Building New Careers:  
Identifying Shortage Occupations and the Skills 50+ Workers Will Need, 2017–2020

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Executive Summary

Although workers age 50 and over experience relatively low levels of unemployment,\(^1\) they are more likely than other age groups to experience high levels of long-term unemployment,\(^2\) stagnant wages,\(^3\) and declining job opportunities.\(^4\) Meanwhile, many employers are experiencing labor shortages and having trouble filling vacancies with qualified, well-trained workers.\(^5\) This contradiction presents an opportunity to ensure that the 50+ workforce develops the skills necessary for in-demand jobs and to encourage employers to fully consider this population when making hiring decisions.

Addressing the re-entry and advancement challenges faced by older workers and preparing them to meet the hiring needs of employers requires a firm understanding of:

- The current and future employment opportunities available to the 50+ workforce
- Whether workers 50 and over possess the skills and knowledge required to compete for current and future job opportunities
- Education and workforce development programs that can help older workers prepare for current and future job opportunities

AARP contracted with IMPAQ International, LLC to provide data on these issues. This report addresses all three areas to recommend ways to position the 50+ workforce to fill vacancies in shortage occupations. Exhibit 1 illustrates our process for addressing these issues as well as the data and analysis techniques we use.

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### Exhibit 1. Study Steps and Analysis

<table>
<thead>
<tr>
<th>Step</th>
<th>Data Sources</th>
<th>Analysis Technique</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Identify occupations projected to experience labor shortages, 2017-2020</td>
<td>Online job postings from Burning Glass Technologies 2011-2016, 2015 American Community Survey one-year microfile</td>
</tr>
<tr>
<td>2</td>
<td>Examine whether the 50+ workforce has the skills and experience required for these occupations</td>
<td>Occupational distribution of the 50+ workforce in 2015 ACS file</td>
</tr>
<tr>
<td>3</td>
<td>Identify education and workforce development options to prepare 50+ workforce for shortage occupations</td>
<td>Crosswalks on relationships between occupations and areas of study/credentials, Occupational distributions in 2015 ACS file</td>
</tr>
</tbody>
</table>
IDENTIFYING OCCUPATIONAL SHORTAGES

To effectively align the skills of the 50+ workforce with employer needs, it is critical to know which occupations will experience labor shortages in the near future. Using forecasting techniques and data on job postings and unemployment, IMPAQ identified occupations projected to experience the largest labor shortages between 2017 and 2020.

Our measure for projecting a shortage in a given occupation—the job shortage index—is based on the ratio of job postings to unemployed individuals in that occupation. Shortage index values range from 0 to 1, with higher values suggesting employers’ need for qualified workers exceeds the supply, perhaps because the available workforce lacks the skills, experience, or characteristics required. Broadly speaking, shortages occur when the economy approaches full employment—when almost all individuals who are able and willing to work are employed.

Exhibit 2 shows that, between 2017 and 2020, the occupation facing the largest shortages will be Health Diagnosing and Treating Practitioners. This occupation includes jobs such as chiropractors, dentists, orthodontists, surgeons, and pharmacists. Health Diagnosing and Treating Practitioners will also account for the largest share of all job postings (forecasted job share) at 13.8%. Motor Vehicle Operators (including job titles such as taxi, bus, 

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6 The occupational categories are constructed around the Bureau of Labor Statistics’ three-digit standard occupational classification codes. This schema provides information that is detailed enough for directing training efforts but also allows for some generalization across occupations. Throughout the report, we use the term “job titles” to refer to the six-digit SOC codes that comprise the three-digit codes.
and ambulance divers) and Computer Occupations (including job titles such as computer systems analysts, computer programmers, and web developers) will also experience a relatively large shortage and account for a substantial share of all job postings. Sales Representatives, Wholesale and Manufacturing occupations and Advertising, Marketing, Promotions, Public Relations, and Sales Managers are projected to experience large shortages but will account for only a small percentage of job postings.

In addition to providing a nationwide overview of occupational shortages, this study includes findings for individual states. These state shortages tend to follow trends that are similar to those at the national level. For example, Health Diagnosing and Treating Practitioners is the occupation projected to experience the largest shortage in 29 states. The second most common shortage occupation is Computer Occupations, projected to be the area of greatest shortage in eight states.7

MATCHING THE 50+ WORKFORCE TO PROJECTED SHORTAGE OCCUPATIONS

The focus of efforts to address challenges faced by workers over 50 and prepare them to compete for jobs in occupations with the greatest shortage partially depends on the knowledge and skills these workers already have. It also depends, perhaps to a greater extent, on whether older workers are already in these occupations or in occupations that require similar knowledge and skills. By examining the current distribution of the 50+ workforce in shortage occupations, we identify areas where skills and knowledge already align and where, by contrast, education and workforce development opportunities may be necessary.8 This knowledge will allow organizations to devote its finite resources to workforce development and advocacy strategies that are responsive to the needs both of employers and of older workers.

Our analyses show that almost 25% of the 50+ workforce is currently employed in one of the top 10 shortage occupations (see Exhibit 3). An additional 20% are employed in occupations requiring similar knowledge and skills. In other words, a substantial number of older workers are already well positioned to fill job openings in the projected shortage occupations, especially Health Diagnosing and Treating Practitioners and Motor Vehicle Operators, each of which employs more than 4% of the 50+ workforce. When we look at areas in which people over 50 currently work either in the shortage occupation or in an occupation that requires similar skills, two more occupations join the list of those that include at least 4% of the 50+ workforce: Sales Representatives, Wholesale and Manufacturing and Health Technologists and Technicians.

7 More details on state-level findings can be found in the body of the report and appendices.
8 Our analyses rely on data from the Census Bureau’s 2015 American Community Survey. The percentage of the 50+ population in an occupation includes not only workers who are currently employed in the occupation but also those who are unemployed but identify themselves as in the occupation.
### Exhibit 3. Percentage of the 50+ Workforce Employed in Shortage Occupations and Similar Occupations

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Shortage Index</th>
<th>Forecasted Job Share</th>
<th>Percent of 50+ Workforce in Occupation</th>
<th>Percent of 50+ Workforce in Occupation or Similar Occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Diagnosing and Treating Practitioners</td>
<td>1.00</td>
<td>13.8%</td>
<td>4.3%</td>
<td>10.1%</td>
</tr>
<tr>
<td>Sales Representatives, Wholesale and Manufacturing</td>
<td>.46</td>
<td>3.9%</td>
<td>1.3%</td>
<td>9.9%</td>
</tr>
<tr>
<td>Computer Occupations</td>
<td>.39</td>
<td>9.4%</td>
<td>2.2%</td>
<td>2.2%</td>
</tr>
<tr>
<td>Advertising, Marketing, Promotions, Public Relations, and Sales Managers</td>
<td>.27</td>
<td>2.0%</td>
<td>0.6%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Motor Vehicle Operators</td>
<td>.24</td>
<td>11.0%</td>
<td>4.1%</td>
<td>6.6%</td>
</tr>
<tr>
<td>Health Technologists and Technicians</td>
<td>.24</td>
<td>3.8%</td>
<td>1.7%</td>
<td>10.1%</td>
</tr>
<tr>
<td>Engineers</td>
<td>.22</td>
<td>1.7%</td>
<td>1.4%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Business Operations Specialists</td>
<td>.16</td>
<td>4.4%</td>
<td>2.7%</td>
<td>2.9%</td>
</tr>
<tr>
<td>Financial Specialists</td>
<td>.15</td>
<td>2.6%</td>
<td>2.6%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Operations Specialties Managers</td>
<td>.13</td>
<td>1.9%</td>
<td>2.3%</td>
<td>2.3%</td>
</tr>
</tbody>
</table>

Note: Occupations in which at least 4% of the 50+ workforce is currently in that occupation or a similar one are highlighted and noted with a check mark. Other occupations are noted with an “x”.

### EDUCATION AND WORKFORCE DEVELOPMENT OPPORTUNITIES FOR THE 50+ POPULATION

Workers 50 and older who are not already in shortage occupations or similar occupations may need additional training to compete for job openings. Additionally, those already in these occupations may benefit from additional training to advance in their careers or to develop new
skills that are necessary to maintain their current jobs. In order to guide training strategies, we identified instructional programs and credentials associated with shortage occupations. This information can help direct resources toward the specific training programs that will make the 50+ workforce more competitive.

