

McKinsey
Global Institute

Executive summary

The future of work in America

People and places, today and tomorrow



July 2019

McKinsey Global Institute

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MGI is led by three McKinsey & Company senior partners: Jacques Bughin, Jonathan Woetzel, and James Manyika, who also serves as the chairman of MGI. Michael Chui, Susan Lund, Anu Madgavkar, Jan Mischke, Sree Ramaswamy, and Jaana Remes are MGI partners, and Mekala Krishnan and Jeongmin Seong are MGI senior fellows.

Project teams are led by the MGI partners and a group of senior fellows and include consultants from McKinsey offices around the world. These teams draw on McKinsey's global network of partners and industry and management experts. The MGI Council, which includes leaders from McKinsey offices around the world and the firm's sector practices, includes Michael Birshan, Andrés Cadena, Sandrine Devillard, André Dua, Kweilin Ellingrud, Tarek Elmasry, Katy George, Rajat Gupta, Eric Hazan, Acha Leke, Scott Nyquist, Gary Pinkus, Sven Smit, Oliver Tonby, and Eckart Windhagen. In addition, leading economists, including Nobel laureates, advise MGI research.

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Preface

Automation technologies promise to deliver major productivity benefits that are too substantial to ignore. They are also beginning to reshape the American workplace, and this evolution will become more pronounced in the next decade. Some occupations will shrink, others will grow, and the tasks and time allocation associated with every job will be subject to change. The challenge will be equipping people with the skills that will serve them well, helping them move into new roles, and addressing local mismatches.

This report represents the next stage in our ongoing body of research into the capabilities, potential, and economic impact of these technologies. This work began with *A future that works: Automation, employment and productivity*, in which we analyzed the automation potential of every occupation by looking at the extent to which its constituent activities can be handled by currently demonstrated technologies. In *Jobs lost, jobs gained: Workforce transition in a time of automation*, we examined the potential for both job displacement and job growth to assess the potential net impact in multiple countries, as well as the implications for occupations, skills, and wages. Earlier this year, we published *The future of women at work: Transitions in the age of automation*, exploring more targeted demographic effects in countries around the world by looking through the lens of gender. Now this report continues our exploration by examining the impact on local economies and demographic groups in the United States, placing automation in the context of other ongoing labor market trends that have affected places and people. Its starting point is a geographic segmentation produced for *America at work: A national mosaic and roadmap for tomorrow*, a research collaboration between McKinsey & Company and the Walmart Foundation.

This research was led by Susan Lund, an MGI partner based in Washington, DC; James Manyika, chairman and director of MGI, based in San Francisco; Liz Hilton Segel, a New York–based senior partner who serves as managing partner for McKinsey in North America; André Dua, an MGI Council member and a senior partner in New York; Bryan Hancock, a partner in Washington, DC; and Scott Rutherford, a senior partner in Washington, DC. Brent Macon led the project team, which included Veena Advani, E.B. Armstrong, Stephanie Bell, Shannon Glick, Megan Hastings, Josh Roberts, and Kelsey Schroeder. Arthur Bianchi, Gurneet Singh Dandona, Ryan Luby, Vivien Singer, Alok Singh, and Soyoko Umeno were instrumental in providing modeling, analytics, and data support.

We are grateful to the academic advisers who challenged our thinking and added new insights: Martin Neil Baily, the Bernard L. Schwartz Chair in Economic Policy Development and a Senior Fellow in Economic Studies at the Brookings Institution; and Laura Tyson, distinguished professor of the graduate school and faculty director of the Institute for Business & Social Impact, Haas School of Business, University of California, Berkeley.

This project benefited immensely from the expertise and perspectives of many McKinsey colleagues. Our US Future of Work steering committee, who generously gave their time and considerable industry insights to this project, included senior partners Kweilin Ellingrud, Katy George, Sajal Kohli, Asutosh Padhi, Thomas Seitz, Navjot Singh, Shubham Singhal, and Virginia Simmons. We also thank Sapana Agrawal, Sruti Balakrishnan, Federico Berruti, Arianna Camacho, Davis Carlin, Yaasna Dua, Pablo Illanes, Mike Kerlin, Lani Marsden, Duwain Pinder, Kate Lazaroff-Puck, Saurabh Sanghvi, Rachel Schaff, Matt Thomas, Carolina Toth, and Rob Whiteman.

This report also benefited from the colleagues, advisers, and collaborators involved the earlier research efforts mentioned above, particularly Gayatri Agnew, Angie Cooper, Kathleen McLaughlin, and Sean Thurman from the Walmart Foundation; McKinsey colleagues Steve Begley and Cassidy Tanner; and MGI colleagues Michael Chui, Mekala Krishnan, and Sree Ramaswamy. Along the way, we received valuable insight from conversations with employers and local leaders across the country and from our involvement in taskforces including the Aspen Institute Future of Work Initiative and the Markle Foundation's Rework America Initiative.

This report was produced by MGI executive editor Lisa Renaud, editorial production manager Julie Philpot, senior graphic designer Patrick White, and designer Laura Brown. We also thank our colleagues Dennis Alexander, Tim Beacom, Deadra Henderson, Richard Johnson, Lauren Meling, and Rebeca Robboy for their contributions and support.

This report contributes to MGI's mission to help business and policy leaders understand the forces transforming the global economy and prepare for the next wave of growth. As with all MGI research, this work is independent, reflects our own views, and has not been commissioned by any business, government, or other institution. We welcome your comments on the research at MGI@mckinsey.com.

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The future of work in America

Much of the research on automation, including our own, has focused on the potential for job displacement and has taken a national-level view. This report looks beneath the national numbers to examine the present and potential future of work for different people and places across America. Local economies across the country have been on diverging trajectories for years, and they are entering the automation age from different starting points. Our view incorporates the current state of local labor markets as well as the jobs that could be lost and gained in the decade ahead.

- Our analysis of 315 cities and more than 3,000 counties shows that the United States is a mosaic of local economies with widening gaps between them. Twenty-five megacities and high-growth hubs, where 96 million people live, have generated most of the nation's job growth since the Great Recession. These are the nation's most dynamic places, with high-growth industries, many high-wage jobs, and young, educated workers but notable inequality. By contrast, 54 trailing cities and roughly 2,000 rural counties, collectively home to 78 million people, have older and shrinking workforces, higher unemployment, and lower educational attainment. Between these extremes are thriving niche cities and a larger "mixed middle" with modest economic growth; 94 million people live in these segments.
- These diverse starting points affect whether communities will have the momentum to offset automation-related displacement. The same 25 cities and peripheries that led the post-recession recovery could capture 60 percent of US job growth through 2030. The mixed middle and trailing cities are positioned for modest job gains, but rural counties could see a decade of flat or even negative net job growth. These shifts are occurring when geographic mobility is at historic lows.
- The next wave of automation will affect occupations across the country, displacing many office support, food service, transportation and logistics, and customer service roles. At the same time, the economy will continue to create jobs, particularly roles in healthcare, STEM fields, and business services, as well as work requiring personal interaction. While there could be positive net job growth at the national level, new jobs may not appear in the same places, and the occupational mix is changing. The challenge will be in addressing local mismatches and help workers gain new skills.
- Labor market outcomes vary across demographic groups today, and automation could amplify these patterns. Individuals with a high school degree or less are four times more likely to hold highly automatable roles than those with bachelor's degrees. Given educational disparities, Hispanic and African-American workers may be hit hardest, with 12 million displaced. Nearly 15 million jobs held by young people could be lost, raising questions about career pathways. Workers over age 50 hold an additional 11.5 million at-risk jobs. The share of middle-wage jobs may shrink as growth concentrates at the high and low ends of the wage scale.
- Employers seeking to make the most of automation for innovation and productivity will need to manage complex transitions. The challenges vary depending on the nature, mix, and geographic footprint of their workforces, as we illustrate through profiles of six types of employers. The questions facing a retail or food chain with a distributed customer-facing workforce, for example, are not the same as those for an employer with a geographically concentrated white-collar workforce. All employers will need to make adept decisions about strategy, investment, technology, workflow redesign, talent needs and training, and the potential impact on the communities in which they operate.
- Communities need to prepare for this wave of change, focusing in particular on job matching and mobility, skills and training, economic development and job creation, and support for workers in transition. They can draw on a common toolbox of solutions, but the priorities vary from place to place—from affordable housing in major cities to digital infrastructure that enables remote work in rural counties.

Without bold, well-targeted interventions, automation could further concentrate growth and opportunity. But these trends are not set in stone. It is possible to turn this period of technological change into an occasion to create more rewarding jobs and build better learning systems and career pathways. The United States needs the energy and ingenuity of its private and public sectors, as well as local coalitions working on the ground in communities. A fresh commitment to investing in people and places can lift up more Americans from coast to coast.

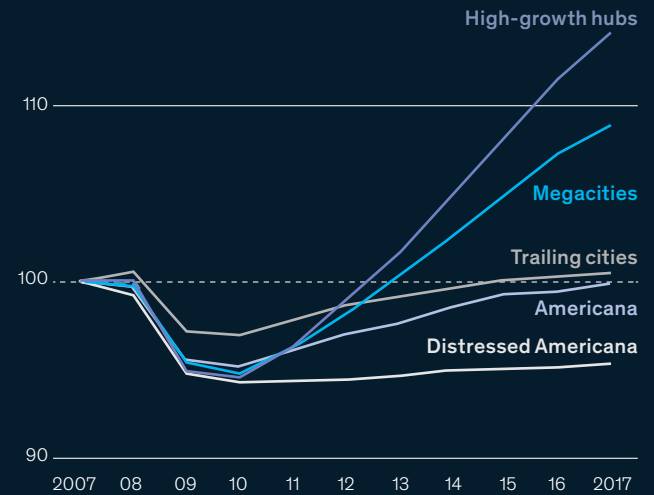
America is a mosaic of local economies on diverging trajectories

