How New Technologies are Transforming Work and How Leaders Need to Adapt

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Business Roundtable

- On August 19, 2019, 200 CEOs overturned a 22-year-old statement that defined a corporation's purpose as maximizing shareholder return

- Statement on the Purpose of a Corporation
  - *Delivering value to our customers*
  - *Investing in our employees*
  - *Dealing fairly and ethically with our suppliers*
  - *Supporting the communities in which we work*
  - *Generating long-term value for shareholders*

Leadership is Adapting to a New Reality

- In the long run, find creative approaches to achieve business objectives

- In the short run, create a highly involved and engaged team characterized by innovation and action
  - *Balance with need for short-term performance*

- Create a culture that brings together professionals with abundant but different talents
  - *Value personal mastery, competence, communication, adaptability, and ingenuity*
  - *Diversity of backgrounds, skills, experiences, and perspectives is important with the best possible joining and participating*
  - *Expect the team to take on the most difficult and most important problems*
  - *Skill development and continuous learning are a priority*
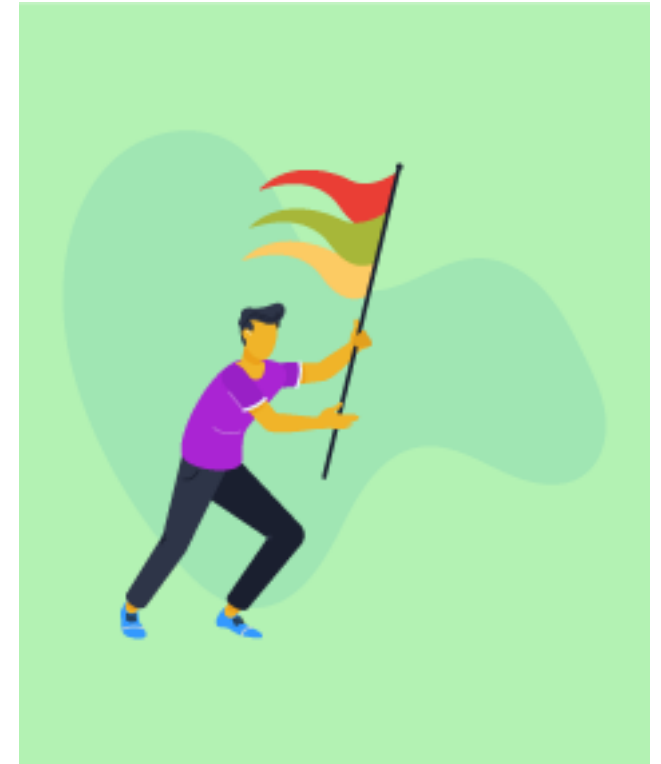
Frontier Firms and Competitive Advantage

- Harmonized data from 24 countries show frontier firms

- Management practices
  - *Replicate practices across lines of business*

- Talent and human resource management
  - *Establishing causality*

- Information and Communications Technology
  - *Europe versus US*

- Learning-by-Doing

**Labor Productivity
Value-Added per Worker
2001 - 2013**
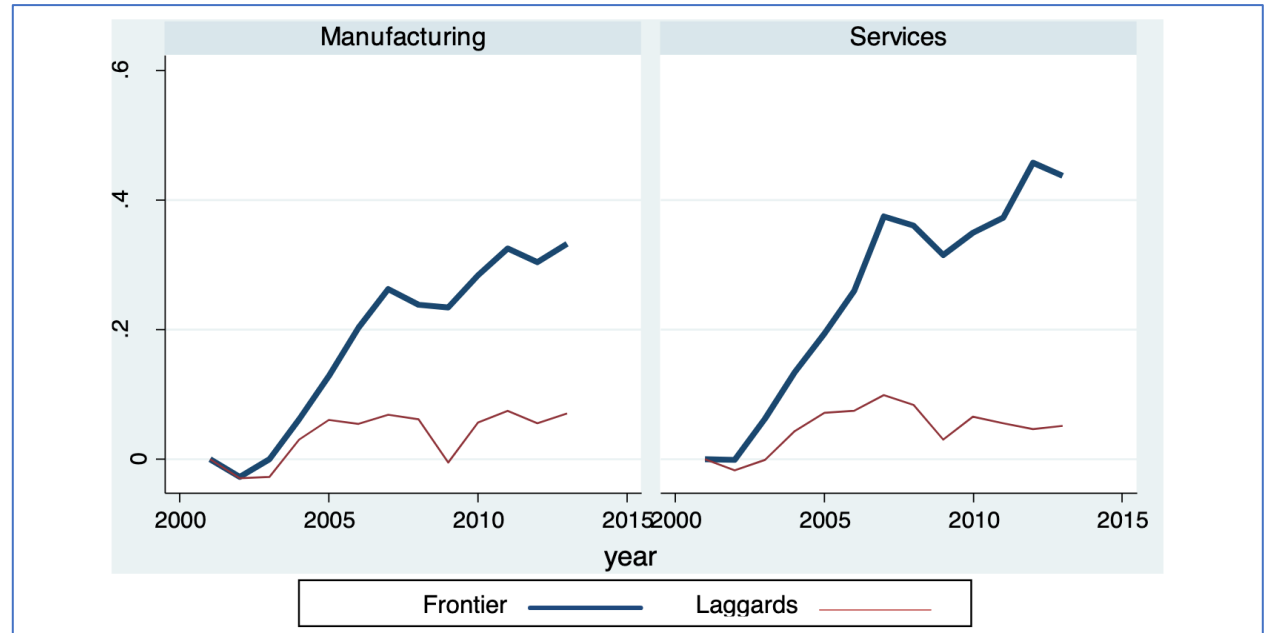
Source: Andrews, David, Criscuolo Chiara, and Gal Peter. N. 2016, "The Best versus the Rest: The Global Productivity Slowdown, Divergence across Firms and the Role of Public Policy", OECD Productivity Working Papers, 2016-05, OECD Publishing, Paris.

