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Jobs lost, jobs gained: Workforce transitions in a time of automation

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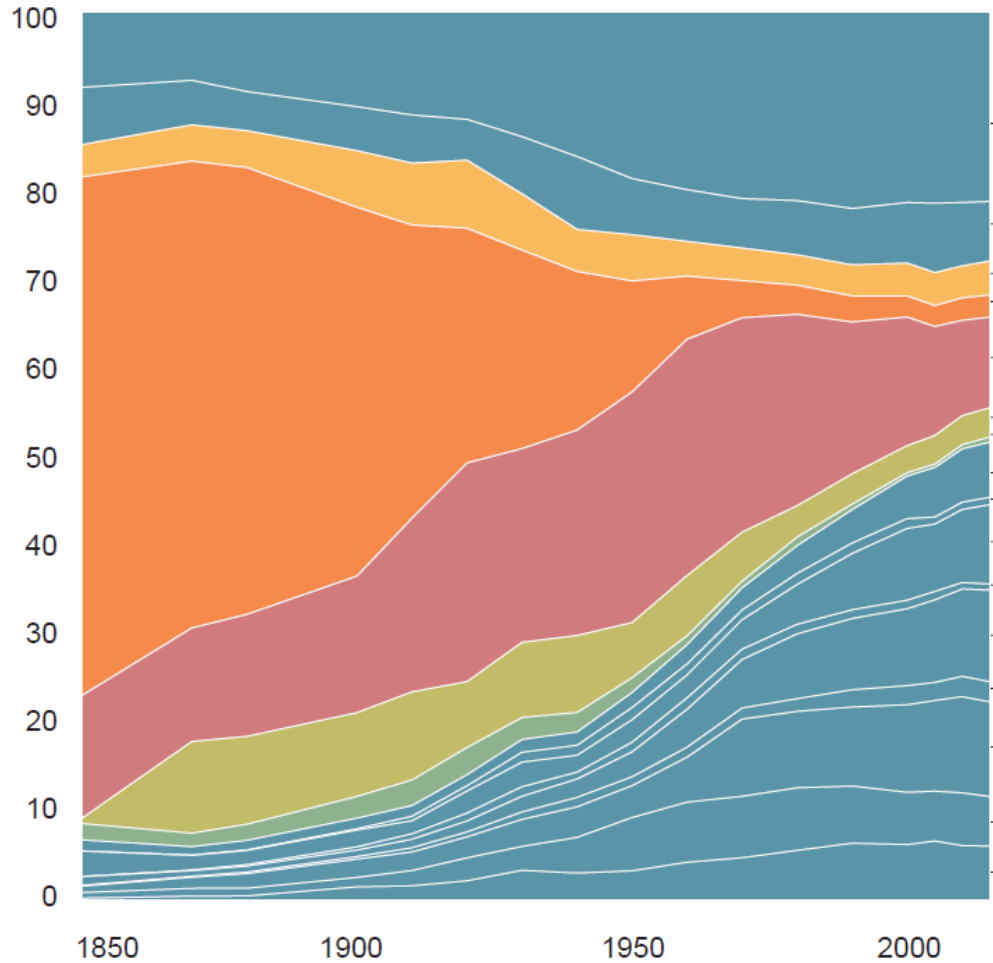
Lessons from history

Automation impact

1 Throughout history, large scale sector employment declines have been countered by growth of new sectors that have absorbed workers