Automation could widen existing disparities

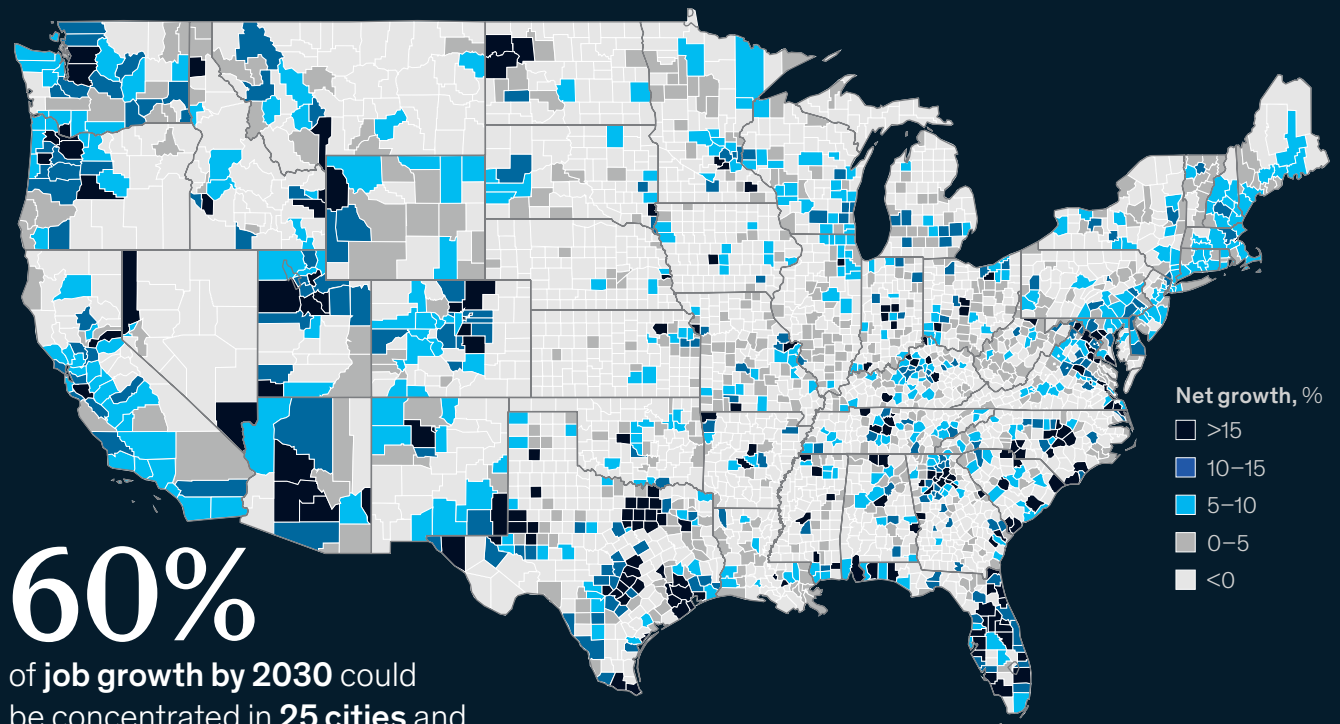
13 community segments have varying economic and demographic profiles

Economic dynamism	Most	Urban core Megacities; High-growth hubs	63 counties	30% of US population
		Periphery Urban periphery	271 counties	16% of US population
		Niche cities Small powerhouses; Silver cities; College-centric towns	89 counties	6% of US population
		Mixed middle Stable cities; Independent economies; America's makers	325 counties	24% of US population
	Least	Low-growth/rural areas Trailing cities; Americana Distressed Americana; Rural outliers	2,365 counties	24% of US population

Employment change for select community segments, % of 2007 employment



Estimated net job growth in midpoint adoption scenario, 2017–30, %



Net growth, %

- >15
- 10–15
- 5–10
- 0–5
- <0

Potential workforce displacement in midpoint adoption scenario, 2017–30

14.7M

Young workers age 18–34

11.5M

Workers over age 50

11.9M

Hispanics and African Americans

4x

Higher displacement risk for workers with high school diploma or less



Executive summary

The US labor market looks markedly different today than it did two decades ago. It has been reshaped by dramatic events like the Great Recession but also by a quieter ongoing evolution in the mix and location of jobs. In the decade ahead, the next wave of technology may accelerate the pace of change. Millions of jobs could be phased out even as new ones are created. More broadly, the day-to-day nature of work could change for nearly everyone as intelligent machines become fixtures in the American workplace.

Until recently, most research on the potential effects of automation, including our own body of work, has focused on the national-level effects. Our previous work ran multiple scenarios regarding the pace and extent of adoption. In the midpoint case, our modeling shows some jobs being phased out but sufficient numbers being added at the same time to produce net positive job growth for the United States as a whole through 2030.¹ But the national results contain a wide spectrum of outcomes, and this report goes one step further to explore those variations. Automation is not happening in a vacuum, and the health of local economies today will affect their ability to adapt and thrive in the face of the changes that lie ahead.

Our analysis of more than 3,000 US counties and 315 cities finds they are on sharply different paths. Twenty-five megacities and high-growth hubs, plus their peripheries, have generated the majority of job growth since the Great Recession. By contrast, 54 trailing cities and roughly 2,000 rural counties that are home to one-quarter of the US population have older and shrinking workforces, higher unemployment, and lower educational attainment. Automation technologies may widen these disparities at a time when workforce mobility is at historic lows.

The labor market could become even more polarized. Workers with a high school degree or less are four times as likely as those with a bachelor's degree to be displaced by automation. Reflecting more limited access to education, Hispanic workers are most at risk of displacement, followed by African Americans. Jobs held by nearly 15 million workers ages 18–34 may be automated, so young people will need new career paths to gain an initial foothold in the working world. Roughly 11.5 million workers over age 50 could also be displaced and face the challenge of making late-career moves. The hollowing out of middle-wage work could continue.

The future of work is not just about how many jobs could be lost and gained. Technology is altering the day-to-day mix of activities associated with more and more jobs over time. The occupational mix of the economy is changing, and the demand for skills is changing along with it. Employers will need to manage large-scale workforce transformations that could involve redefining business processes and workforce needs, retraining and moving some people into new roles, and creating programs for continuous learning. This could be an opportunity to upgrade jobs and make them more rewarding. The choices that employers make will ripple through the communities in which they operate.

¹ This research builds on MGI's automation and job creation models, which have formed the basis of previous research reports including *A future that works: Automation, employment, and productivity* (January 2017), and *Jobs lost, jobs gained: Workforce transitions in a time of automation* (November 2017).

Local economies have been on diverging trajectories for years

Cities and counties across the United States are entering this period of technological and labor market change from different starting points. We used a mathematical clustering method to categorize all US counties (and, for counties in urban core areas, the cities with which they are associated) into 13 segments using more than 40 variables reflecting their economic health, business dynamism, industry mix, labor force demographics, and other characteristics (Exhibit E1).² This approach reveals that the differences between local economies across the country are more nuanced than a simple rural-urban divide or regional variations. (See the technical appendix in the full report or visit www.mckinsey.com/futureofworkinamerica for a full list of the cities and counties in each segment.)

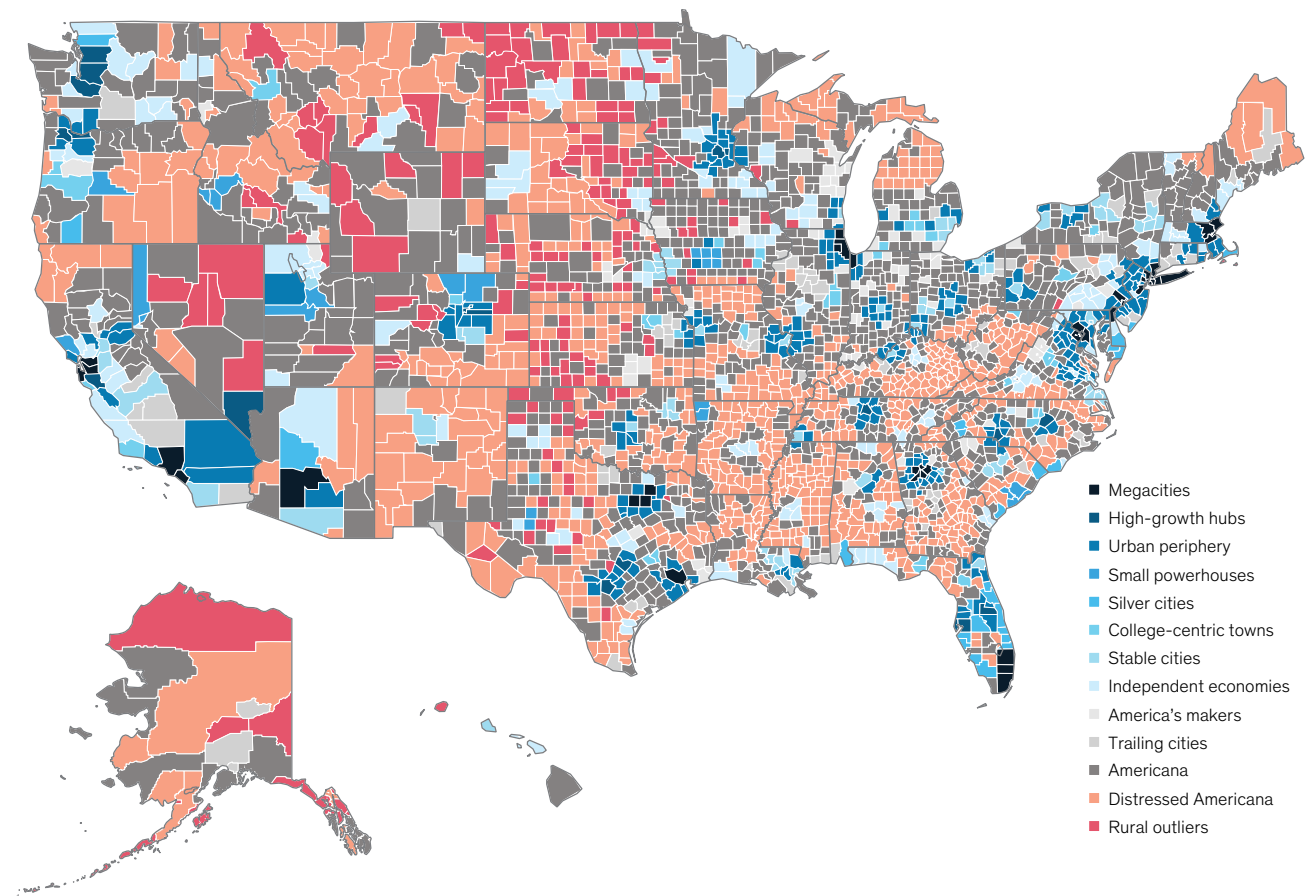
Our 13 archetypes can be grouped into five segments with common patterns (Exhibit E2):

- **Urban core.** Twenty-five megacities and high-growth hubs account for roughly 30 percent of the US population and are the nation's most dynamic places. The high-growth industries of high tech, media, healthcare, real estate, and finance make up a large share of these local economies. These cities have higher incomes, faster employment growth since the Great Recession, high net migration, and younger and more educated

Exhibit E1

The United States is a complex mosaic of local economies, with 13 distinct community archetypes.

Map of county types (color-coded by segment)



Source: McKinsey Global Institute analysis

² For this effort, we updated the county segmentation used in *America at work: A national mosaic and roadmap for tomorrow* (2019), a research collaboration between Walmart and McKinsey & Company. Our database includes indicators for all 3,113 US counties.

workforces than the rest of the country—but also high levels of income inequality. Many are experiencing congestion and affordable housing shortages.

- **Urban periphery.** These 271 counties are the extended suburbs of US cities. Home to 16 percent of the US population, they also have seen strong net migration, attracting people moving out of cities in search of more space. In most of these counties, a large

Exhibit E2

Community segments have varying demographic and economic profiles.