A relatively large portion of the 50+ workforce is already employed in Health Diagnosing and Treating Practitioner occupations. Because these occupations can require substantial training, it may be best off investing limited resources in training incumbents for career advancement rather than training new entrants. The time investment in training for Sales Representatives, Wholesale and Manufacturing; Motor Vehicle Operators; and Health Technologists and Technicians tends to be shorter than for other shortage occupations. Therefore, these career options could be more accessible to older workers who are not already employed in any of the top shortage or related occupations.

**RECOMMENDATIONS**

Across the U.S., Health Diagnosing and Treating Practitioners; Sales Representatives, Wholesale and Manufacturing; Computer Occupations; Advertising, Marketing, Promotions, Public Relations, and Sales Managers; Motor Vehicle Operators; and Health Technologists and Technicians are projected to experience the largest labor shortages. Among these, Health Diagnosing and Treating Practitioners, Computer Occupations, and Motor Vehicle Operators are expected to comprise the largest share of job postings. Therefore, these are promising areas of focus for strategies to prepare the 50+ workforce for job opportunities.

Any approach to preparing the 50+ workforce to compete for jobs in shortage occupations should take into account the time required for training. Because of the time intensive training required to enter the field, initiatives for Health Diagnosing and Treating Practitioners and many Computer Occupations jobs are best directed toward preparing the incumbent workforce for career advancement. However, the training required for entry into Motor Vehicle Operators; Sales Representatives, Wholesale and Manufacturing; Health Technologists and Technicians; and some entry-level Computer Occupations jobs tends to be less time intensive. Therefore, these occupations may offer opportunities to prepare 50+ workers for new careers in shortage occupations.
1. Introduction

Although workers age 50 and older experience relatively low levels of unemployment, they are more likely than other age groups to experience high levels of long-term unemployment, stagnant wages, and declining job opportunities. At the same time that the older workforce faces these challenges, many employers are experiencing labor shortages and having trouble filling vacancies with qualified, well-trained workers. This contradiction presents an opportunity to ensure that the 50+ workforce develops the skills necessary for jobs in shortage occupations and to encourage employers to fully consider this population when making hiring decisions. Building the skills required for these occupations can complement the existing strengths of the older workforce. For example, when compared to younger workers, employers scored older workers higher in reliability, commitment to the organization, being customer-oriented, social skills, and accuracy. These are the types of soft skills that can help well-trained older workers obtain and succeed in high-demand jobs.

Addressing the re-entry and advancement challenges faced by older workers and preparing them to meet the hiring needs of employers requires a firm understanding of:

- The current and future employment opportunities available to the 50+ workforce
- Whether workers 50 and over possess the skills and knowledge required to compete for current and future job opportunities
- Education and workforce development programs that can help older workers prepare for current and future job opportunities

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AARP contracted with IMPAQ International, LLC, to provide data on these issues. This report addresses all three areas to recommend ways to position the 50+ workforce to fill vacancies in high-demand occupations.

### 1.1 OLDER WORKERS IN THE AMERICAN WORKFORCE

The unemployment rate for workers 50 and older hit a historic high of 7.3% in 2010. However, since then it has recorded a steady decline. In 2016, the annual unemployment rate for people 50 and older ranged from 3.4% to 4.1% depending on age. This is compared with 8.4% for those between the ages of 20 and 24. However, long-term unemployment has increased for older workers in recent years and remains the highest among all age groups. Additionally, discouraged job seekers may be dropping out of the labor force all together. Therefore, data may not be capturing the full extent of unemployment among this population. Not only are older workers taking longer to find work, but also their post-unemployment monthly earnings are stagnant. Older workers thus face both challenges to re-entry into the workforce and loss of earning power once they secure a job.

Older workers are also changing jobs more frequently than in the past. Those who are less educated are seeing the available job opportunities narrow significantly as they age through their late 50s and early 60s. Among older workers making career changes, those who are able to make use of existing skills in their new job tend to be more successful. For example, those who reported using a majority of the same skills in their new job as in previous jobs were more likely to feel successful in their career transition than those who had to learn new skills.

To summarize, though they enjoy relatively low levels of unemployment, older workers face significant challenges, including:

- High rates of long-term unemployment
- Stagnant wages
- Narrowing job opportunities

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1.2 DEMAND FOR SKILLED WORKERS

At the same time that the older workforce struggles with these challenges, employers in some fields, such as healthcare, are having trouble filling vacancies with qualified, well-trained candidates. Though the inability to meet the demand for labor is due in part to growth in the number of jobs, other factors include the retirement of baby boomers and a stagnant labor supply.

Older workers can fill this need, if two conditions are met: (1) They have the skills required by occupations experiencing a labor shortage and (2) employers know they have those skills. This gap provides substantial opportunity to position the 50+ workforce to fill openings in shortage occupations. To provide the information necessary to begin this effort, this study identifies:

- Occupations that are projected to experience a labor shortage between 2017 and 2020
- The shortage occupations and related occupations requiring similar skills in which the 50+ workforce is currently employed
- The education and workforce development programs that can prepare older workers for employment in shortage occupations

Because labor markets and the characteristics of the workforce can vary substantially across the U.S., this report analyzes findings at both the national and state levels.

2. What Occupations Will Need Qualified Workers?

To effectively align the skills of the 50+ workforce with employer needs, it is critical to know which occupations will have job openings in the near future.22 Using forecasting techniques and data on job postings and unemployment, IMPAQ identified occupations projected to experience the largest labor shortages between 2017 and 2020.

**Key Findings**

- The occupations projected to experience the largest labor shortages are Health Diagnosing and Treating Practitioners; Sales Representatives, Wholesale and Manufacturing; Computer Occupations; Advertising, Marketing, Promotions, Public Relations, and Sales Managers; Motor Vehicle Operators; and Health Technicians and Technologists.

- Among these, Health Diagnosing and Treating Practitioners, Computer Occupations, and Motor Vehicle Operators are expected to comprise the largest share of job postings.

- These trends are similar across the U.S.

### 2.1 LABOR SHORTAGES

A labor shortage occurs in any given occupation when demand for labor exceeds supply: The number of qualified workers needed by employers is greater than the number available. Labor shortages typically occur when the economy approaches full employment—when almost all individuals who are able and willing to work are employed. Identifying the occupations that are projected to experience shortages allows us to understand anticipated hiring patterns and develop strategies to ensure that the 50+ workforce is well positioned to compete for these jobs.

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22 The occupational categories are constructed around the Bureau of Labor Statistics’ three-digit standard occupational classification (SOC) codes. This schema provides information that is detailed enough for directing training efforts but also allows for some generalization across occupations. Throughout the report, we use the term “job titles” to refer to the six-digit SOC codes that comprise the three-digit codes.
2.2 MEASURING LABOR SHORTAGES

Our measure for projecting a shortage in a given occupation is based on the ratio of job postings (demand) to unemployed individuals in that occupation (supply). A higher value suggests that employers’ need for qualified workers exceeds the available supply, perhaps because the available workforce lacks the skills, experience, or characteristics required. This measure has been widely used by state government agencies. At the national level, data limitations prohibit combining raw numbers of job postings and of unemployed workers into a single measure over a common time period. The demand data come from monthly job postings, while the supply data represent a snapshot of the number of people who were unemployed. Because they represent different time spans, these measures cannot be directly compared. Instead, we created “shares” of demand and supply. As illustrated in Exhibit 4, the demand share is the proportion of projected job postings in an occupation. The supply share is the proportion of unemployed people in that occupation. The ratio is then converted to a single number, as described below. This job shortage index allows us to rank occupations by the size of the labor shortage they are expected to experience and compare the relative size of shortages across occupations.

*Exhibit 4. Job Shortage Ratio*

**Job Shortage Ratio**

**Demand**: Share of projected job openings within an occupation

**Supply**: Share of unemployed individuals within that occupation

**Labor Demand.** In the literature, labor demand is the amount of labor that employers are willing to buy at the prevailing wage. It is often measured as the number of available jobs. The demand measure used in this report is derived from data collected by Burning Glass Technologies. Every day, Burning Glass compiles online job postings by scanning online job

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23 See “Identifying Regional Skill Shortages in the Dayton Metropolitan Statistical Area (MSA), 2007” by the Ohio Department of Job and Family Services or “Labor Supply & Demand: First Quarter 2016” by the Rhode Island Department of Labor and Training.