Persistent and sustained productivity differentials are the result of investments in intangible capital - the business know-how embodied in capabilities across the organization

The Challenges of AI and Cloud Computing

Many cloud migrations have failed:

- Double-bubble costs result from complex applications and nervous cutover
    - *Takes longer since both the cloud and data centers are running.*

- Hidden costs may arise when platforms, tooling, and services are not well understood

- System-integrator cost may continue into the third or fourth years

- Add-on services can be three or four times higher than necessary

- Financial-accounting rules and poor governance can exacerbate costs

Source: Joe Dertouzos, Ewan Duncan, Matthias Kässer, Satya Rao, and Wolf Richter; Making the Cloud Pay: How Industrial Companies Can Accelerate Impact from the Cloud, McKinsey & Co. (2020)

Building Entirely New Capabilities Is Needed

- Grocery stores typically carry 50,000 stock keeping units per store with 1,000 stores in a chain

- Sales forecasts are critical for inventory management, customer satisfaction, and financial performance

- Often MSE of store/SKU forecasts can be 20% - 30%

- With the advent of deep learning, neural network models MSE can be reduced below 10%

- The challenge is enormous cloud compute requirements are needed

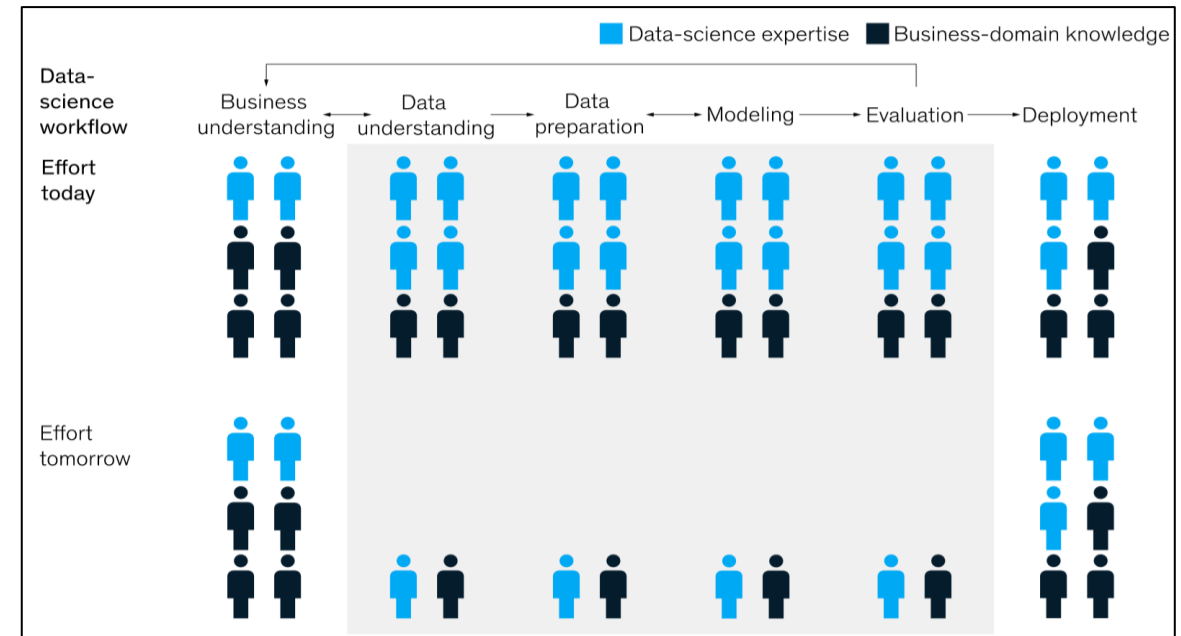- New data science, software and hardware skills are needed to deliver benefits at scale

