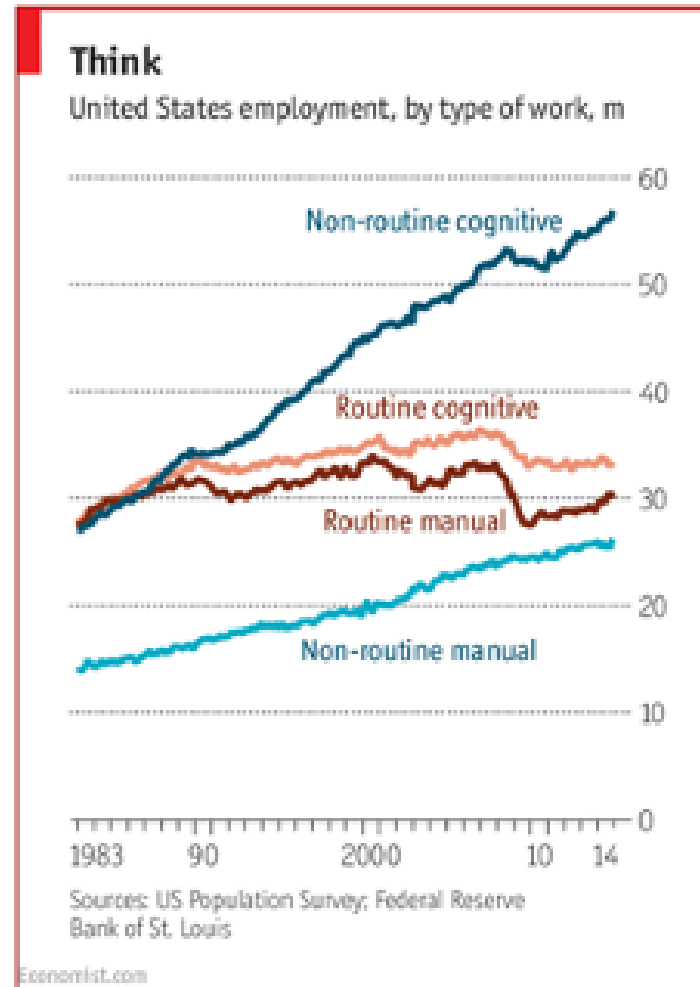# *An Overview of the Workforce Implications of Artificial Intelligence*

Daniel Rock

University of Pennsylvania

IT job displacement arguments aren't new

Think

United States employment, by type of work, m

Non-routine cognitive

Routine cognitive

Routine manual

Non-routine manual

60
50
40
30
20
10
0

1983 90 2000 10 14

The potential of this wave of AI is transformative.

- Around 80 percent of workers have at least 10 percent of their tasks exposed

  - While workers in some tasks might immediately become more productive, much of the value is locked up: **additional tools and software unlock the value of AI**

  - Exposure is neither good nor bad! It means we can expect change.

- Exposure to generative AI is pervasive across industries and occupations

  - The types of work generative AI helps with typically relate to **information processing.**

  - Jobs probably aren't the right unit of analysis. Consider **tasks** and **systems**.

Task ID	Occupation Title	DWAs	Task Description
14675	Computer Systems Engineers/Architects	Monitor computer system performance to ensure proper operation.	Monitor system operation to detect potential problems.
18310	Acute Care Nurses	Operate diagnostic or therapeutic medical instruments or equipment. Prepare medical supplies or equipment for use.	Set up, operate, or monitor invasive equipment and devices, such as colostomy or tracheotomy equipment, mechanical ventilators, catheters, gastrointestinal tubes, and central lines.
4668.0	Gambling Cage Workers	Execute sales or other financial transactions.	Cash checks and process credit card advances for patrons.
15709	Online Merchants	Execute sales or other financial transactions.	Deliver e-mail confirmation of completed transactions and shipment.
6529	Kindergarten Teachers, Except Special Education	–	Involve parent volunteers and older students in children's activities to facilitate involvement in focused, complex play.
6568	Elementary School Teachers, Except Special Education	–	Involve parent volunteers and older students in children's activities to facilitate involvement in focused, complex play.

Table 1: Sample of occupations, tasks, and Detailed Work Activities from the O*NET database. We see that aggregating over activities alone is imprecise, as evidenced by the fact that we'd expect Gambling Cage Workers to complete the given DWA in person, using some physicality while we'd expect Online Merchants to complete the same activity solely with a computer.