			Economic indicators					Industry mix	Labor market	
			Household income, \$ thousand	GDP growth, 2012–17, CAGR ¹	Empl. growth, 2012–17, CAGR	Net migration 2010–17, ² %	Poverty rate, %	GDP in high-growth industries, ³ %	Pop. over age 55, %	Pop. with BA or higher, %
Examples										
Urban core	Megacities 12 cities, 74.3M people	New York, NY San Francisco, CA	68.8	2.5	2.2	3.2	14.2	48.0	24.5	38.5
	High-growth hubs 13 cities, 21.6M people	Seattle, WA Austin, TX	65.6	3.7	3.0	7.4	13.4	44.4	23.1	40.0
Periphery	Urban periphery 271 counties, 52.2M people	Arlington, VA Riverside, CA	69.0	2.5	2.1	4.1	10.2	29.6	28.0	29.4
Niche cities	Small powerhouses 11 cities, 5.0M people	Provo, UT Reno, NV	63.5	4.9	3.6	8.7	12.0	35.3	24.8	33.5
	Silver cities 19 cities, 6.8M people	The Villages, FL Prescott, AZ	53.7	2.4	2.7	11.9	13.3	40.7	40.4	29.2
	College-centric towns 26 cities, 6.1M people	Chapel Hill, NC South Bend, IN	55.1	1.9	1.7	3.7	18.9	38.1	23.5	43.2
Mixed middle	Stable cities 36 cities, 39.3M people	Detroit, MI Columbus, OH	55.6	1.6	1.4	0.6	15.7	41.2	26.3	32.1
	Independent economies 94 cities, 26.0M people	Little Rock, AR Providence, RI	57.9	2.0	1.6	3.3	13.7	36.7	27.4	29.3
	America's makers 50 cities, 11.2M people	Grand Rapids, MI Greensboro, NC	52.7	1.6	1.2	0.2	14.4	29.4	28.0	25.0
Low-growth and rural areas	Trailing cities 54 cities, 14.8M people	Bridgeport, CT Flint, MI	53.2	0.3	0.3	-2.0	16.4	33.7	26.8	24.2
	Americana 1,118 counties, 44.0M people	Cameron, TX Caddo Parish, LA	48.7	1.1	0.5	-1.1	15.4	23.5	31.6	19.2
	Distressed Americana 972 counties, 18.1M people	Coahoma, MS Pittsylvania/ Danville, VA	38.9	0.5	0.0	-2.4	20.8	23.0	33.9	15.9
	Rural outliers 192 counties, 1.5M people	Kauai County, HI Juneau Borough, AK	57.5	1.1	0.0	-1.2	10.4	21.3	34.2	22.5

¹ Compound annual growth rate.

² Calculated as total net migration between 2010 and 2017 divided by 2017 population.

³ Information; finance and insurance; real estate / rental leasing; professional, scientific, and technical services; and healthcare and social assistance.

Note: This exhibit shows only a sample of the more than 40 variables used in a clustering analysis to segment communities across the United States.

Source: US Census American Community Survey, Moody's Analytics; McKinsey Global Institute analysis

share of the population works in nearby urban areas. Healthcare, retail, logistics, and local services are large parts of these local economies.

- **Niche cities.** These 56 much smaller towns and cities, home to 6 percent of the US population, have found success by building on unique features. In college-centric towns, a major research university dominates the local economy. Silver cities, many of which are in Florida, are fast-growing retirement destinations. Small powerhouses, such as Bend, OR, and Provo, UT, have built economic clusters around technology and other industries; they have the fastest economic growth rates and second-highest rate of net migration across our archetypes. All niche cities are attracting both workers and companies with a low cost of living and a high quality of life.
- **Mixed middle.** Almost one-quarter of the nation's population is found in these 180 stable cities (such as Cincinnati and St. Louis), smaller independent economies (such as Lancaster, PA, and Winston-Salem, NC), and the manufacturing hubs that we call "America's makers" (such as Rockford, IL, and Oshkosh, WI). Neither thriving nor in distress, these places have slower economic and job growth, higher unemployment, and workforces with slightly lower educational attainment than those in urban core cities. Some of America's makers are on an upward trajectory, while others are in decline.
- **Low-growth and rural areas.** This group, which includes 54 trailing cities and more than 2,000 rural counties, is home to one-quarter of the US population. Many trailing cities, such as Flint, MI, and Bridgeport, CT, are former industrial towns with struggling economies. Rural counties encompass somewhat better-performing places (Americana) and struggling areas (distressed Americana). In these segments, populations are older, unemployment is higher, and educational attainment is lower than the national average. Things are somewhat brighter in the 192 rural outlier counties that have found some success with tourism or mining and energy.

25

urban areas accounted for >2/3 of US job growth since 2007

The economic performance of these segments has been diverging for decades, and that trend accelerated after the Great Recession. While all areas of the country lost employment during the downturn, job growth since then has been a tale of two Americas. Just 25 cities (megacities and high-growth hubs, plus their urban peripheries) have accounted for more than two-thirds of job growth in the last decade (Exhibit E3). By contrast, trailing cities have had virtually no job growth for a decade—and the counties of Americana and distressed Americana have 360,000 fewer jobs in 2017 than they did in 2007.³

Population growth has also tilted toward urban America. High-growth hubs, small powerhouses, and silver cities have grown by more than 10 percent since 2007, and most urban peripheries are also growing. Residents have been moving out of megacities, stable cities, America's makers, and trailing cities, but immigration has more than offset the losses in megacities and stable cities. By contrast, populations in rural Americana counties grew by less than 1 percent—and distressed Americana is shrinking.

One of the most profound changes of the past two decades has been the "hollowing out" of middle-wage jobs.⁴ Our analysis finds that middle-wage jobs accounted for 49 percent of employment in 1997 but only 41 percent in 2017.⁵ More Americans have been climbing into higher income brackets or slipping out of the middle class altogether. Some 2.9 million middle-wage roles—including jobs in construction, manufacturing, and office support—vanished between 2007 and 2012, although some were regained in the recovery. But this

³ See also Enrico Moretti, *The New Geography of Jobs*, Boston, MA: Houghton Mifflin Harcourt, 2012; and Clare Hendrickson, Mark Muro, and William A. Galston, *Countering the geography of discontent: Strategies for left-behind places*, Brookings Institution, November 2018.

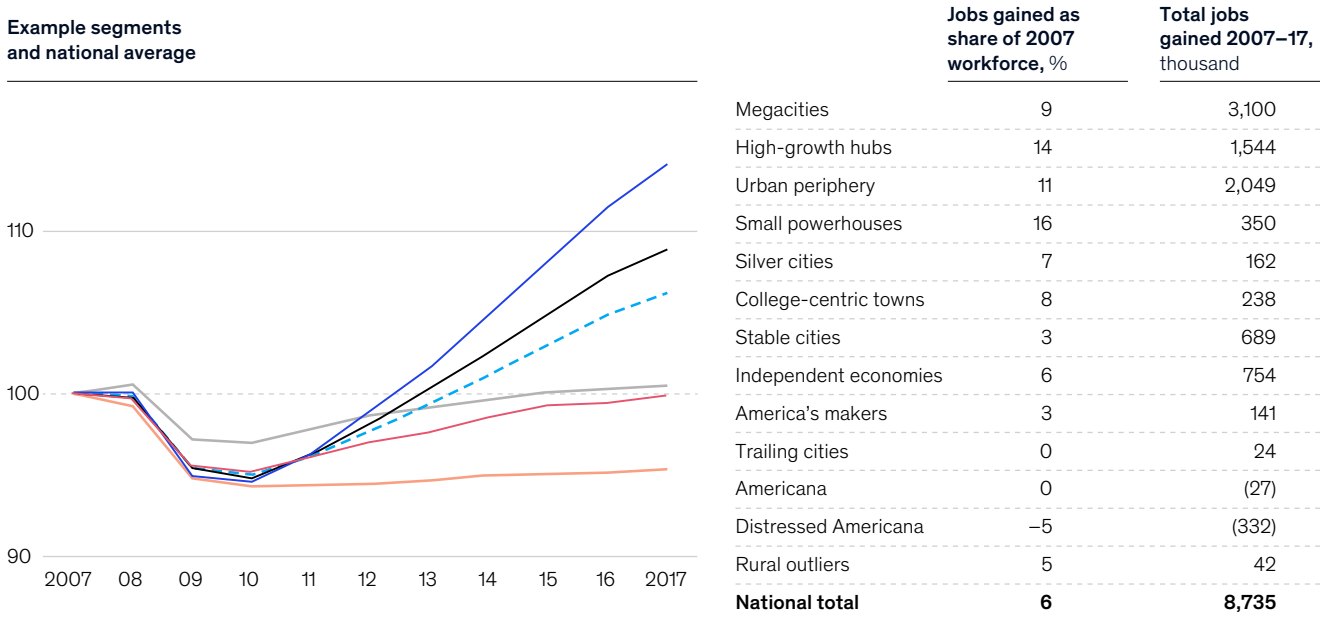
⁴ See David H. Autor and David Dorn, "The growth of low-skill service jobs and the polarization of the US labor market," *American Economic Review*, August 2013, Volume 103, Number 5.

⁵ Low-wage jobs are those paying less than \$27,500 annually; middle-wage jobs pay \$27,500–\$54,200 annually; high-wage jobs pay more than \$54,200 annually (all figures in 2017 dollars).

All segments lost jobs during the Great Recession, but employment gains during the recovery have been heavily concentrated in urban areas.

Annual employment by segment, % of 2007 employment

— Megacities — High-growth hubs — Americana — Distressed Americana — Trailing cities - - - National average



Source: Moody's Analytics; McKinsey Global Institute analysis

trend has not played out evenly across the country. While states such as Florida, Maryland, and Rhode Island all saw middle-wage jobs vanish over the last decade, many others, from West Virginia to Utah, have seen middle-wage jobs grow in construction, mining and energy, and other sectors.

3.6%

of Americans moved between counties or states in 2017

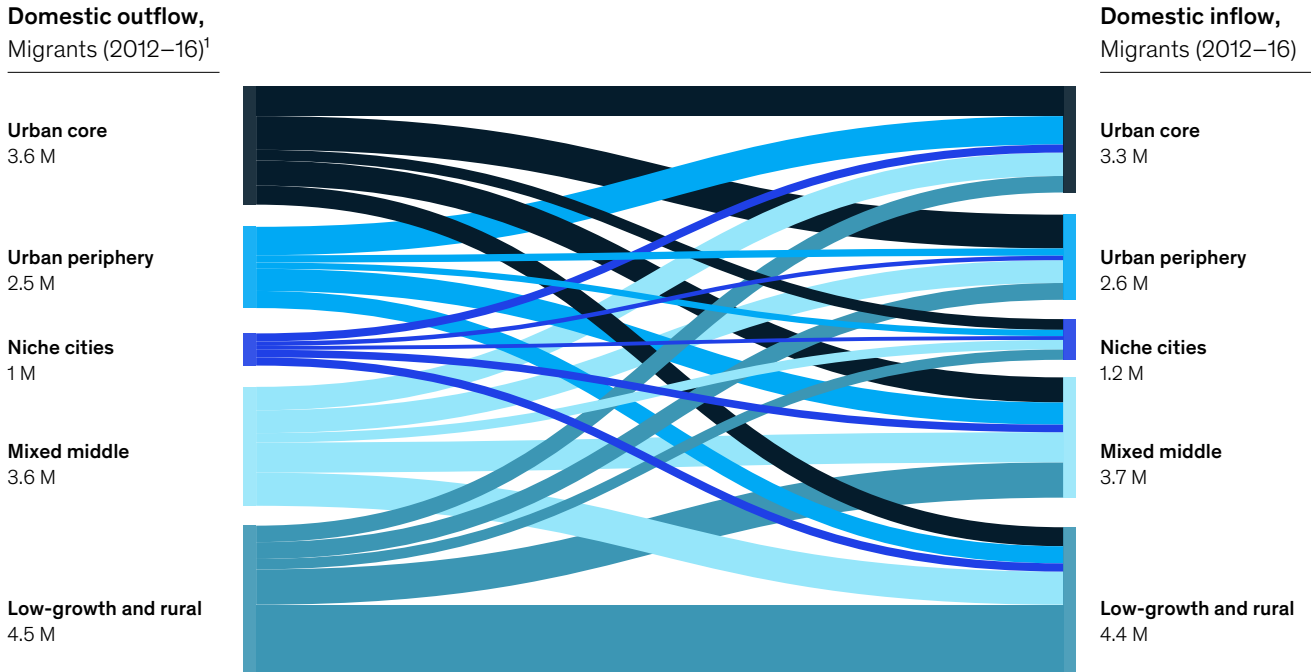
Growing economic divergence might have been expected to prompt more people to move from distressed areas to thriving job markets. Yet geographic mobility in the United States has eroded to historically low levels. While 6.1 percent of Americans moved between counties or states in 1990, only 3.6 percent did so in 2017. Furthermore, when people in rural segments and less vibrant cities do move, it is usually to places with a similar profile rather than to megacities or high-growth hubs (Exhibit E4). Differentials in the cost of living, ties with family and friends, and a growing cultural divide all partially explain these patterns, but more research is needed to understand them fully.