25 http://burning-glass.com/
boards, corporate websites, and online newspapers where job ads are posted. On average, Burning Glass scans over 40,000 different sources daily; it then applies an algorithm to remove duplicate job postings.\textsuperscript{26}

Using Burning Glass data, we constructed a monthly count of job postings from January 2011 through June 2016. We then applied a widely used modeling approach\textsuperscript{27} to project the number of postings for each occupation from January 2017 to December 2020. This modeling technique was applied to generate projections both for the nation as a whole and for each state.\textsuperscript{28}

Once we projected the total number of job postings for 2017 to 2020, we created an average monthly share of job postings for each occupation for each month.\textsuperscript{29} This value constitutes the demand component of our shortage measure.

**Labor Supply.** Labor supply is typically defined as the number of workers with the required skills and knowledge available to fill an open position.\textsuperscript{30} The measure of supply used in this report is the share of unemployed individuals in a particular occupation. Ideally, labor supply would be projected through an approach similar to that described for projecting demand. However, such projections would be unreliable because of data limitations. The monthly unemployment estimates produced by the Census Bureau from its Current Population Survey, for example, are based on sample sizes that are too small to produce reliable forecasts. We therefore used 2015 data from the Census Bureau's American Community Survey (ACS), which includes a large enough sample to provide meaningful estimates of unemployment in each occupation. For this study, the supply measures were calculated for each state and for the nation as a whole. We assume that unemployment values from the 2015 ACS data will remain relatively constant between 2017 and 2020. However, if there are major economic shocks, this

\textsuperscript{26} The algorithm counts the same job ad as new if it is reposted after 60 days.

\textsuperscript{27} To project job postings, we used an autoregressive integrated moving average (ARIMA) forecasting model. This model uses information from historical data to forecast future trends. See Appendix A for more detail about how we applied this model to project labor demand.

\textsuperscript{28} One limitation of this approach is that it assumes that observed patterns in existing data will continue into the projected period. If there were isolated political or economic shifts statewide or nationally, or changes in Burning Glass's data collection methodology that caused a sudden change in the number of job postings, the methodology will incorporate these into projected values. This is likely to be more pronounced in state-level estimates. For example, if a large employer opened a facility in a small state during the period covered by the Burning Glass data, there may be an initial spike in hiring that makes up a large portion of all job postings in that state. This hiring pattern may not continue at a similar pace into the projected period. However, the projection methodology assumes that these past patterns will be consistent into the projected period. Likewise, the projections cannot anticipate sudden economic or political shifts that will occur in the period between 2017 and 2020. For instance, if a large organization relocates from one state to another in 2018, or changes in the economy lead to a recessionary growth, the projections will not foresee these changes.

\textsuperscript{29} This was a weighted average, using a linear term that gives greater weight to months earlier in the period because their projections are more likely to be accurate.

could influence the supply component of the shortage ratio. For example, the 2008 financial crisis represented an unanticipated economic shock that resulted in higher levels of unemployment and a rapid increase in labor supply in the US.

**Job Shortage Index.** To estimate projected occupational shortages, we divided the labor demand measure by the supply measure to produce a ratio. We then ranked occupations according to this value. Occupations with the largest ratio are projected to experience the largest labor shortages.

Then, to allow for an easier comparison of the relative size of shortages between occupations, we transformed the ratio into an index. To do this, we divided each occupation’s shortage ratio by the ratio for the occupation with the largest shortage in the given geography (nation or state). Based on this calculation, the occupation with the largest shortage ratio receives an index value of one. The index for all other occupations then represents the size of that occupation’s shortage relative to this top shortage occupation. For example, as shown in Exhibit 5, the top shortage occupation at the national level is Health Diagnosing and Treating Practitioners. The occupation with the second largest shortage – Sales Representatives, Wholesale and Manufacturing – has a job shortage index value of .46. This means that the projected shortage for Sales Representatives, Wholesale and Manufacturing is

\[PP\_o = \frac{PP_{o}}{U_{o}}\] / \[\max_{t} \left( \frac{PP_{o}}{U_{o}} \right) \] Where, \(PP = \) average number of job postings projected, 2017–2020;
\(U = \) number of unemployed people in the occupation, 2015; \(g = \) geographical area (an individual state or the nation); \(o = \) occupation; \(t = \) total of all occupations
46% of the ratio for the top shortage occupation - Health Diagnosing and Treating Practitioners. Exhibit 6 shows the relative sizes of the projected shortages for the top 10 shortage occupations. For example, it shows that the size of the projected shortage for Sales Representatives, Wholesale and Manufacturing is 46% of the size of the projected shortage for Health Diagnosing and Treating Practitioners. Additionally, the graph shows that the size of the projected shortage for Motor Vehicle Operators (which has a shortage index of .24) is 24% of the size of the projected shortage for Health Diagnosing and Treating Practitioners. See Appendix B for additional details on the construction of the job shortage index.

Exhibit 6. Job Shortage Index – Comparisons across Occupations

2.3 PROJECTED NATIONAL SHORTAGES AND LABOR DEMAND

Exhibit 5 summarizes our findings for the top 10 occupations projected to experience labor shortages between 2017 and 2020 (the complete list of occupations is in Appendix C). This exhibit lists the shortage index, described above, and the forecasted job share. While a labor shortage suggests that demand for labor is projected to outpace the supply of qualified workers to fill positions, the forecasted job share represents the percentage of all job postings from 2017 to 2020 represented by an occupation, so it is an estimate of labor demand.

It is important to consider shortages and labor demand together when making decisions about preparing 50+ workers to compete for jobs in shortage occupations. An occupation may be projected to experience a shortage and hire a large number of workers. For example, Health Diagnosing and Treating and Computer Occupations, are projected to be among the top 10 shortage occupations and experience a large demand for labor as represented by relatively high job shares. However, an occupation may experience a shortage but hire relatively few workers.
For example, while Advertising, Marketing, Promotions, Public Relations and Sales Managers is also among the top 10 projected shortage occupations, the demand for workers is projected to be relatively small. This can occur when there are not enough qualified workers to meet employer needs for a particular occupation (causing a shortage) but the occupation comprises a small portion of all jobs (resulting in low labor demand).

According to our data, Health Diagnosing and Treating Practitioners will face the largest shortage and will account for the largest share of all job postings between 2017 and 2020. As shown in Exhibit 7, this occupation includes jobs such as chiropractors, dentists, orthodontists, surgeons, and pharmacists. Many of these jobs require extensive training and practitioners often spend much of their time working directly with patients. The labor shortage among Health Diagnosing and Treating Practitioners is due in part to rapid job growth within this occupation. The Bureau of Labor Statistics projects that this set of healthcare occupations will experience a 16.8% increase in employment between 2014 and 2024, adding about 862,300 new jobs.

Motor Vehicle Operators and Computer Occupations will also experience a relatively large shortage and account for a substantial share of all job postings. As Exhibit 7 shows, Motor Vehicle Operators includes job titles such as taxi, bus, and ambulance drivers. Training requirements for these occupations tend to be more limited than for Health Diagnosing and Treating occupations. However, employees must be certified to safely operate motor vehicles. Computer Operators includes job titles such as computer systems analysts, computer programmers, web developers, and user support specialists. Training requirements for these occupations vary from vocational training to advanced degrees.

Like Health Diagnosing and Treating occupations, much of the shortage associated with Computer Occupations is likely to be the result of new job growth. Computer Occupations are expected to see a 12.5% increase in employment between 2014 and 2024, adding 488,500 new jobs. By contrast, the projected shortage for Motor Vehicle Operators is largely due to the need to replace existing workers. Between 2014 and 2024, almost 700,000 of the 900,000 available jobs in this occupation will be replacements rather than new positions.

Three other occupations are projected to experience relatively large shortages. These include Sales Representatives, Wholesale and Manufacturing Occupations; Advertising, Marketing, Promotions, Public Relations, and Sales Managers; and Health Technologists and Technicians. These occupations will offer relatively few job opportunities because they account for a small

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32 A complete list of specific job titles associated with each of the top 10 shortage occupations is included in Appendix C.
34 Ibid.
35 Ibid.
portion of projected job postings between 2017 and 2020; that is, they have small forecasted job shares. An overview of the specific types of jobs, responsibilities, and educational requirements for each of these occupations is included in Exhibit 7. Additional details are provided in Appendices C and D.

