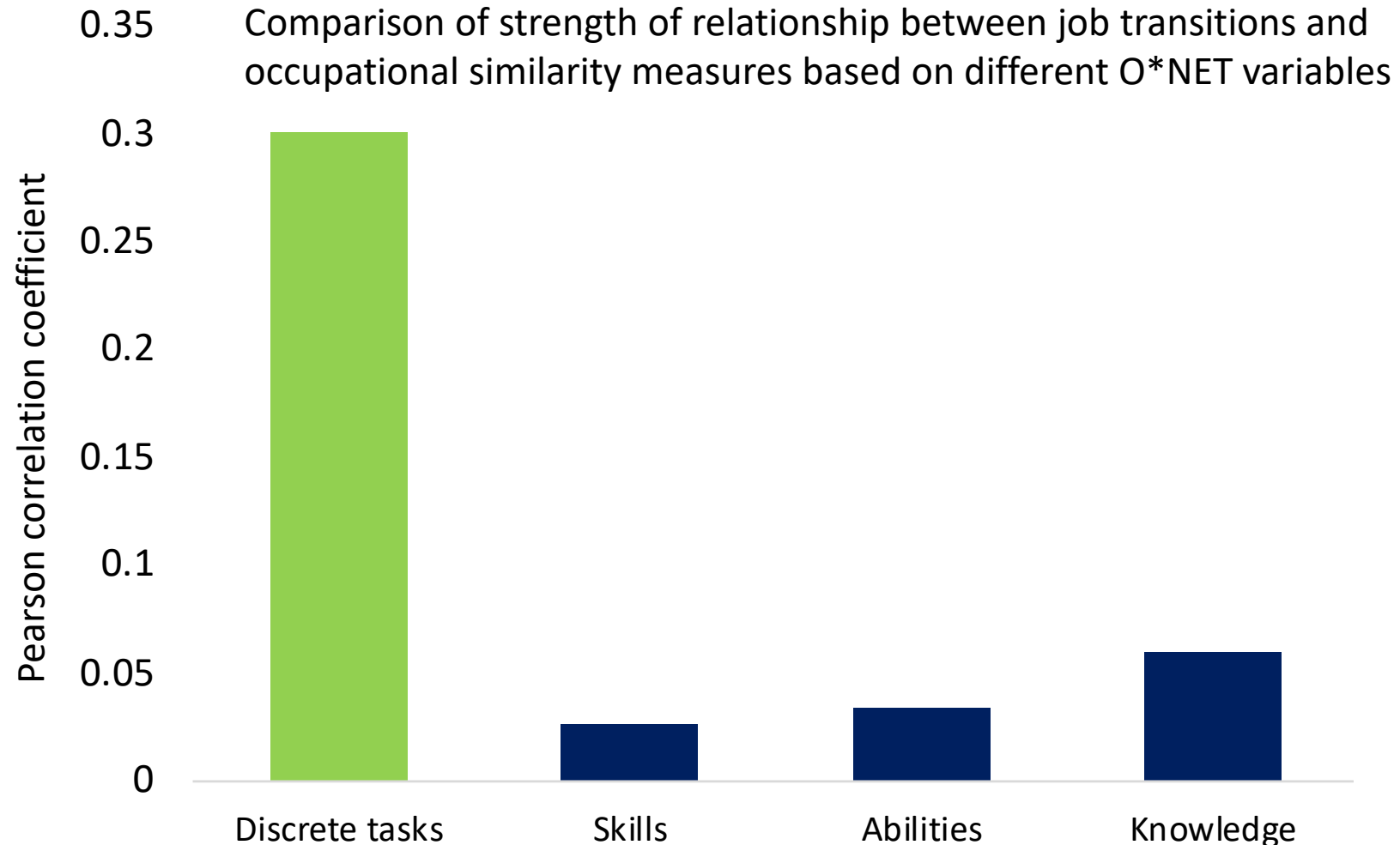
Occupational task similarity predicts future job transitions



...what you do at work matters



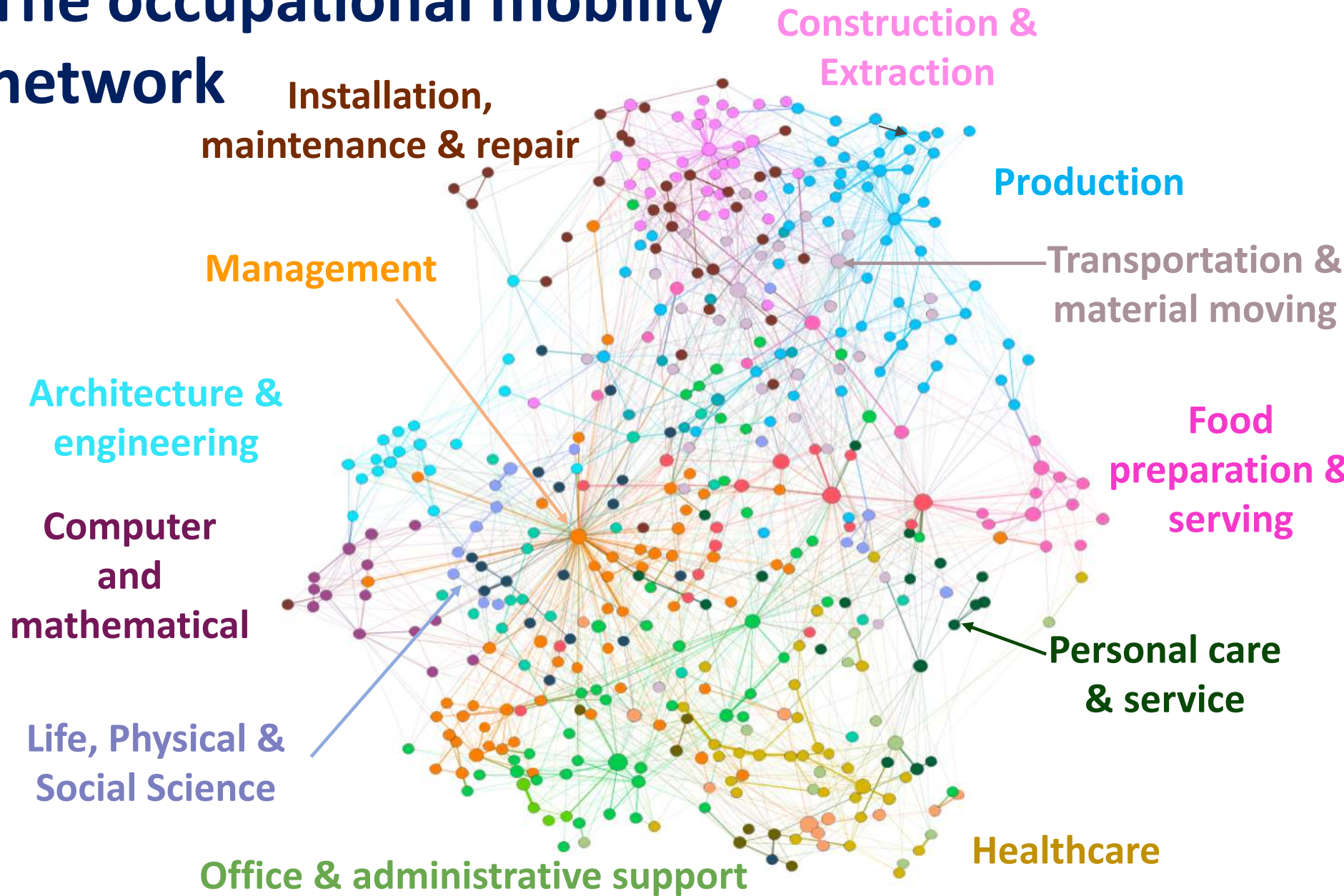
Task similarity better explains variance in job transitions than other O*NET variables



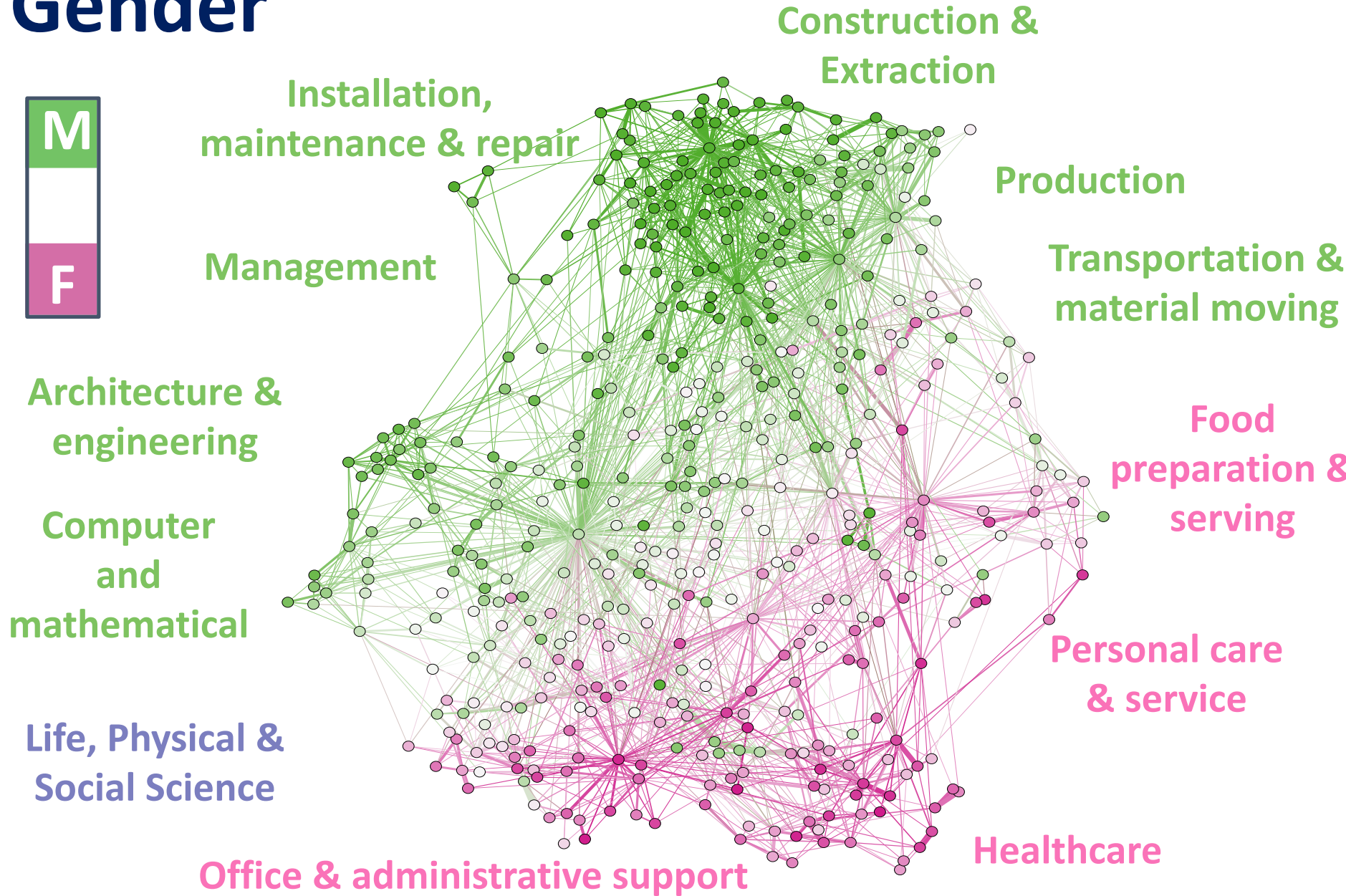
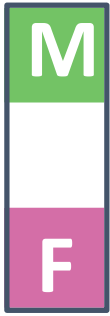
Divisions of labour



