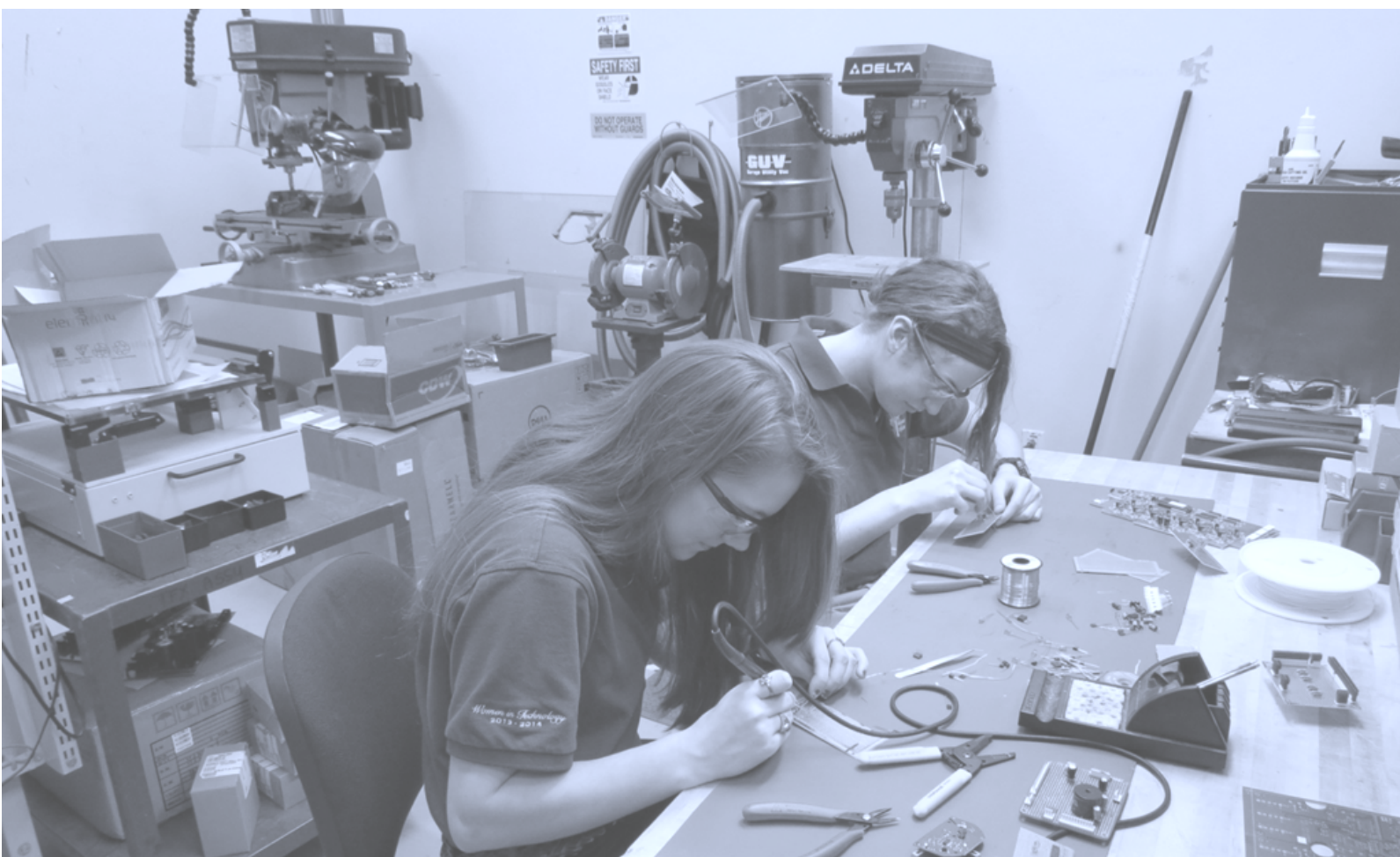


A Primer about Labor Market Information

**Methods for Researching Industries and Occupations to Help
Massachusetts Students Make Good Career Decisions**



**Massachusetts Department of Elementary and Secondary Education
Office of College and Career Readiness**

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Chapter One. Primer on Labor Market Information and Analysis

Introduction. The Massachusetts Department of Elementary and Secondary Education (ESE) has developed this training manual about Labor Market Information (LMI) through its Connecting Activities initiative, as a tool to support career awareness and exploration activities for students of the Commonwealth. The primary goal of this publication and related LMI materials is to enhance the quality of Career Development Education (CDE) in Massachusetts¹ to ensure that all students are college and career ready when they complete high school.