Share of total employment by sector in the US, 1850-2015
Percent of jobs



Employment share by sector in the US, 1850-2015
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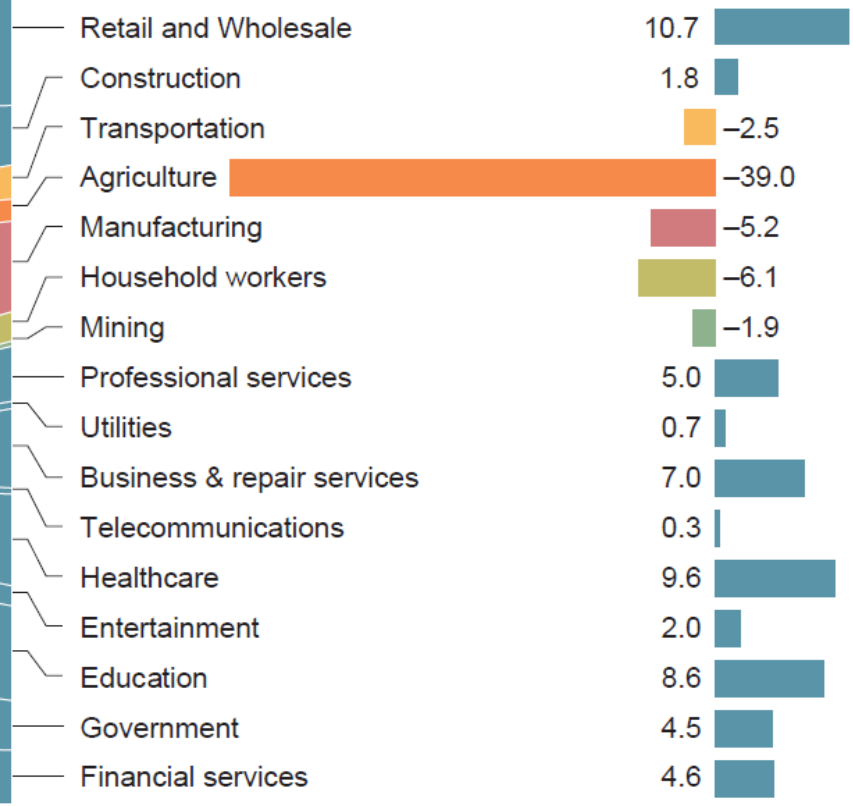
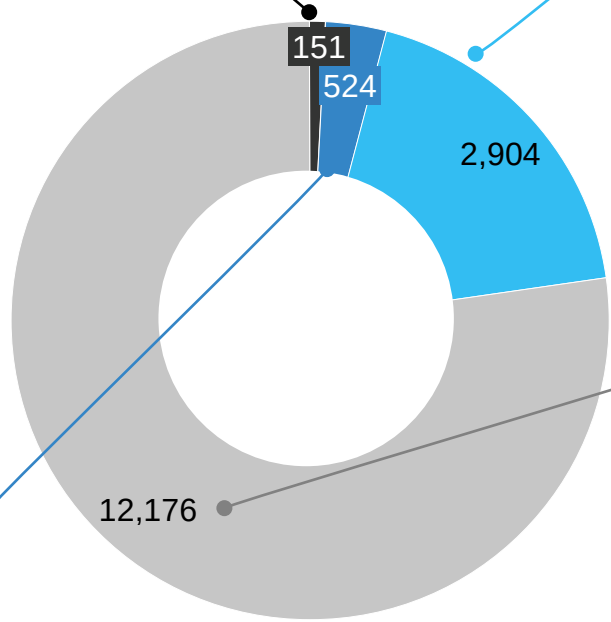


2 New technologies create many more jobs than they destroy over time, mainly outside the industry itself: Example of PCs

Total net US jobs created and occupations with most jobs created and destroyed by PCs
Thousands of jobs

EXAMPLES SHOWN NOT EXHAUSTIVE



Direct–Computer equipment manufacturing
1970 - 2015

Assorted managers and administrators	31
Computer software developers (in-industry equipment)	27
Computer scientists	18
Office machine manufacturers (typewriters)	-61

Indirect–Computer suppliers
1970 - 2015

Managers	42
Semiconductor manufacturing occupations	31
Printed circuit assembly occupations	26
Typewriter indirect occupations	-79

Enabled–Computer software and services industries
1970 - 2015

Software developers (SW and apps)	768
Computer scientists	686
Managers	416
Typewriter repair	-32

Utilizers–Computer utilizing industries
1980 - 2015

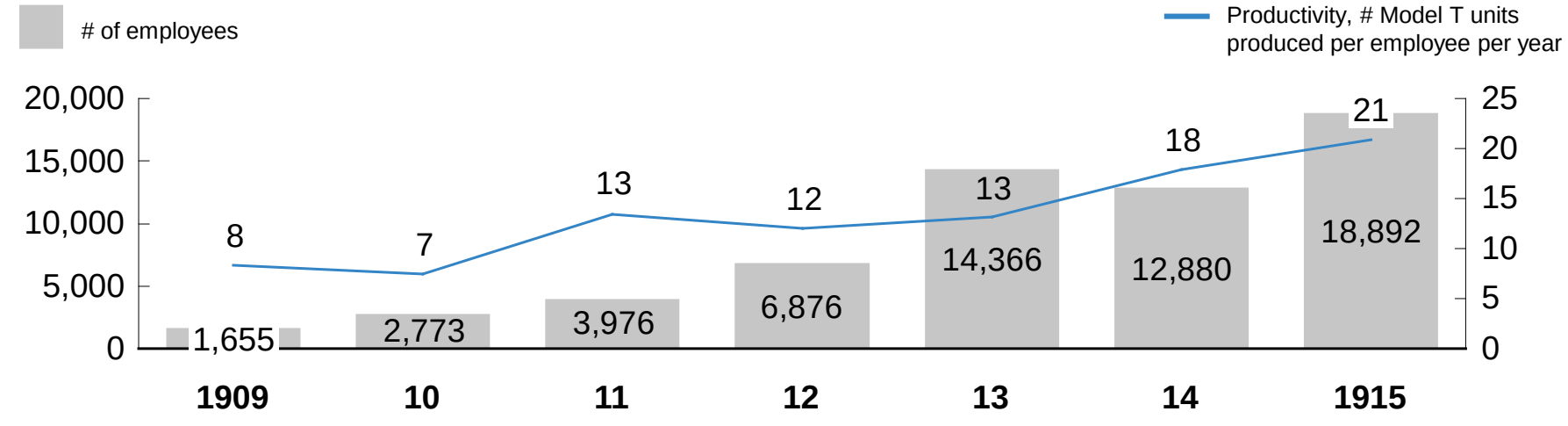
Customer service reps	3205
Computer scientists (not in computer industry)	1873
Stock and inventory clerks	1517
Bookkeepers and auditing clerks	-881
Secretaries	-823
Typists	-562