36 A detailed overview of each of the top 10 shortage occupations is included in Appendix D.
Exhibit 7. Overview of Top Shortage Occupations

**Health Diagnosing and Treating Practitioners**

- Sample Job Titles:
  - Chiropractors
  - Dentists
  - Orthodontists
  - Surgeons
  - Optometrists
  - Podiatrists
  - Therapists
  - Dietitians and nutritionists
  - Exercise physiologists
  - Pharmacists

- Description:
  - Diagnose and treat patients
  - Care for others
  - Maintain or improve health in specialized areas and for general health
  - May perform surgery or write prescriptions for treatment

- Training and Education:
  - Many jobs require extensive training and advanced degrees
  - Requires active listening and learning, critical thinking, decision-making, therapy and counselling, and customer/personal service

**Sales Representatives, Wholesale and Manufacturing**

- Sample Job Titles:
  - Sales Representative
  - Sales Executive
  - Sales Consultant
  - Sales Agent
  - Direct Salesperson
  - Technical Sales Representative

- Description:
  - Negotiate prices or terms of sales or service agreements
  - Prepare and submit sales contracts for orders
  - Conduct sales visits and pitches
  - Maintain customer records
  - Answer customer questions about products

- Training and Education:
  - Jobs typically require at least two years of secondary education in the product's academic area (such as biology, electronics, or engineering)
  - Knowledge of customer/personal service, sales, marketing, administration, and management

**Computer Occupations**

- Sample Job Titles:
  - Computer and information research scientists
  - Computer systems analysts
  - Computer programmers
  - Information security analysts
  - Web developers
  - Software developers
  - Computer user support specialists

- Description:
  - Work with and on computers
  - Gather and process information
  - Analyze data and make decisions
  - Might include working on databases, software, hardware, websites, and providing technical support to users

- Training and Education:
  - Jobs range from needing a vocational degree with on the job training to advanced degrees
  - Knowledge of computers and electronics, math, customer service, decision making, critical thinking, and programming.
Exhibit 7 cont. Overview of Top Shortage Occupations

**ADVERTISING, MARKETING, PROMOTIONS, PUBLIC RELATIONS, AND SALES MANAGERS**

**Sample Job Titles**
- Advertising and Promotions Managers
- Marketing Managers
- Sales Managers
- Public Relations
- Fundraising Managers

**Description**
- Manage public- and client-facing image and associated relationships
- Manage teams to implement promotional campaigns
- Respond and handle press releases and media inquiries

**Training and Education**
- Jobs typically require at least a Bachelor’s Degree
- Knowledge of customer/personal service, public relations management, communications design, marketing, administration, and management

**MOTOR VEHICLE OPERATORS**

**Sample Job Titles**
- Ambulance drivers
- Bus drivers
- Sales drivers
- Heavy or tractor-trailer truck drivers
- Light truck or delivery services drivers
- Taxi drivers
- chauffeurs

**Description**
- Transporting goods, clients, and/or patients
- Assisting passengers with luggage, first-aid, or getting in/out of bus

**Training and Education**
- Most jobs require a high school diploma and a few months of training
- Requires near and far vision, depth perception, knowledge of public safety and security, abiding traffic laws, control precision, and customer service

**HEALTH TECHNOLOGISTS AND TECHNICIANS**

**Sample Job Titles**
- Medical and clinical laboratory technologists/technicians
- Dental hygienists
- Radiologic technologists
- Emergency medical technicians and paramedics

**Description**
- Operate the technology required to diagnose and treat patients
- Conduct analysis on medical samples from patients
- Assist with maintaining or improving health - in specialized areas and for general health

**Training and Education**
- Many jobs require extensive training and advanced degrees
- Requires active listening and learning, critical thinking, decision-making, technological expertise, and knowledge of biology, medicine, dentistry, and/or chemistry
2.4 WAGES IN SHORTAGE OCCUPATIONS

Median hourly wages for the top 10 shortage occupations are shown in Exhibit 8. Engineers can expect to earn the highest median wage at $38.46 per hour. Computer Occupations; Advertising, Marketing, Promotions, Public Relations, and Sales Managers; Health Diagnosing and Treating Practitioners; and Operations Specialties Managers can also expect to earn more than $30 per hour. Motor Vehicle Operators had the lowest median wage at $16.62 per hour. This suggests that among shortage occupations, wages increase along with training requirements. It also highlights the importance of linking older workers with training opportunities that offer verified credentials and understanding the investment older workers are able to make in training. In Section 4, we discuss the training requirements for shortage occupations in detail.
Exhibit 8. Median Hourly Wages by Occupation

2.5 SHORTAGE OCCUPATIONS AND INDUSTRIES

In developing strategies to ensure that the 50+ workforce is prepared to compete for jobs in shortage occupations, we may focus on particular industries. As shown in Exhibit 9, many shortage occupations tend to cluster in specific industries. As expected, Health Diagnosing and Treating Practitioners are concentrated in the healthcare and social assistance industry. Sales Representatives, Wholesale and Manufacturing tend to be concentrated in wholesale trade.

Exhibit 9. Industries of the Top Projected Shortage Occupations

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Industry</th>
<th>Job Growth in Industry*</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1: Health Diagnosing and Treating Practitioners</td>
<td>79% Healthcare and social assistance</td>
<td>1.9%</td>
</tr>
<tr>
<td>#2: Sales Representatives, Wholesale and Manufacturing</td>
<td>67% Wholesale trade</td>
<td>0.5%</td>
</tr>
<tr>
<td></td>
<td>14% Manufacturing</td>
<td>-0.7%</td>
</tr>
<tr>
<td>#3: Computer Occupations</td>
<td>35% Professional, scientific, and technical services</td>
<td>0.9%</td>
</tr>
<tr>
<td></td>
<td>13% Information</td>
<td>-0.1%</td>
</tr>
<tr>
<td>#4: Advertising, Marketing, Promotions, Public Relations, and Sales Managers</td>
<td>15% Wholesale trade</td>
<td>0.5%</td>
</tr>
<tr>
<td></td>
<td>14% Professional, scientific, and technical services</td>
<td>0.9%</td>
</tr>
<tr>
<td></td>
<td>12% Retail Trade</td>
<td>0.5%</td>
</tr>
<tr>
<td></td>
<td>11% Management of companies and enterprises</td>
<td>N/A</td>
</tr>
<tr>
<td>#5: Motor Vehicle Operators</td>
<td>41% Transportation and warehousing</td>
<td>0.3%</td>
</tr>
<tr>
<td></td>
<td>14% Manufacturing</td>
<td>-0.7%</td>
</tr>
</tbody>
</table>

Note: Only the industries with the highest concentrations of workers in each occupation are reported. The industry lists are not comprehensive, so that percentages do not add up to 100%.

2.5 PROJECTED STATE-LEVEL SHORTAGES

State-level shortages tend to be similar to national-level trends. For example, Health Diagnosing and Treating Practitioners is by far the occupation most frequently projected to experience
shortage in the states. As shown in Exhibit 10, this occupation is projected to experience the largest shortage in 29 states. The second most common shortage occupation in the states is Computer Occupations, which is expected to have the greatest shortage in eight states. Two occupations that do not appear among the top 10 shortage occupations nationally do appear at the top of state shortage lists: Counselors, Social Workers, and Other Community and Social Service Specialists in Idaho and Other Installation, Maintenance, and Repair Occupations in North Dakota. Complete lists of each state’s projected shortage occupations are in Appendix E.

Exhibit 10. Top Projected Shortage Occupations by State
3. Is the 50+ Workforce Well Positioned to Fill Shortage Occupations?

The focus of any efforts to prepare the 50+ workforce to compete for vacancies in shortage occupations partially depends on the current knowledge and skills of older workers. It also depends, perhaps to a greater extent, on whether older workers are currently in these occupations or in occupations that require similar knowledge and skills. By examining the current distribution of the 50+ workforce in shortage occupations, we identified areas where skills and knowledge already align with job opportunities and where, by contrast, education and workforce development may be necessary. This knowledge will allow organizations to devote its finite resources to workforce development and advocacy strategies that are responsive both to employers’ needs and to the training needs of the 50+ workforce.

Key Findings

- A substantial portion of the 50+ workforce is already well prepared for many projected shortage occupations, including Health Diagnosing and Treating Practitioners; Sales Representatives, Wholesale and Manufacturing; Motor Vehicle Operators; and Health Technologists and Technicians.