Summary of exposure rubric

No exposure (E0) if:

- using the described LLM results in no or minimal reduction in the time required to complete the activity or task while maintaining equivalent quality[a] or

- using the described LLM results in a decrease in the quality of the activity/task output.

Direct exposure (E1) if:

- using the described LLM via ChatGPT or the OpenAI playground can decrease the time required to complete the DWA or task by at least half (50%).

LLM+ Exposed (E2) if:

- access to the described LLM alone would not reduce the time required to complete the activity/task by at least half, but

- additional software could be developed on top of the LLM that could reduce the time it takes to complete the specific activity/task with quality by at least half. Among these systems, we count access to image generation systems.[b]

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[a]Equivalent quality means that a third party, typically the recipient of the output, would not notice or care about LLM assistance.
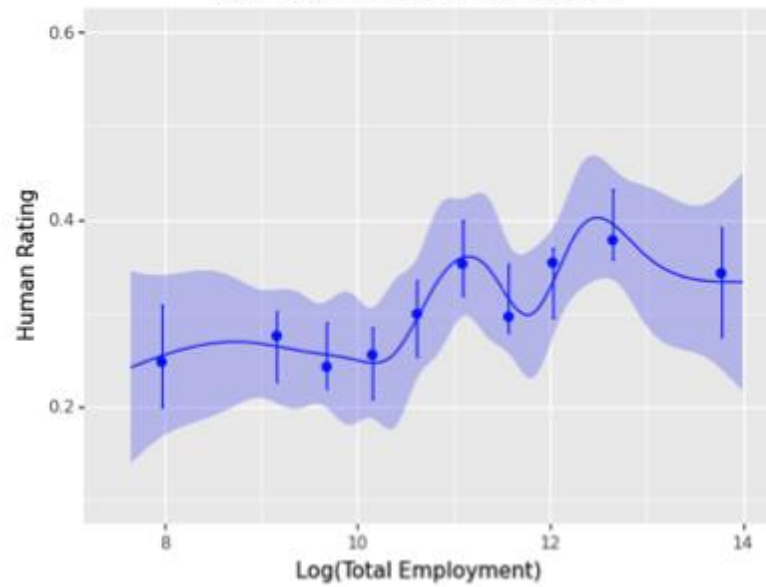
[b]In practice, as can be seen in the full rubric in Appendix A.1, we categorize access to image capabilities separately (E3) to facilitate annotation, though we combine E2 and E3 for all analyses.

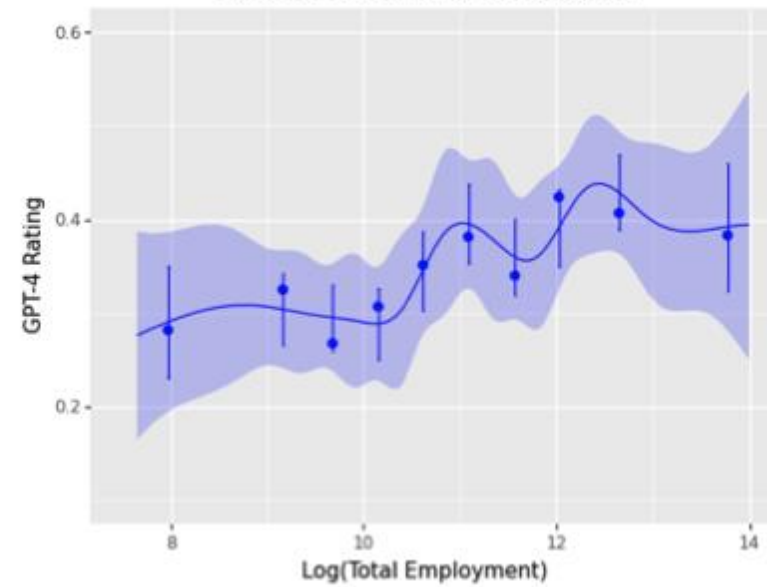# What are the most exposed roles? They tend to be knowledge workers.

Title
Mathematicians
Proofreaders and Copy Markers
Blockchain Engineers
Correspondence Clerks
Court Reporters and Simultaneous Captioners
Computer Programmers
Data Warehousing Specialists
Database Administrators
Web Developers
Web Administrators
Telephone Operators
Data Entry Keyers
Statistical Assistants
Poets, Lyricists and Creative Writers
Interpreters and Translators
Database Architects
Software Quality Assurance Analysts and Testers
Medical Transcriptionists
Software Developers
Bioinformatics Technicians

- These technologies are triggering a repricing of human capital.