Automation will not be felt evenly across places or occupational categories

Previous MGI research has found that less than 5 percent of occupations can be automated in their entirety, but within 60 percent of jobs, at least 30 percent of activities could be automated by adapting currently demonstrated technologies.⁶ What lies ahead is not a sudden robot takeover but a period of ongoing, and perhaps accelerated, change in how work is organized and the mix of jobs in the economy. Even as some jobs decline, the US economy will continue to create others—and technologies themselves will give rise to new occupations. All workers will need to adapt as machines take over routine and some physical tasks and

⁶ See two earlier McKinsey Global Institute reports: *A future that works: Automation, employment and productivity* (January 2017) and *Jobs lost, jobs gained: Workforce transitions in a time of automation* (November 2017). We analyze the automation potential of every occupation by looking at the extent to which its constituent activities and associated capabilities can be handled by currently demonstrated automation technologies.

Americans in lower-growth areas are not migrating to high-growth places.



¹ Analysis excludes all migration within a core-based statistical area that is within the same segment (e.g., migration from one New York City CBSA megacity county to another).

Source: US Census Bureau County-to-County Migration Flows 2012-2016, McKinsey Global Institute analysis

as demand grows for work involving socioemotional, creative, technological, and higher cognitive skills.⁷

Almost
40%

of Americans are in occupational categories that could shrink by 2030

Building on our earlier research, we modeled scenarios with varying timelines for the widespread adoption of automation technologies in the American workplace. Throughout this report, we focus on the midpoint adoption scenario.⁸ Our model shows some local economies experiencing more disruption than others. At the high end of the displacement spectrum are 512 counties, home to 20.3 million people, where more than 25 percent of workers could be displaced. The vast majority (429 counties) are rural areas in the Americana and distressed Americana segments. In contrast, urban areas with more diversified economies and workers with higher educational attainment, such as Washington, DC, and Durham, NC, might feel somewhat more muted effects from automation; just over 20 percent of their workforces are likely to be displaced. These differences are explained by each county and city's current industry and occupation mix as well as wages.⁹

The coming wave of automation will affect some of the largest occupational categories in the US economy, such as office support, food service, production work, and customer service and retail sales (Exhibit E5). Nearly 40 percent of current US jobs are in occupational categories that could shrink between now and 2030. A common thread among shrinking roles is that they involve many routine or physical tasks. Because these roles are distributed across the country, no community will be immune from automation-related displacement.

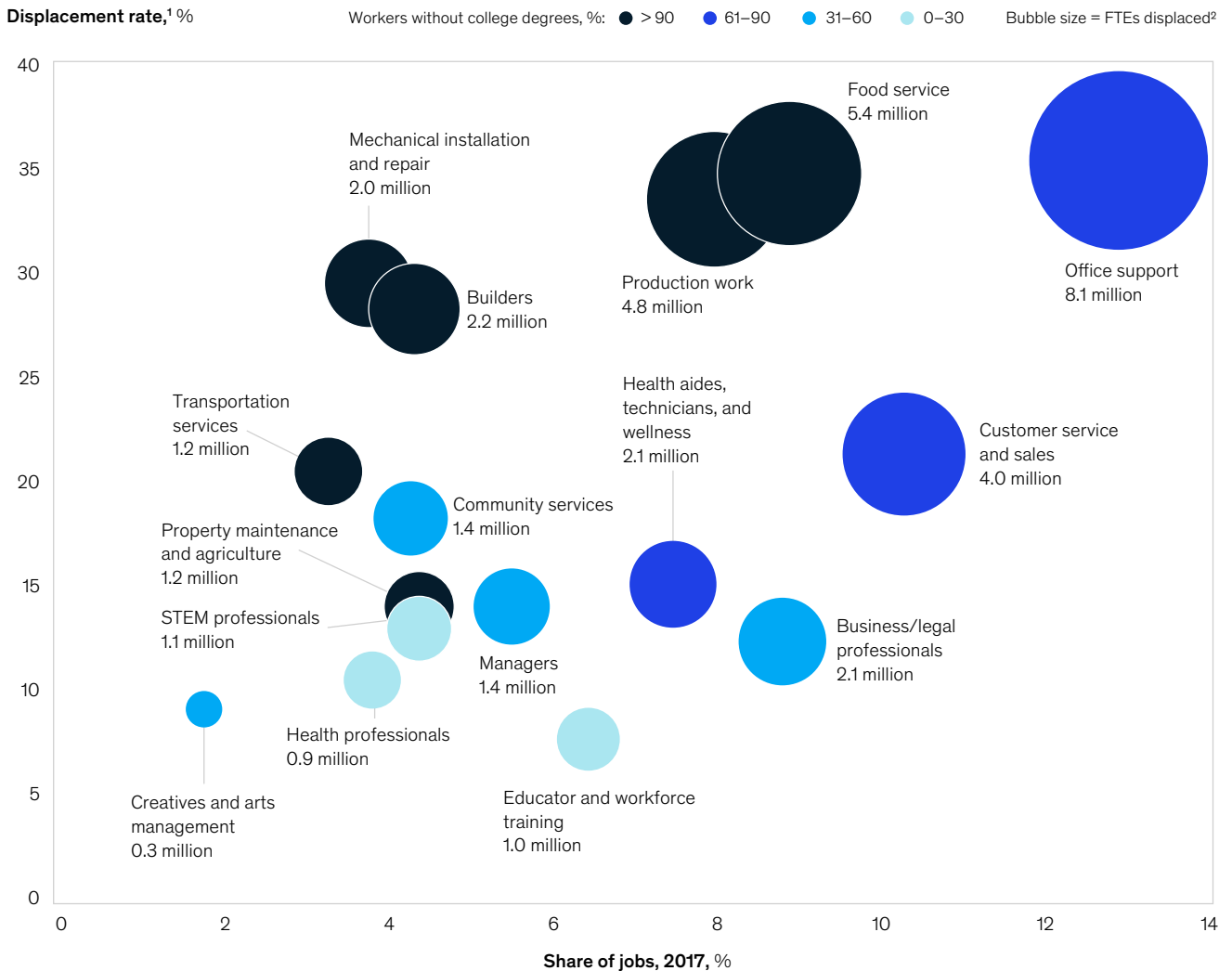
⁷ *Skill shift: Automation and the future of the workforce*, McKinsey Global Institute, May 2018.

⁸ See also Mark Muro, Robert Maxim, and Jacob Whiton, *Automation and artificial intelligence: How machines are affecting people and places*, Metropolitan Policy Program at Brookings, January 2019.

⁹ The pace of disruption from automation will depend on how rapidly companies adopt the new technologies. We model a range of different adoption scenarios based on historical experience that take local wage differentials into account. Our modeling is not intended to produce a forecast; it is a mechanism for assessing and sizing a range of potential outcomes. See the technical appendix in the full report for more detail on methodology and potential limitations.

The largest occupational categories in the US economy have the highest potential displacement rates.

Occupational categories by share of US employment and displacement rate¹ through 2030, midpoint adoption scenario



¹ Based on the share of automatable activities for occupations within each category.

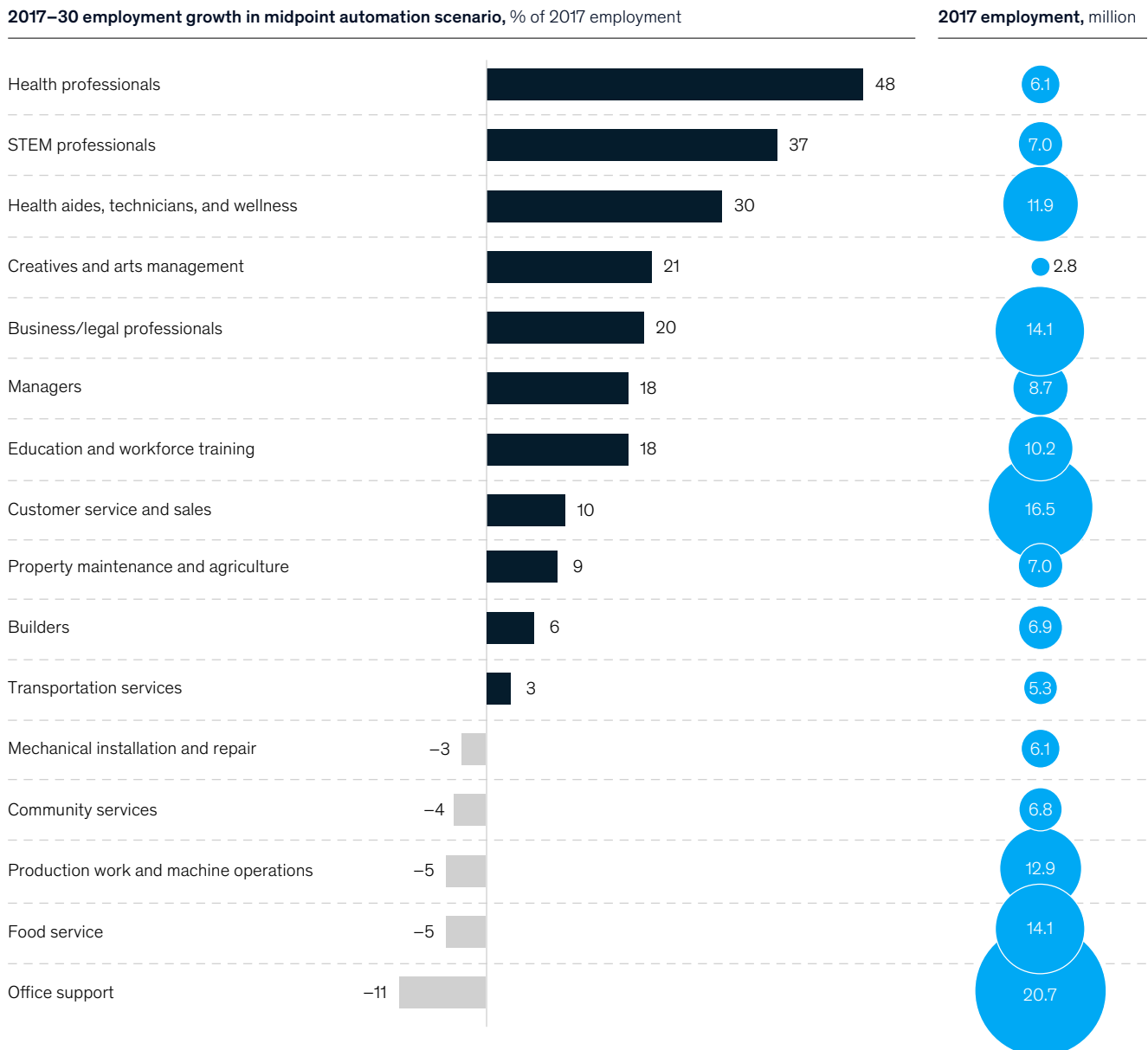
² Full-time equivalents displaced in midpoint automation scenario by 2030. In office support, for example, technology could handle the activities that account for more than 35 percent of all hours worked, or the equivalent of 8.1 million full-time workers.