AutoAI Automates Model Lifecycle Management

- AutoAI automates: data preparation, model development, feature engineering, and hyper-parameter optimization

- Develop models by leveraging one or more available algorithms on open-source platforms

- Test and fine-tune models for performance and address risks, such as bias, fairness, and production readiness

- Deploy the models into production, embedding them into business and decision-making workflows, and monitoring their performance, making updates as needed

Source: IBM Corp. *AutoAI with IBM Watson Studio* August 18, 2020, link
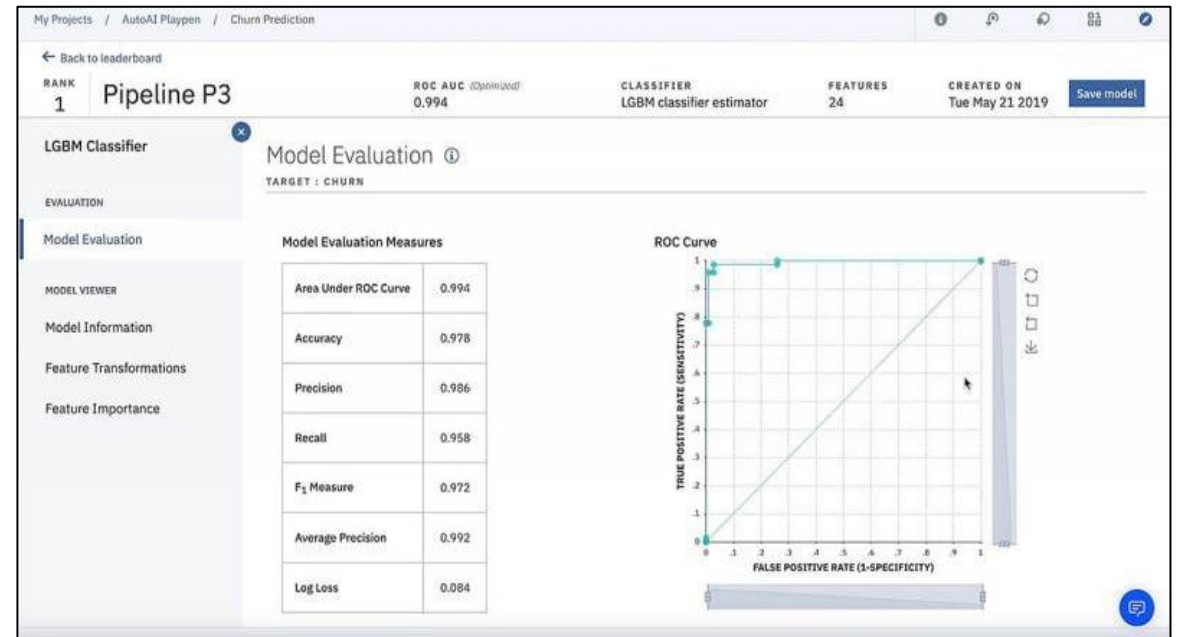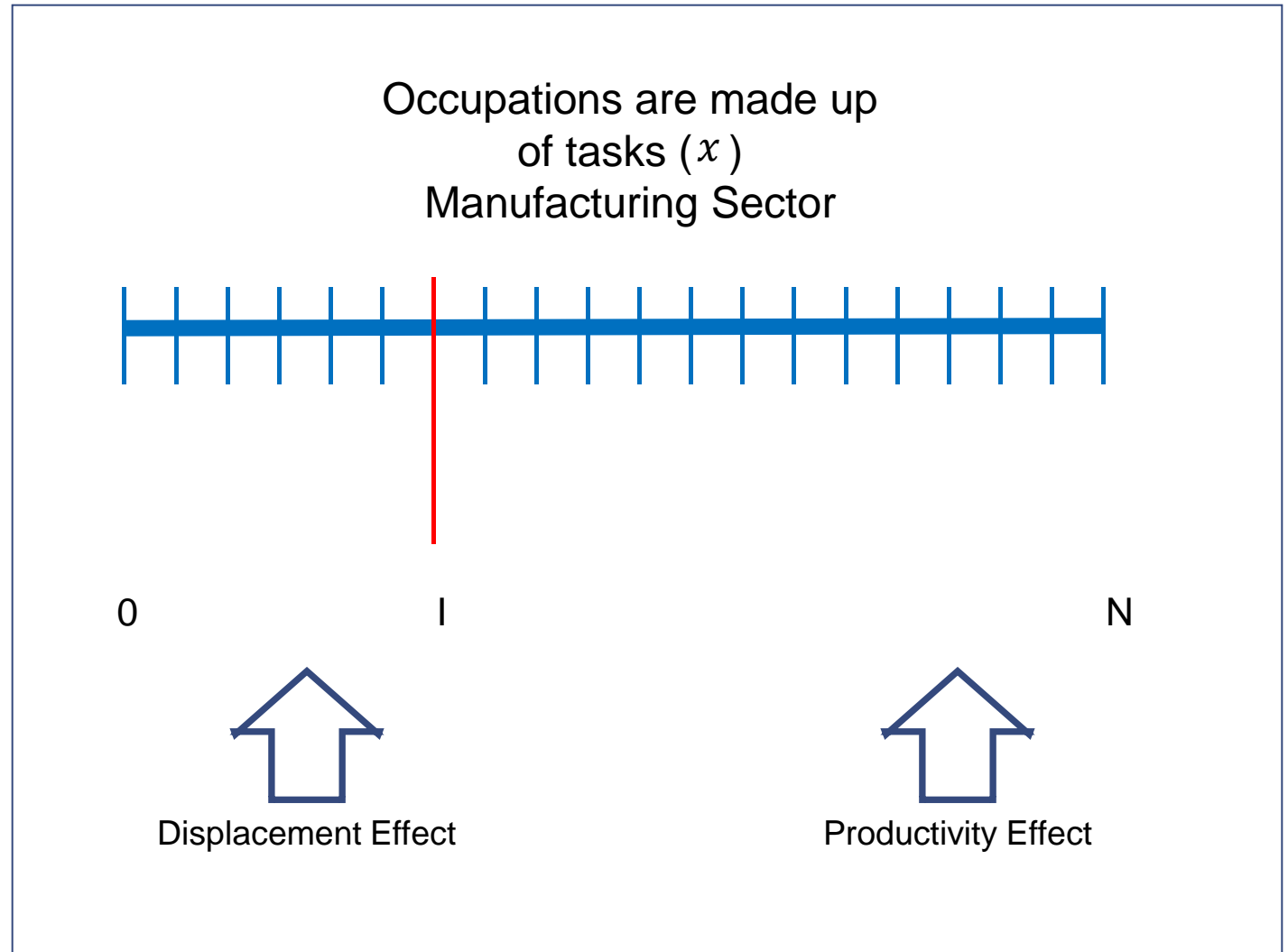
Business Process Transformation