The Department envisions that professionals in a wide range of settings will use this LMI primer, from middle and high school classrooms in which educators and counselors are helping guide student research about careers, to community settings where workforce professionals are supporting youth, whether in or out-of-school, who are placed in work-based learning experiences. This manual will be useful to educators in academic and comprehensive high schools as well as career vocational technical high schools. It will also support training and education being offered to adult learners in community colleges, workforce training programs, and other related programs throughout the state.

This is not itself a career development guide. It is a primer on ‘labor market information’ – and is specifically designed to help users gain a working familiarity with national and state databases regarding industry sectors and occupations. ESE offers this primer in light of the increasing need to help students make well-informed choices about career direction that are informed by LMI. This primer is intended to demystify the sources of LMI, and to simplify efforts to access this information.

There are many useful tools and websites aimed at helping students with the career decision-making process. Many of these include data about jobs; occupational projections, educational programs that help students better prepare for careers, and wage levels.

Almost all of these sites are connected to core databases that document the composition of our economy, data that track the growth of industries and reflect changes in occupational staffing patterns within business firms. These changes represent the ‘demand side’ of labor market information – postings that advertise jobs seeking applicants with specific skills and attributes to fill available positions.

These large scale databases also track changes in the ‘supply side’ – current workers and new entrants to the labor force who collectively provide the skills available that drive the economy.

¹ To learn more about ESE’s guidance to practitioners about Career Development Education generally, see its publication titled [the Career Development Education Guide and Glossary](#), which can be found at the Connecting Activities page of the ESE website. See <http://www.doe.mass.edu/connect>.

Knowing more about how population changes, the aging of the workforce, and the impact of immigration will help anyone be more knowledgeable about career and job opportunities.

This primer helps inform users about how to access these core databases and how to use this information in conjunction with more typical career development tools to give students a broader understanding of their options.

Taking the Wider View. Rapid technological change is having a dramatic effect on jobs and job skills that are needed to have a secure career. The most effective career exploration and decision-making strategies will include a heavy dose of career management – making it a life-long process for everyone to understand changes in jobs and industries and the need for constantly adding new skills in order to stay competitive and employable.

Career decision-making these days is not about asking a student to choose a single, narrowly defined occupation that could serve as an ending point to an education or training program. Job content is changing too fast to offer much in the way of job security. Instead, we need students to be flexible, to know how careers are comprised of a variety of job progressions. They need to know about occupational clusters and pathways, and how to navigate through a constantly changing job environment.

We think this primer can help educators as they work with students and their career decision-making.

Labor Market Information and Other Connections to the Classroom. Understanding the basics of labor market information isn't helpful for just career decision-making. In today's academic environment, learner-centered inquiry will inevitably connect with economic research. As such, the study of labor market information can be an avenue for integrating career awareness into classes across many different subject areas. We are already aware that many educators are interested in embedding this type of research into regular classroom curriculum, to enhance math, social studies and reading by using real world practical applications.

Economic and labor market research and analysis can offer students many insights and connections into:

- local, state, national and world history and geography;
- economic literacy concepts, especially those contained in the Grade 8-12 Concepts and Skills in the Social Studies and History;
- technology and engineering standards contained in middle school and high school science standards, especially around understanding manufacturing, communications, transportation and other systems;

- CVTE frameworks about employability skills, management, entrepreneurship and technological literacy;
- applications to math frameworks and skills, including practical statistics, data analysis and graphing; and
- applications to English Language Arts frameworks and skills, including research skills and technical reading and vocabulary.

The study of labor market statistics is also a natural part of the career exploration activities that are often part of internship classes, senior capstone projects, summer employment programs, guidance workshops and advisories, and other career-related programming. A broad look at the labor market is valuable as a backdrop for research into specific occupations and industries, as background before a field trip or guest speaker series, or as a classroom activity complementing individual research about occupations of interest.

Finally, this guide will help both students and educators learn some of the technical vocabulary used in labor market analysis. A grounding in the basic terms can help users be more economically literate, and better understand how to read economic content contained in graphs, charts, tables, and news articles.

Chapter Two. Population Dynamics and Educational Attainment

Learning goals for this chapter

- Learn the basic data and terminology that is used to define the 'supply side' of labor market information.
- Understand population demographics and how changes in population affect the labor force.
- Learn about educational attainment within the United States population, and how education levels affect competition for jobs and careers.