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

These losses will not necessarily manifest as sudden mass unemployment. Many occupations are likely to shrink through attrition and reduced hiring. This has already been occurring in office support roles, for instance. Offices once populated by armies of administrative assistants, research librarians, and payroll and data clerks now run with leaner support teams and more digital tools. Administrative assistants, bill collectors, and bookkeepers lost a combined 226,000 jobs from 2012 to 2017.

Even as some occupations decline, the US economy should continue to grow and create new jobs in the years to 2030. But the occupational mix of the economy is evolving and could do so at an even faster pace in the decade ahead. While employment in categories such as office support and food service may decline, our scenario suggests strong job growth in healthcare, STEM occupations, creatives and arts management, and business services (Exhibit E6). Growth and displacement may occur even within the same occupational category. In customer service and retail sales, for example, counter attendants and rental clerks may decline, but more workers could be added to help customers in stores or to staff distribution centers.

In the decade ahead, health and STEM occupations could post rapid growth while office support, food service, and manufacturing production jobs could decline.



Note: This exhibit displays net job growth, factoring in both job losses due to automation and expected job creation. Customer service and sales, for instance, is one of the occupational categories with the largest number of potential displacements, yet our model finds that enough jobs will be added over the same period to produce positive net growth overall.

Source: McKinsey Global Institute analysis

Growth in transportation services may seem surprising as autonomous trucks and cars appear to be making rapid advances. In reality, it could take years to surmount the technical and regulatory hurdles to their deployment and for companies to replace the extensive capital assets already on the roads.

A look at some of the fastest-growing job categories of the past five years reveals that shifts are already occurring.¹⁰ The economy is adding jobs that make use of new technologies—not only software developers and information security analysts but also solar panel installers and

¹⁰ David H. Autor, *Work of the past, work of the future*, Richard T. Ely Lecture, American Economic Association Annual Meeting, Atlanta, GA, January 4, 2019.

wind turbine technicians. A society with increasing affluence has more demand for personal services, creating work for massage therapists, concierges, and fitness trainers. Healthcare roles such as hearing aid specialists and personal care aides are expanding. Creative jobs, such as video editors, makeup artists, and fashion designers, are another growth area. There are more family therapists, psychologists, and community service managers—roles involving the kind of interpersonal interaction and empathy that machines cannot provide. At the same time, technology is likely to create new jobs we cannot imagine today; academic research suggests that about 8 to 9 percent of jobs by 2030 will be ones that barely exist today.¹¹

Despite new occupations and overall job growth, one worrisome trend could continue: the hollowing out of middle-wage jobs. Our analysis suggests that by 2030, they could decline as a share of national employment by 3.4 percentage points. Our model shows employment in low-wage jobs declining by 0.4 percentage point, while employment in the highest-wage jobs grows by 3.8 percentage points.¹² The growth of high-wage roles can be realized only if workers can obtain the necessary education and skills. Forging career pathways to help people move up and finding sources of future middle-wage jobs will be essential to sustaining the US middle class (see Box E1, “Mapping new career pathways to enable economic mobility”).

All Americans will need to cultivate new skills to remain relevant in a more digital and knowledge-intensive economy. The biggest effect of automation will not necessarily be in sidelining people but in augmenting what they do. As machines perform some tasks, the time that is freed up can be reallocated into different, and often higher-value, activities. More workers will need to work side by side with machines and use them to become more productive.

Box E1

Mapping new career pathways to enable economic mobility

Although technology may displace some workers, it can also be part of the solution for re-engaging them—by identifying career pathways and logical job moves based on the skills an individual already has.

Using data from Economic Modeling Specialists International, we can match displaced workers with growing occupations that utilize compatible skills and require similar education credentials—even some with the same or higher median wages. For example, 900,000 bookkeepers, accountants, and auditing clerks nationwide, with a median annual salary of \$39,240, may see their jobs phased out in the decade ahead. But their skills are highly compatible with less automatable occupations such as insurance underwriter (median salary of \$69,760), loan officer (\$64,660), credit analyst (\$71,290), and claims adjuster (\$64,900). Workers might need to acquire new credentials or add specific skills to make some of these moves. This type of analysis can be applied at the level of a city, country, state, or industry.

Identifying career pathways in this way can not only help people clarify a course of action in a time of change; it can put more people on the path to upward mobility. Employers, too, can use a similar approach in their internal workforce transformations to map whether employees in declining roles have complementary skills that could make them a good fit for growing roles and determine what kind of additional training they might need to fill the gaps.

¹¹ Jeffrey Lin, “Technological adaptation, cities, and new work,” *Review of Economics and Statistics*, May 2011, Volume 93, Number 2.

¹² Based on the median salary of jobs in 2017. We define middle-wage jobs as those in the middle 40 percent in the income distribution. This analysis does not account for different wage growth or decline over time.

In the decade ahead, local economies could continue to diverge

Workforce transitions will play out differently in local communities across the United States. Our findings suggest that net job growth through 2030 may be concentrated in relatively few urban areas, while wide swaths of the country see little employment growth or even lose jobs (Exhibit E7).¹³

25

urban areas could generate 60% of US job growth through 2030

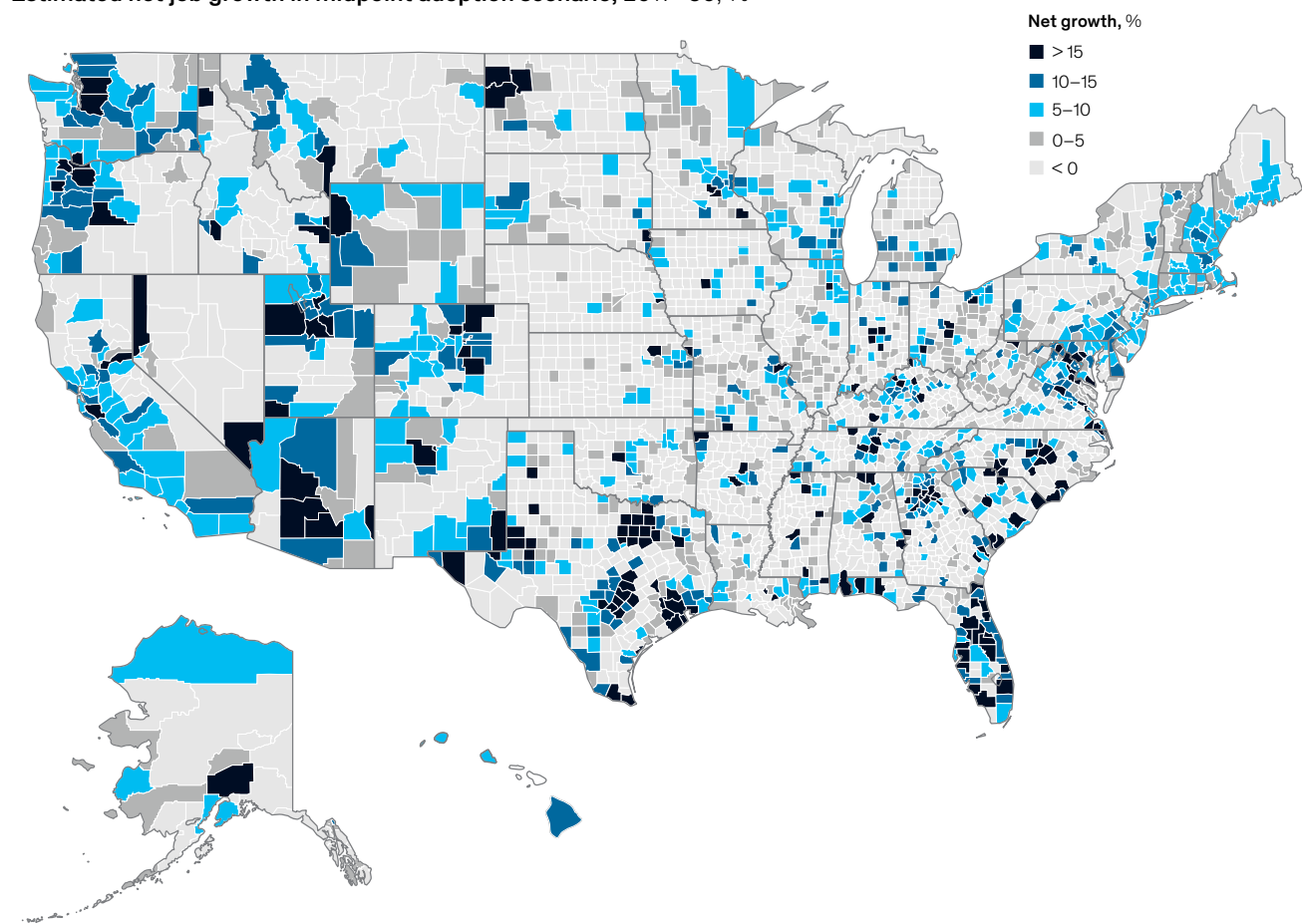
The 25 megacities and high-growth hubs, plus their peripheries, may account for about 60 percent of net job growth by 2030, although they have just 44 percent of the population. Individual standouts like Phoenix and Austin have diverse economies and high concentrations of the tech and business services that may boost job creation. But even the most thriving cities will need to connect marginalized populations with better opportunities.

Some niche cities are also well positioned. Small powerhouses could enjoy 15 percent employment growth on average by 2030, fueled in many places by technology businesses. Silver cities are riding a wave of growth as the retirement-age population swells. Employment in this segment could grow by 15 percent as seniors drive demand for healthcare and other services—and as more of them continue working past traditional retirement age. College-centric towns may see 11 percent employment growth over the next decade; they can build on their well-educated talent pools.

Exhibit E7

In our midpoint adoption scenario, net job creation through 2030 is concentrated in some urban counties, while rural areas lose jobs.