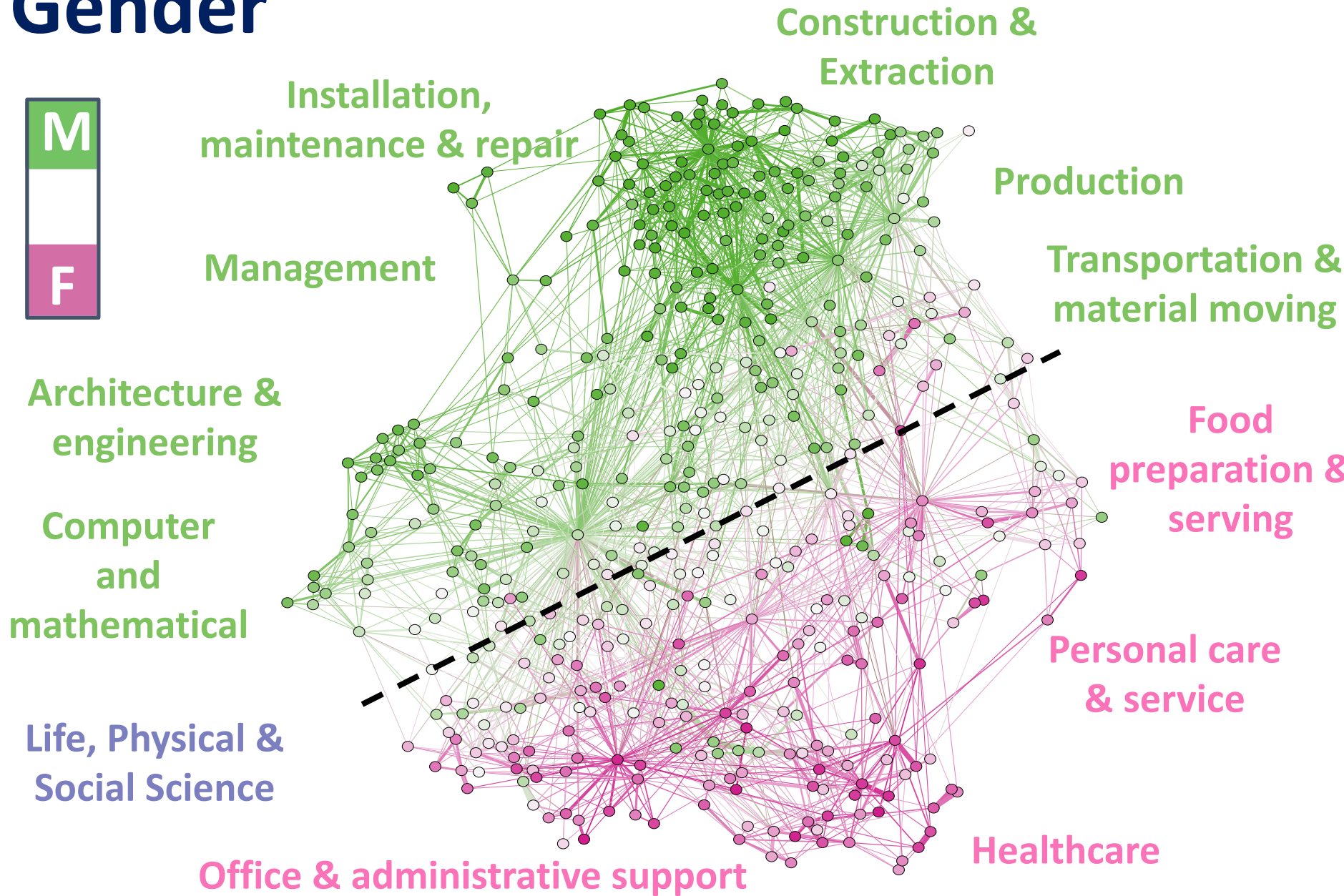
The occupational mobility network



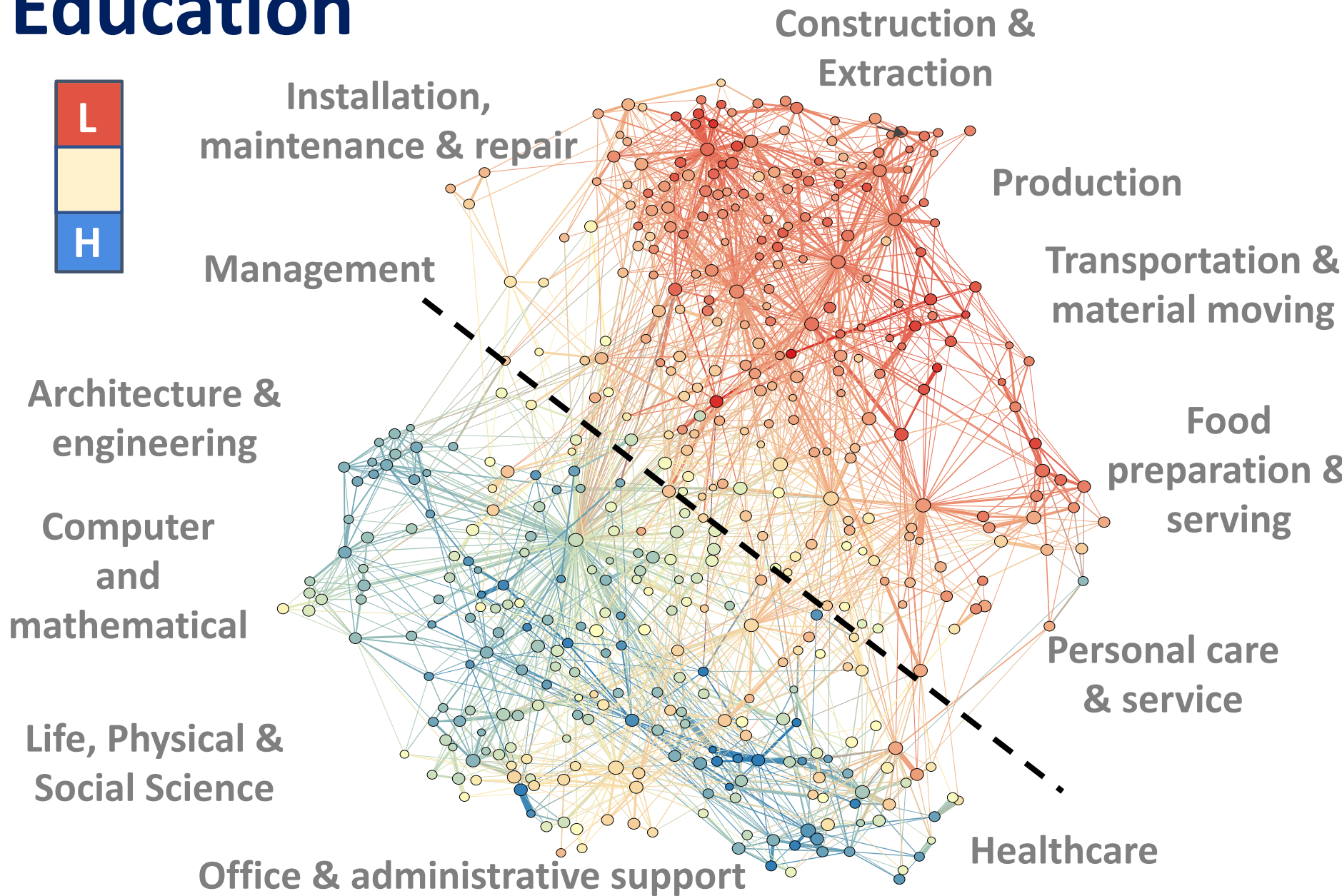
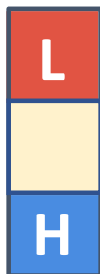
Gender



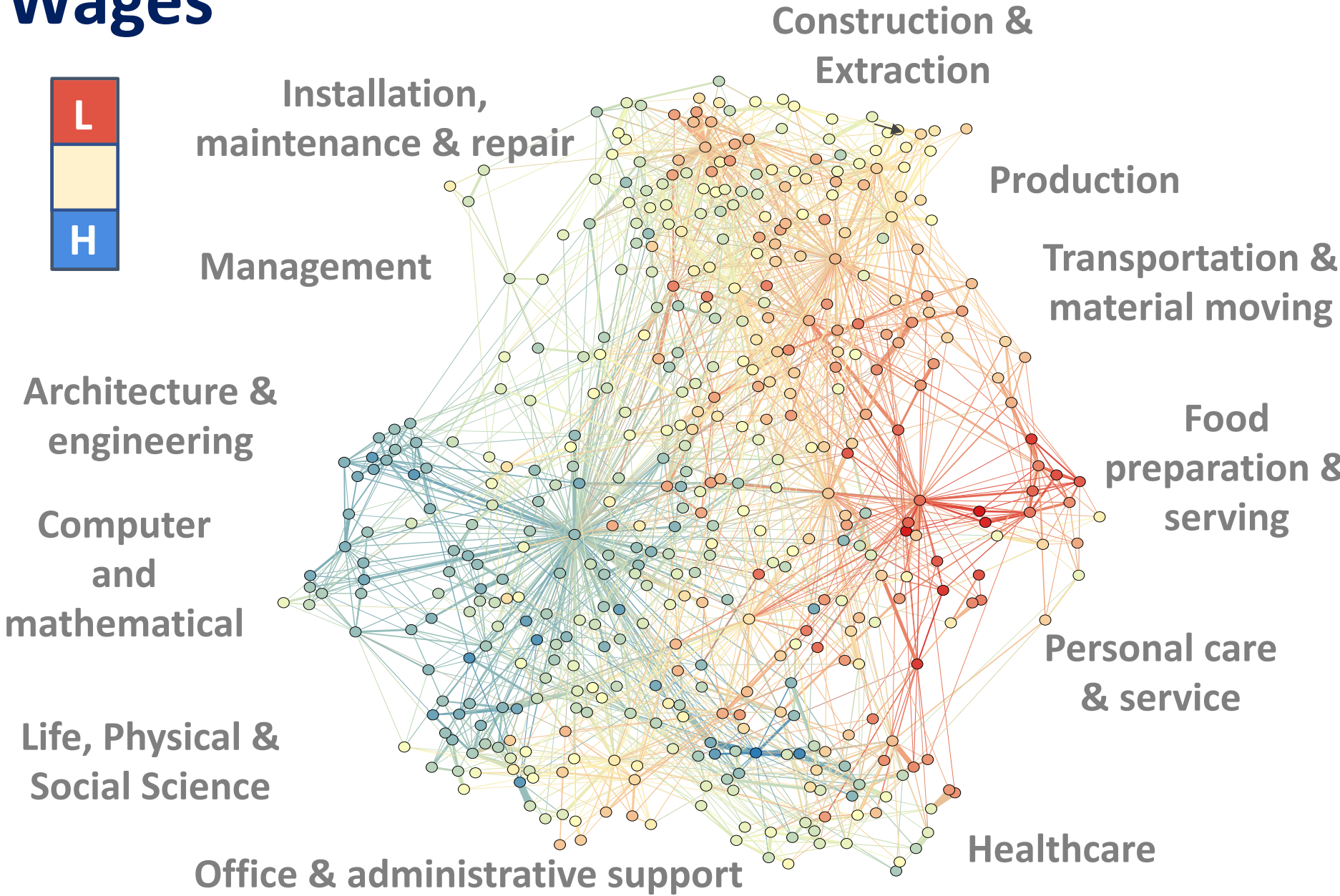
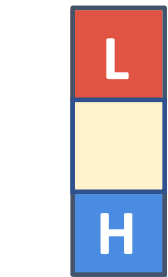
Gender



Education

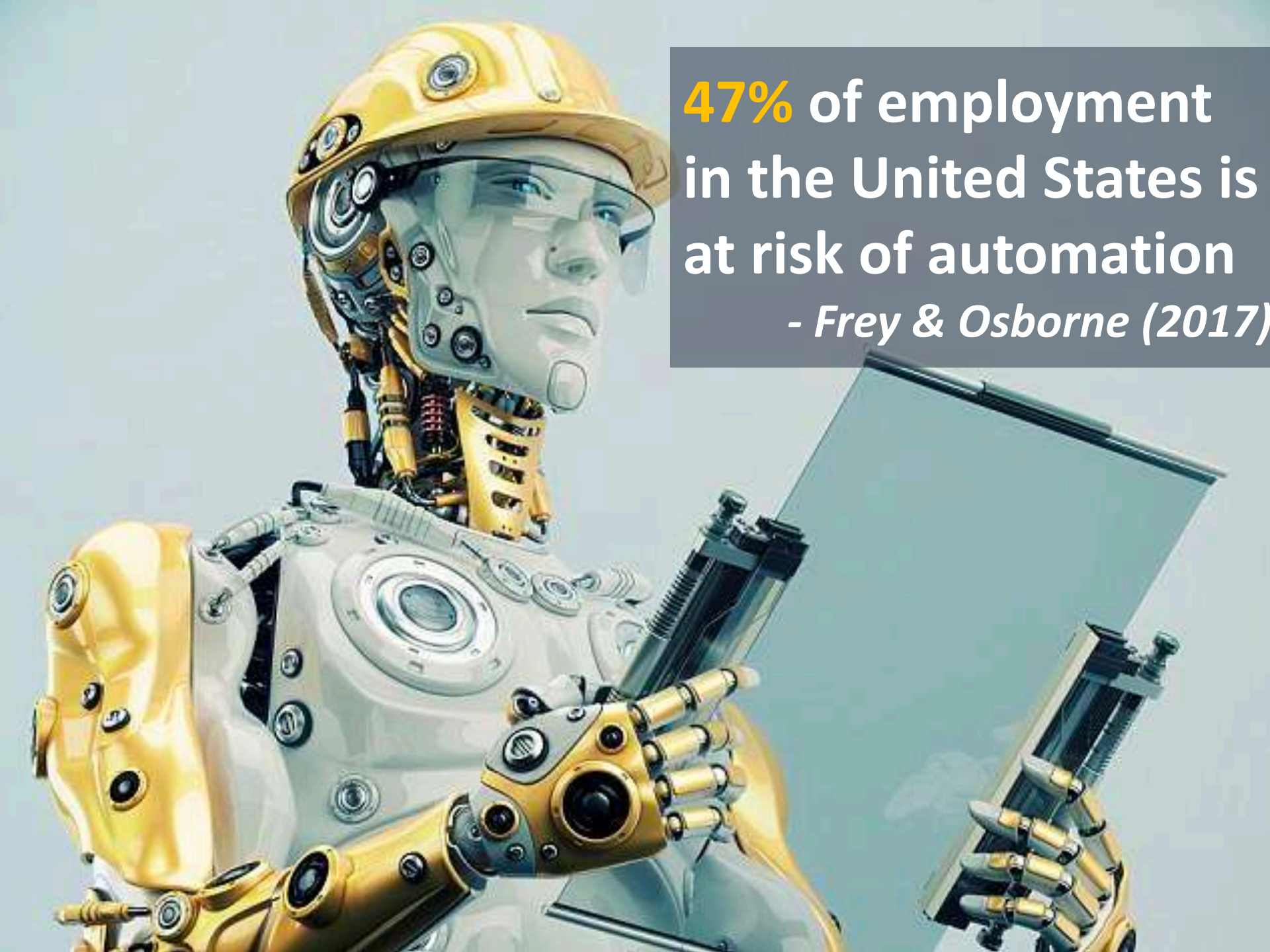


Wages



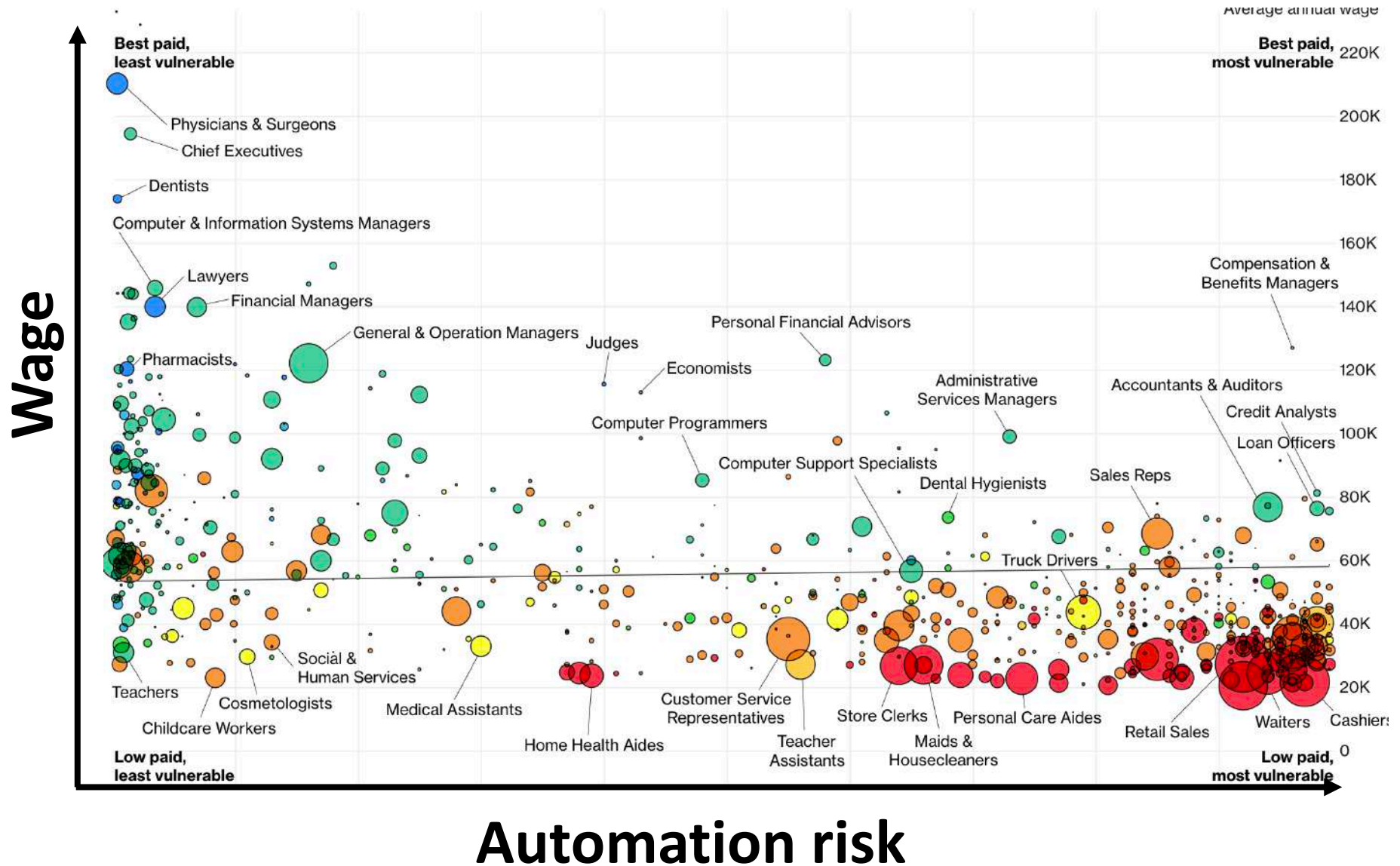
What about automation?