Background. The field of labor market research analyzes the factors that affect employment and wages. Labor market economists, as in any branch of economics, look at the dynamics of supply and demand for labor. Ideally, the labor market will be in balance, where the supply of people (and the productive skills they possess) will match the demand for workers as signaled by employer job postings and hiring.

When a market is in equilibrium, workers are able to find good jobs that meet their education, training, and interests and offer good wages and working conditions. Employers are able to fill job slots with people who have the right skills to be productive in a work environment.

In ideal circumstances, over time, as the population changes through growth, aging, or immigration, the market adjusts and workers continue to find good jobs. And, ideally, as the economy changes and business firms shift their mix of products and services, workers are still able to keep up with new production technologies and continually changing skill needs.

But economic conditions are in constant motion, and the labor market is rarely ever in balance. In just the past few decades, there have been major changes in both the supply and demand for labor (and skills) highlight gaps and disconnects. Even in the healthiest most flexible economy, employers and workers are constantly adjusting to changes in supply and demand. Employers shape and re-shape staffing patterns to adjust to new mixes of products and services, changes in markets, and to respond to the highs and lows of business cycles.

Some of these major shifts include:

- The U.S. continues to undergo major shifts in the mix of manufacturing-based and service-based employment.

- New technologies cause big changes in how work is organized; how products are created and what types of goods and services exist; in the skills needed across all types of jobs; and the mix of production, technical, managerial and other occupations.
- The U.S. population is aging rapidly, and the baby boom generation has begun to retire in large numbers. Boomers are turning 65 at the rate of about 8,000 every day. As older workers leave employment, this creates a big demand for replacements.
- The U.S. has experienced significant in-migration of persons from other countries. Since 1999, more than 15 million foreign persons legally immigrated – about half came from Central and South America, about a third came from Africa and the Middle East, and about one-fifth came from Southeast Asia and China.²
- Economic conditions are highly variable across different states, and across sub-state regions within a single state. The economic health of regions reflects the industries that cluster there and the age, experience, and education/skill levels of people who live there. The rate of economic change at the regional level is one of the major structural shifts in the U.S. economy.

The Purpose of Supply-Side Analysis. This chapter provides a broad overview of data that define the supply side of labor market research, and seeks to acquaint students and educators with beginning level of knowledge about key technical terms relating to the labor force.

When engaged in career exploration and decision-making, it is uncommon for students to take a detailed look at the supply side. Population variables reflect large scale trends, and there is nothing that any individual student can do to affect big social changes. But having some core knowledge of the population and labor force can help a student understand the context for how their education, skills and interests fit within a changing economy. We want to help students gain a broader perspective so they can make good choices about education programs and careers.

Knowing more about the supply side variables is helpful when trying to interpret or understand many charts, tables, graphics and news articles that forecast job growth or future economic conditions. Understanding these concepts is part of developing an overall ‘economic literacy’ about job markets. It helps students create a broader view about jobs and job changes that will help them develop good long-term strategies for career success.

² See detailed data from the Migration Policy Institute <http://www.migrationpolicy.org/programs/data-hub/us-immigration-trends>.

Sources of Population Data. Between 2010 and 2050, the U.S. population is expected to grow from 310 million to 439 million, an increase of 42 percent. Population size is a function of several variables, including:

- the current **size of the population** within the geography being studied -- the U.S. Census Bureau is the leading source of statistical information about the nation's people. Our population statistics come from the decennial census, which count the entire U.S. population every ten years, and are supplemented regularly with data developed from several other surveys.³
- **age dynamics** – the number of people in each age cohort, usually organized into five-year groupings.⁴ The age structure of a population affects a nation's key socioeconomic issues. Countries with young populations (high percentage under age 15) need to invest more in schools, while countries with older populations (high percentage ages 65 and over) need to invest more in the health sector. The age structure can also be used to help predict potential political issues. For example, the rapid growth of a young adult population unable to find employment has led to political unrest in several developing nations.
- the **birth rate** (number of live births per 1,000 of a population within a given year) -- The country's birth rate dipped to 62.5 births per 1,000 women between ages 15 and 44, which is ten percent lower than the birth rate in 2007 (69.3 per 1,000 women), and a record low since the government started tracking birth rates in 1909 (when the birth rate was 126.8 per 1,000 women).⁵
- **mortality rate** (number of deaths per 1,000 of a population within a given year) – the mortality rate in the U.S. is about 8.21 deaths for 1,000 persons.⁶
- **net migration** – the net migration rate is the difference of immigrants and emigrants of an area in a period of time per 1,000 inhabitants. A positive value represents more

³ The home page for the Census Bureau's population reports contain a wealth of data, information, downloads, and articles on population in the U.S. (and for each state), and for demographic characteristics such as age, gender, ethnicity, ancestry, and migration. See <http://www.census.gov/topics/population.html>.