- Occupations in which the 50+ workforce do not have relevant skills and knowledge may be areas for training. These include Computer Occupations and Advertising, Marketing, Promotions, Public Relations, and Sales Managers.

3.1 CURRENT OCCUPATIONS OF WORKERS 50+

The analysis of the occupations of older workers is based on data from the 2015 ACS. Workers in an occupation include not only those who are currently employed in that area but also those who are unemployed but identify as being in that profession. Exhibit 11 shows the top 10 occupations in which the 50+ workforce is concentrated. The largest concentration is in Other Management Occupations. These occupations include a wide variety of positions ranging from agricultural managers to funeral service or real estate managers.

37 A detailed list of job titles associated with each of these occupations is in Appendix D. The proportion of the 50+ workforce across occupations is in Appendix F.
Three of the top occupations in which the 50+ population is concentrated also appear on the list of the 10 occupations projected to experience the largest shortages: Health Diagnosing and Treating Practitioners, Motor Vehicle Operators, and Business Operations Specialists. Collectively, 11.1% of the 50+ workforce falls into these three occupations.

**Exhibit 11. Top 10 Occupations of 50+ Workers, 2015**

<table>
<thead>
<tr>
<th>Occupation</th>
<th>% of 50+ Workforce</th>
<th>Sample Job Titles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Other Management Occupations</td>
<td>7.7%</td>
<td>Architectural and Engineering Managers, Construction Managers, Education Administrators, Food Service Managers, Postmasters</td>
</tr>
<tr>
<td>2. Health Diagnosing and Treating Practitioners</td>
<td>4.3%</td>
<td>Chiropractors, Dentists, Orthodontists, Surgeons, Optometrists, Podiatrists, Therapists, Dietitians and Nutritionists, Exercise Physiologists, Pharmacists</td>
</tr>
<tr>
<td>3. Motor Vehicle Operators</td>
<td>4.1%</td>
<td>Ambulance Drivers, Bus Drivers, Sales Drivers, Heavy or Tractor-trailer Truck Drivers, Taxi Drivers, Chauffeurs, Light Truck/Delivery Services Drivers</td>
</tr>
<tr>
<td>4. Construction Trades Workers</td>
<td>3.6%</td>
<td>Brickmasons and Blockmasons, Carpenters, Carpet Installers, Cement Masons and Concrete Finishers, Electricians, Painters, Roofers</td>
</tr>
<tr>
<td>5. Retail Sales Workers</td>
<td>3.4%</td>
<td>Cashiers, Gaming Change Persons and Booth Cashiers, Counter and Rental Clerks, Retail Salespersons</td>
</tr>
<tr>
<td>6. Preschool, Primary, Secondary, and</td>
<td>3.2%</td>
<td>Teachers from Pre-school through Secondary School, Special Education Teachers</td>
</tr>
<tr>
<td>Special Education School Teachers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Secretaries and Administrative Assistants</td>
<td>3.0%</td>
<td>Executive Administrative Assistants, Legal Secretaries, Medical Secretaries, Secretaries and Administrative Assistants</td>
</tr>
<tr>
<td>8. Supervisors of Sales Workers</td>
<td>2.9%</td>
<td>First-Line Supervisors of Retail Sales Workers, First-Line Supervisors of Non-Retail Sales Workers</td>
</tr>
<tr>
<td>9. Information and Record Clerks</td>
<td>2.9%</td>
<td>Brokerage Clerks, Court, Municipal, and License Clerks, Customer Service Representatives, Interviewers Library Assistants, Travel Clerks</td>
</tr>
<tr>
<td>10. Business Operations Specialists</td>
<td>2.7%</td>
<td>Agents and Business Managers of Artists, Performers, and Athletes, Fundraisers, Management Analysts, Development Specialists</td>
</tr>
</tbody>
</table>
3.2 COMPARING CURRENT OCCUPATIONS OF WORKERS 50+ TO OCCUPATIONS WITH PROJECTED SHORTAGES

Our analyses of ACS data show that almost 25% of 50+ workers are currently employed, or unemployed but experienced, in one of the top 10 shortage occupations (see Exhibit 12). That is, a substantial portion of older workers may already be well positioned to fill openings in the projected shortage occupations, particularly Health Diagnosing and Treating Practitioners and Motor Vehicle Operators. These occupations, highlighted in Exhibit 12, each include over 4% of the 50+ workforce. The full list is available in Appendix F.
### Exhibit 12. Percentage of the 50+ Workforce Employed in the Top 10 Shortage Occupations

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Shortage Index</th>
<th>Forecasted Job Share</th>
<th>Percent of 50+ Workforce in Occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Diagnosing and Treating Practitioners</td>
<td>1</td>
<td>13.8%</td>
<td>4.3%</td>
</tr>
<tr>
<td>Sales Representatives, Wholesale and Manufacturing</td>
<td>.46</td>
<td>3.9%</td>
<td>1.3%</td>
</tr>
<tr>
<td>Computer Occupations</td>
<td>39</td>
<td>9.4%</td>
<td>2.2%</td>
</tr>
<tr>
<td>Advertising, Marketing, Promotions, Public Relations, and Sales Managers</td>
<td>.27</td>
<td>2.0%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Motor Vehicle Operators</td>
<td>.24</td>
<td>11.0%</td>
<td>4.1%</td>
</tr>
<tr>
<td>Health Technologists and Technicians</td>
<td>.24</td>
<td>3.8%</td>
<td>1.7%</td>
</tr>
<tr>
<td>Engineers</td>
<td>.22</td>
<td>1.7%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Business Operations Specialists</td>
<td>.16</td>
<td>4.4%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Financial Specialists</td>
<td>.15</td>
<td>2.6%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Operations Specialties Managers</td>
<td>.13</td>
<td>1.9%</td>
<td>2.3%</td>
</tr>
</tbody>
</table>

**Note:** Occupations in which at least 4% of the 50+ workforce is currently in that occupation are highlighted. A check mark denotes an occupation with a relatively high participation rate among 50+ workers that is projected to experience future shortages. An “x” represents relatively low participation in an occupation among the 50+ workforce.
Although our methodology for predicting shortages focuses on individual occupations, knowledge and skills are often transferrable. Therefore, to assess whether the 50+ workforce is well positioned to fill vacancies in projected shortage occupations, we also looked at whether older workers are employed in other occupations requiring similar knowledge and skills. To classify occupations as similar, we first identified those with overlapping career pathways, which represent a series of integrated educational and training options in similar career clusters. This methodology is explained in Appendix G and occupations classified as similar to each of the top 10 shortage occupations are listed in Exhibit 13. While the skills for the shortage and similar occupations may not be identical, the fact that they share a career pathway means there will be overlap in the types of credentials and knowledge required.

Exhibit 13. Top 10 Shortage Occupations and their Related Occupations

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Related Occupations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advertising, Marketing, Promotions, Public Relations, and Sales Managers</td>
<td>None</td>
</tr>
<tr>
<td>Operations Specialties Managers</td>
<td>None</td>
</tr>
<tr>
<td>Business Operations Specialists</td>
<td>Mathematical Science Occupations</td>
</tr>
<tr>
<td>Financial Specialists</td>
<td>None</td>
</tr>
<tr>
<td>Computer Occupations</td>
<td>None</td>
</tr>
<tr>
<td>Engineers</td>
<td>None</td>
</tr>
<tr>
<td>Health Diagnosing and Treating Practitioners</td>
<td>Health Technologists and Technicians</td>
</tr>
<tr>
<td></td>
<td>Other Healthcare Practitioners and Technical Occupations</td>
</tr>
<tr>
<td></td>
<td>Nursing, Psychiatric, and Home Health Aides</td>
</tr>
</tbody>
</table>
Exhibit 14 provides an example of how an older worker might move from a job in a similar occupation to a job within an associated shortage occupation. In this case, moving from a Respiratory Therapy Technician (within the Health Technologists and Technicians occupation) to a Respiratory Therapist (within the Health Diagnosing and Treating occupation) does not necessitate additional education but it does require additional certification. This serves as an example, however the ease and requirements of making these types of transitions will be specific to individual jobs.
Exhibit 14. Sample Transition into a Shortage Occupation from a Similar Occupation