- Transforming business processes is the key to productivity improvement
  - *With AI automated, time spent on transformation increases from 41% to 55% with less total time*

- Without automation, 60% to 80% of data scientists' time is spent preparing the data, once the initial model is built, 4% is spent testing and tuning code.

- Tuning model parameters has become a commodity, and performance is driven by data selection and preparation

Source: McKinsey & Co. *Rethinking AI Talent Strategy As Automated Machine Learning Comes Of Age,* August 14, 2020

All Jobs Will Change

- Technology-Task Mismatch Hypothesis

- Displacement is counteracted by improved productivity

Occupations are made up
of tasks (x)
Manufacturing Sector

0   I   N
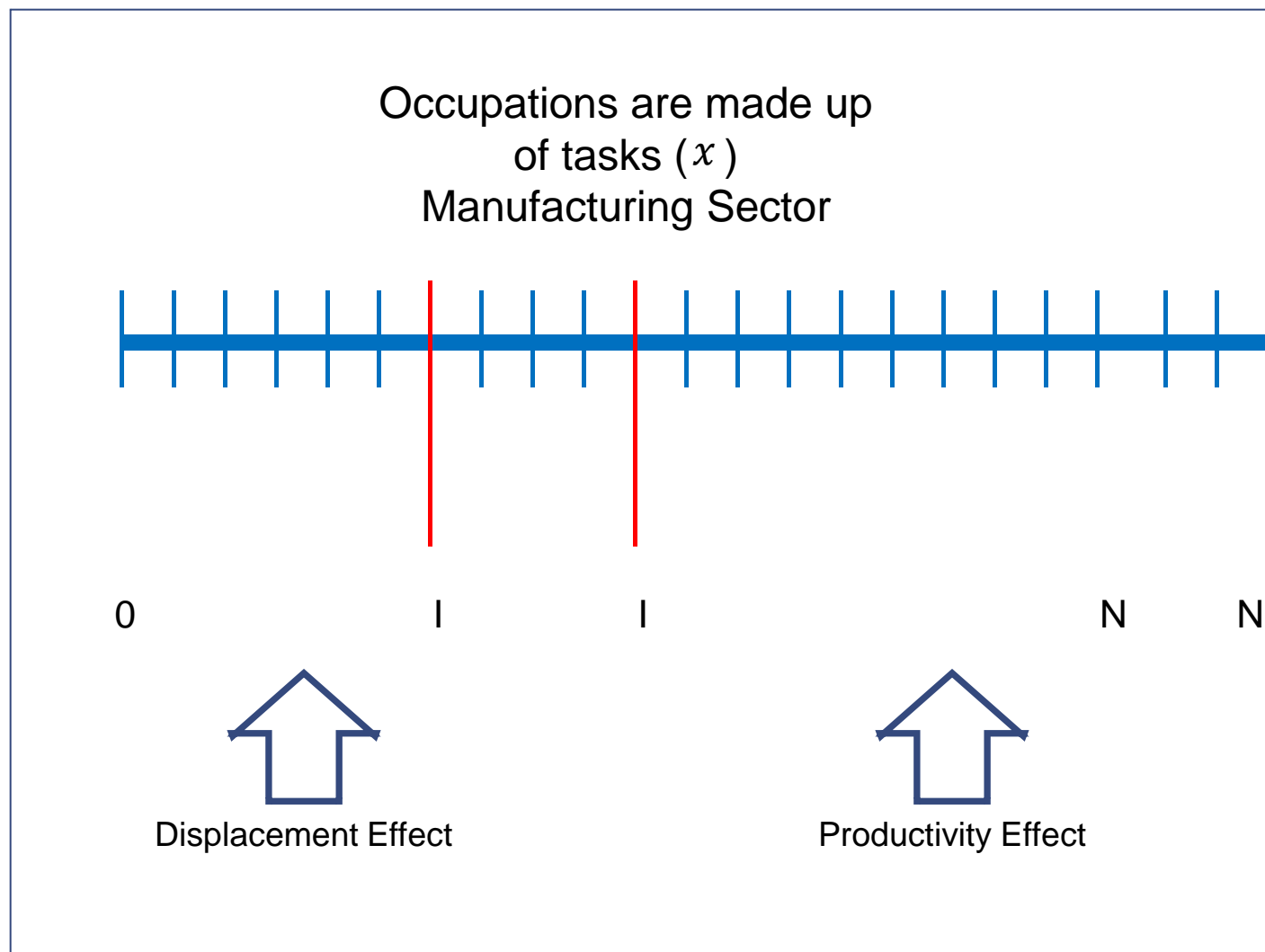