- This is a new kind of software, opening up frontiers in generating value from data.
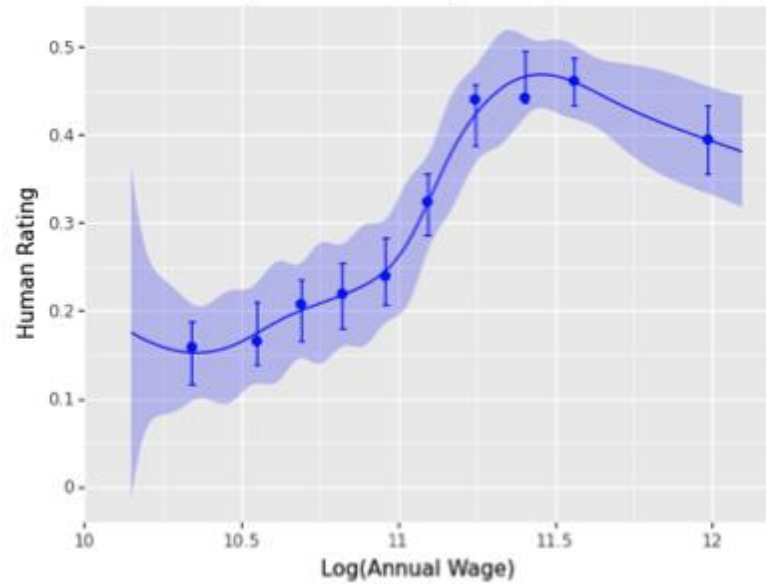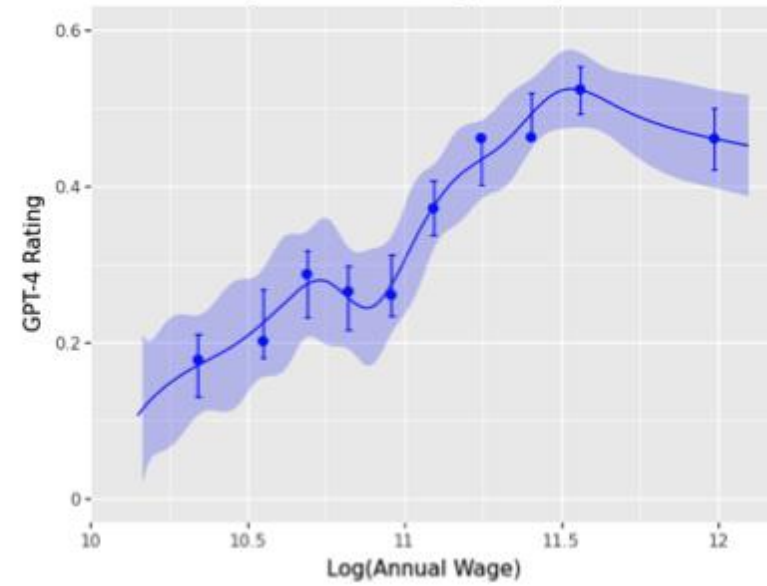
Exposure to GPTs by Occupation