Estimated net job growth in midpoint adoption scenario, 2017–30, %



Source: McKinsey Global Institute analysis

¹³ These results should not be read as forecasts. As in our previous research, we model a likely scenario to indicate the scale and direction of what could occur.

-3%

potential job growth through 2030 in distressed Americana counties

On the other end of the spectrum, the decade ahead could be a rocky one for rural America. Low-growth and rural areas as a group account for 20 percent of jobs today but could drive as little as 3 percent of job growth through 2030. Our model indicates anemic 1 percent employment growth over the entirety of the next decade in the more than 1,100 rural Americana counties. Rural outlier counties should continue to sustain growth through natural resources and tourism, although they may manage job growth of only 3 percent. The picture is worst for the roughly 970 distressed Americana counties that are entering the decade in poor economic health. Our model suggests that these areas could experience net job loss, with their employment bases shrinking by 3 percent.

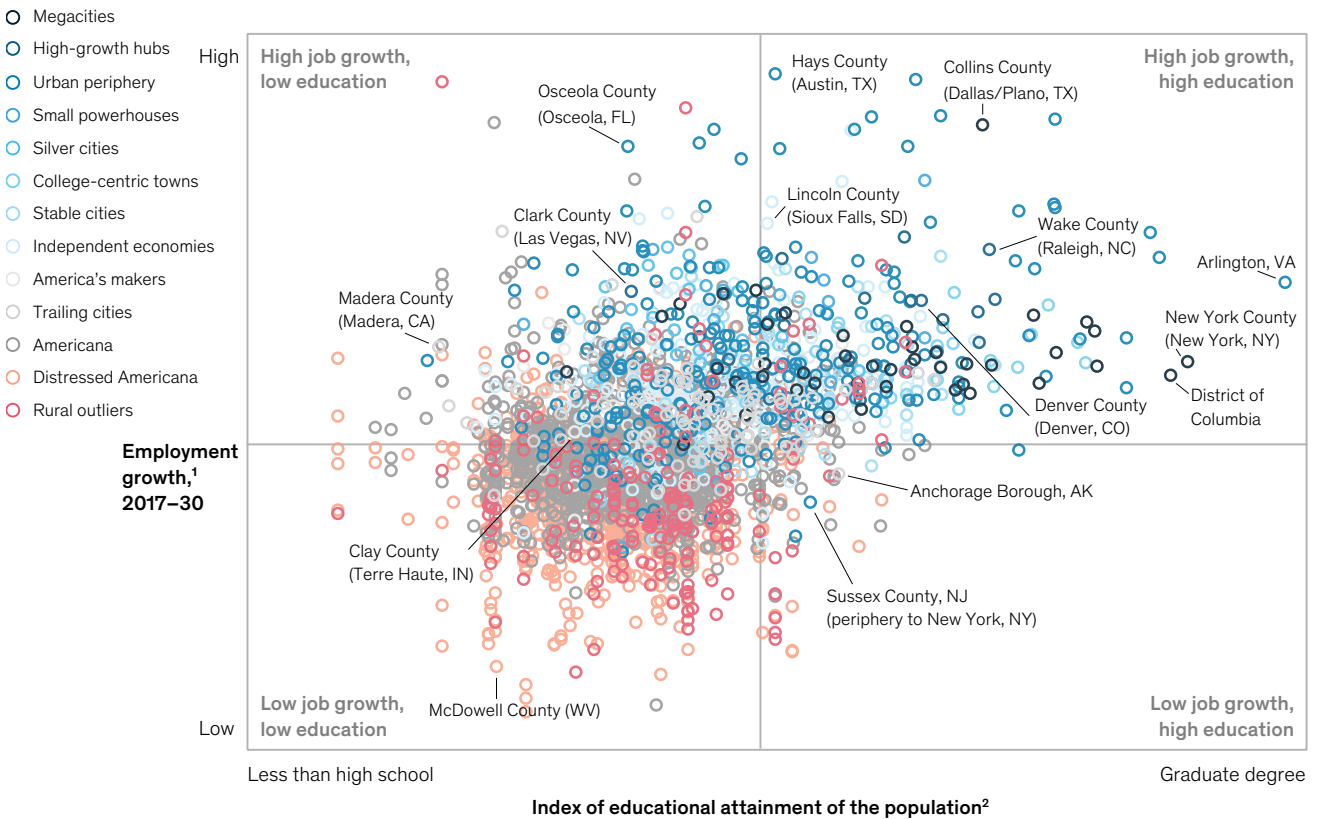
The mixed middle cities are positioned for modest jobs gains. Some could manage to accelerate growth, but in a period of change and churn, others could slip into decline. Many stable cities and independent economies have relatively educated workforces and could become attractive regional outposts for corporations looking to expand into lower-cost locations. America's makers may see mixed results; they will need clear strategies to shift to advanced manufacturing and rebuild local supply chains.¹⁴

Exhibit E8 shows that correlation between the educational attainment of individual communities and their future economic prospects. Most fast-growing cities fall into the upper right quadrant, with highly educated workforces and more robust employment growth; the reverse is true for rural counties, many of which are concentrated in the lower left quadrant.

Exhibit E8

Urban counties, with higher levels of education, are positioned for stronger job growth.

County average educational attainment and employment growth in midpoint adoption scenario, 2017–30



¹ Midpoint adoption scenario. Counties above the line have positive growth, and counties below the line have negative growth.

² Scaled from 0-10 where 0 is less than high school, 2.5 is high school, 5 is some college, 7.5 is bachelor's degree, and 10 is graduate degree, multiplying the share of each by its value.

Source: Integrated Public Use Microdata Series (IPUMS ACS); McKinsey Global Institute analysis

¹⁴ *Making it in America: Revitalizing US manufacturing*, McKinsey Global Institute, November 2017.

Some stable cities and independent economies combine relatively lower education levels with high job growth potential, raising questions about the quality of the jobs they are generating. Notably few places combine high education levels with poor employment prospects.

Less educated workers are most likely to be displaced, while the youngest and oldest workers could face unique challenges

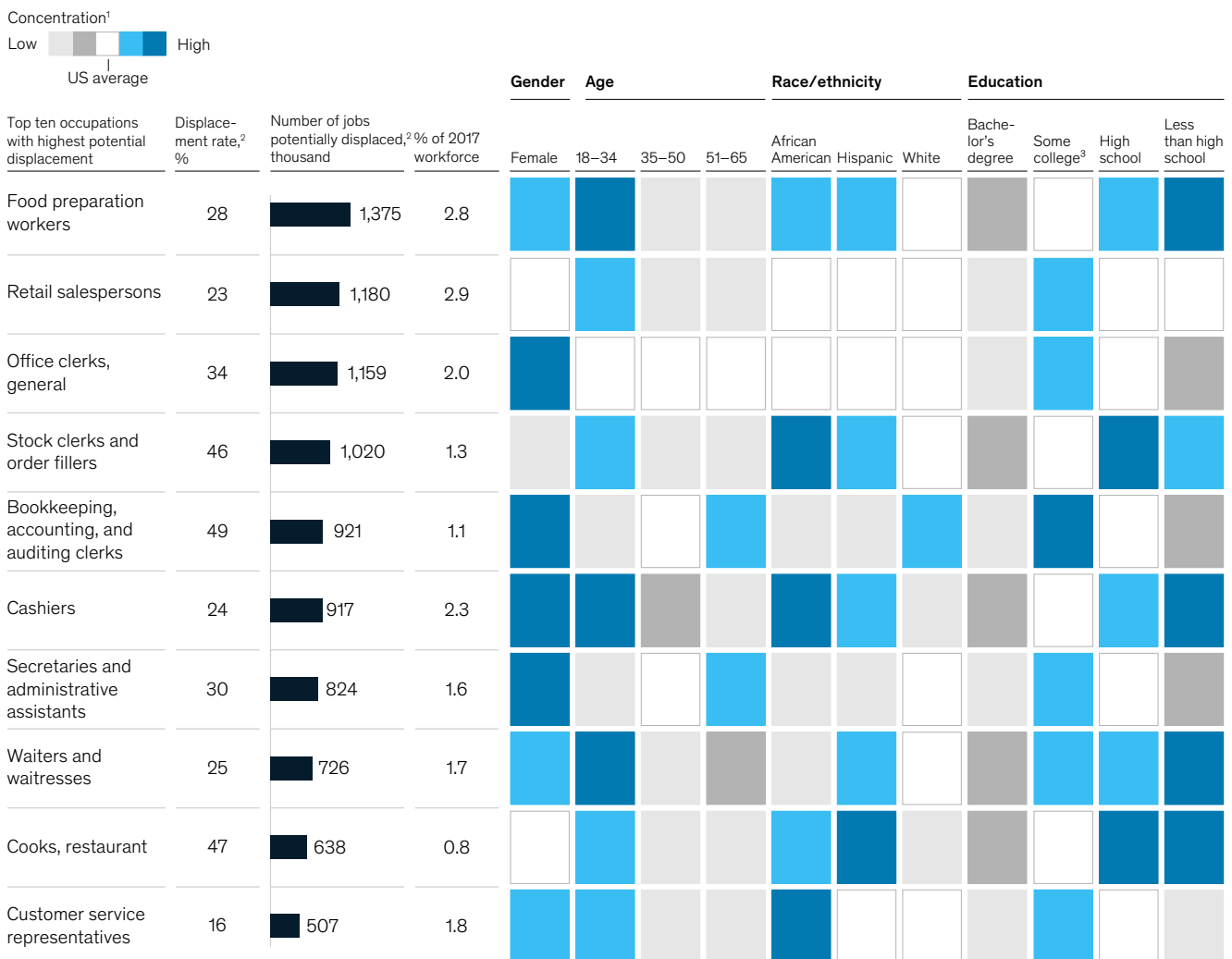
The effects of automation will vary across specific demographic groups (Exhibit E9). Understanding who holds the occupations with the highest automation potential today and which workers are best positioned for future job growth is an important first step for designing targeted interventions and training programs. Our findings suggest that automation could disproportionately affect workers in already underrepresented racial groups.

Workers with the lowest levels of educational attainment are at greatest risk

Education does not automatically confer job skills, but we rely on educational attainment as a proxy for skills—and it stands out as a key indicator of displacement risk from automation. We find that individuals with a high school degree or less are four times more likely to be in a

Exhibit E9

Some occupations with high displacement potential have skewed demographic concentrations.



¹ Measured by comparing share of persons fitting each demographic profile in an occupation with share in total US workforce.

² 2030 midpoint adoption scenario.

³ Includes associate's degrees.

Source: US Bureau of Labor Statistics, Integrated Public Use Microdata Series (IPUMS ACS) 2017; McKinsey Global Institute analysis

highly automatable role than individuals with a bachelor's degree or higher—and as much as 14 times more vulnerable than someone with a graduate degree.

For a number of years, job postings have shown persistent “degree inflation.” One report found that almost two-thirds of job postings for executive assistants, for example, now call for a bachelor's degree when only 19 percent of those employed in those roles at the time of the study held those degrees.¹⁵ Breaking this trend by focusing on the specific skills needed in a given job, rather than on degree requirements, can vastly increase the number of qualified job applicants and create opportunities for more people.