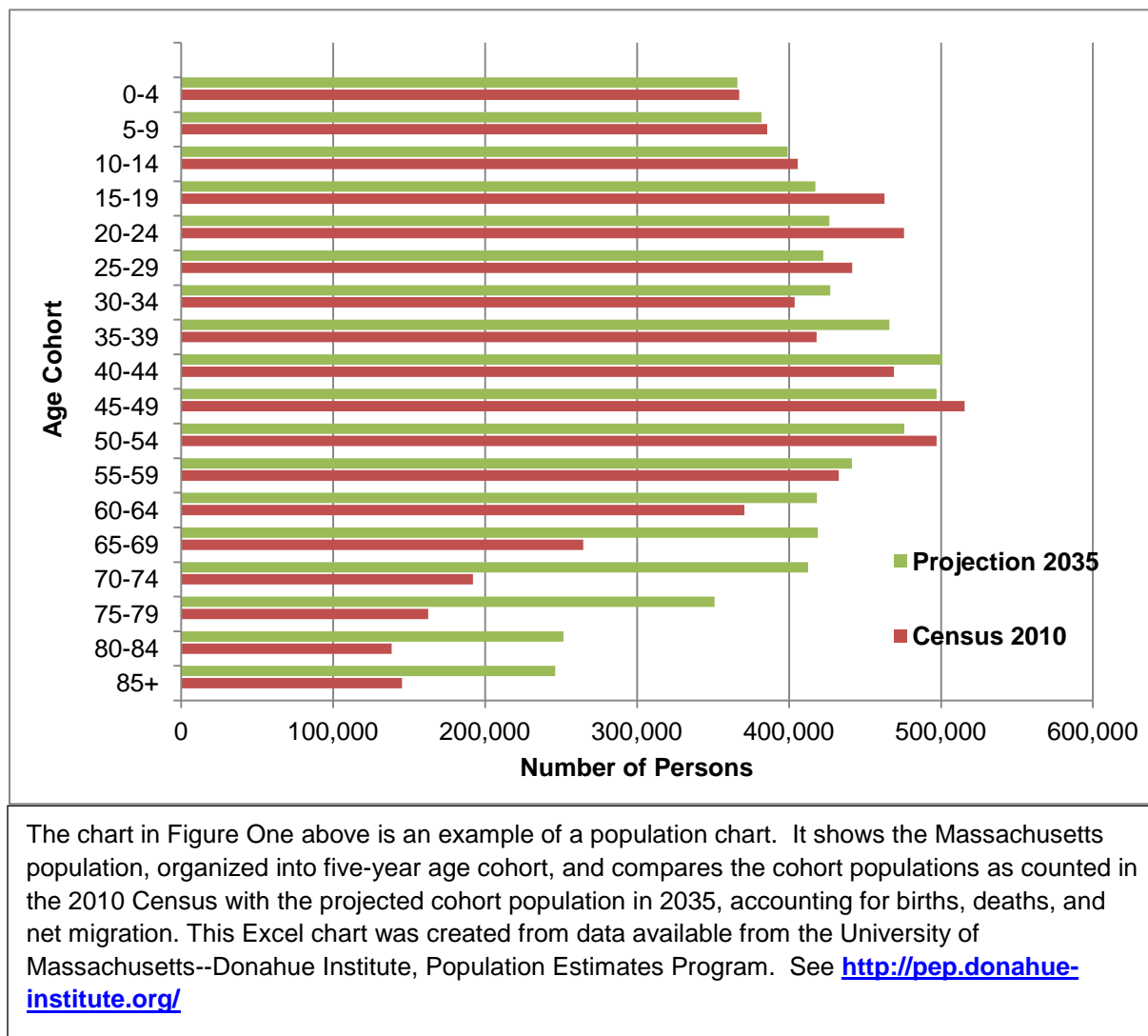
⁴ A chart showing the age structure of the U.S. population, by gender, is accessible at http://www.indexmundi.com/united_states/age_structure.html. The data in the chart is sourced to the World Fact Book, published by the U.S. Central Intelligence Agency, accessible at <https://www.cia.gov/library/publications/the-world-factbook/>

⁵ The Centers for Disease Control and Prevention maintain a number of databases and publications regarding birth rates in the U.S. See, e.g., <http://www.cdc.gov/nchs/data/databriefs/db175.htm>.