Displacement Effect   Productivity Effect

Source: Daron Acemoglu and Pascual Restrepo (2019. "Automation and New Tasks: How Technology Displaces and Reinstates Labor"; *Journal of Economic Perspectives.*

All Jobs Will Change

- Improved productivity results from business process transformation, new task creation, and occupation redefinition

- Hypothesis: Slow adjustment
  - *Mismatch between the skill requirements of new technologies*
 - *Organizational resistance to change*

Occupations are made up of tasks (x)
Manufacturing Sector

0   I   I   N   N

Displacement Effect   Productivity Effect

Few Occupations Disappear While Task Shifts are Frequent

Occupation Employment Share by Wage Tercile
Percentage Point Change
2010 -2017
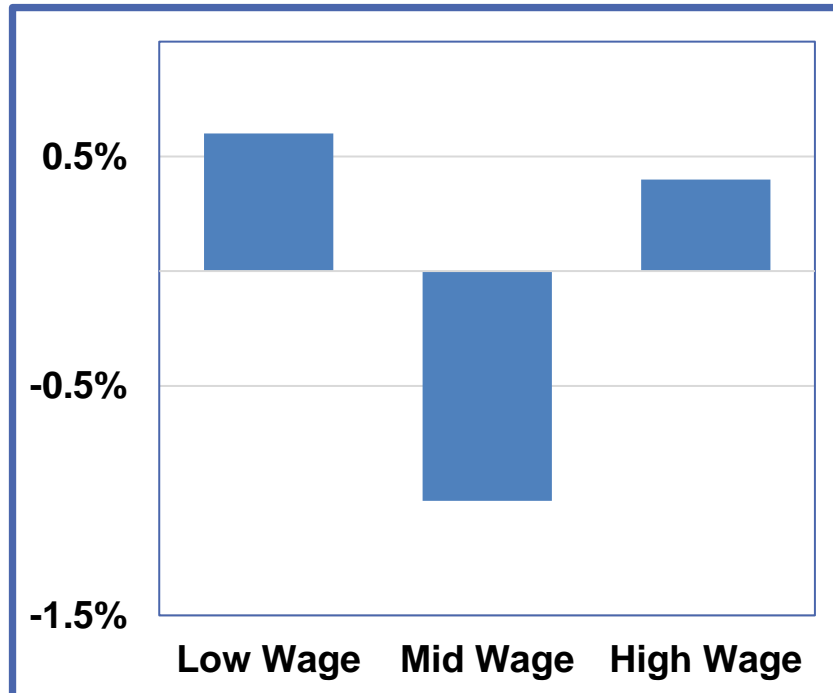
Task Changes by Occupation Wage Tercile