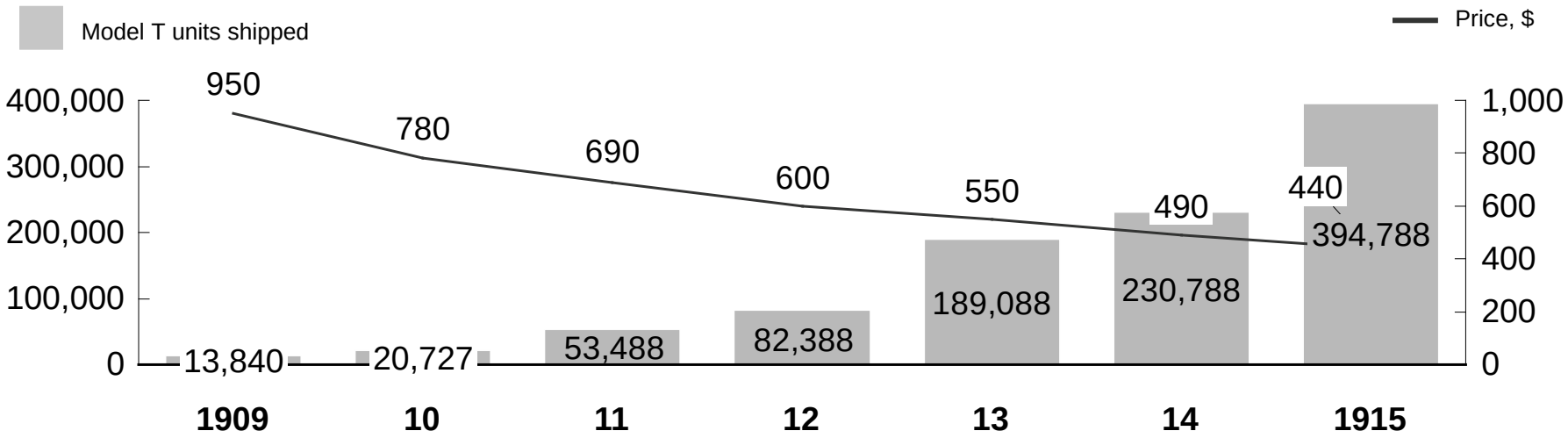
Jobs created: 19.3M
Jobs destroyed: 3.5M
Net jobs: 15.8M
(~10% of labor force)

SOURCE: IPUMS; Moody's; IMPLAN; US Bureau of Labor Statistics; FRED; McKinsey Global Institute analysis

3 Automation can stimulate employment by lowering the price of a good and unleashing latent demand: Example of Ford Model T

Ford Model T – Assembly line improved productivity and number of employees as a result of higher sales at lower prices