<table>
<thead>
<tr>
<th>Respiratory Therapy Technician</th>
<th>Respiratory Therapist</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tasks</strong></td>
<td></td>
</tr>
<tr>
<td>- Works in emergency rooms or intensive care</td>
<td>- Provides emergency care</td>
</tr>
<tr>
<td>- Monitors patients</td>
<td>- Monitors patients</td>
</tr>
<tr>
<td>- Reports unusual reactions to the respiratory therapist</td>
<td>- Reports adverse reactions</td>
</tr>
<tr>
<td>- Uses ventilators and other breathing instruments</td>
<td>- Operates ventilators</td>
</tr>
<tr>
<td>- Follows safety rules when using equipment</td>
<td>- Works with team of physicians, nurses, and other professionals</td>
</tr>
<tr>
<td></td>
<td>- Maintains patient charts</td>
</tr>
<tr>
<td><strong>Selected Certifications</strong></td>
<td></td>
</tr>
<tr>
<td>- Certified Pulmonary Function Technologist</td>
<td>- Certified Respiratory Therapist (CRT)</td>
</tr>
<tr>
<td></td>
<td>- Registered Respiratory Therapist (RRT)</td>
</tr>
<tr>
<td><strong>Required Work Experience in Related Occupations</strong></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td><strong>Typical On-the-Job training</strong></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td><strong>Median Annual Wage</strong></td>
<td></td>
</tr>
<tr>
<td>$49,780</td>
<td>$58,670</td>
</tr>
</tbody>
</table>

In addition to the 25% of 50+ workers in one of the top 10 shortage occupations, 20% are already in similar occupations. Exhibit 15 highlights four shortage occupations that, together with similar occupations, include at least 4% of the 50+ workforce: Health Diagnosing and Treating Practitioners; Sales Representatives, Wholesale and Manufacturing; Motor Vehicle Operators; and Health Technologists and Technicians.
Exhibit 15. Percentage of the 50+ Workforce Employed in Shortage Occupations and Similar Occupations

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Shortage Index</th>
<th>Forecasted Job Share</th>
<th>Percent of 50+ Workforce in Occupation</th>
<th>Percent of 50+ Workforce in Occupation or Similar Occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Diagnosing and Treating Practitioners</td>
<td>1.00</td>
<td>13.8%</td>
<td>4.3%</td>
<td>10.1%</td>
</tr>
<tr>
<td>Sales Representatives, Wholesale and Manufacturing</td>
<td>.46</td>
<td>3.9%</td>
<td>1.3%</td>
<td>9.9%</td>
</tr>
<tr>
<td>Computer Occupations</td>
<td>.39</td>
<td>9.4%</td>
<td>2.2%</td>
<td>2.2%</td>
</tr>
<tr>
<td>Advertising, Marketing, Promotions, Public Relations, and Sales Managers</td>
<td>.27</td>
<td>2.0%</td>
<td>0.6%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Motor Vehicle Operators</td>
<td>.24</td>
<td>11.0%</td>
<td>4.1%</td>
<td>6.6%</td>
</tr>
<tr>
<td>Health Technologists and Technicians</td>
<td>.24</td>
<td>3.8%</td>
<td>1.7%</td>
<td>10.1%</td>
</tr>
<tr>
<td>Engineers</td>
<td>.22</td>
<td>1.7%</td>
<td>1.4%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Business Operations Specialists</td>
<td>.16</td>
<td>4.4%</td>
<td>2.7%</td>
<td>2.9%</td>
</tr>
<tr>
<td>Financial Specialists</td>
<td>.15</td>
<td>2.6%</td>
<td>2.6%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Operations Specialties Managers</td>
<td>.13</td>
<td>1.9%</td>
<td>2.3%</td>
<td>2.3%</td>
</tr>
</tbody>
</table>

Note: Occupations in which at least 4% of the 50+ workforce is currently in that occupation or a similar one are highlighted and noted with a check mark. Other occupations are noted with an “x.”

Exhibits 16–19 summarize state-level findings on the proportion of the 50+ workforce employed in shortage or similar occupations, grouping states into four regions: Midwest, Northeast, South, and West. Across all regions, Health Diagnosing and Treating Practitioners occupations are projected to have the largest shortage and, in many instances, the largest share of jobs; this occupation also has relatively high proportions of older workers in all four regions. As is true for the nation as a whole, the other shortage and similar occupations comprising at least 4% of the 50+ workforce (the lighter rows in Exhibits 16–19) generally are Sales Representatives,
Wholesale and Manufacturing; Health Technologists and Technicians; and Motor Vehicle Operators. In the Northeast, Motor Vehicle Operators do not appear in the top 10 shortage occupations; they are replaced by Top Executives, who constitute more than 4% of the 50+ workforce.

As is the case at the national level, all regions are projected to have shortages among Computer Occupations; Engineers; Advertising, Marketing, Promotions, Public Relations, and Sales Managers; Financial Specialists; and Business Operations Specialists—but in no case do the percentages of 50+ workers in these professions reach 4%. There are some variations in shortage occupations among regions—for example, Art and Design Workers make the top 10 in the Midwest—but these less frequently occurring occupations do not fall into the top five shortage occupations. Also, except for Top Executives in the Northeast, none of these less common occupations capture at least 4% of the current 50+ workforce.
**Exhibit 16. Midwest: Top 10 Shortage Occupations, with Percentage of the 50+ Workforce Employed in Those or Similar Occupations**

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Shortage Index</th>
<th>Forecasted Job Share</th>
<th>Percent of 50+ Workforce in Occupation</th>
<th>Percent of 50+ Workforce in Occupation or Similar Occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Diagnosing and Treating Practitioners</td>
<td>.27*</td>
<td>11.2%</td>
<td>4.6%</td>
<td>10.4%</td>
</tr>
<tr>
<td>Sales Representatives, Wholesale and Manufacturing</td>
<td>.20</td>
<td>3.5%</td>
<td>1.2%</td>
<td>9.7%</td>
</tr>
<tr>
<td>Computer Occupations</td>
<td>.16</td>
<td>8.9%</td>
<td>2.0%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Engineers</td>
<td>.14</td>
<td>2.5%</td>
<td>1.4%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Health Technologists and Technicians</td>
<td>.10</td>
<td>3.4%</td>
<td>1.8%</td>
<td>10.4%</td>
</tr>
<tr>
<td>Motor Vehicle Operators</td>
<td>.09</td>
<td>11.9%</td>
<td>4.6%</td>
<td>7.6%</td>
</tr>
<tr>
<td>Advertising, Marketing, Promotions, Public Relations, and Sales Managers</td>
<td>.09</td>
<td>1.7%</td>
<td>0.6%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Business Operations Specialists</td>
<td>.06</td>
<td>4.2%</td>
<td>2.6%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Financial Specialists</td>
<td>.06</td>
<td>2.5%</td>
<td>2.4%</td>
<td>2.4%</td>
</tr>
<tr>
<td>Art and Design Workers</td>
<td>.06</td>
<td>1.2%</td>
<td>0.6%</td>
<td>0.6%</td>
</tr>
</tbody>
</table>

* The top index value is less than 1.0 because the occupation with the highest shortage ratio (and therefore an index value of 1) comprised less than 1% of the total job share. It therefore was not included in the table.

Note: Occupations in which at least 4% of the 50+ workforce is currently in that occupation or a similar one are highlighted. States include Illinois, Indiana, Michigan, Ohio, Wisconsin, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota.
Exhibit 17. Northeast: Top 10 Shortage Occupations, with Percentage of the 50+ Workforce Employed in Those or Similar Occupations

<table>
<thead>
<tr>
<th>Occupations</th>
<th>Shortage Index</th>
<th>Forecasted Job Share</th>
<th>Percent of 50+ Workforce in Occupation</th>
<th>Percent of 50+ Workforce in Occupation or Similar Occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Diagnosing and Treating Practitioners</td>
<td>1.00</td>
<td>11.6%</td>
<td>4.9%</td>
<td>11.6%</td>
</tr>
<tr>
<td>Sales Representatives, Wholesale and Manufacturing</td>
<td>0.60</td>
<td>3.4%</td>
<td>1.1%</td>
<td>9.6%</td>
</tr>
<tr>
<td>Computer Occupations</td>
<td>0.38</td>
<td>9.1%</td>
<td>2.2%</td>
<td>2.2%</td>
</tr>
<tr>
<td>Engineers</td>
<td>0.23</td>
<td>2.1%</td>
<td>1.2%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Health Technologists and Technicians</td>
<td>0.21</td>
<td>1.4%</td>
<td>1.9%</td>
<td>11.6%</td>
</tr>
<tr>
<td>Advertising, Marketing, Promotions, Public Relations, and Sales Managers</td>
<td>0.21</td>
<td>2.5%</td>
<td>0.6%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Financial Specialists</td>
<td>0.16</td>
<td>2.5%</td>
<td>2.7%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Operations Specialists Managers</td>
<td>0.16</td>
<td>3.8%</td>
<td>2.3%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Business Operations Specialists</td>
<td>0.14</td>
<td>2.0%</td>
<td>2.7%</td>
<td>2.8%</td>
</tr>
<tr>
<td>Top Executives</td>
<td>0.13</td>
<td>4.6%</td>
<td>2.1%</td>
<td>9.4%</td>
</tr>
</tbody>
</table>