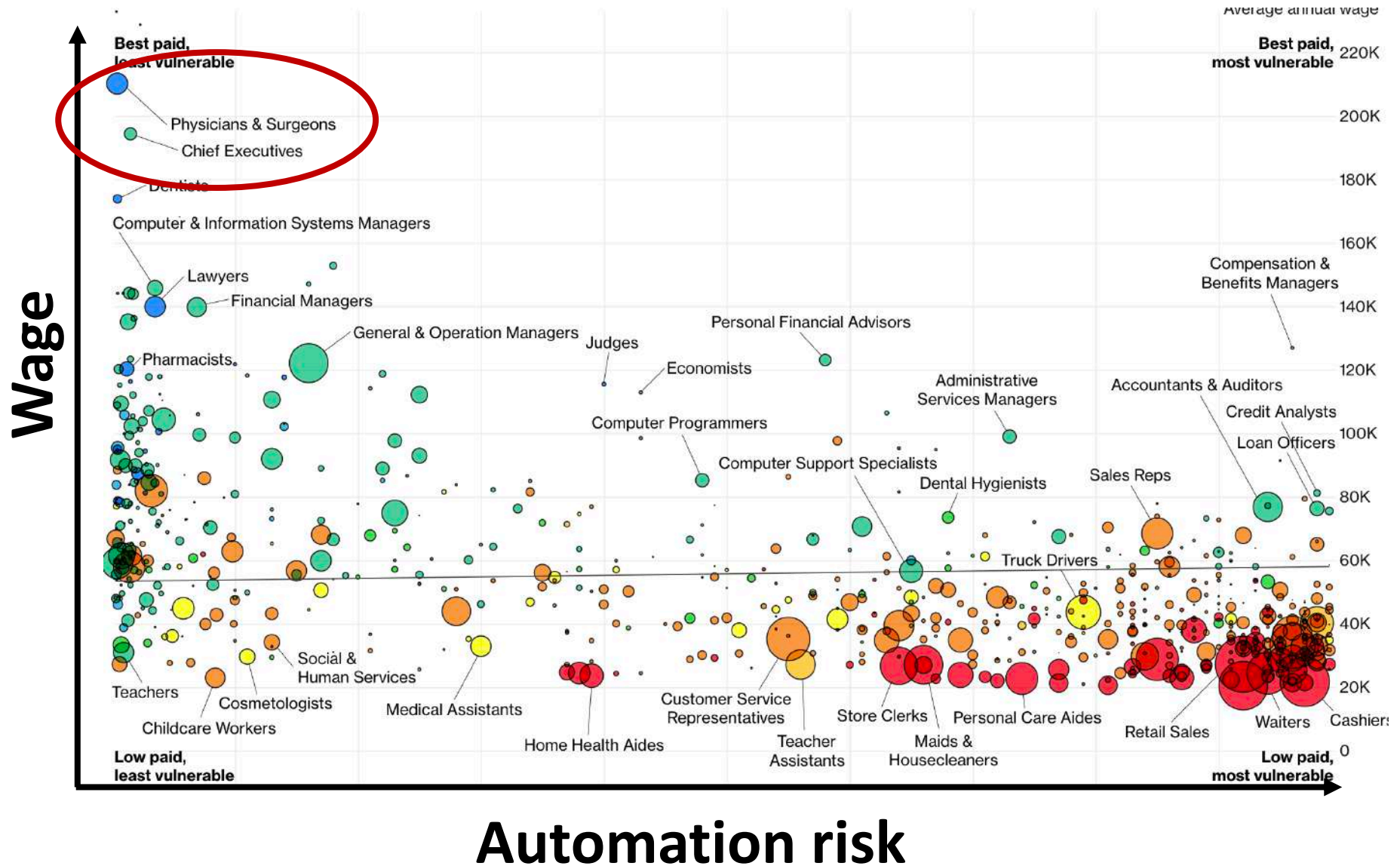
A futuristic robot with a yellow and white body, wearing a yellow hard hat and safety glasses. The robot is holding a large, transparent tablet in its right hand. The background is a light blue gradient.

47% of employment
in the United States is
at risk of automation
- Frey & Osborne (2017)

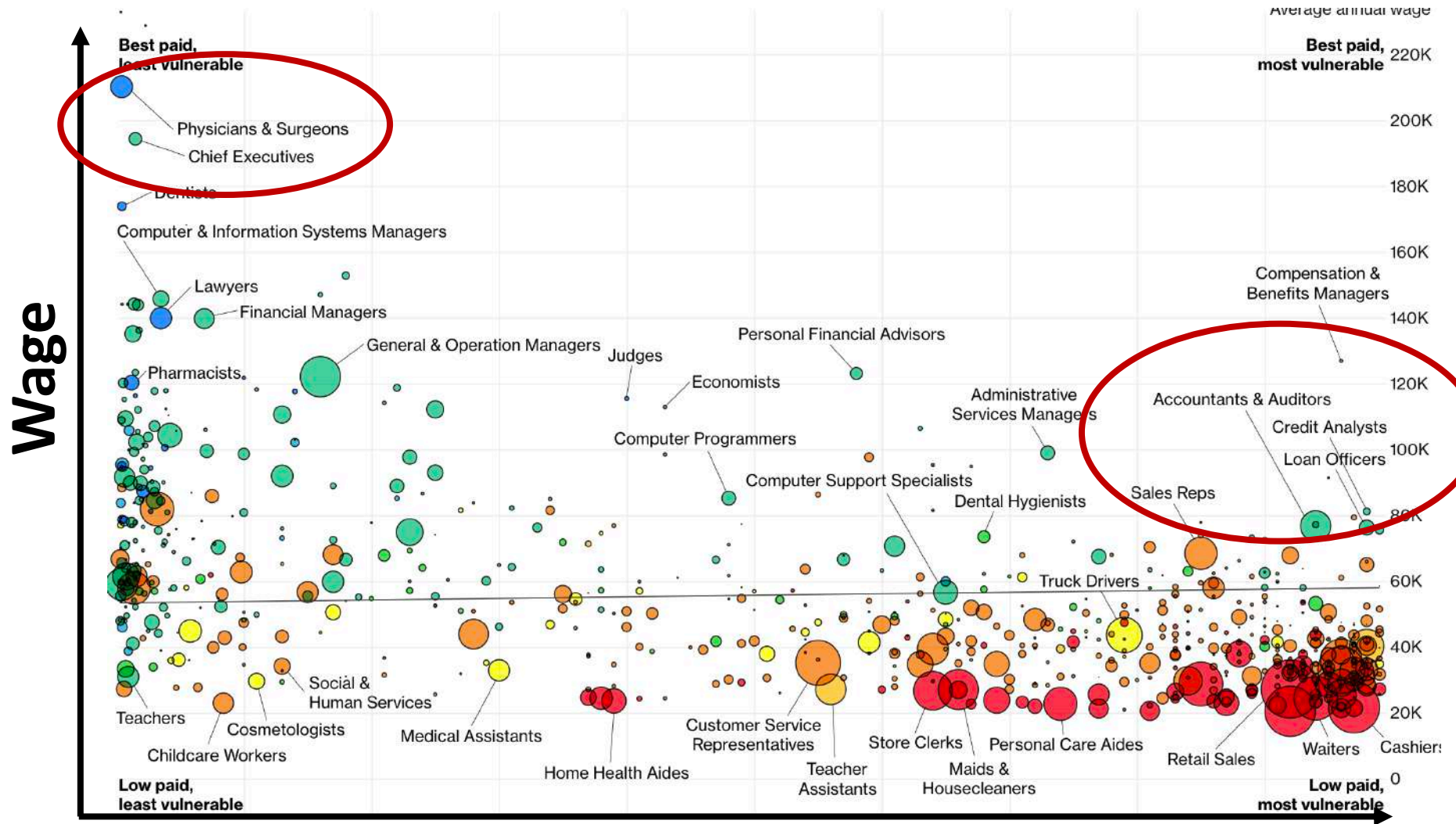
Occupation-specific risk estimates are useful, but...



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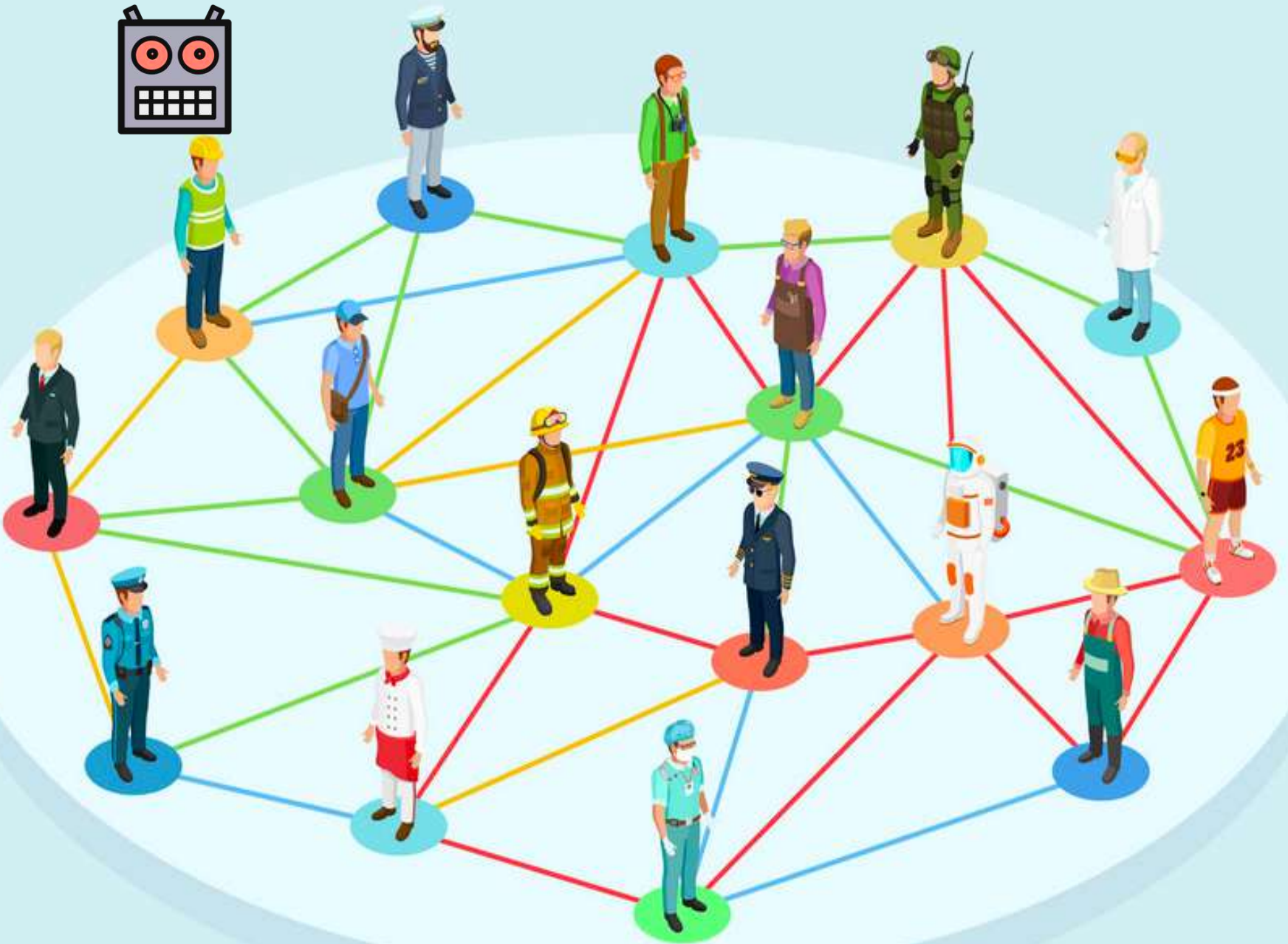
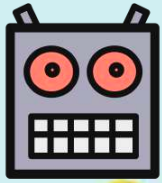
Occupation-specific risk estimates are useful, but...

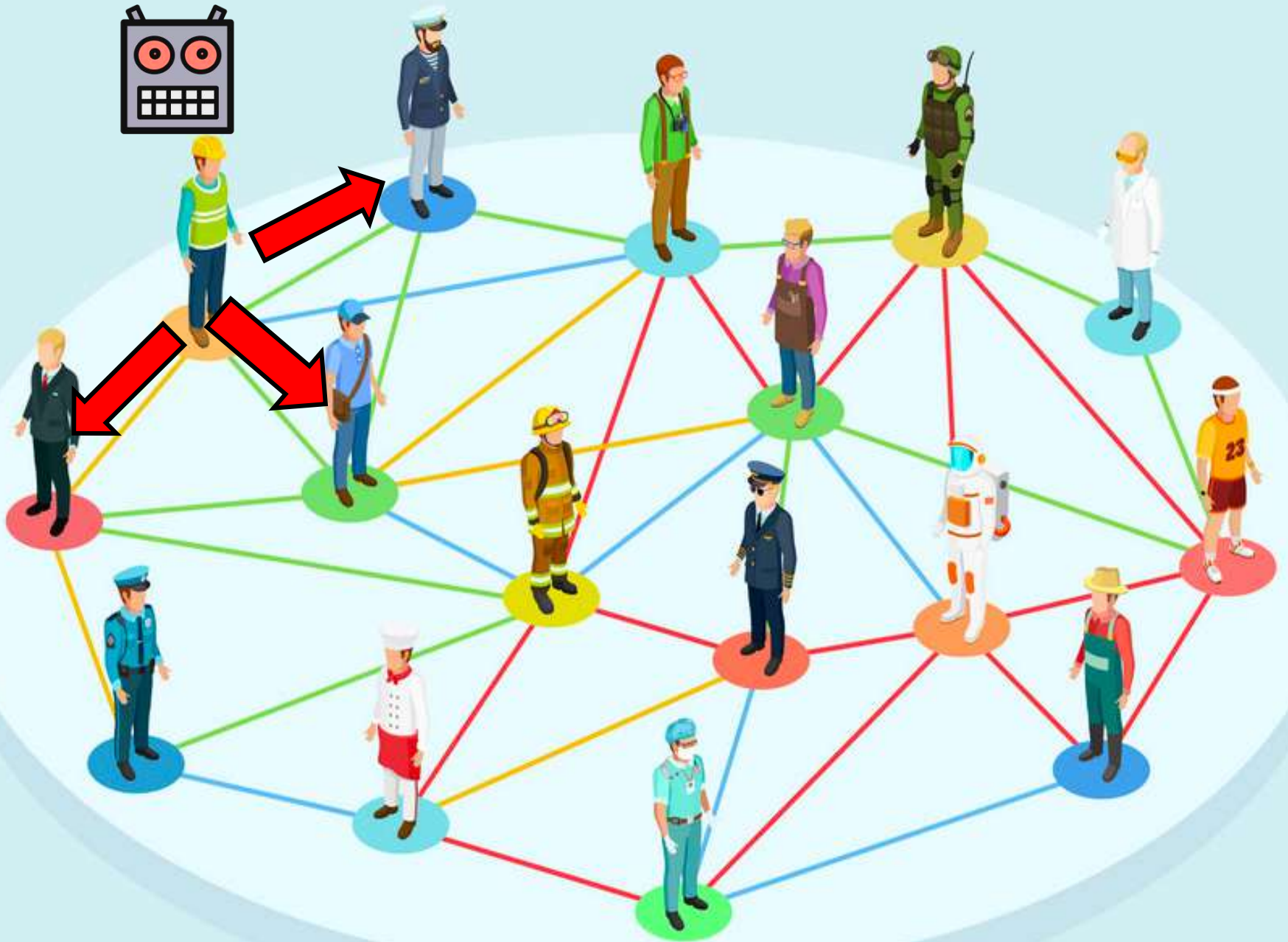
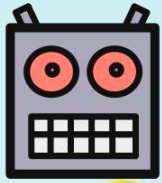


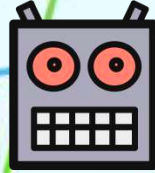
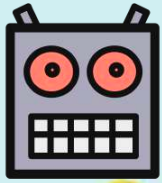
Automation risk

Could we take a more **holistic** view?