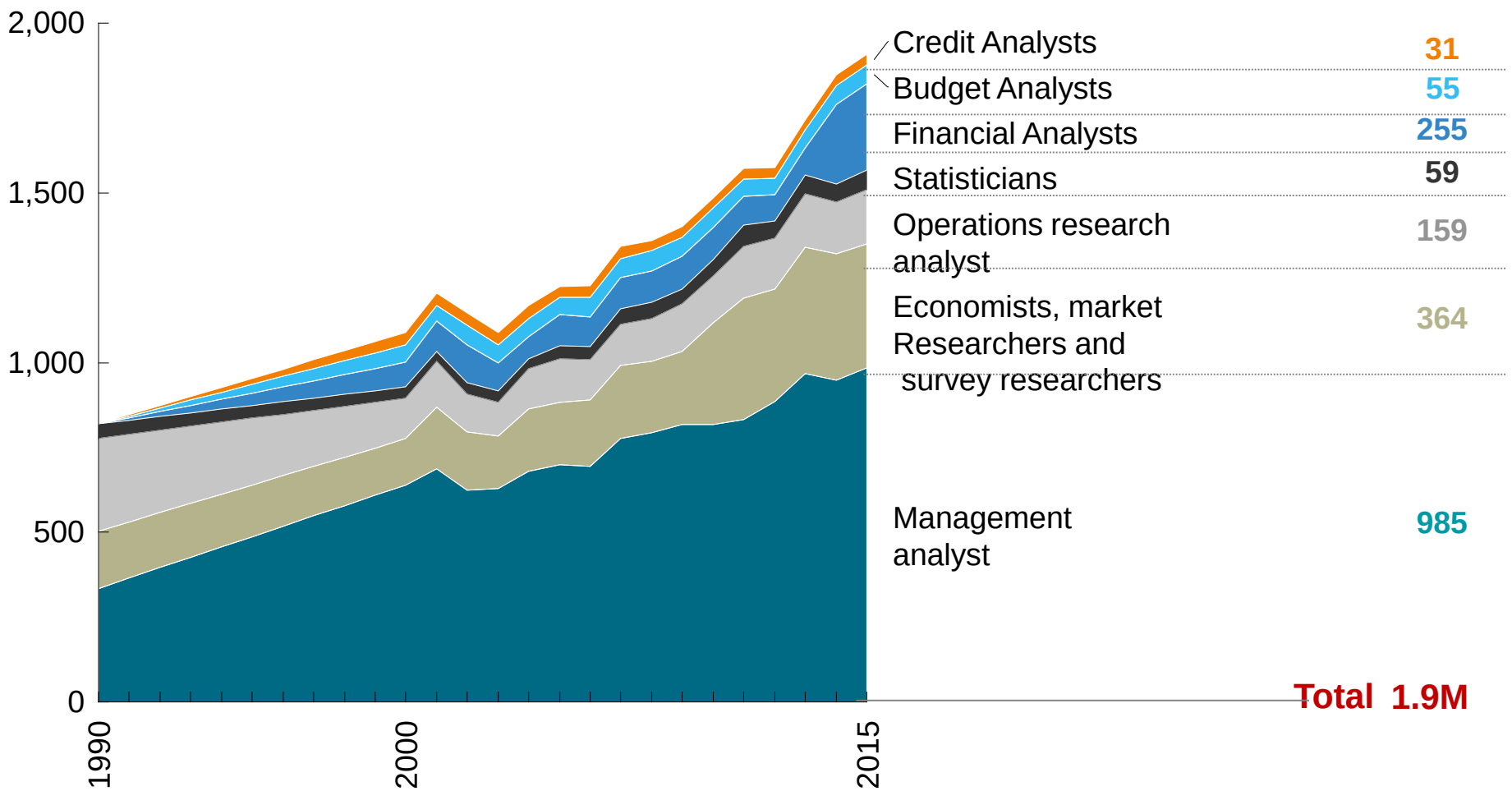




SOURCE: BLS, FDIC, SNL Hounshell (1984: 224) for the first two columns and Beaudreau (2008: 71), McKinsey Global Institute Analysis