Note: Occupations in which at least 4% of the 50+ workforce is currently in that occupation or a similar one are highlighted. States include Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, New Jersey, New York, and Pennsylvania.
### Exhibit 18. South: Top 10 Shortage Occupations, with Percentage of the 50+ Workforce Employed in Those or Similar Occupations

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Shortage Index</th>
<th>Forecasted Job Share</th>
<th>Percent of 50+ Workforce in Occupation</th>
<th>Percent of 50+ Workforce in Occupation or Similar Occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Diagnosing and Treating Practitioners</td>
<td>1.00</td>
<td>11.0%</td>
<td>4.1%</td>
<td>9.8%</td>
</tr>
<tr>
<td>Sales Representatives, Wholesale and Manufacturing</td>
<td>0.50</td>
<td>3.3%</td>
<td>1.1%</td>
<td>10.4%</td>
</tr>
<tr>
<td>Computer Occupations</td>
<td>0.49</td>
<td>8.1%</td>
<td>2.2%</td>
<td>2.2%</td>
</tr>
<tr>
<td>Advertising, Marketing, Promotions, Public Relations, and Sales Managers</td>
<td>0.31</td>
<td>1.5%</td>
<td>0.6%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Motor Vehicle Operators</td>
<td>0.29</td>
<td>9.6%</td>
<td>4.1%</td>
<td>6.6%</td>
</tr>
<tr>
<td>Health Technologists and Technicians</td>
<td>0.24</td>
<td>3.5%</td>
<td>1.7%</td>
<td>9.8%</td>
</tr>
<tr>
<td>Engineers</td>
<td>0.24</td>
<td>1.3%</td>
<td>1.3%</td>
<td>1.3%</td>
</tr>
<tr>
<td>Financial Specialists</td>
<td>0.19</td>
<td>2.0%</td>
<td>2.5%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Supervisors of Food Preparation and Serving Workers</td>
<td>0.19</td>
<td>1.2%</td>
<td>0.4%</td>
<td>3.3%</td>
</tr>
<tr>
<td>Business Operations Specialists</td>
<td>0.16</td>
<td>3.7%</td>
<td>2.8%</td>
<td>2.9%</td>
</tr>
</tbody>
</table>

*Note: Occupations in which at least 4% of the 50+ workforce is currently in that occupation or a similar one are highlighted. States include Delaware, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, District of Columbia, West Virginia, Alabama, Kentucky, Mississippi, Tennessee, Arkansas, Louisiana, Oklahoma, and Texas.*
### Exhibit 19. West: Top 10 Shortage Occupations, with Percentage of the 50+ Workforce Employed in Those or Similar Occupations

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Shortage Index</th>
<th>Forecasted Job Share</th>
<th>Percent of 50+ Workforce in Occupation</th>
<th>Percent of 50+ Workforce in Occupation or Similar Occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Diagnosing and Treating Practitioners</td>
<td>1.00</td>
<td>11.9%</td>
<td>4.0%</td>
<td>9.1%</td>
</tr>
<tr>
<td>Computer Occupations</td>
<td>.36</td>
<td>10.2%</td>
<td>2.4%</td>
<td>2.4%</td>
</tr>
<tr>
<td>Sales Representatives, Wholesale and Manufacturing</td>
<td>.36</td>
<td>4.0%</td>
<td>1.1%</td>
<td>9.8%</td>
</tr>
<tr>
<td>Advertising, Marketing, Promotions, Public Relations, and Sales Managers</td>
<td>.27</td>
<td>2.4%</td>
<td>0.6%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Health Technologists and Technicians</td>
<td>.22</td>
<td>2.9%</td>
<td>1.4%</td>
<td>9.1%</td>
</tr>
<tr>
<td>Motor Vehicle Operators</td>
<td>.16</td>
<td>7.0%</td>
<td>3.6%</td>
<td>5.9%</td>
</tr>
<tr>
<td>Engineers</td>
<td>.15</td>
<td>1.7%</td>
<td>1.7%</td>
<td>1.7%</td>
</tr>
<tr>
<td>Business Operations Specialists</td>
<td>.14</td>
<td>4.2%</td>
<td>2.8%</td>
<td>3.0%</td>
</tr>
<tr>
<td>Financial Specialists</td>
<td>.14</td>
<td>2.7%</td>
<td>2.7%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Operations Specialties Managers</td>
<td>.13</td>
<td>2.0%</td>
<td>2.2%</td>
<td>2.2%</td>
</tr>
</tbody>
</table>

*Note: Occupations in which at least 4% of the 50+ workforce is currently in that occupation or a similar one are highlighted. States include Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming, Alaska, California, Hawaii, Oregon, and Washington.*

These results suggest that, across the U.S., a substantial portion of the 50+ workforce is already well prepared for employment in the top shortage occupations, particularly as Health Diagnosing and Treating Practitioners; Sales Representatives, Wholesale and Manufacturing; Motor Vehicle Operators; and Health Technologists and Technicians. However, there are a number of occupations projected to experience shortages that include a relatively small portion
of the 50+ population, including Computer Occupations and Advertising, Marketing, Promotions, Public Relations, and Sales Managers.
4. How Can the 50+ Workforce Be Trained for Shortage Occupations?

Workers 50 and older who are not already employed in shortage or similar occupations may need additional training to compete for job openings. Furthermore, those already in these occupations may benefit from additional training for career advancement or to learn new skills necessary for maintaining their current jobs. In order to guide training strategies, we have identified instructional programs and credentials associated with shortage occupations. This information can help to direct resources toward the specific training programs that will make the 50+ workforce more competitive.

Key Findings

- A large portion of the 50+ workforce is already employed as Health Diagnosing and Treating Practitioners. Entering these occupations can require substantial training. Therefore, training resources may be focused on career advancement for those already in these occupations.

- The time investment in training for Motor Vehicle Operators tends to be substantially less than for the other shortage occupations. Therefore, this career option could be accessible to workers 50+ who are not already employed in top shortage or related occupations.

4.1 IMPORTANCE OF INSTRUCTIONAL PROGRAMS AND CREDENTIALS TO INFORM TRAINING STRATEGIES

The U.S. Department of Education (ED) categorizes educational programs into specific fields of study denoted by Classification of Instructional Programs (CIP) codes. CIP codes represent instructional programs that result in formal completion points and awards. Though some represent, for example, medical residencies, personal leisure programs, and instructional

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programs that lead to secondary diplomas, many are related to academic or occupational instructional programs.39

In addition to instructional programs required for entry into an occupation, ED and the U.S. Department of Labor (DOL) increasingly emphasize the attainment of credentials. As educational requirements have increased for many, if not most, jobs, fostering credential achievement has been a central component of DOL's strategic planning, the Workforce Innovation and Opportunity Act, and public workforce initiatives such as career pathways. Credentials that give concrete evidence of a specific set of competencies are viewed by DOL as a path to building a more qualified, higher-earning workforce that has the skills employers need.40

4.2 IDENTIFYING INSTRUCTIONAL AREAS AND CREDENTIALS FOR SHORTAGE OCCUPATIONS

Exhibit 20 lists the instructional programs and credentials for the top shortage occupations.41 This list was constructed using crosswalks from ED and DOL that link occupations to CIP codes and credentials, respectively. Complete lists of codes and credentials for all states are in Appendix H. To effectively prepare the older workforce to compete for jobs in shortage occupations, one approach may be to collaborate with training providers offering these programs and credentials. This collaboration may help older workers validate the claims of training providers offering flexible courses and quick attainment of marketable skills and ensure providers are offering relevant credentials for in-demand jobs.