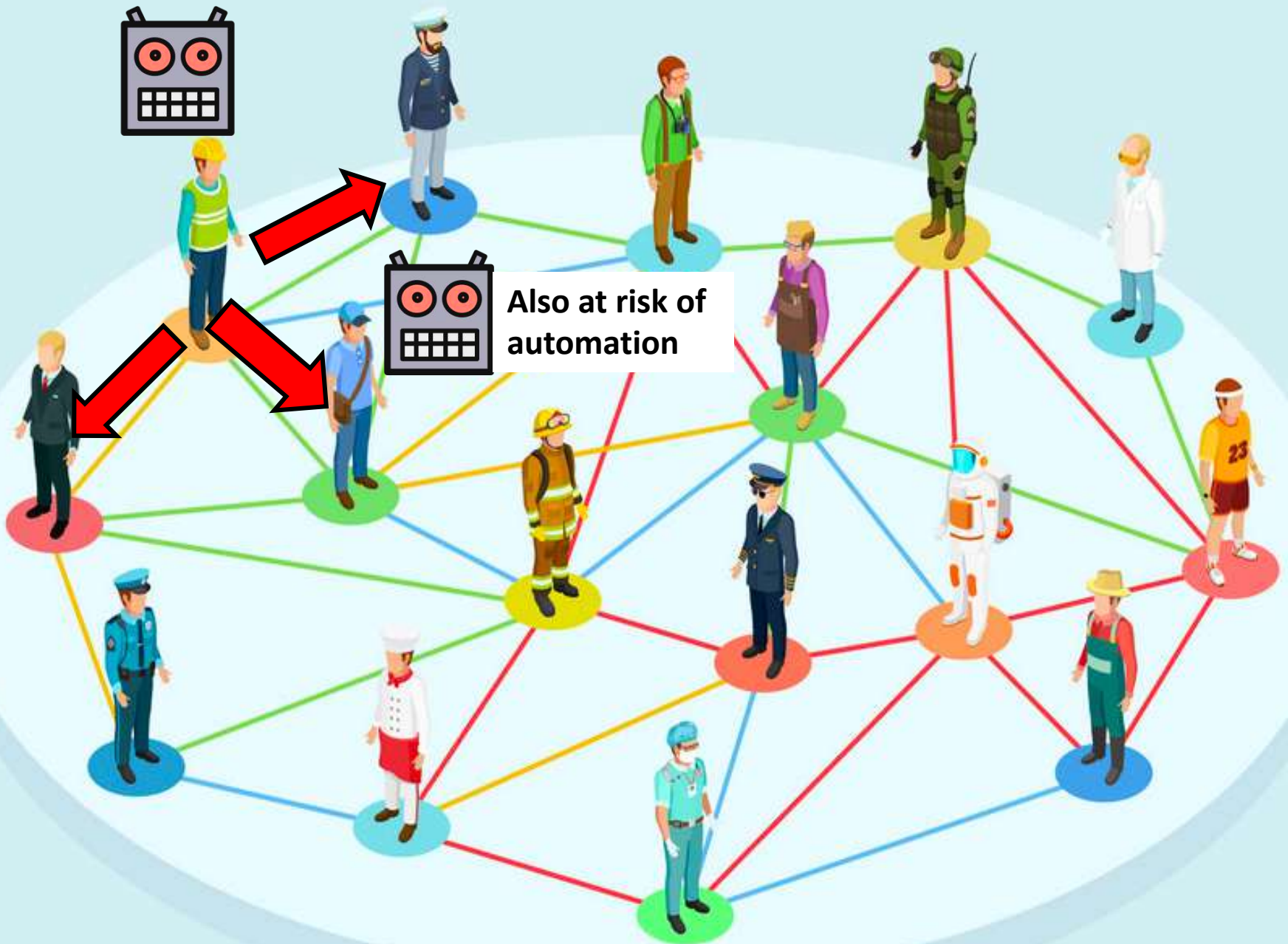


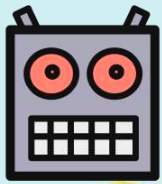




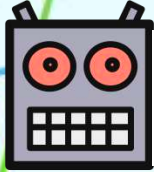


Also at risk of automation

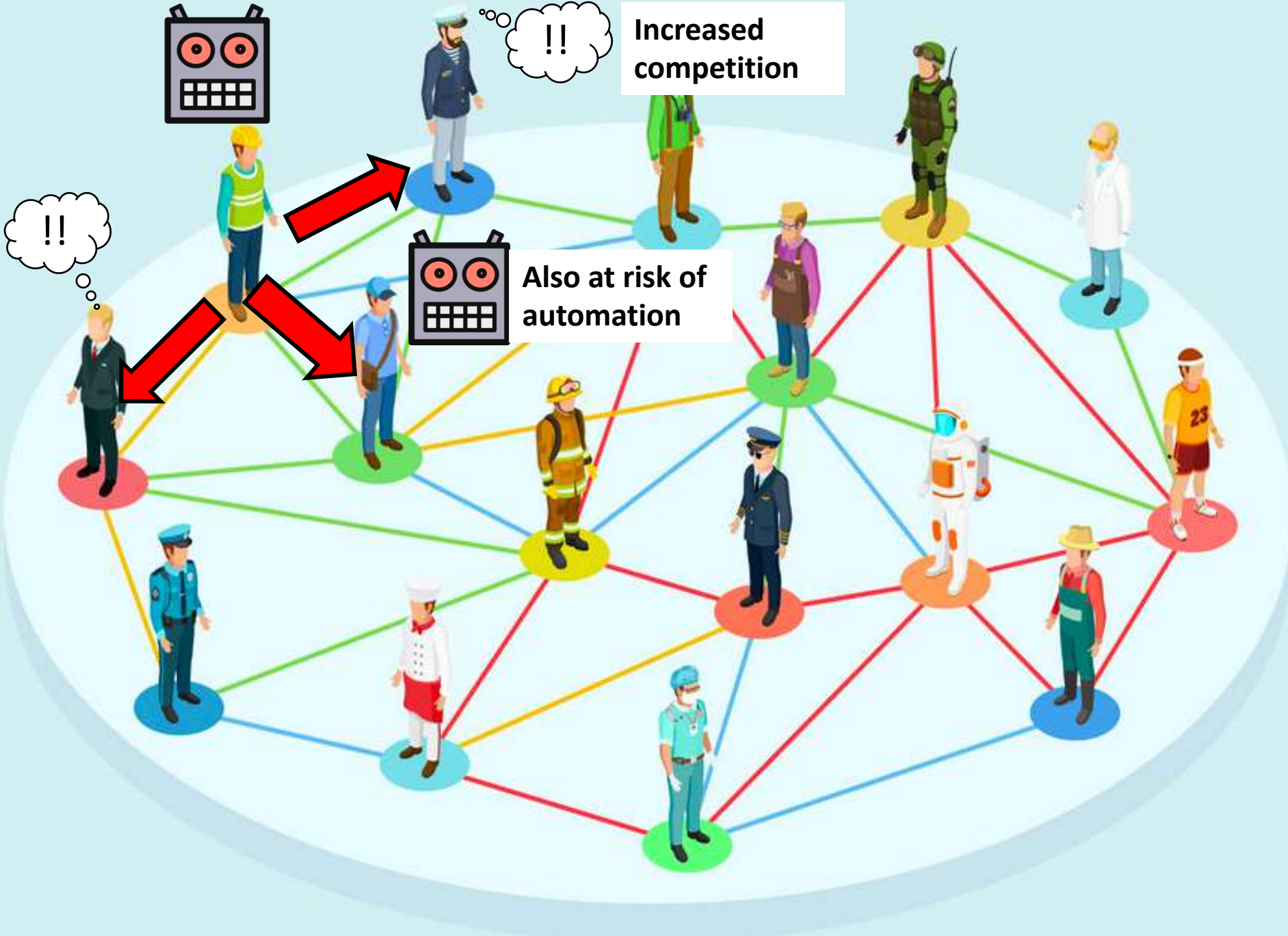


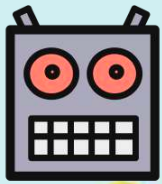


Increased competition

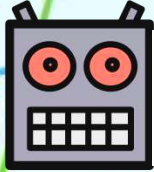


Also at risk of automation

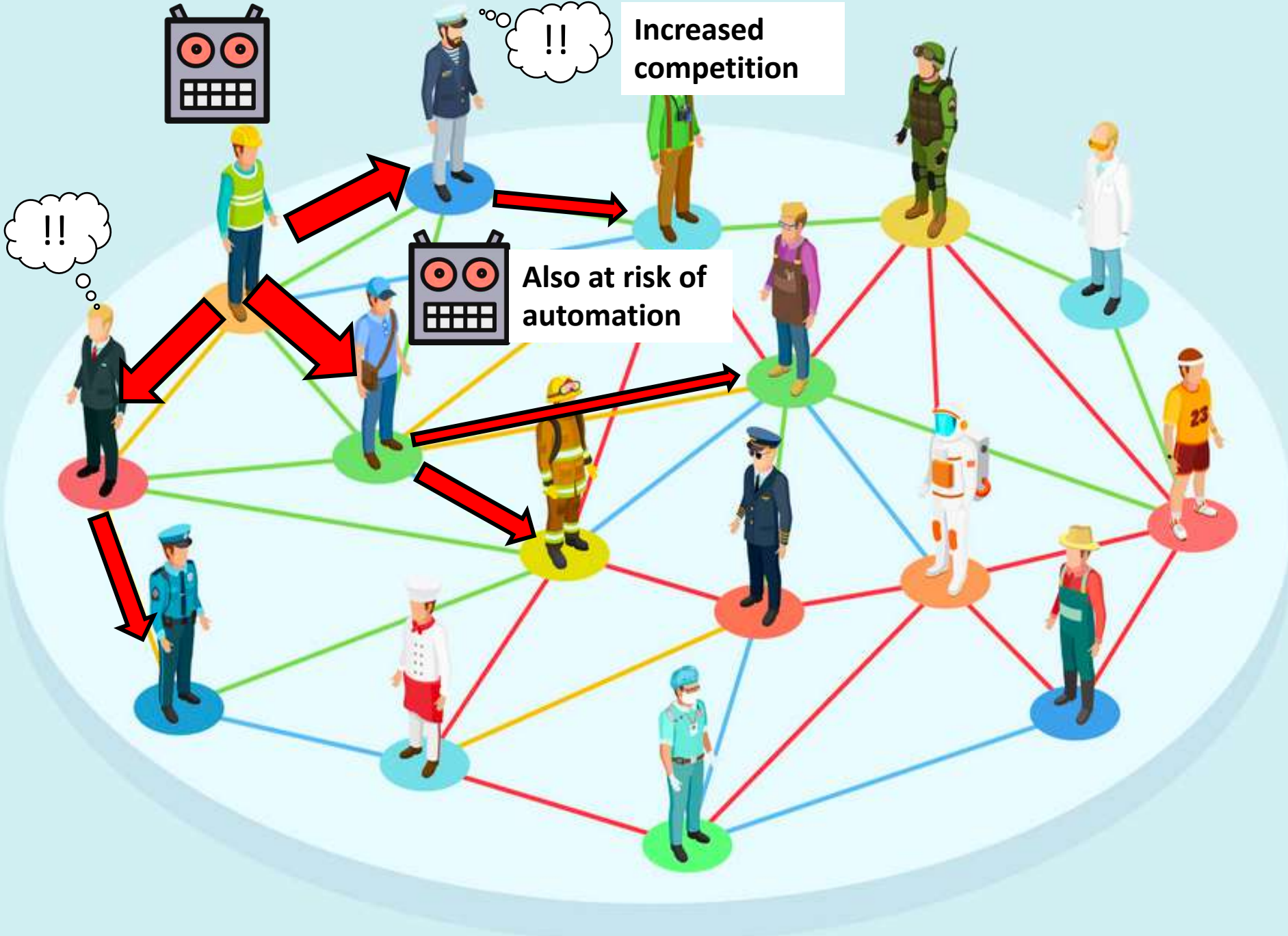




Increased competition



Also at risk of automation

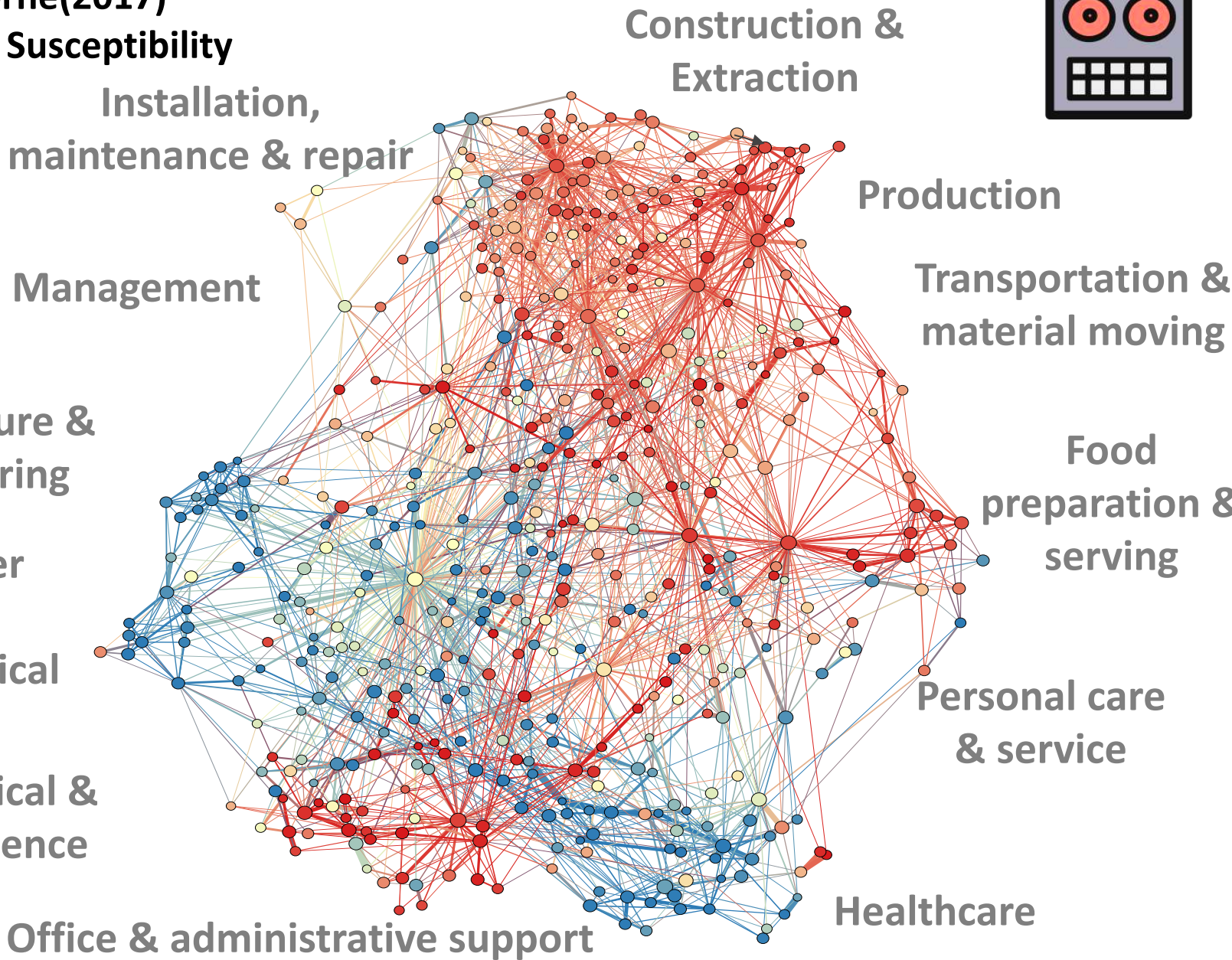
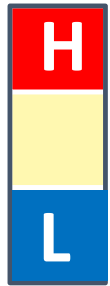
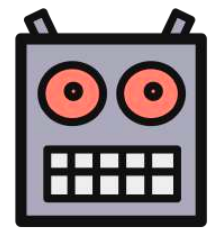


New agent-based model of the labour market

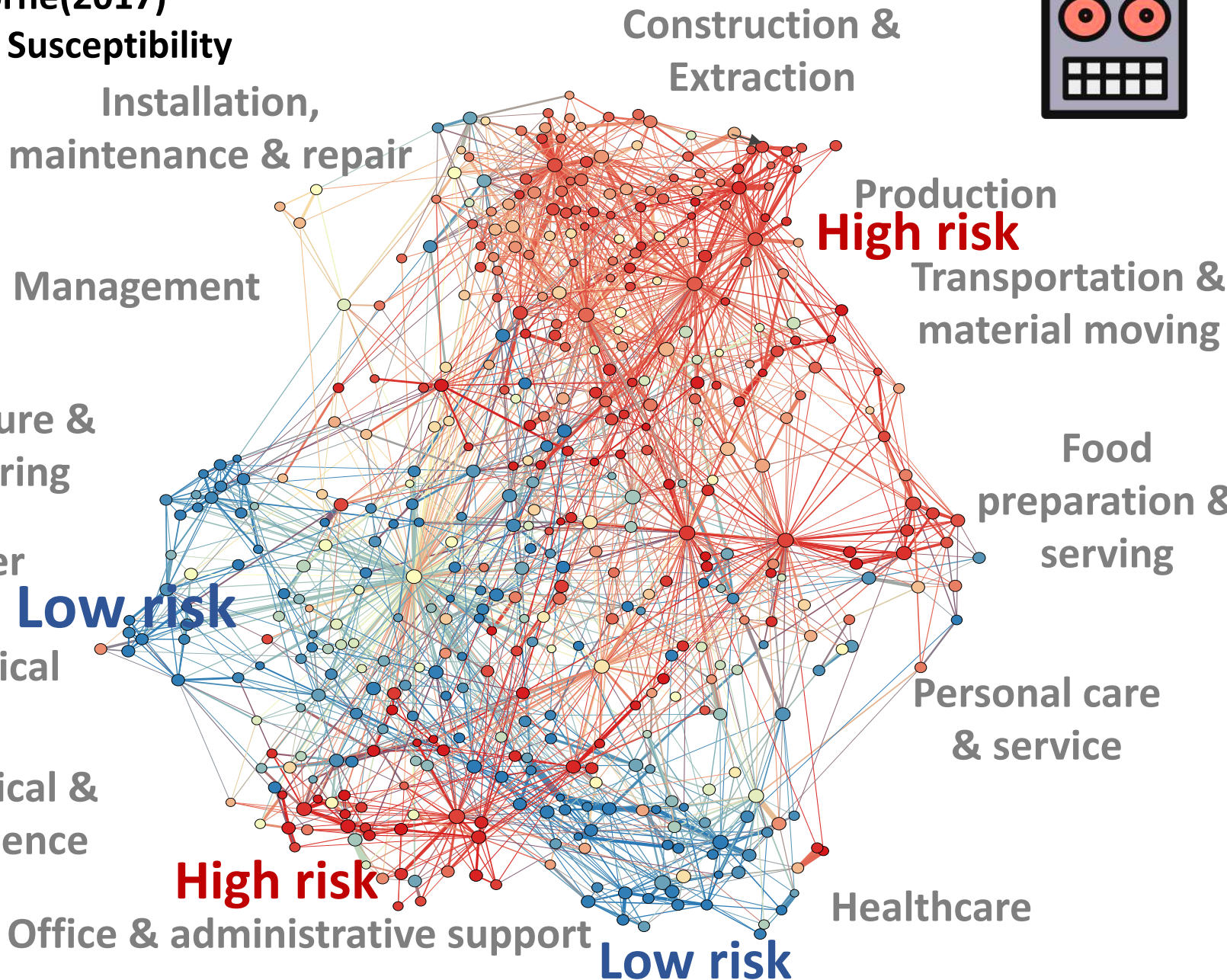
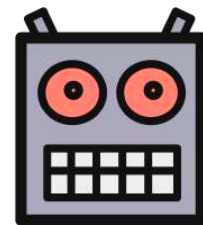