4 The personal computer and Internet might have reduced employment for information analysts, but instead it has doubled

Employment in analyst occupations, US
Total employment, thousands, 1990-2015

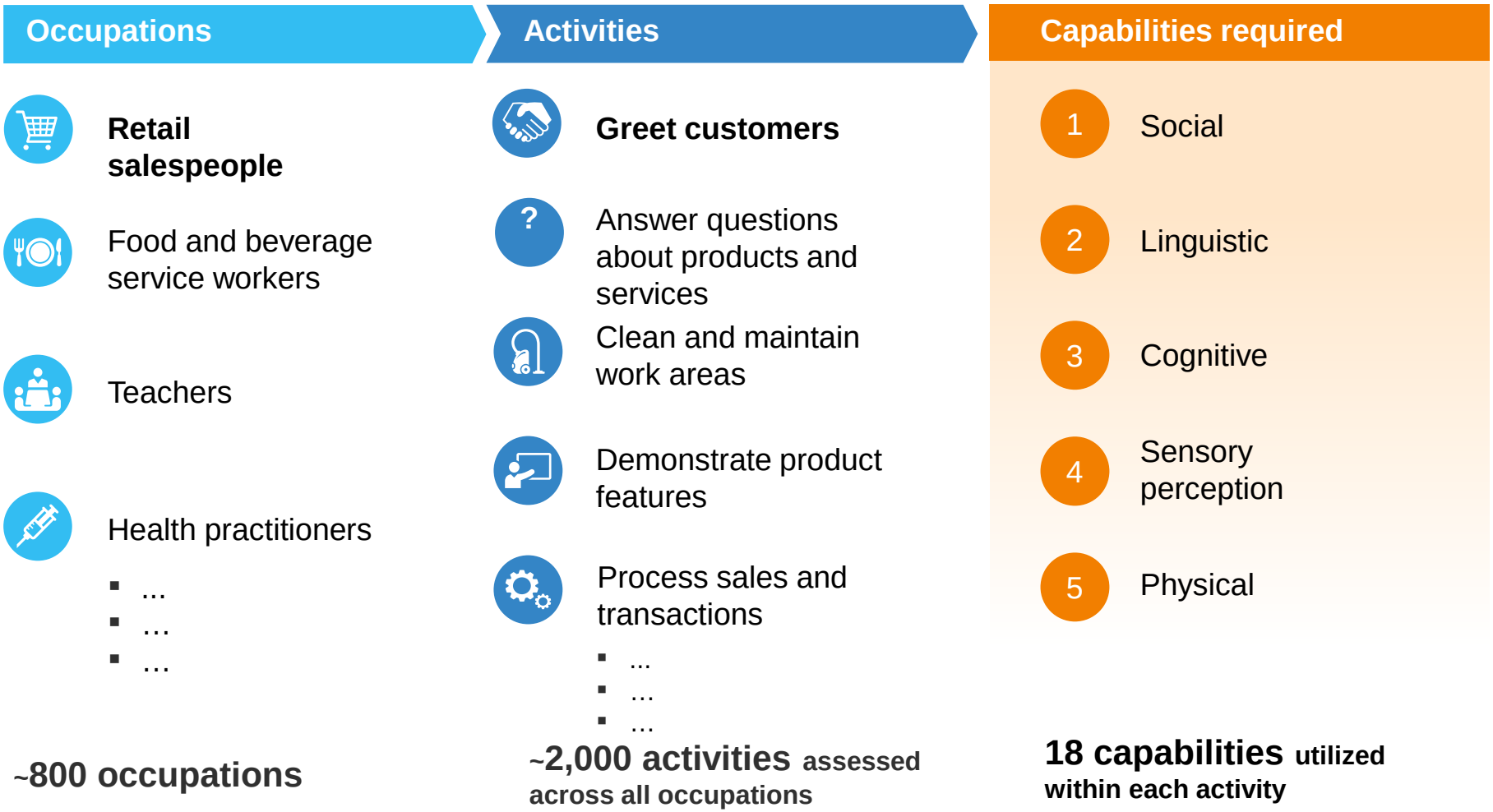


SOURCE: IPUMS, McKinsey Global Institute Analysis

Lessons from history

Automation impact

To assess the impact of automation on employment, we focus on the activities within occupations and the capabilities of currently demonstrated technologies

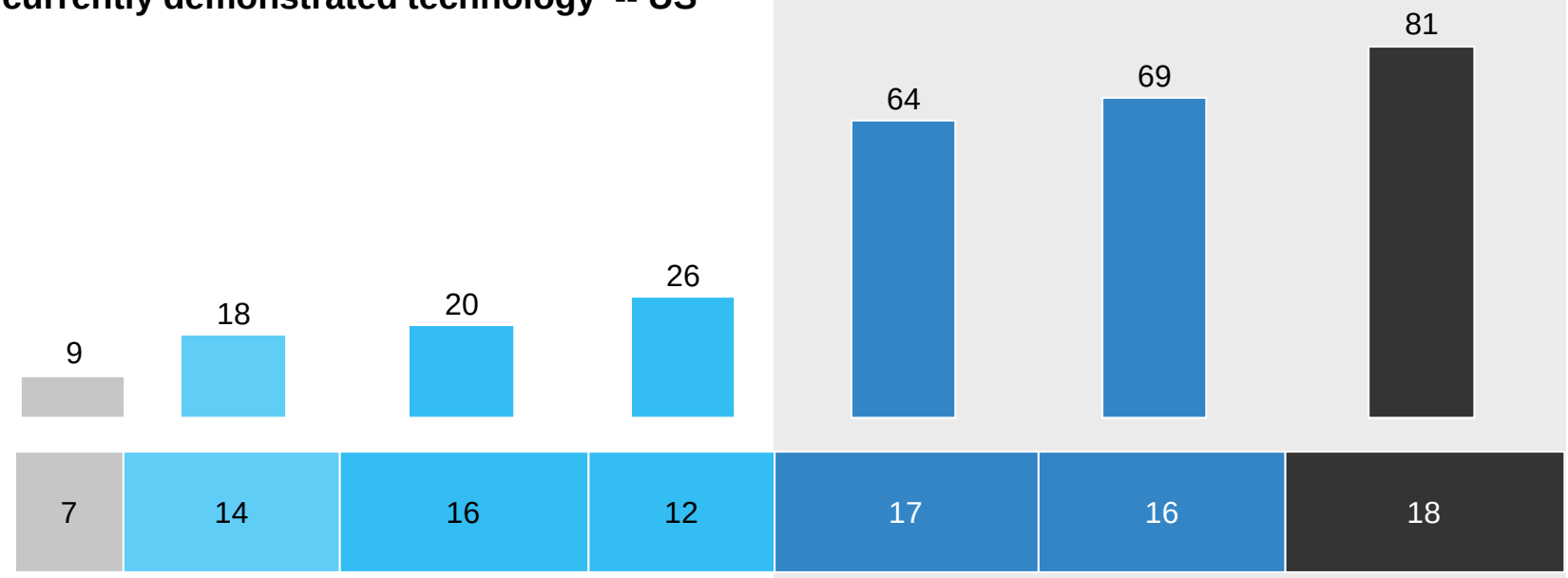


SOURCE: McKinsey Global Institute analysis

Three categories of activities have higher technical automation potential

BASED ON DEMONSTRATED TECHNOLOGY

Time spent on activities that can be automated by adapting currently demonstrated technology -- US
%