⁶ The Centers for Disease Control and Prevention (CDC) maintain a number of databases and publications regarding death rates in the U.S. See, e.g., <http://www.cdc.gov/nchs/fastats/deaths.htm>.

people entering the country than leaving it, while a negative value means more people are leaving than entering it.⁷

Figure One. Massachusetts Population, 2010 and 2035, by 5-Year Age Cohorts



Most of the projected population group over the next few decades is expected to be the result of high rates of in-migration plus low mortality rates. The nation will become more racially and

⁷ In 2014, the U.S. had a net migration rate of 2.45 persons per 1,000 – about average for all countries in the world. By comparison, American Samoa had a rate of -21.64, while the British Cayman Islands had a net migration rate of +17.69. See World Fact Book, published by the U.S. Central Intelligence Agency, accessible at <https://www.cia.gov/library/publications/the-world-factbook/rankorder/2112rank.html>.

ethnically diverse, with the aggregate minority population projected to become the majority by 2042. The population is also expected to become much older, and nearly one in five U.S. residents will be 65 or older in 2030.⁸

Defining the Labor Force. The overall population count is the biggest factor in defining aspects of the labor force, whether the data being assessed are national, state, or local. But population size is only the starting point. Other steps that are used to identify the size of the labor force include:

- **Working age population.** The term ‘working age population’ refers to the total population in a region, state, or nation that falls within a set range of ages. The working-age population measure is used to give an estimate of the total number of *potential* workers within an economy.

Typically, working age is assumed to consist of persons who are 18 years of age or more, or 65 years of age or less. This measure considers all individuals between these ages, but doesn't differentiate between those who are actually working and those who are currently unemployed. We count everyone over the age of 18, even if they are enrolled in college or not actually working. We don't count anyone older than age 65, even if they are still working. The count is simply an indicator of the potential size of the labor force, not an actual count.

The working-age population of an economy is always shifting as the demographics of a region change, with large changes having the potential to significantly impact the economy. The Federal Reserve Bank of St. Louis publishes a variety of economic data, including an interactive series that tracks the working age population.⁹

- **Civilian non-institutional population.** This term refers to persons 16 years of age and older residing in the fifty states and the District of Columbia, who are not inmates of institutions (e.g., penal and mental facilities, homes for the aged), and who are not on active duty in the armed forces. Practically speaking, persons who are institutionalized or serving in the armed forces are not available as workers in the labor market, so we exclude them in this step.
- **Civilian labor force.** All persons in the civilian non-institutional population are classified as either employed or unemployed. This data point is an expression of the labor force, not the population.

⁸Vincent & Velkoff, *The Next Four Decades: The Older Population in the United States, 2010 to 2050 Population Estimates and Projections*, U.S. Department of Commerce, Bureau of the Census (May 2015). Population Report is accessible at <http://www.census.gov/prod/2010pubs/p25-1138.pdf>.

⁹ See <https://research.stlouisfed.org/fred2/series/LFWA64TTUSM647S>.

- **Employed persons.** All persons who, during the reference period, (a) did any work as paid employees, worked in their own business or profession or on their own farm, or worked 15 hours or more as unpaid workers in an enterprise operated by a member of their family, or (b) were not working but who had jobs from which they were temporarily absent. Each employed person is counted only once, even if he or she holds more than one job.
- **Unemployed persons.** All persons who had no employment during the reference period, were available for work (except for temporary illness) and had made specific efforts to find employment some time during the four week-period ending with the reference date. Persons who were waiting to be recalled to a job from which they had been laid off need not have been looking for work to be classified as unemployed.
- **Not in the labor force.** Persons who are neither employed nor unemployed are not in the labor force. This category includes retired persons, students, those taking care of children or other family members, and others who are neither working nor seeking work.