Del Rio-Chanona, R. M., Mealy, P., Beguerisse-Díaz, M., Lafond, F., & Farmer, J. D. (2019). Occupational mobility and automation: A data-driven network model

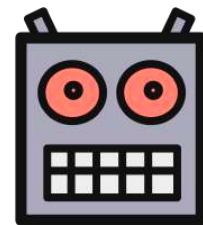
Frey & Osborne(2017)
Automation Susceptibility
Estimate



Frey & Osborne(2017)
Automation Susceptibility
Estimate



Frey & Osborne(2017)
Automation Susceptibility
Estimate



Installation,
maintenance & repair

Construction &
Extraction

Management

Production
High risk

Transportation &
material moving

Architecture &
engineering

Food
preparation &
serving

Computing
and
mathematics

**Statistical
technician**

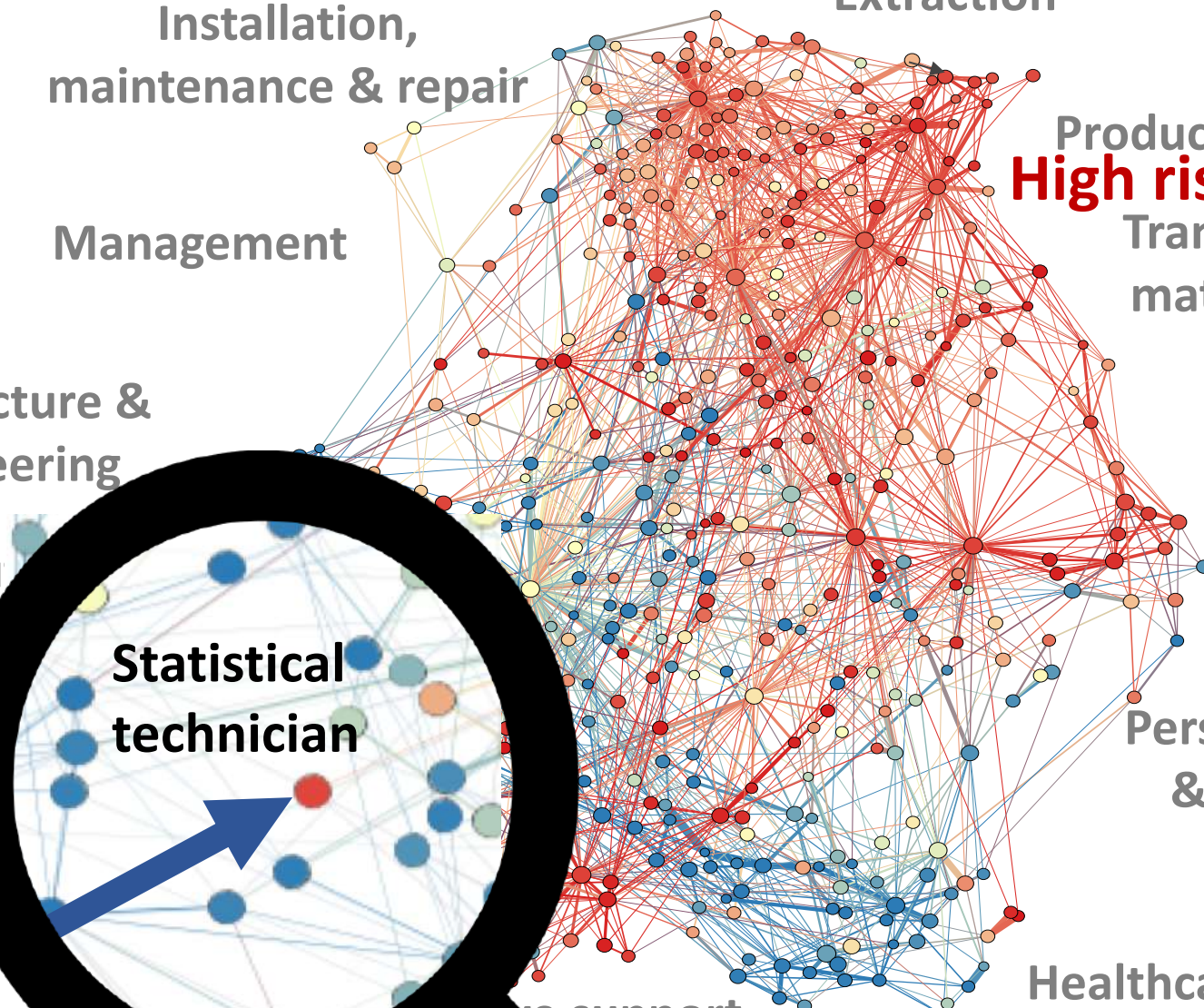
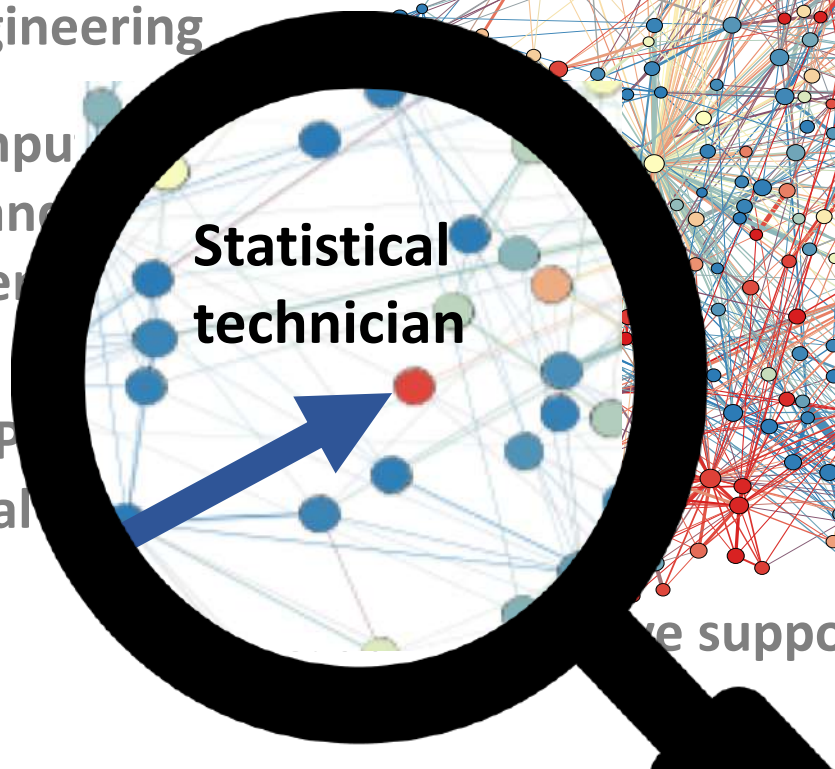
Personal care
& service