41 To do this we matched CIP codes and credentials to occupations using the six-digit SOCs. Our lists of relevant instructional programs and credentials are based on three-digit SOCs. To transform the information from six-digit to three-digit SOCs, we weighted the relevance of each CIP or credential by the portion of the workforce in the three-digit SOC code associated with the six-digit SOC occupations requesting the CIP or credential. The workforce population information was pulled from the 2015 ACS. Exhibit 20 shows the five most relevant CIP codes and credentials associated with each occupation using this method. If there were fewer than five relevant CIP codes or credentials, all were listed.


Exhibit 20. CIP Codes and Credentials Associated with the Top Shortage Occupations

<table>
<thead>
<tr>
<th>Occupation and Shortage Rank</th>
<th>Related CIP Codes</th>
<th>Related Credentials</th>
</tr>
</thead>
</table>
| 1 Health Diagnosing and Treating Practitioners | 5119 - Osteopathic Medicine/Osteopathy  
5138 - Registered Nursing, Nursing Administration, Nursing Research and Clinical Nursing  
6005 - Medical Residency Programs - Subspecialty Certificates  
5112 - Medicine  
6004 - Medical Residency Programs - General Certificates | 6051 - Wound Care Certified  
6875 - Multiple Sclerosis Certified Specialist  
9533 - Vascular Access-Board Certified  
2437 - Certified Nutrition Support Clinician  
9539 - Certificate of Completion: Bronchoscopy |
| 2 Sales Representatives, Wholesale and Manufacturing | 5219 - Specialized Sales, Merchandising and Marketing Operations  
5218 - General Sales, Merchandising and Related Marketing Operations | 0462 - Certified Salesperson  
5264 - National Professional Certification in Sales  
9140 - Certified Advertising Specialist  
1320 - Certified Sales Professional  
0139 - Training Advertising Specialist |
| 3 Computer Occupations | 1101 - Computer and Information Sciences, General  
1110 - Computer/Information Technology Administration and Management  
1107 - Computer Science  
1102 - Computer Programming  
1512 - Computer Engineering Technologies/Technicians | 9545 - Microsoft Dynamics NAV 2013 C/Side Development  
9665 - Microsoft Dynamics CRM 2013 Applications  
9855 - Oracle WebCenter Content 11g Essentials  
9549 - Microsoft Dynamics AX 2012 Service Management  
9752 - Windows UX Design |
| 4 Advertising, Marketing, Promotions, Public Relations, and Sales Managers | 5214 - Marketing  
5120 - Pharmacy, Pharmaceutical Sciences, and Administration  
1902 - Family and Consumer Sciences/Human Sciences Business Services  
5202 - Business Administration, Management and Operations  
5201 - Business/Commerce, General | 0045 - Certified Product Marketing Manager  
0047 - Agile Certified Product Manager  
0046 - Certified Innovation Leader  
5588 - Certified Hospitality Marketing Executive  
3850 - Certified Financial Marketing Professional |
| 5 Motor Vehicle Operators | 4902 - Ground Transportation  
5108 - Allied Health and Medical Assisting Services | 2511 - Director of Pupil Transportation  
2512 - Supervisor of Pupil Transportation  
2513 - Pupil Transportation Specialist  
5591 - Certified Community Transit Manager  
8593 - Route Driver Certification |
| 6 Health Technologists and Technicians | 5139 - Practical Nursing, Vocational Nursing and Nursing Assistants  
5110 - Clinical/Medical Laboratory Science/Research and Allied Professions  
5109 - Allied Health Diagnostic, Intervention, and Treatment Professions  
5108 - Allied Health and Medical Assisting Services  
5106 - Dental Support Services and Allied Professions | 2451 - Drug Collection Specialist  
2452 - Paramedical Insurance Examiner  
9533 - Vascular Access-Board Certified  
1045-2449 - Point-of-Care Technician |
Knowledge of the instructional areas and credentials associated with shortage occupations allows resources to be targeted toward preparing the older workforce for jobs. However, the time investment required for training varies by occupation and in many cases, it may not be feasible for older workers to dedicate themselves to intensive training to enter a new occupation.

Although Health Diagnosing and Treating Practitioners are projected to experience the greatest shortage, training 50+ workers to enter this occupation may be impractical. Many of the associated programs of instruction and credentials take many years to complete, so older workers may not be able to make the required time investment. However, resources could be target toward training older workers already in this occupation for career advancement or to develop new skills necessary to maintain their current jobs.

A relatively large portion of the 50+ workforce (9.9%) is also already in Sales Representatives, Wholesale and Manufacturing and similar occupations. Educational requirements for these occupations are not as intensive as for the health diagnosing and treating occupations. Therefore, training opportunities could target those able to commit to a moderate level of training. Additionally, because a relatively large portion of the 50+ workforce is already in these occupations, there may be opportunities for training to foster advancement. A similar scenario applies to Health Technologists and Technicians, which along with similar occupations, already includes 10.1% of the 50+ workforce.

Motor Vehicle Operators may provide greater opportunity to workers over 50 who are not already in any of the top shortage or related occupations. The time investment in training for Motor Vehicle Operators tends to be substantially shorter than for the other top shortage occupations. However, as noted in Section 2.3, among all shortage occupations, Motor Vehicle Operators has the lowest median wages.

As noted previously, Computer Occupations are projected to experience a shortage and comprise a large share (9.4%) of all job postings between 2017 and 2020. However, only a small portion of the 50+ workforce (2.2%) is currently in these and similar occupations. Preparing a substantial portion of the 50+ workforce to be competitive in Computer Occupations may be impractical. For workers with limited experience, training for these occupations could

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Note: This table shows the five most relevant CIP codes and credentials associated with each occupation using the method described above. If there were fewer than five relevant CIP codes or credentials, all were listed.

45 Ibid.
require a substantial time commitment. Resources might rather be focused toward providing additional training for those already in these occupations or preparing 50+ workers for entry-level positions so they can gain experience while earning credentials.
5. Recommendations

Even as the 50+ workforce faces persistent long-term unemployment, stagnant wages, and narrowing job opportunities, many employers are having trouble finding qualified workers to fill job openings. Preparing older workers to be competitive in shortage occupations can help address some of the challenges faced by both 50+ workers and employers and build on the soft skills that are an existing strength among this segment of the workforce. An effective strategy needs to take into account both the occupations that are projected to be hiring as well as the existing skills and training needs of the 50+ workforce.

Across the U.S., Health Diagnosing and Treating Practitioners; Sales Representatives, Wholesale and Manufacturing; Computer Occupations; Advertising, Marketing, Promotions, Public Relations, and Sales Managers; Motor Vehicle Operators; and Health Technicians and Technologists are projected to experience the largest labor shortages. Among these, Health Diagnosing and Treating Practitioners, Computer Occupations, and Motor Vehicle Operators are expected to comprise the largest share of job postings. These are therefore promising areas of focus for strategies to prepare the 50+ workforce for job opportunities. However, any approach to training the 50+ workforce should take into account the time required for training and whether to target incumbent workers or new entrants.

Much of the 50+ workforce is already well positioned to fill vacancies in these occupations. Among all occupations, Health Diagnosing and Treating Practitioners includes the second-highest portion of the 50+ workforce, at 4.3%; an additional 5.8% are in similar occupations. That is, more than 10% of the 50+ workforce already has the knowledge and skills required to fill job openings in health diagnosis and treatment. Because of the time-intensive training requirements, efforts in this occupation may be better directed toward helping these workers advance in their careers rather than training new entrants. As noted previously, older workers tend to be most successful in career changes when they are moving into jobs with similar skill requirements.

Motor Vehicle Operators and similar occupations also already include a relatively large portion of the 50+ workforce (6.6%). Additionally, the time commitment for training new entrants is minimal compared to other shortage occupations. Therefore, motor vehicle operation could be an area of focus for efforts to train 50+ workers looking to enter new occupations with promising job prospects. This is also the case for Sales Representatives, Wholesale and Manufacturing and Health Technicians and Technologists. A large portion of the 50+ workforce is already in
these and similar occupations so efforts could be directed at training these individuals for career advancement. Additionally, the time commitment required for training new entrants is more moderate than for other shortage occupations.

Computer Occupations are projected to experience shortages and to comprise a large share of job postings, but only a small portion of the 50+ population is in these or similar occupations. Efforts to prepare the 50+ workforce quickly for these jobs would be best directed toward entry-level jobs that require minimal training. For the small portion of the 50+ workforce in Computer Occupations, resources could be targeted toward additional training for career advancement.