Table One. Population and Labor Force Estimates in the U.S., 2015

Category	Number of Persons
U.S. population ¹⁰	321,044,165
→ Working age population ¹¹	204,026,415
→ Civilian non-institutional population ¹²	247,947,000
→ Civilian labor force ¹³	155,922,000
Employed ¹⁴	146,305,000
Unemployed ¹⁵	9,617,000
→ Not in labor force ¹⁶	92,025,000

¹⁰ The U.S. population 'clock', showing a constantly-refreshing value, is available at <http://www.census.gov/popclock/>. This page includes a number of excellent resources covering national state, and global population data.

¹¹ The working age population figures can be accessed at the website of the Federal Reserve Bank of St. Louis, referenced in footnote 9. Massachusetts population and labor force data is available at <http://www.massbondholder.com/real-time-disclosure/economic-data/population-characteristics>.

¹² <http://www.bls.gov/cps/cpsaat05.htm>.

¹³ Ibid.

¹⁴ Ibid.

¹⁵ Ibid.

¹⁶ Ibid.

Educational Attainment. Educational attainment refers to the highest level of education that an *individual* has completed. At a labor market level, we track educational attainment levels across an entire population as a general indicator of the skill levels within the entire labor force. Levels of education are one proxy for skill levels – of direct importance when determining whether a balance exists between the supply and demand for workers.

Educational attainment is also correlated with better labor market outcomes. The higher a person's education, the more likely he/she is to be in the labor force, be employed (and be less affected by layoffs and unemployment), and also more likely to earn a higher wage. In fact, the difference in labor market outcomes grows over time. Younger workers who had completed four-years of college earned 60 percent more than those who had only earned a high school diploma – a premium that increased to 95 percent more for workers aged 45-49.¹⁷

Educational attainment data is usually reported for populations aged 25 or older – since many (though not all) individuals have completed postsecondary education by age 25. The most complete data documenting educational attainment comes from the U.S. decennial census, supplemented by the Current Population Survey. The Census Bureau publishes a great deal of specific information about the methodology for their data collections, including Frequently Asked Questions ("FAQs")¹⁸ other useful sources of data include the American Community Survey and the Current Population Survey.¹⁹

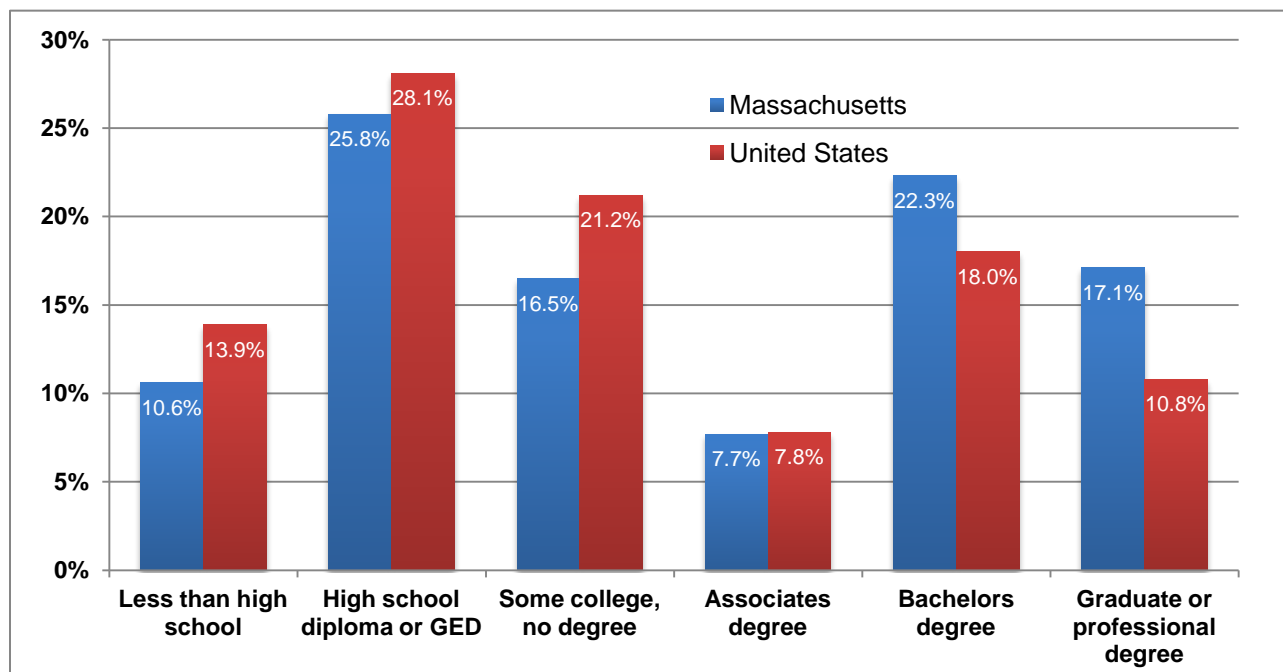
Typically, education attainment levels are reported for broad categories – persons who did not finish high school, those that finished high school but have no postsecondary education, persons who finished some college but do not have a degree, followed by persons who earned an associate's degree, a bachelor's degree, and those with a graduate or professional degree.