High: 46.4% → 46.8% +0.4

Mid: 30.6% → 28.4% -2.2

Low: 23.0% → 24.7% +1.7
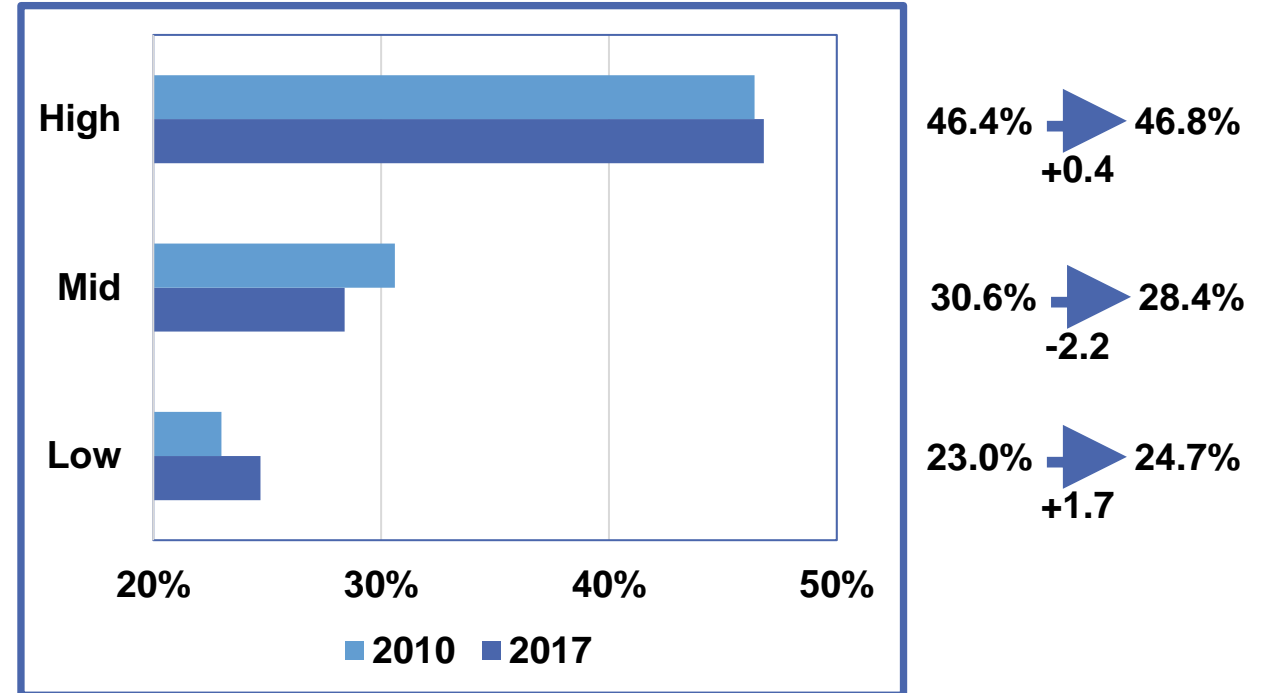
- The middle-class challenge is not disappearing jobs but but the need for skill ambidexterity for greater return to workers
- 88% of task content changes occur within rather that between job titles
- 100% of jobs will change

Work Is More Focused

- Across more than 18,500 task, workers were asked to perform 3.7 fewer tasks in 2017 than seven years earlier

- Among tasks that are *more* suitable for machine learning, workers were asked for perform 4.3 fewer tasks

- Conversely, among tasks that are *less* suitable for machine learning, workers were asked to perform 2.9 fewer tasks

- A 46% larger decline in demand for tasks more suitable for machine learning, compared to those less suitable