Most susceptible activities

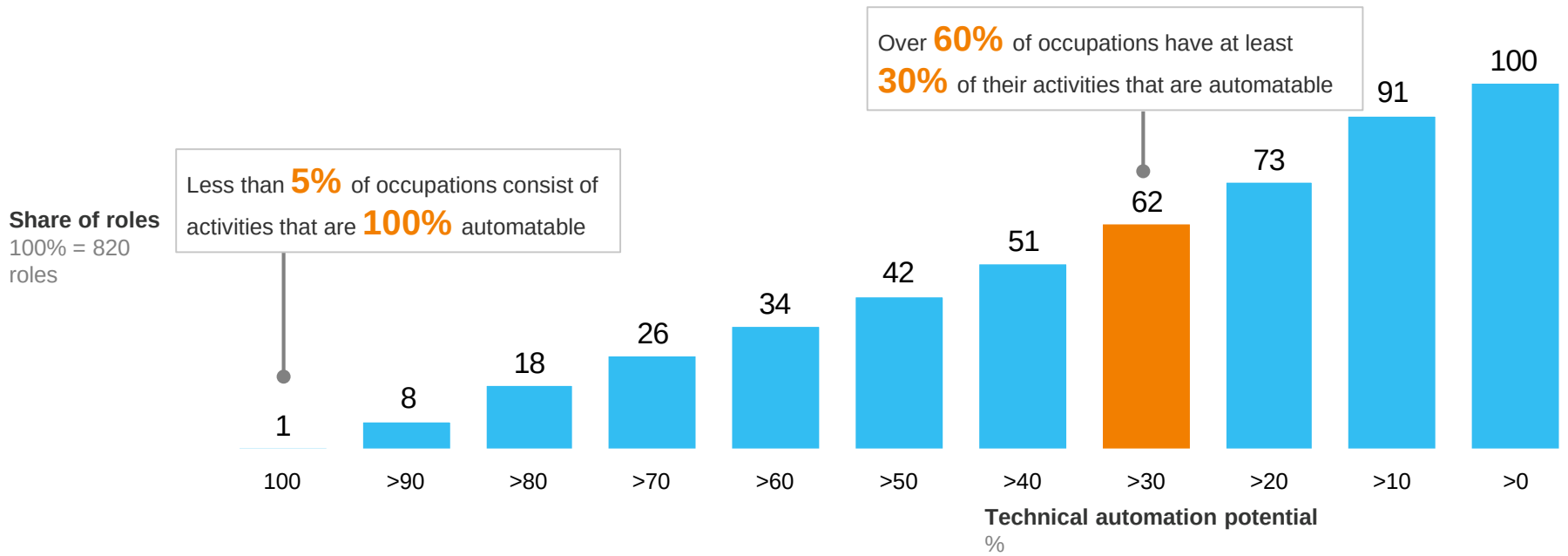
- 51% of US economy
- $2.7 trillion in wages

1 Managing and developing people.
2 Applying expertise to decision making, planning, and creative tasks.
3 Interfacing with stakeholders.
4 Performing physical activities and operating machinery in unpredictable environments.
5 Performing physical activities and operating machinery in predictable environments.

SOURCE: US Bureau of Labor Statistics; McKinsey Global Institute analysis

While few occupations are fully automatable, over 60 percent of all occupations have at least 30 percent technically automatable activities

Automation potential based on demonstrated technology of occupation titles in the US (cumulative)



Example occupations

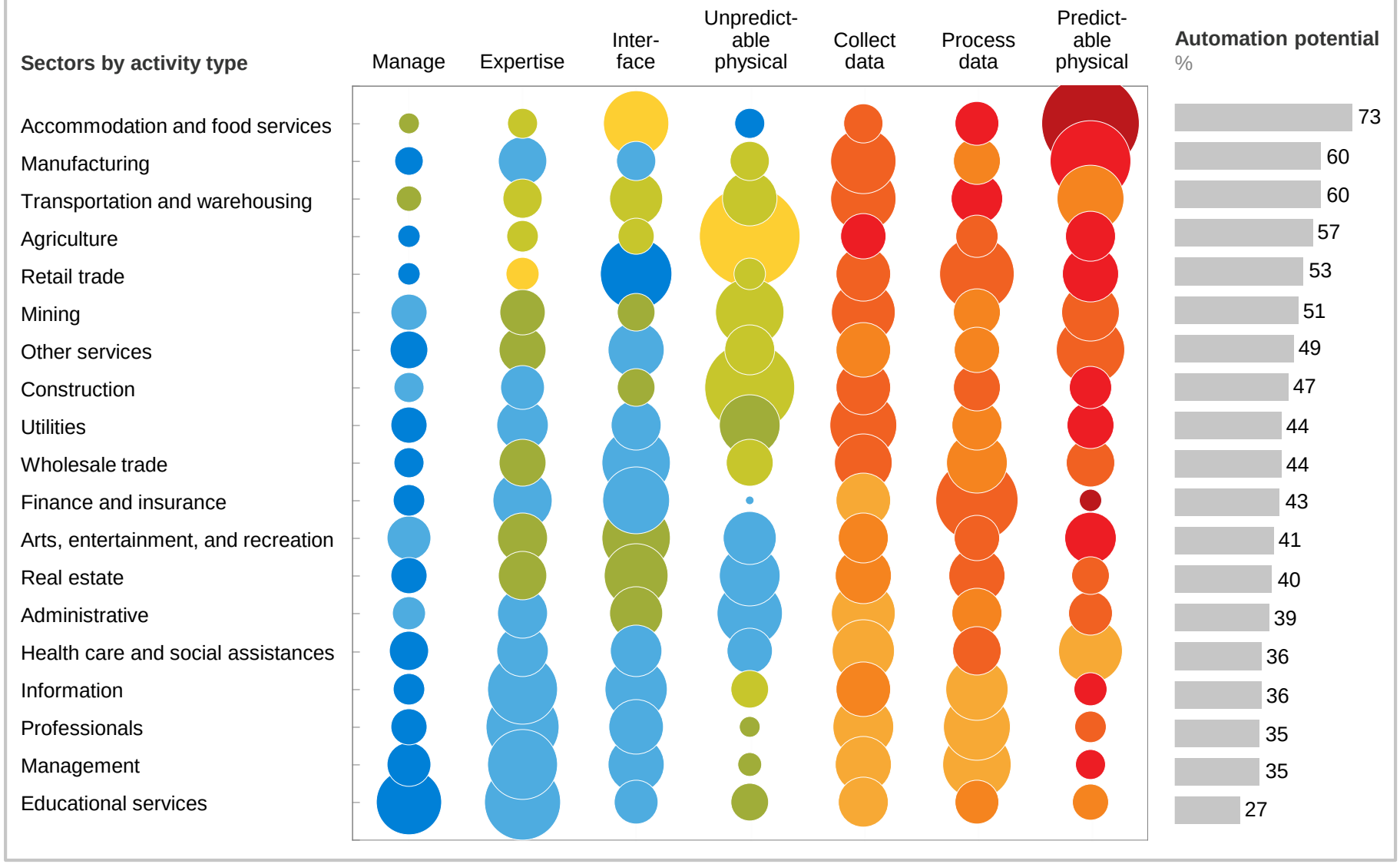
▪ Sewing machine operators ▪ Graders and sorters of agricultural products	▪ Stock clerks ▪ Travel agents ▪ Watch repairers	▪ Chemical technicians, ▪ Nursing assistants ▪ Web developers	▪ Fashion designers ▪ Chief executives ▪ Statisticians	▪ Psychiatrist ▪ Legislators