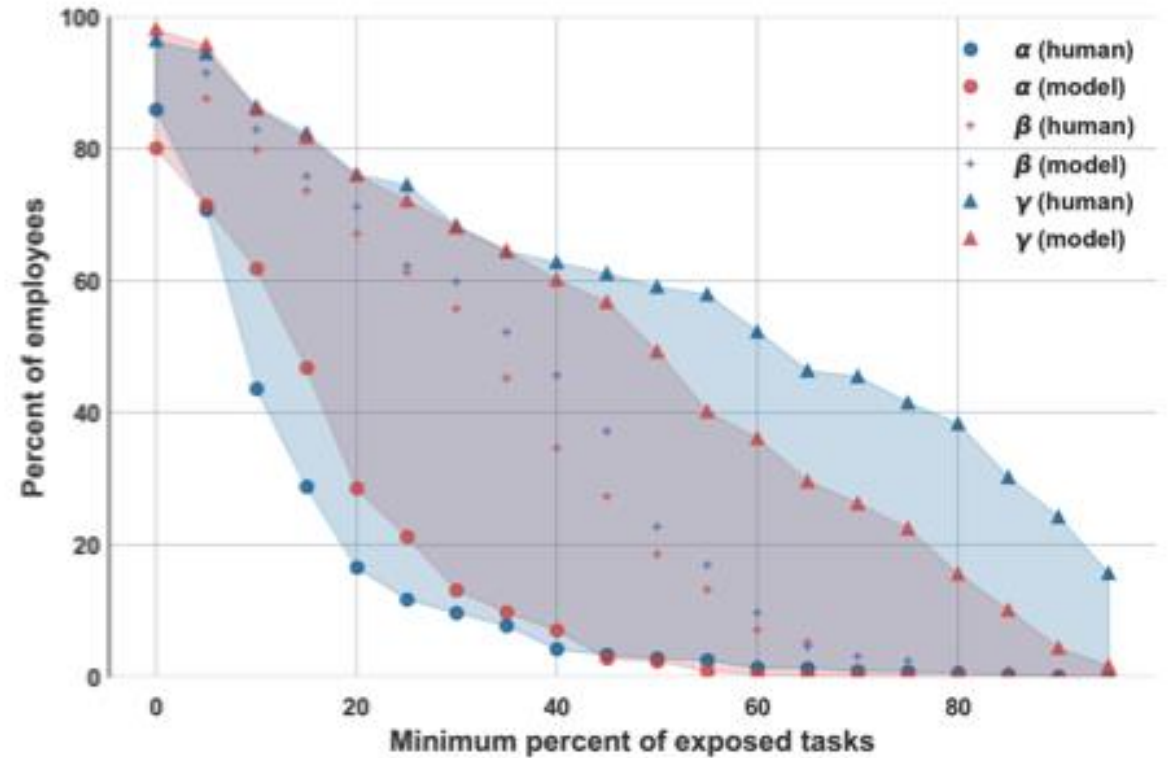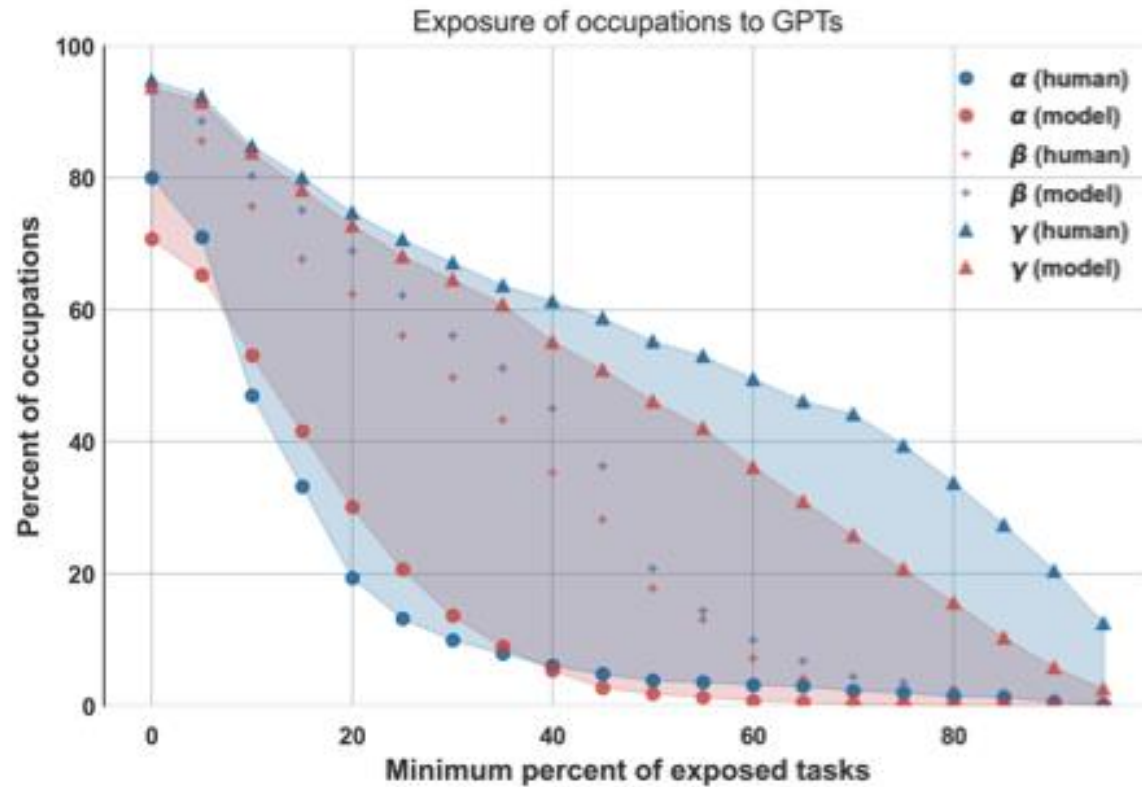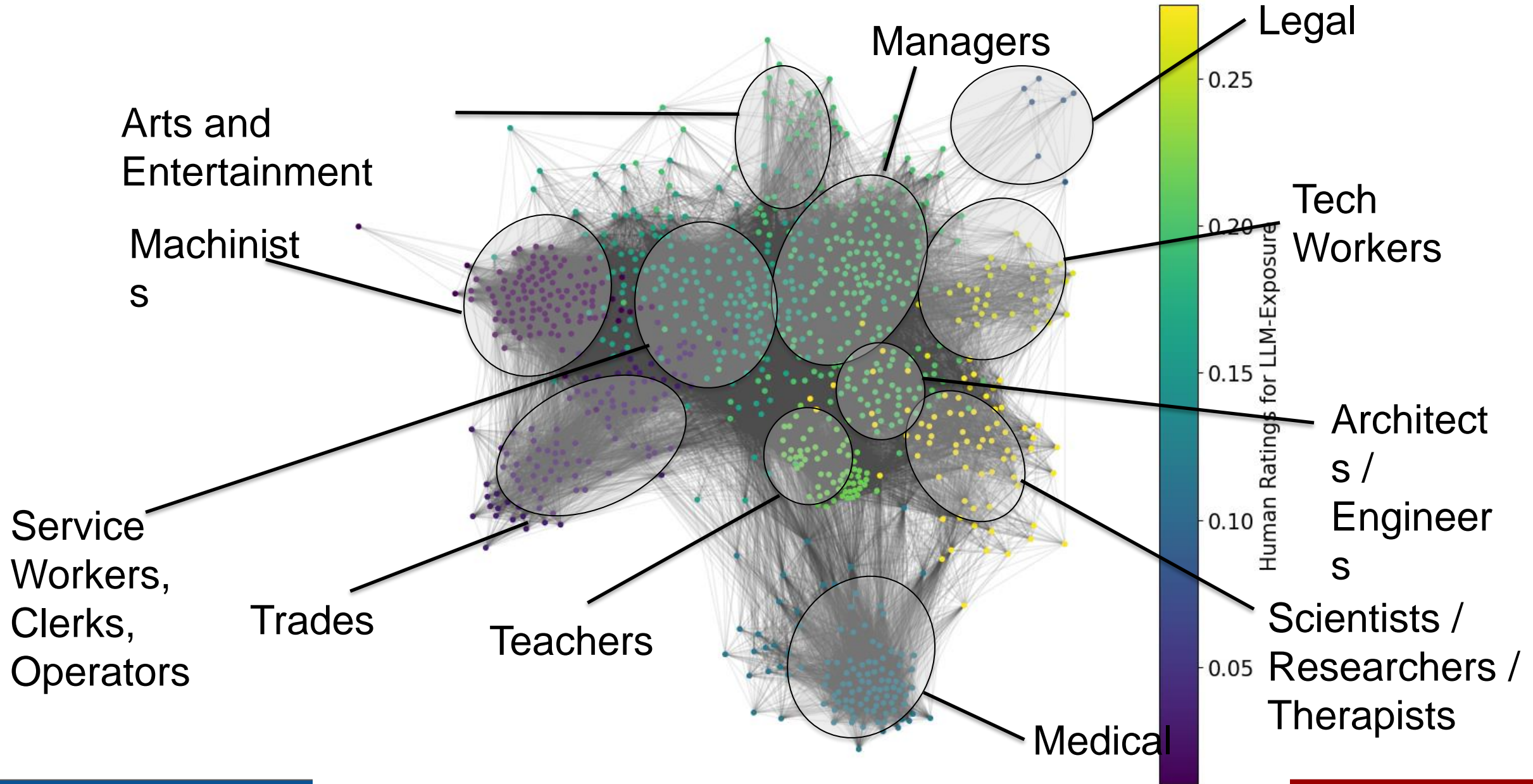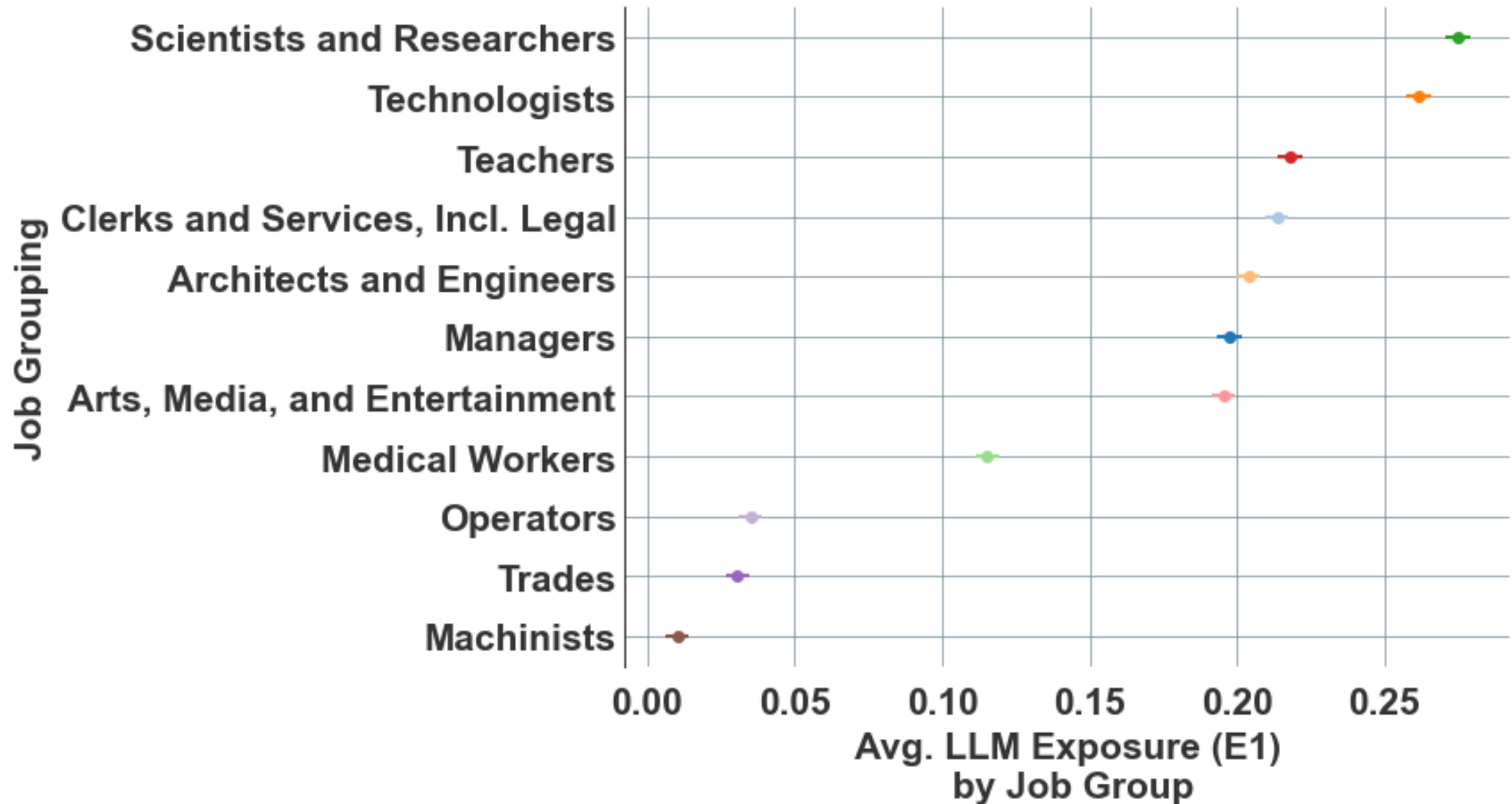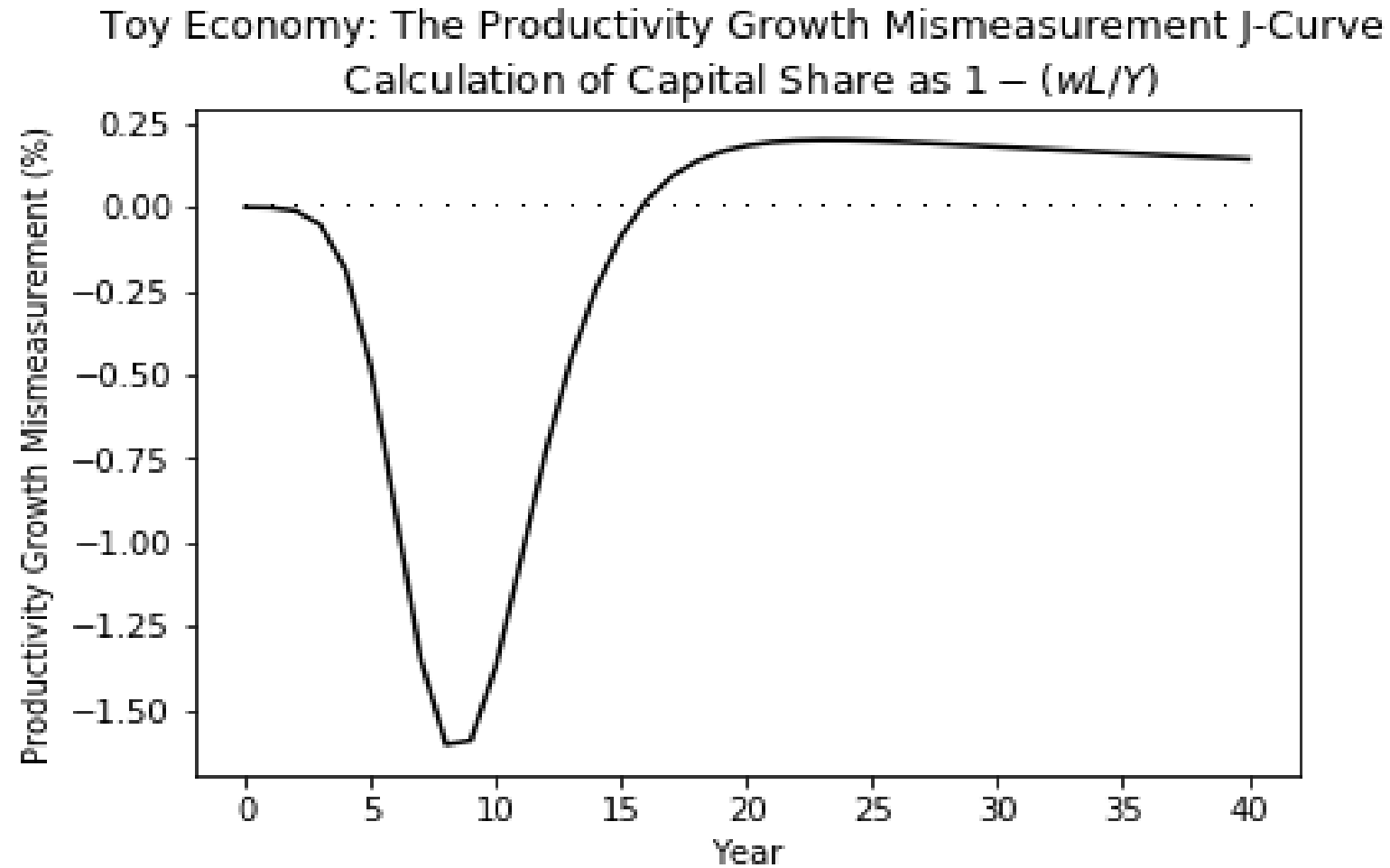# Unlocking AI potential means building innovative tools, software, and processes

Researchers and developers rank amongst the most exposed groups

Clustering exposure (just to LLMs) by job "archetypes" shows the pattern

Transformational change will take time: The Productivity J-Curve

Toy Economy: The Productivity Growth Mismeasurement J-Curve
Calculation of Capital Share as $1 - (wL/Y)$

Transformative change isn't immediate.

- Around 80 percent of workers have at least 10 percent of their tasks exposed

  - While workers in some tasks might immediately become more productive, much of the value is locked up: additional tools and software unlock the value of AI

  - Exposure is neither good nor bad! It means we can expect change.

  - **Expect organizational changes to take a while. What are the *complements*?**

- Exposure to generative AI is pervasive across industries and occupations

  - The types of work generative AI helps with typically relate to information processing.

  - Jobs probably aren't the right unit of analysis. Consider tasks and systems.

  - **Investment is upfront, but benefits accrue over time.**