Change in Task Demand versus Suitability for Machine Learning *
2010 - 2017
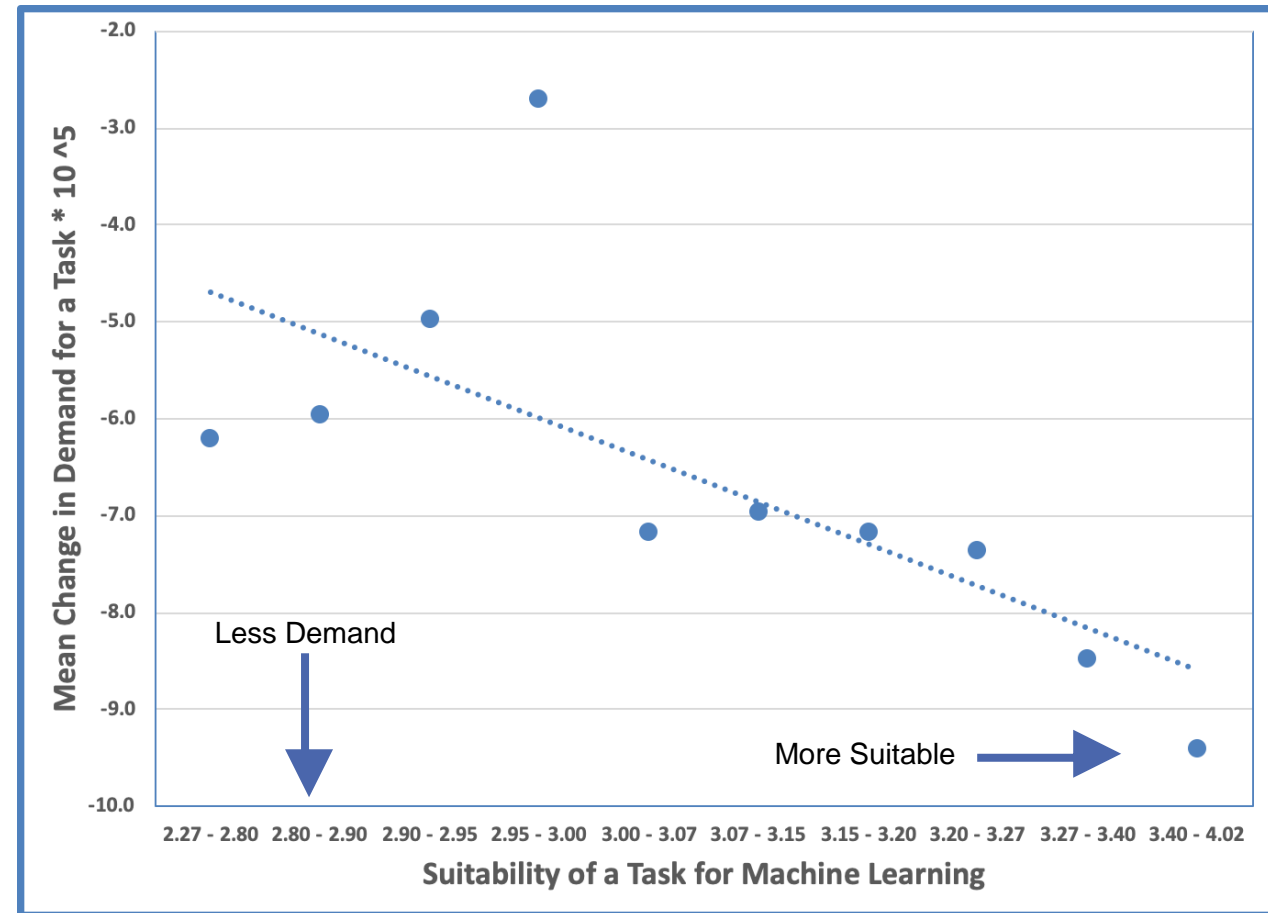
*Source: Martin Fleming, Wyatt Clarke, Subhro Das, Phai Phongthiengtham, and Prabhat Reddy, *The Future of Work: How New Technologies Are Transforming Tasks,* MIT-IBM Watson AI Lab, October 24, 2019. For Suitability for Machine Learning, see: Brynjolfsson, Erik, Tom Mitchell, and Daniel Rock (2018) "What Can Machines Learn and What Does It Mean for Occupations and the Economy?", American Economic Association Papers and Proceedings, 108: 43–47

STEM Jobs Are Changing Rapidly

- Job skill requirements changed significantly between 2007 and 2017, and the rate of change was especially high for STEM occupations

- STEM jobs are more likely than others to require technical skills such as proficiency with specific software

- STEM jobs are much more likely than others to require experienced workers to learn new skills on the job that did not exist when they were in college

Source: David Deming and Kadeem L. Noray (2019), "STEM Careers and the Changing Skill Requirements of Work", *NBER Working Paper* No. 25065