Life, Physical
Social

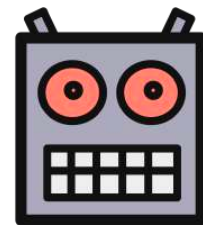
Healthcare
support

Healthcare

Low risk



Frey & Osborne(2017)
Automation Susceptibility
Estimate



Installation,
maintenance & re

Construction &
Extraction

Management

Production
High risk

Transportation &
material moving

Architecture &
engineering

Food
preparation &
serving

Compu
and
mathem

**Statistical
technician**

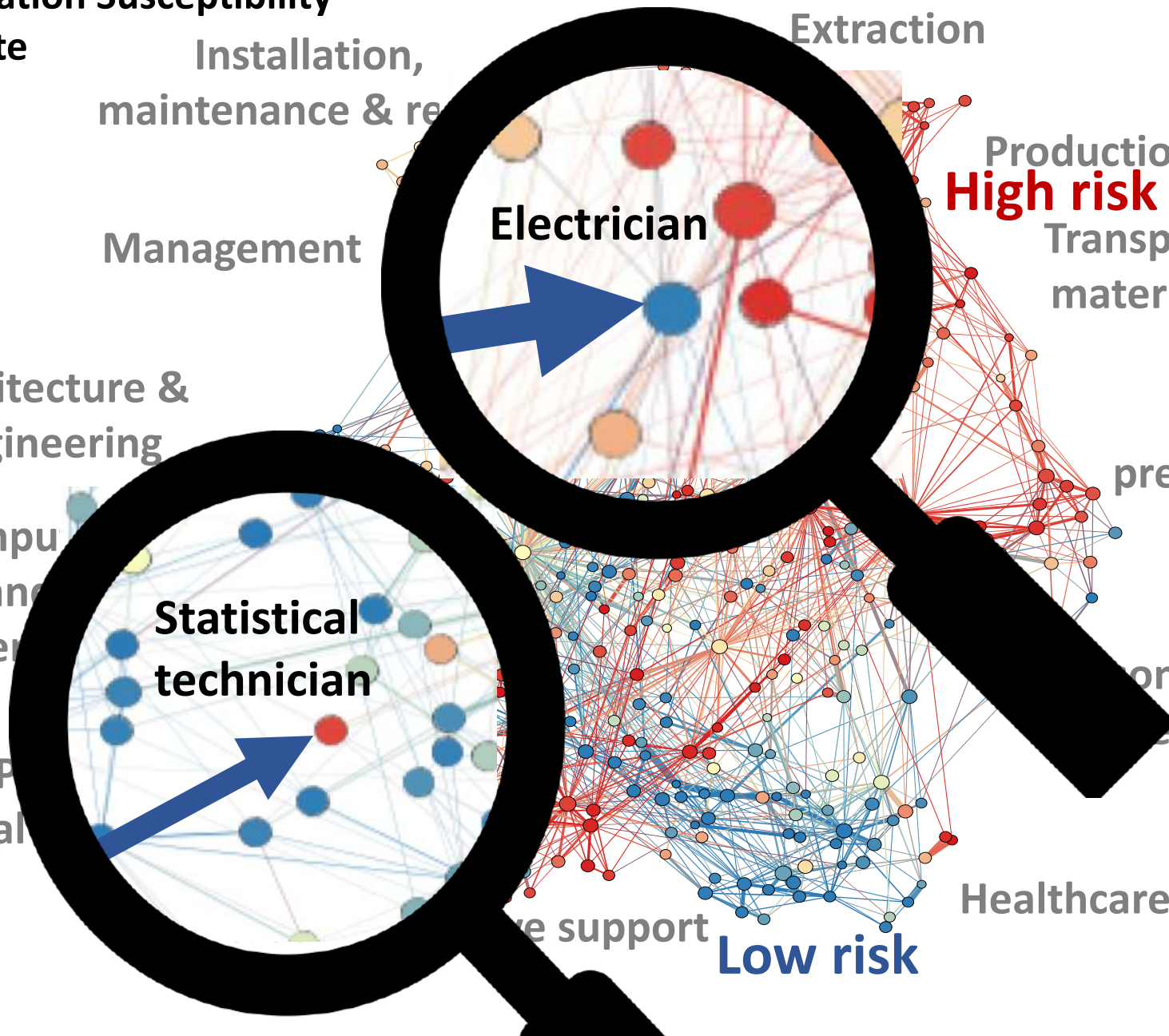
onal care
service

Life, P
Social

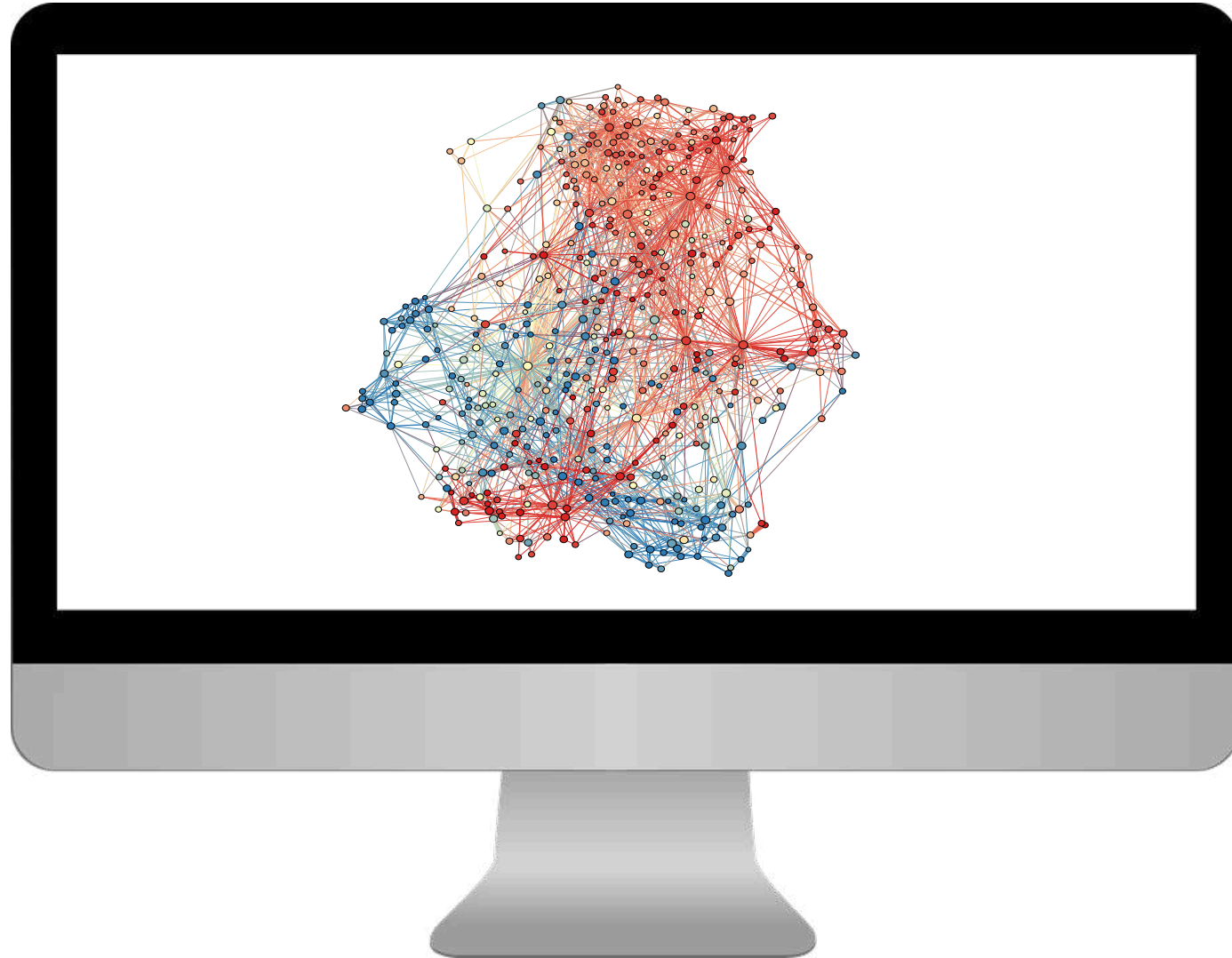
ive support

Low risk

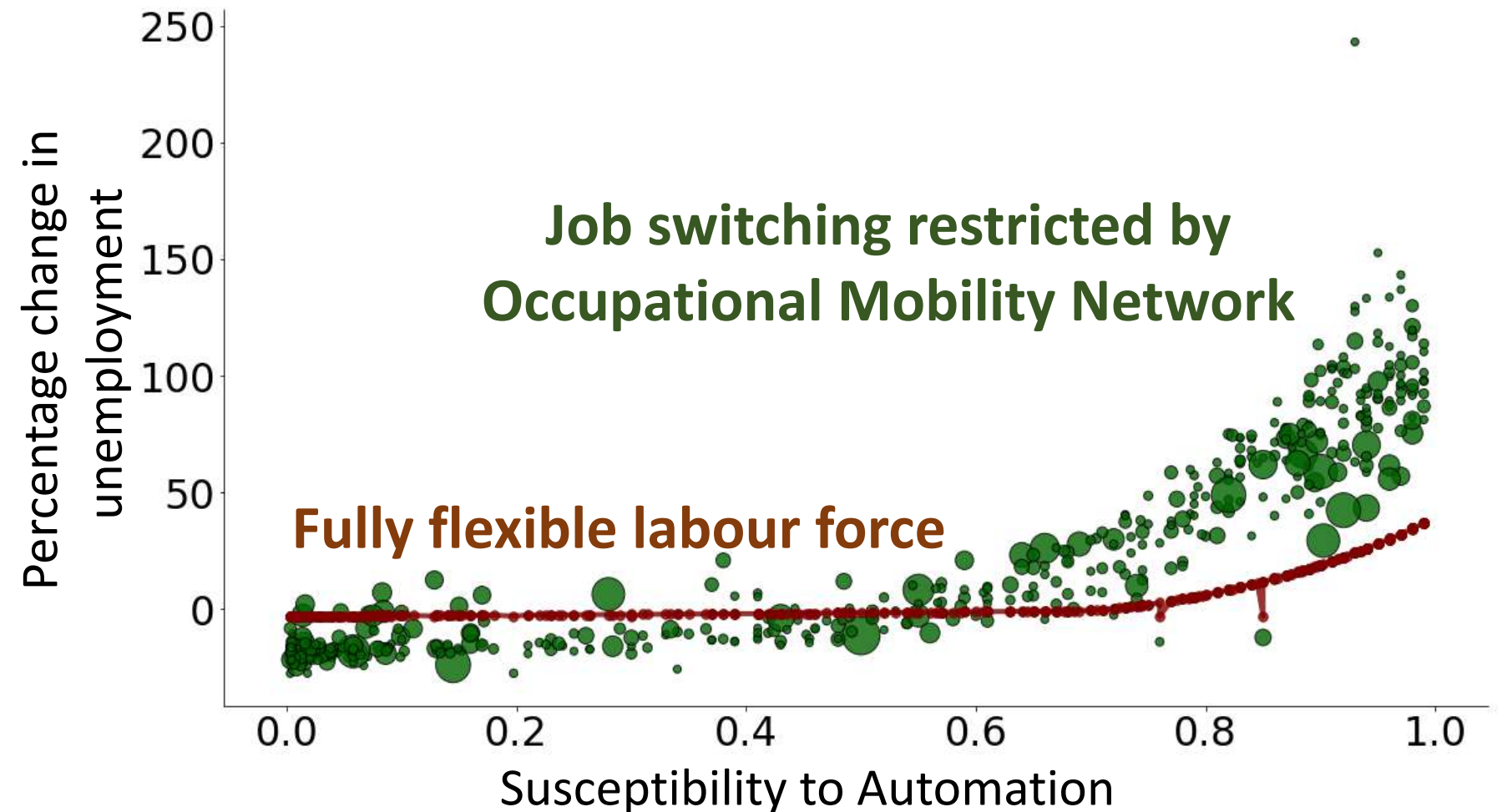
Healthcare



We simulate workers responding to changes in demand associated with Frey and Osborne's automation predictions



Restrictions in occupational mobility exacerbate unemployment impacts



Occupations assigned the same automation risk can have very different unemployment prospects

Occupation	FO Automation Probability	% increase in long term unemployment
shipping and traffic clerks	0.98	133.36
parts salespersons	0.98	119.36
library technicians	0.99	116.21
cargo and freight agents	0.99	106.48
claims adjusters and investigators	0.98	102.05
tellers	0.98	93.25
telemarketers	0.99	91.54
tax preparers	0.99	78.70
data entry keyers	0.99	73.05
new accounts clerks	0.99	70.12
credit analysts	0.98	63.79
procurement clerks	0.98	53.44
accounting and auditing clerks	0.98	51.60
brokerage clerks	0.98	34.50

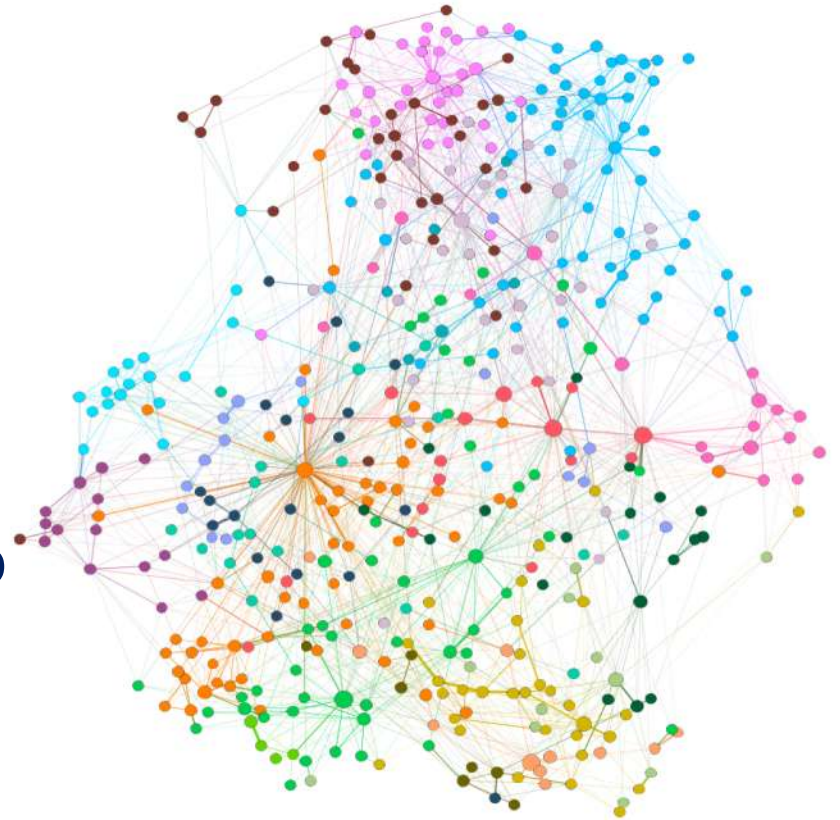
Summary and key take aways



Summary and key take aways

Job transitions and occupational mobility:

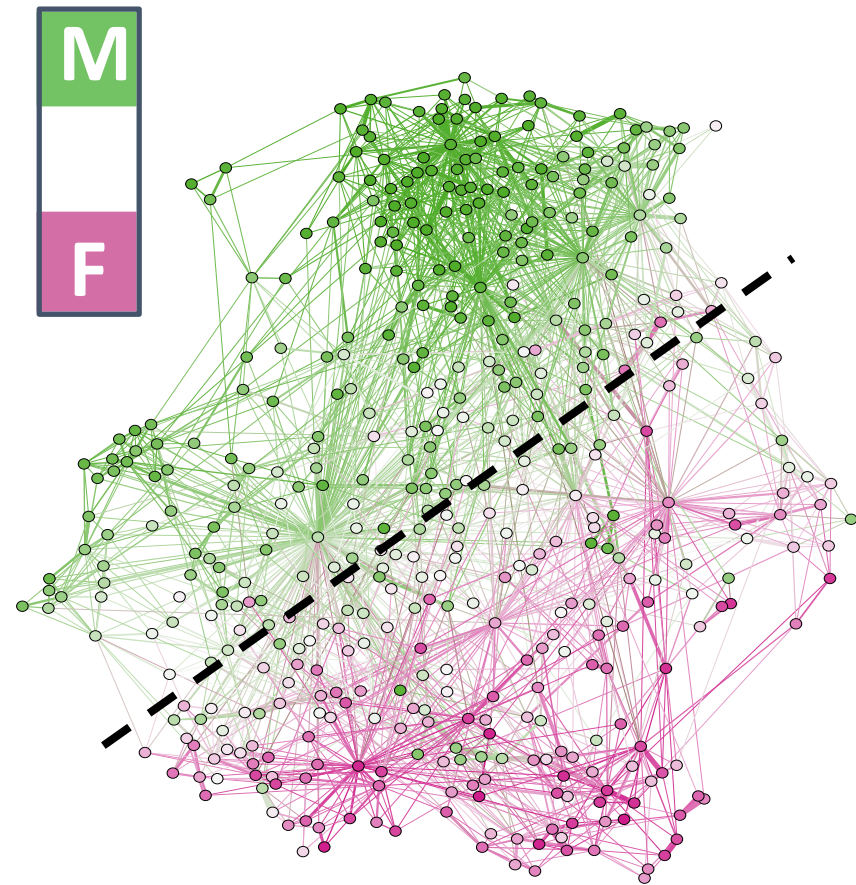
- A networks perspective on job transitions helps understand restrictions in occupational mobility in the labour market.
- Tasks in existing jobs appear to be more predictive of future career mobility than other variables.