SOURCE: US Bureau of Labor Statistics; McKinsey Global Institute analysis

Technical potential for automation across sectors varies depending on mix of activity types

Size of bubble indicates % of time spent in US occupations

Ability to automate (%)
0 50 100

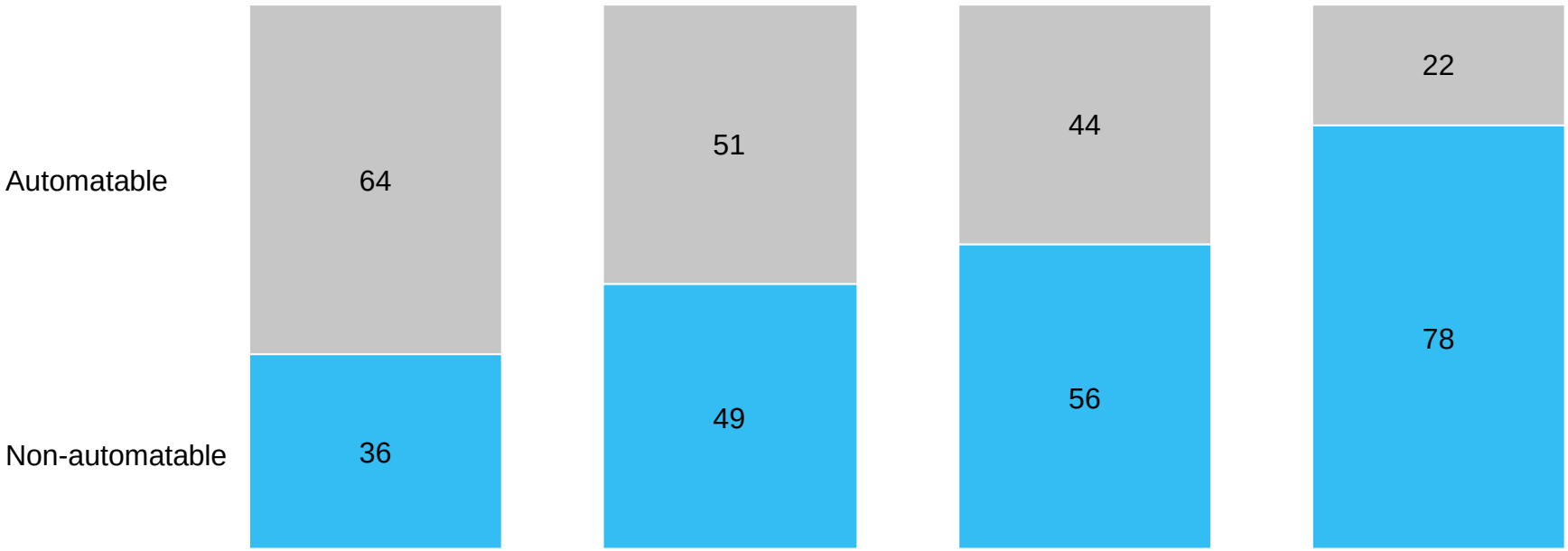


SOURCE: US Bureau of Labor Statistics; McKinsey Global Institute analysis

Occupations requiring higher levels of education and experience have lower automation potential