25.5%

potential displacement rate for Hispanic workers

Because some minority groups have lower educational attainment, we find they are more vulnerable to being displaced by automation. Hispanic workers, for instance, are overrepresented in food service roles and have the highest rate of potential displacement among all minority groups, at 25.5 percent (7.4 million individuals). For African Americans, the potential displacement rate is 23.1 percent (4.6 million individuals). White workers have a potential displacement rate of 22.4 percent, and Asian-American workers have the lowest rate, at 21.7 percent. Particularly in places such as California, Texas, and Florida, all of which have large concentrations of Hispanic workers, targeted retraining and job placement programs will be needed.

Automation will pose particular challenges for young and old workers

Automation will affect workers across age brackets, but both the youngest and oldest segments of the labor force face unique risks.

14.7M

young workers are in highly automatable jobs

Young people will need new career paths to build skills and gain a foothold into the working world. Tens of millions of Americans can think back to their first jobs in retail or food service—roles that gave them valuable soft skills and experience that propelled them on their way. But these are the very roles that automation could phase out. Roughly 14.7 million workers under age 34 could be displaced by automation; almost half of them are in roles with high separation rates, so employers may not see a clear business case for retraining and redeploying them. It will be important to create a wider variety of pathways from high school to work, perhaps through apprenticeship.

11.5M

workers over age 50 at risk

On the opposite side of the generational divide, some 11.5 million US workers over the age of 50 could be displaced by automation. While some of these workers are close to retirement, others have years to go. One study looking at labor market recovery after recessions found that displaced workers ages 55 to 64 were 16 percentage points less likely to be re-employed at the time of follow-up surveys than workers ages 35 to 44.¹⁶ While some displaced older workers who have spent much of their career doing one thing may not be willing or able to make a drastic change, millions more might embrace the opportunity to train for different lines of work.

While both men and women could be displaced by automation, women may be better positioned for future job growth

Many of the specific jobs most at risk from automation skew heavily toward one gender or the other. Men, for example, make up the majority of drivers and assembly line workers, while administrative assistants and bookkeepers are predominantly female. Overall, women represent 47 percent of the displaced workers in our midpoint automation scenario, while men are 53 percent. Based on the current gender share of occupations, our modeling suggests that women could capture 58 percent of net job growth through 2030, although the gender balance in occupations can and does change over time. Much of this is due to women's heavy representation in health professions and personal care work.

¹⁵ *Moving the goalposts: How demand for a bachelor's degree is reshaping the workforce*, Burning Glass Technologies, September 2014.

¹⁶ Henry S. Farber, *Job loss in the Great Recession and its aftermath: US evidence from the Displaced Workers Survey*, NBER working paper number 21216, May 2015.

58%

share of net job growth that women could capture

But these growing categories consider only jobs that exist today. Recent research notes that men are more heavily represented in “frontier” jobs involving cutting-edge technologies, which may position them for other jobs that have yet to emerge.¹⁷ Improving the representation of women in the tech sector is a priority. A 2018 report that surveyed 279 companies with a combined workforce of 13 million found that progress on improving gender diversity has stalled, despite the fact that more women than men earn college degrees.¹⁸ Overall, this period of change is an opportunity for many women to move into more productive, better-paying work.¹⁹

The opportunities and challenges for employers depend on their workforce characteristics and geographic footprint

To take full advantage of what automation technologies can do for innovation and productivity, employers will need to rethink business processes and workflows—all of which may require large-scale workforce transformations. Several factors will shape their decisions: the state of their current digital initiatives, the share of current work that machines can handle, whether technology complements existing labor or substitutes for it, the diversity of current roles, the education level of the current workforce, turnover rates, and the customer experience.

Large-scale workforce transformation requires vision and adept leadership from the entire management team—and it has implications for the company’s overall strategy, operations, talent needs, capital investment, geographic footprint, diversity goals, and external reputation. As the demand for labor shifts across the country, these changes will affect the geography of consumer purchasing power.

Every company will forge its own path. But some common considerations exist, particularly for companies with similar profiles. While not exhaustive, Exhibit E10 profiles the opportunities and challenges for six types of employers with varying workforce characteristics, geographic concentrations, and density of automatable activities.

For example, a company with a large, nationally distributed frontline workforce, such as those in retail, food service, and hospitality, can raise productivity through labor-saving automation.²⁰ Retraining and redeploying workers into other roles, for instance in distribution centers or customer experience roles, might make sense. With high turnover rates in entry-level roles, however, companies may not see a clear business case for retraining. But it is wrong to assume that training cannot pay off for these workforces; many employers have found that offering learning programs and upward pathways can reduce attrition rates and enhance employee engagement.²¹ This period of transition could be a once-in-a-generation opportunity to transform many “dead-end” jobs into more interesting and rewarding work. Because these employers will be making decisions that affect millions of low-wage workers, they could affect many local communities.

The challenges look very different for geographically concentrated businesses with white-collar workforces. Automation and AI technologies could replace millions of workers in middle- to high-wage accounting, finance, business, legal, and support functions. Many of these workers have college degrees, with low turnover and attrition, presenting companies with meaningful decisions regarding redeployment. Their challenge will be determining when to hire external talent with digital skills and when retraining and redeploying committed workers who already know the company’s business and culture is feasible.

¹⁷ David H. Autor, *Work of the past, work of the future*, Richard T. Ely Lecture, American Economic Association Annual Meeting, Atlanta, GA, January 4, 2019.

¹⁸ *Women in the Workplace 2018*, McKinsey & Company and LeanIn.Org.

¹⁹ For more on this topic, see *The future of women and work: Transitions in the age of automation*, McKinsey Global Institute, June 2019.

²⁰ Steven Begley, Bryan Hancock, Thomas Kilroy, and Sajal Kohli, “Automation in retail: An executive overview for getting ready,” May 2019, McKinsey.com.

²¹ See, for instance, Zeynep Ton, *The Good Jobs Strategy: How the Smartest Companies Invest in Workers to Lower Costs and Boost Profits*, Boston, MA: Houghton Mifflin Harcourt, 2014.

Employers' opportunities and challenges depend on company footprint and workforce characteristics.



Size of workforce



Share of workers with bachelor's degree



Automation displacement rate

Workforce characteristics	Examples	Description	Key challenges
White-collar workforces 25M–30M 35–45% 20–25%	Insurance Banking HQ functions Gov't agencies	Concentrated footprint, middle- and high-skill workforce with low turnover. Process automation can enhance efficiency but may displace workers.	<ul style="list-style-type: none"> Retraining and redeployment to new roles within the company, especially digital Hiring required tech talent
Nationwide customer-facing 15M–20M 15–25% 25–30%	Retail Food service Hospitality	Nationally dispersed geographic footprint. Majority of workforce is in lower-skill jobs with high turnover.	<ul style="list-style-type: none"> Economics of retraining may be challenging given high turnover Reskilling and redeployment (into managers, delivery, other new customer experience roles)
Movers and builders 10M–15M 5–15% 20–25%	Parcel delivery Warehouses Construction	Mix of local and national footprint. Largely middle-skill workforce, some with specialized skills. High diversity of occupations and automation potential.	<ul style="list-style-type: none"> Training employees to integrate, operate, and maintain technologies Finding adjacent middle-skill occupations to redeploy workers
Specialized practitioners 5M–10M 50–60% 10–15%	Healthcare Education Professional services	Middle- to high-skill workforce. Automation complements labor and reduces routine tasks, allowing more time on highest-value-added work.	<ul style="list-style-type: none"> Continuous learning to adopt new technology Finding new business models that leverage technology, including remote service delivery
STEM-based workforce 5M–10M 65–75% 10–15%	Pharmaceutical Tech Software	Highly specialized, high-skill workforce with concentrated geographic footprint. High pace of sector technology change.	<ul style="list-style-type: none"> Attracting and retaining top talent and continuous learning Rethinking location strategy based on cost and access to talent
Makers and extractors 5M–10M 5–15% 25–30%	Manufacturing Oil and gas Mining	Geographically concentrated. Low- to middle-skill workforces performing physically intensive and repetitive tasks. Lower turnover.	<ul style="list-style-type: none"> Building technical capabilities; attracting talent to remote areas or retraining existing employees Potential for community disruption

Note: "Archetype" refers to organizations with particular workforce characteristics, largely determined by work activities and related skills, workforce mobility and churn, and geographic footprint. "Examples" highlight sectors in which these workforce characteristics are common, although they are not universal or exhaustive. The "key challenges," too, are highlights rather than a comprehensive list.

Source: McKinsey Global Institute analysis

Local business leaders, policy makers, and educators will need to work together to chart a new course

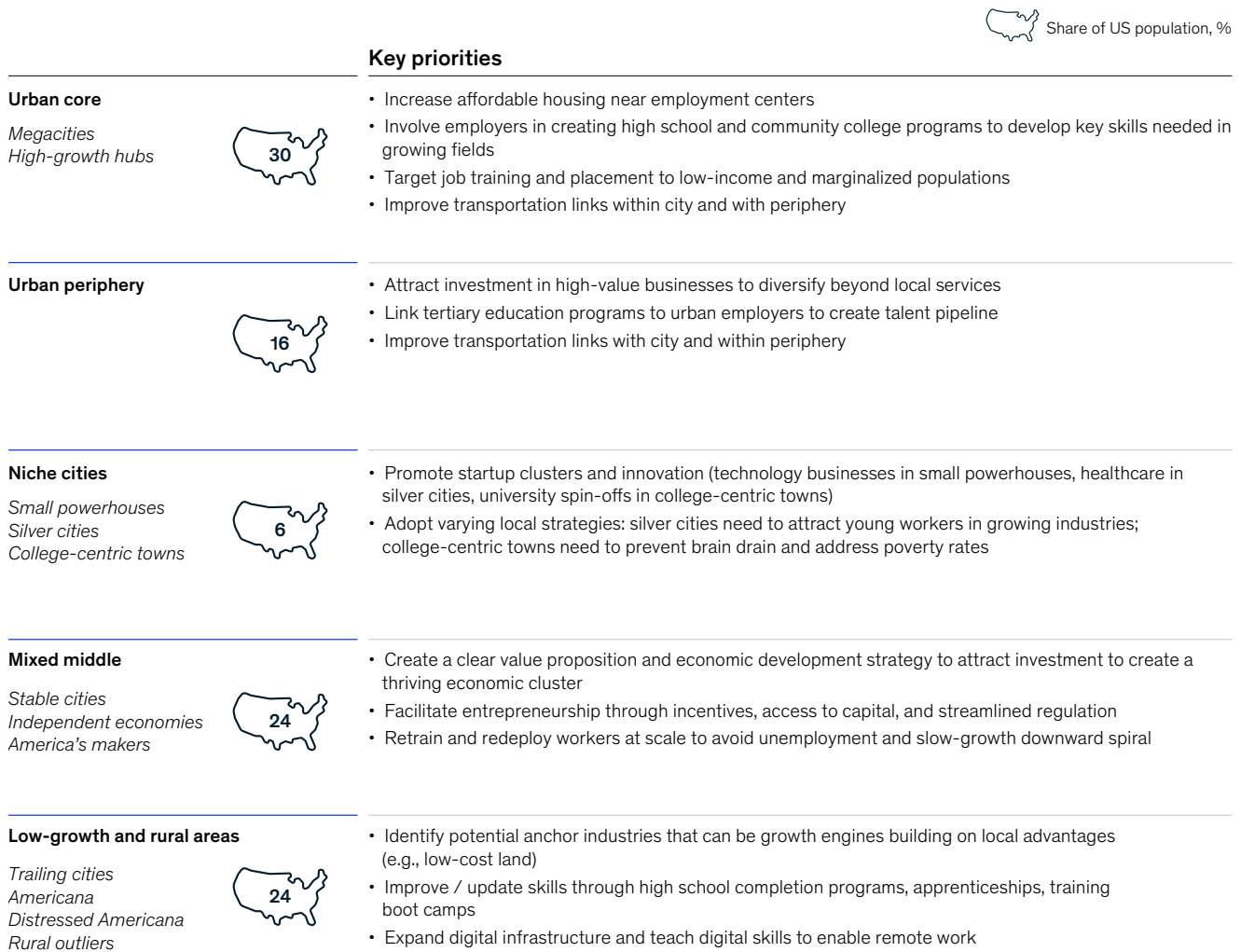
The next decade will bring every community new challenges—but also new opportunities to boost innovation, productivity, and inclusive growth. Even in the nation's most prosperous cities, large populations are already struggling to find a place in the new economy and keep up with the rising cost of living. But in general, cities are more diversified and have more resources and investment flows on which to draw. Reinvention will be a harder task for trailing cities, some manufacturing towns, and rural counties that never bounced back from the Great