Summary and key take aways

Division of labour:

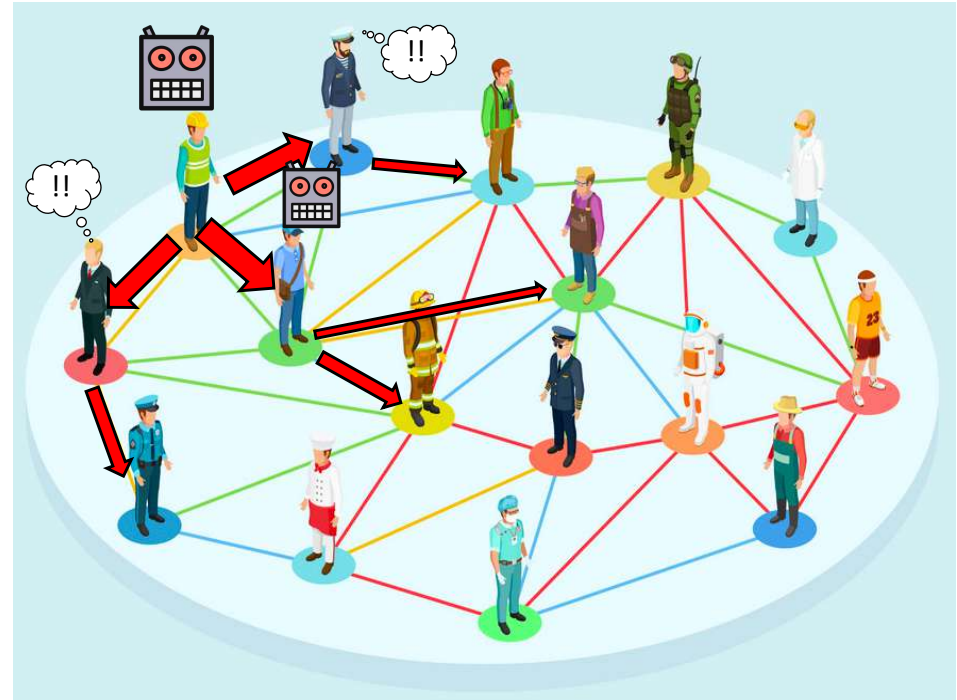
- There are distinct segregation patterns in career mobility in the US labour force.
- A better understanding of these systemic divisions in the labour market, could help address polarization and gender-balance in the workplace.



Summary and key take aways

Automation impacts:

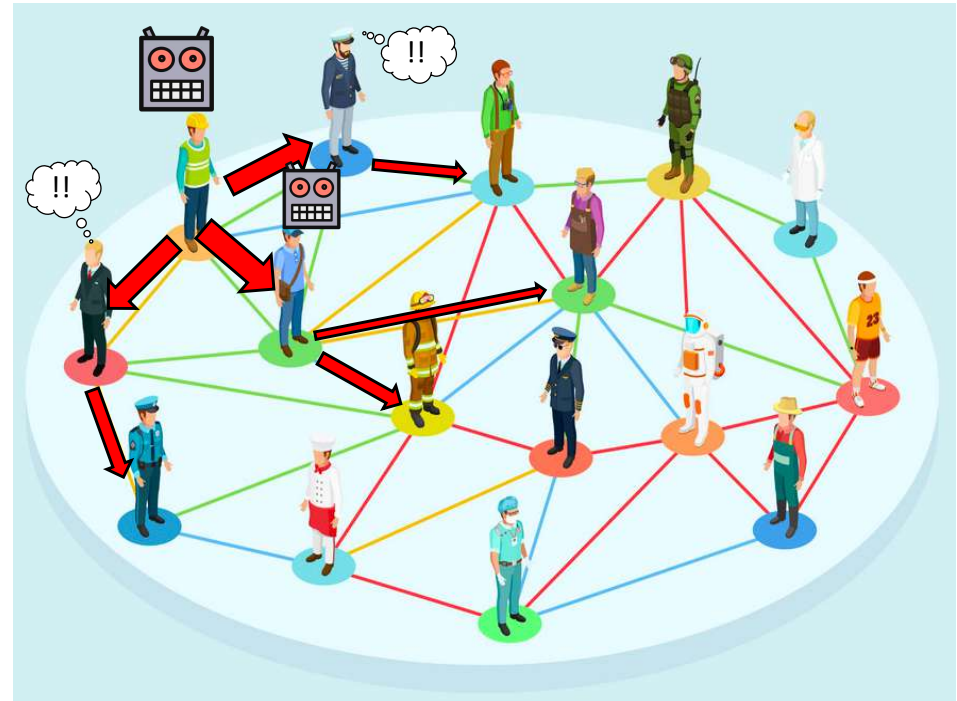
- Overall employment prospects for workers depend not only on the automatability of their current occupation, but also on the alternative jobs they are able to transition into



Summary and key take aways

Automation impacts:

- Policies to help workers adapt to the changing labour market could be more efficiently targeted towards workers that are likely to face longer spells of unemployment, rather than only considering automation risks associated with their current job





Key references


Del Rio-Chanona, R. M., Mealy, P., Beguerisse-Díaz, M., Lafond, F., & Farmer, J. D. (2019). Occupational mobility and automation: A data-driven network model. <https://arxiv.org/pdf/1906.04086.pdf>

Mealy, P., del Rio-Chanona, R. M., & Farmer, J. D. (2018). What you do at work matters: New lenses on labour. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3143064



Thank you!

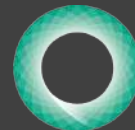


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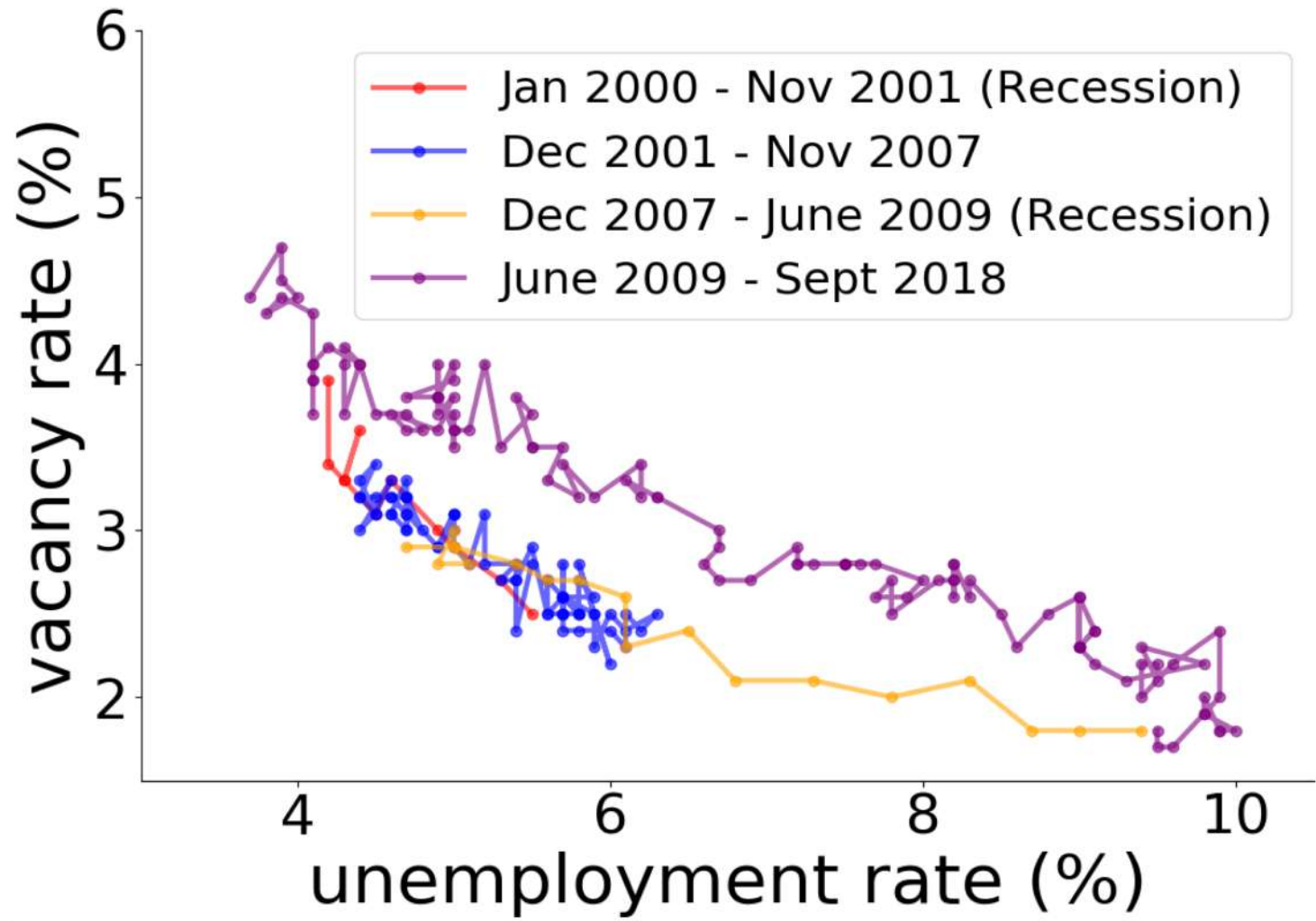
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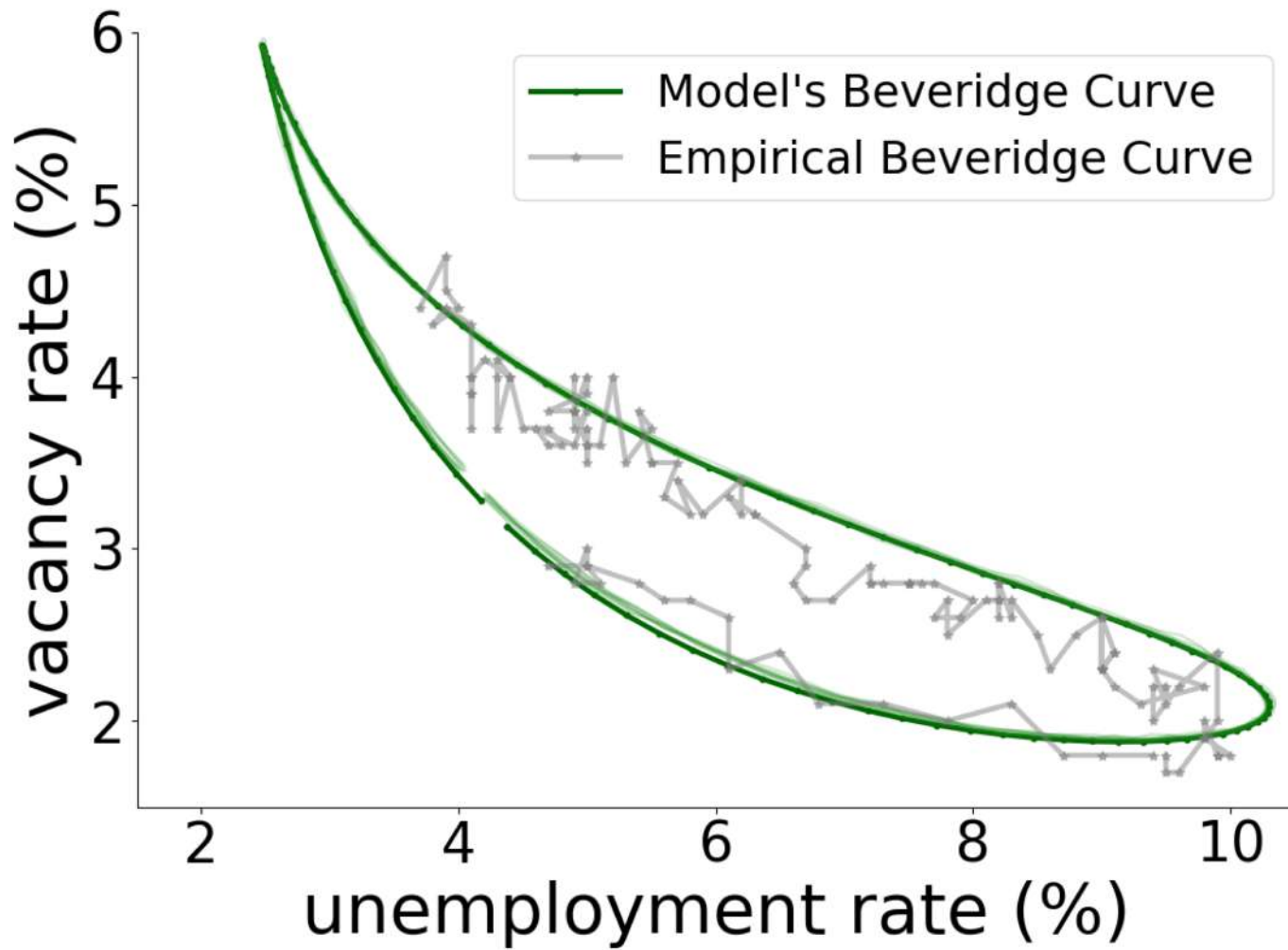