Technical automation potential of work activities by job zone in the US

%



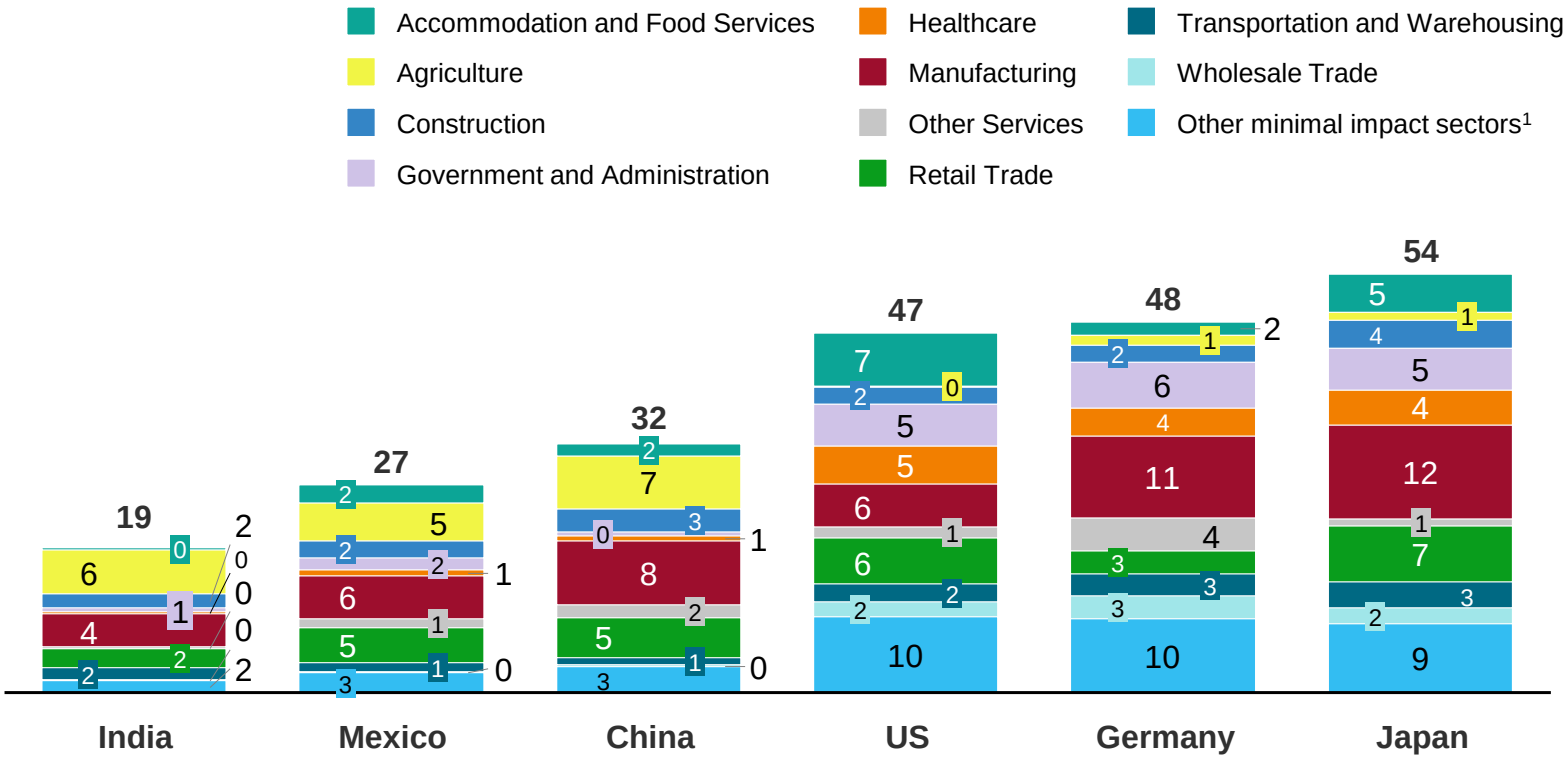
	Less than high school	High school or some experience	Some post-secondary education	Bachelor and graduate degree
Example occupations	▪ Logging equipment operators ▪ Taxi drivers	▪ Stock clerks ▪ Travel agents ▪ Dental lab technicians ▪ Fire fighter	▪ Nursing assistants ▪ Web developers ▪ Electricians ▪ Legal secretaries	▪ Lawyer ▪ Doctors ▪ Teacher ▪ Statisticians ▪ Chief executives

SOURCE: BLS 2014; O*Net; Global Automation Impact Model; McKinsey analysis

By 2030, automation has the potential to replace up to 47 percent of work hours in the US in the earliest adoption scenario

Projected impact to total employment in earliest automation scenario

Share of 2014 FTE hours with potential to be automated, 2016-2030



Midpoint automation scenario, country aggregate

India	Mexico	China	US	Germany	Japan
9%	13%	16%	25%	25%	28%

SOURCE: McKinsey Global Institute analysis

Thank you

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