Recession. Without forward-thinking interventions, the disparities separating America's communities could widen.²²

The good news is that there is a growing tool kit of potential solutions, and many promising pilots are under way. The relative priorities will vary from place to place, and each community will need to determine what is most urgent and set its own agenda (Exhibit E11). Wherever they choose to begin, the growing urgency for coordinated action from local business leaders, policy makers, educators, and other stakeholders from coast to coast is clear.

Exhibit E11

Communities face different future of work challenges.



Source: McKinsey Global Institute analysis

Connecting workers with opportunities

A central challenge in the automation age will be connecting millions of displaced workers to new, growing jobs. Some may need to change jobs within the same company, and employers would provide the necessary training in these situations. But many workers may need to switch employers or make even bigger moves to different occupations in new locations.

²² For a comprehensive discussion of potential policy interventions, see *The work ahead: Machines, skills, and US leadership in the twenty-first century*, Council on Foreign Relations, Independent Task Force Report number 76, 2018; *America at work: A national mosaic and roadmap for tomorrow*, Walmart, 2019; and Ethan Pollack, Alastair Fitzpayne, and Conor McKay, *Automation and a changing economy*, Aspen Institute Future of Work Initiative, April 2019.

A survey of US households found that over half of workers displaced between 2005 and 2015 found their next job in a different industry.²³ For these workers, governments and other stakeholders can help to make local labor markets more fluid and easier to navigate.

In a more technology-driven world, job-matching efforts can be aided by a range of new digital tools and should run on easily accessible digital platforms. New online tools can assess an individual's skills, suggest appropriate career choices, and clarify which jobs are in demand and the credentials needed to obtain them.²⁴ Many efforts are under way to centralize and standardize information on skills, job postings, and credentials.²⁵ The Markle Foundation's Skillful initiative brings together employers, state governments, technology experts, and educators to improve job matching.

Geography itself can be a barrier to connecting to new opportunities, given the declines in Americans' mobility. It is sometimes suggested that people should simply leave distressed places and move to where the jobs are. But this greatly oversimplifies the weight of this decision for individuals who may have deep personal and family ties to the places where they live, as well as economic barriers to leaving. Addressing the affordable housing shortage in the fastest-growing urban areas would enable people who *do* want to move for better opportunities to do so (and would create demand in the construction sector at the same time). Because there is a national benefit to improving labor market fluidity, policy makers might consider providing relocation assistance or tax credits, as they have for other investments, such as home energy efficiency.

Retraining workers and providing lifelong learning

Workforce skills have been a growing concern in the United States for many years. Now new and higher-level skills are in demand, including not only digital skills but also critical thinking, creativity, and socioemotional skills. The skills needed in fast-growing STEM roles, in particular, are continuously evolving. The old model of front-loading education early in life needs to give way to lifelong learning. Training and education can no longer end when workers are in their twenties and carry them through the decades.

Employers will be the natural providers of training and continuous learning opportunities for many workers. For instance, Walmart's Academy is designed to allow high-performing associates to move into management. Toyota's Advanced Manufacturing Technician program integrates a two-year technical degree curriculum with paid part-time employment. SAP quantified an expected skills gap, then mapped comprehensive "learning journeys" to help thousands of employees transition into new roles through in-house classroom training courses and boot camps, job shadowing, and on-the-job practice.²⁶

Many workers who need to switch employers or change occupations will need training options outside the workplace. All levels of government, nonprofits, education providers, and industry associations can play a role here. Midcareer workers need to continue paying their bills while they train for the next chapter in their careers; they require short, flexible courses that follow the boot camp model, teaching new skills in weeks or months rather than years.

Across the country are numerous examples of industry-specific training programs delivered through local educational institutions that result in job placements. Georgia's Quick Start, for instance, is a state-funded program that provides customized workforce development training at no cost to qualified businesses; it covers industries such as advanced

²³ *Addressing America's reskilling challenge*, US Council of Economic Advisers, July 2018.

²⁴ *Online talent platforms: Connecting workers with opportunity in the digital age*, McKinsey Global Institute, June 2015.

²⁵ Major efforts are under way to create a consistent taxonomy to describe workforce skills. The US Chamber of Commerce Foundation and the Lumina Foundation have launched the T3 Innovation Network to create an open data ecosystem to centralize information on skills, credentialing, and the needs of the economy and to standardize how skills are defined across industries and employers. A nonprofit called Credential Engine is creating an online registry to make information about the thousands of varying credentials across the country more transparent and searchable.

²⁶ "Building the workforce of tomorrow, today," *McKinsey Quarterly*, November 2018.

4x

higher risk of displacement
for workers with high school
diplomas or less

manufacturing and bioscience. The online company Coursera offers an eight-month Google-designed IT support certificate program that has drawn tens of thousands of trainees. Udacity, another online learning company, offers “nanodegrees” in areas including data science, programming, and cloud computing.

The millions of Americans who did not complete high school will be hit hardest by automation. The Michigan 23+ program aims to reach them with an online program offering high school diplomas, workforce credentials, guidance, and job placement. The American Association of Community Colleges’ Plus 50 initiative provides grants to hundreds of individual institutions across the country for workforce training programs geared to participants over age 50.

The challenge ahead is to scale up the most successful programs. Using data to track employment outcomes will be essential so that funding can be channeled into what works and individuals can make more informed choices about their own training and careers. The most effective programs will need to be replicated across cities, regions, and industries.

Creating tailored economic development strategies to boost job creation

Every community, from the most dynamic to the most distressed, faces economic development issues that need to be solved at the local and regional level. Priorities may vary across different community segments, and individual cities and counties will need highly tailored strategies. For megacities and high-growth hubs, the priorities may be connecting disadvantaged populations with new opportunities, adding affordable housing, and improving transportation. The communities in the mixed middle segment need to accelerate economic growth and focus on entrepreneurship and skills development.

For rural counties, the road is tougher. Many of these places lack the economic base or the inflows of investment or people to create new jobs. No amount of workforce retraining can solve the bigger challenge of lack of economic activity. Individual companies can help to ease this strain by considering whether there is a business case for establishing operations in more affordable parts of the country that need the investment.

Turning around places that have lost their economic dynamism is a multiyear journey, but it is possible. Each community will have to take inventory of its assets, such as available industrial space, natural attractions, local universities, and specialized workforce skills.²⁷ That data can form the basis of an economic development plan built around a growth engine industry that can create jobs and spillover effects. The next step is attracting investment, which does not have to come from within the United States. Subsidies and tax incentives can be part of the tool kit, but they need to be backed by a rigorous business case. Incentives for brownfield investment could help legacy firms modernize and grow. Almost every city and county has pockets of poverty that need special attention. Stabilizing the most distressed neighborhoods may take extra investment and targeted efforts (such as blight removal, home and infrastructure repair, and additional community services).

The growing acceptance of remote working models could be a positive trend for creating jobs in rural counties, whether full-time work-at-home employee roles or contract work. But it will take a push to continue building out fast, affordable broadband in the regions that still need service. The Rural Innovation Initiative, recently launched in nine communities nationwide, is building outposts for workers in the downtowns of rural cities, aiming to spur professional collaboration and nurture tech talent across the country.

²⁷ See James Fallows and Deborah Fallows, *Our Towns: A 100,000-Mile Journey into the Heart of America*, New York, NY: Pantheon Books, 2018.

Supporting workers in transition

In this period of technological change, the United States will need to look at modernizing and strengthening the social safety net to support people transitioning between jobs. Workers displaced from full-time roles experience an average 35 percent loss of earnings, due to gaps in employment or working fewer hours at a new job.²⁸ Some of the people most likely to be affected are already living paycheck-to-paycheck. For them, even a short period of disruption could provoke tremendous stress.²⁹

Supporting them can take many forms: longer and more flexible income support programs during periods of unemployment, relocation assistance, training grants, and earned income tax credits. Because unemployment insurance is administered at the state level, this is an opportunity for state governments to innovate and lead. In addition, establishing tax incentives for employers to offer job retraining could help to head off some potential displacements before they occur.

Portable benefits—tied to the worker rather than the employer—could offer stability to people who need to move between opportunities and geographies. Benefits could be universal for full-time, part-time, and independent workers, and they could be prorated so that contributions are tied to hours worked for different employers. A broader system of portable benefits can offer more stability and free more Americans to strike out on their own and become entrepreneurs.

Wages and purchasing power are real concerns. Although a tighter labor market may increase wage growth in the short term, it will take sustained growth to counter the trend of wage stagnation, which dates to the 1980s.³⁰ In the decade ahead, if displacement leaves more uncredentialed workers competing for the jobs that remain, this surplus labor could flood the market and again drive down wages at the lower end of the pay scale. Policy makers and employers alike cannot ignore the implications if a large share of the population is falling behind.

The United States does not have to let opportunity concentrate in a limited number of places, some of which are straining at the seams, while others wither. Policy choices, along with increased public and private investment in people and in the places that need it, can create more inclusive growth. Companies can make a difference by recognizing that talent is available all over the country and investing alongside other entities to realize untapped potential. The nation will need the combined energy and ingenuity of many local coalitions from coast to coast, united not in fighting against technology but in preparing US workers to succeed alongside it.

²⁸ Henry Farber. "Employment, hours, and earnings consequences of job loss," *Journal of Labor Economics*. Volume 35, number S1, July 2017.

²⁹ Conor McKay, Ethan Pollack, and Alastair Fitzpayne, *Automation and a changing economy, Part I: The case for action*, Aspen Institute Future of Work Initiative, April 2019.

³⁰ Jay Shambaugh et al., *Thirteen facts about wage growth*, The Hamilton Project, Brookings Institution, September 2017.

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July 2019

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