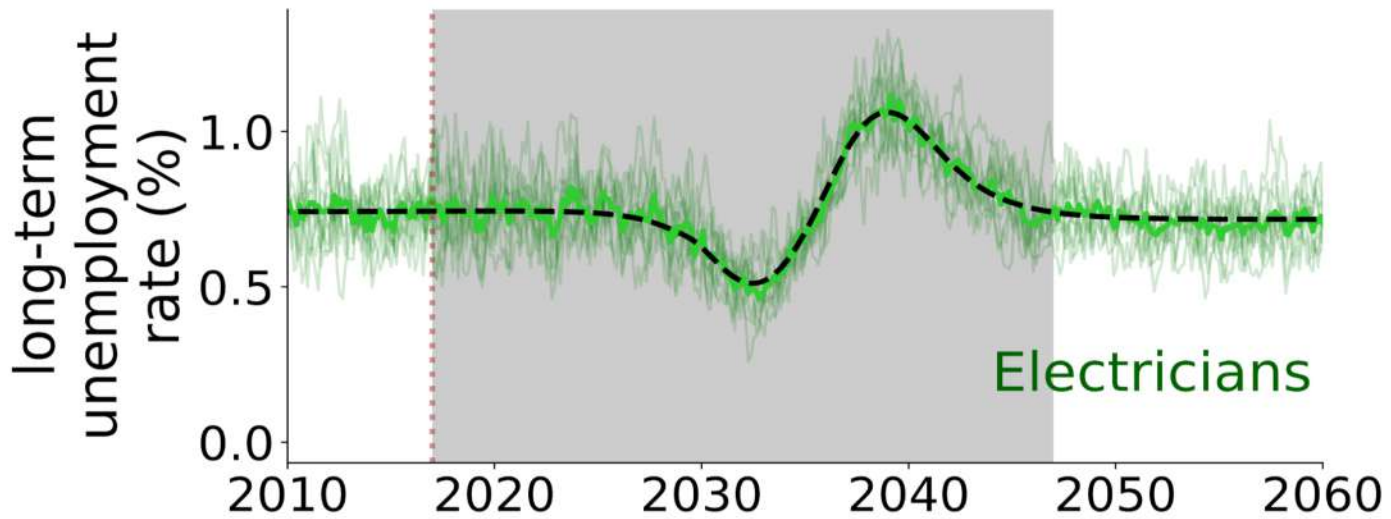
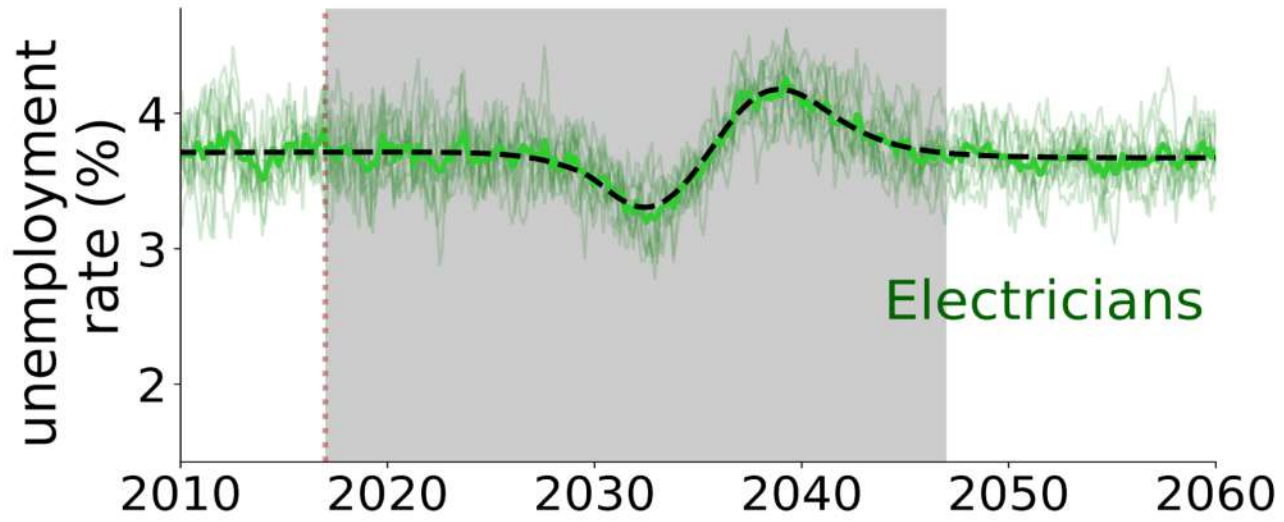
Institute for
New Economic Thinking

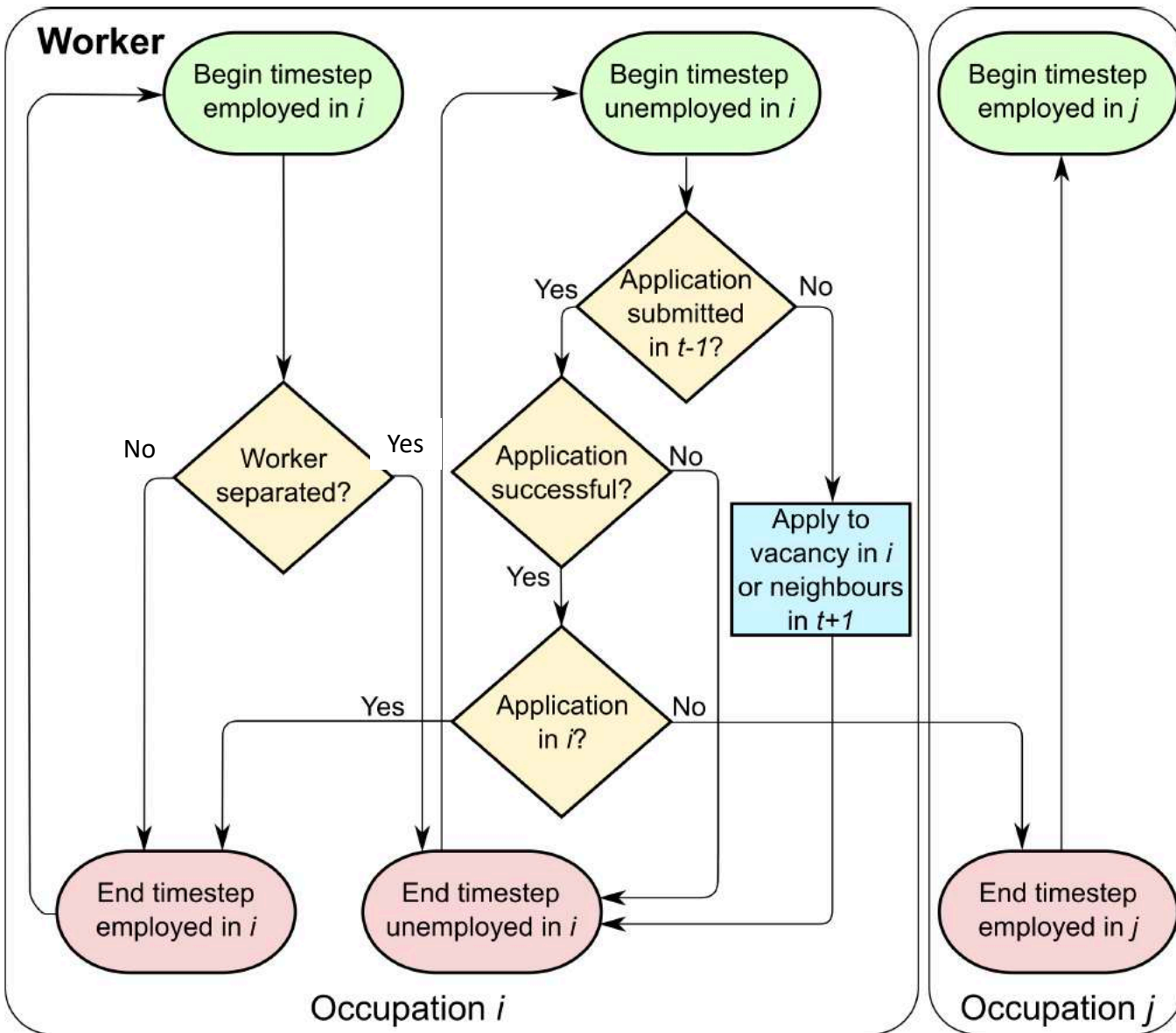


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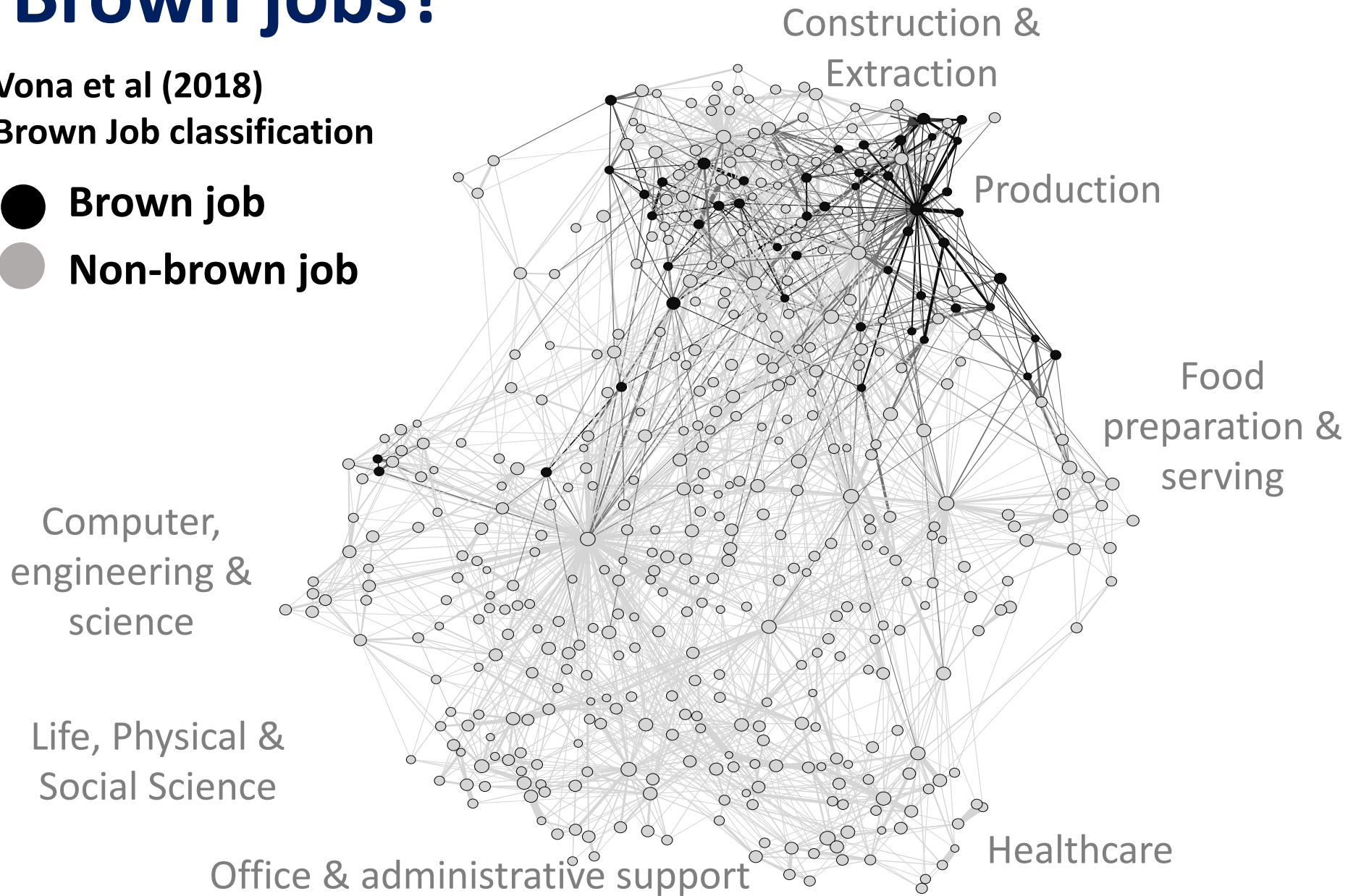
Brown jobs?

Vona et al (2018)

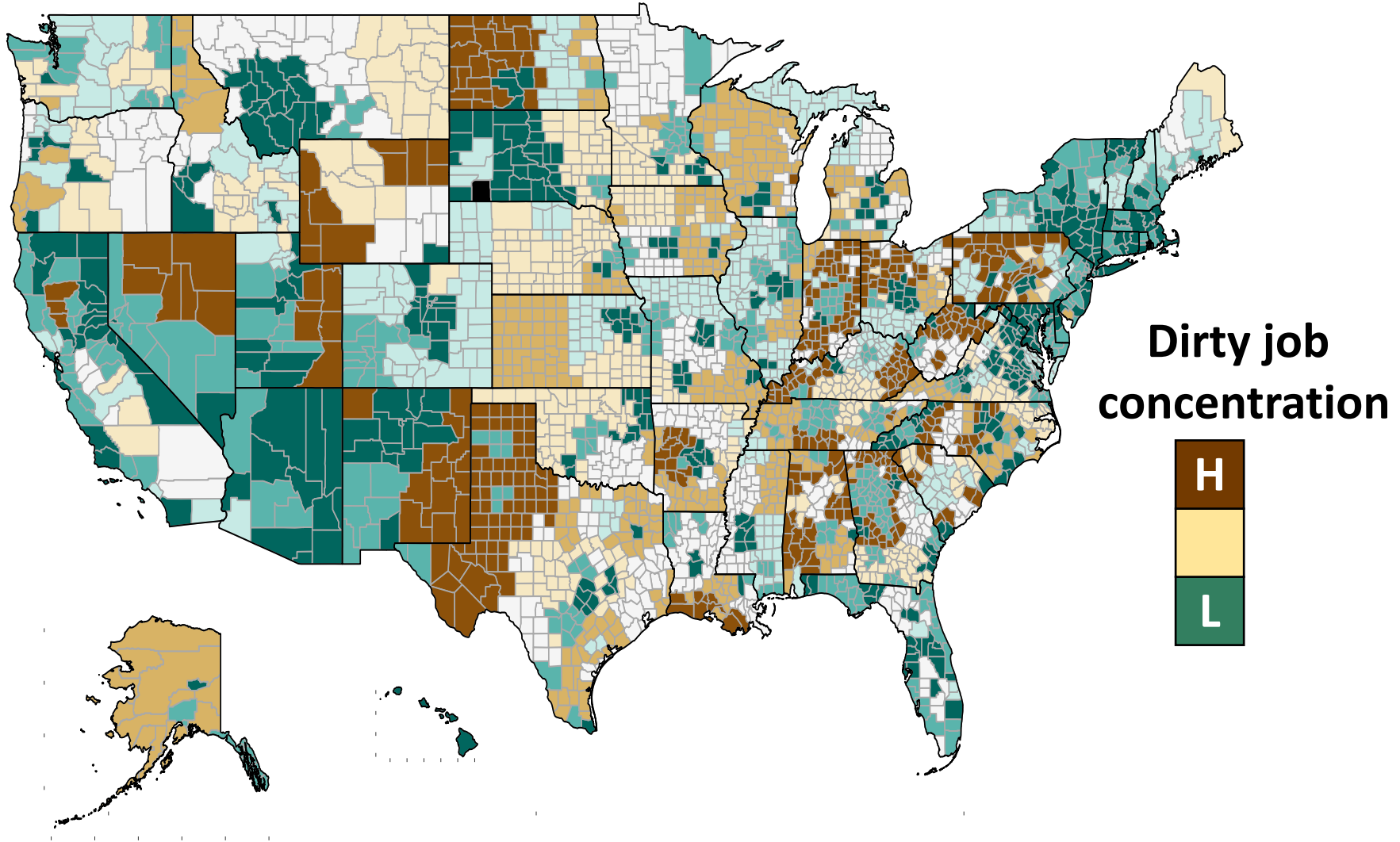
Brown Job classification

● Brown job

● Non-brown job



But highly geographically concentrated...



But highly geographically concentrated...

- could **exacerbate** employment impacts