# STEM Jobs Have Rapidly Changing Skill Requirements

- Jobs with high rates of change have higher starting wages and flatter age-earnings profiles
    - They disproportionately employ younger workers

- The earnings premium for STEM majors is highest at labor market entry and declines by more than 50% in the first decade of working life

- Flatter wage growth coincides with a relatively rapid exit of STEM majors from STEM occupations

- The *relative* return to ability is higher in careers that change less, because on-the-job learning gains accumulate

Worker Wage Profile
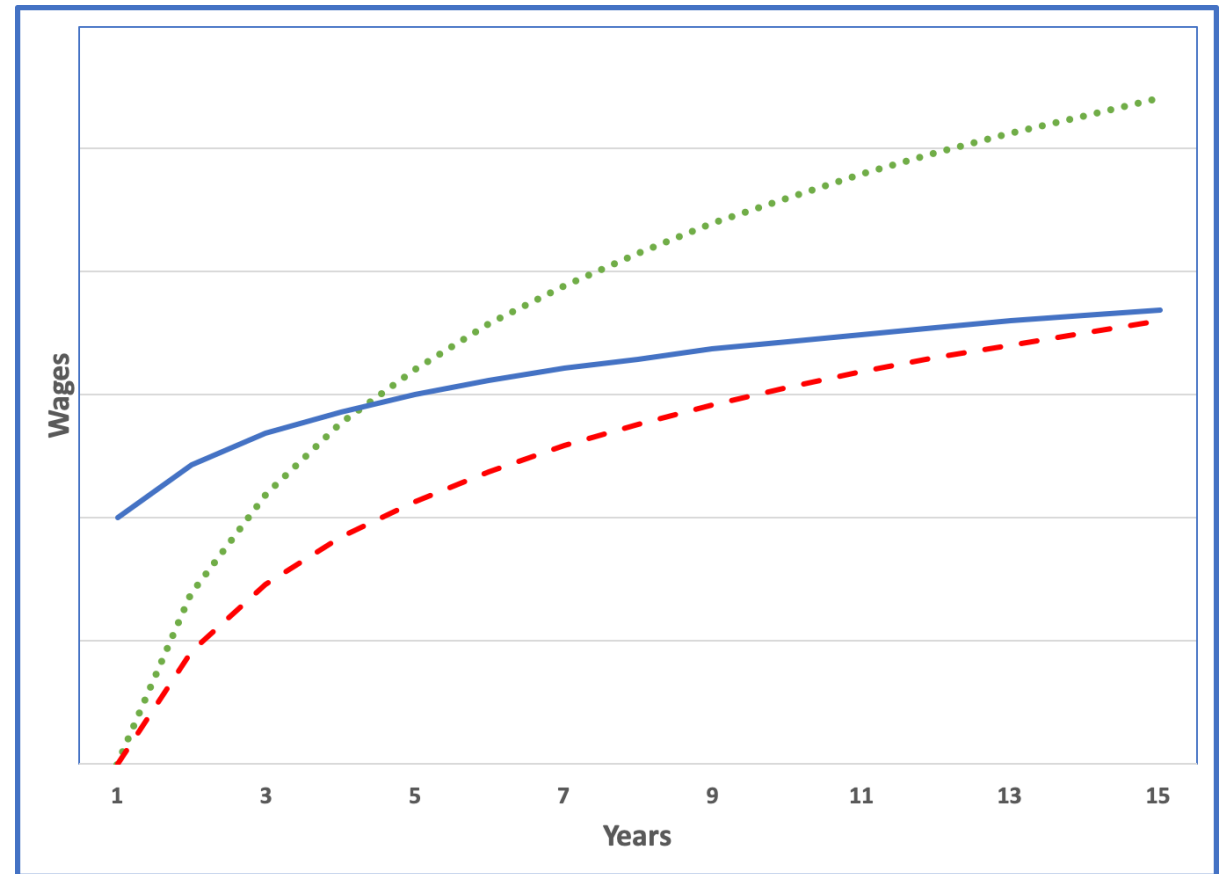
—— **High productivity and high task change**

······ **Low initial productivity and low task change**

– – – **Low initial wage and limited task change**

Source: David Deming and Kadeem L. Noray (2019), "STEM Careers and the Changing Skill Requirements of Work", *NBER Working Paper* No. 25065

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AI Poses New Challenges For Leadership

- Leaders must continue to deliver financial performance

- At the same time, make significant investments in hiring, training and reskilling their workforce

- And all the while, leaders need to spend on new technologies and the transformation that support productivity and growth

- Competing business objectives can make for difficult, and often agonizing, leadership decisions