¹⁷ Richard Buddin, *Implications of Educational Attainment Trends for Labor Market Outcomes*, ACT Research Report Series 2012, No. 7 (October 2012), available at http://www.act.org/research/researchers/reports/pdf/ACT_RR2012-7.pdf.

¹⁸ <http://www.census.gov/hhes/socdemo/education/about/faqs.html>

¹⁹ Census data is analyzed at <http://www.census.gov/hhes/socdemo/education/data/census/index.html>; data from the American Community survey is available at <http://www.census.gov/hhes/socdemo/education/data/acs/index.html>; data from the Current Population Survey is available at <http://www.census.gov/programs-surveys/cps.html>.

Figure Two. Educational Attainment Levels in Massachusetts and the U.S., 2013

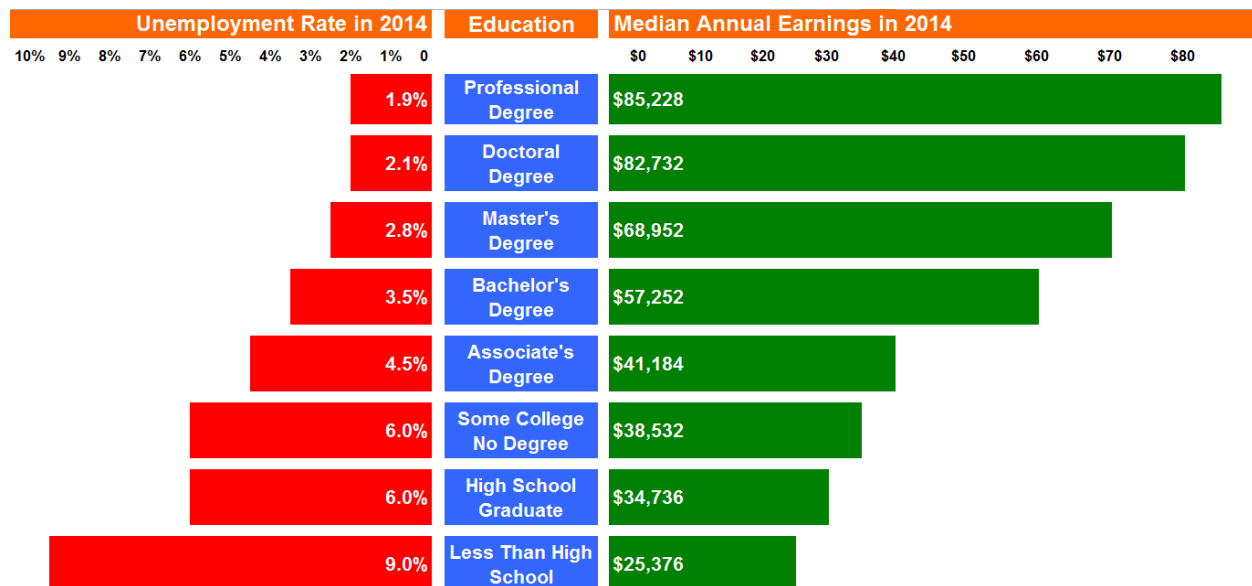


This chart compares the educational attainment levels in Massachusetts with attainment in the U.S. as a whole. Data covers the population aged 25 and over, and were downloaded from the Census Bureau, American Community Survey website (<http://www.census.gov/acs/www/>).

The chart illustrates that Massachusetts has a lower percentage of its adult population that has less than a high school education, a high school diploma, or has some college but no degree, and a higher percentage of its population that has a bachelor's, graduate, or professional degree – relative to the levels for the U.S.

Other data show that the Massachusetts population ranks highest among all fifty states in the percentage of its population that has earned a graduate or professional degree. See the website published by National Center for Higher Education Management Systems <http://www.higheredinfo.org/stateprofile/index.php> The share of Massachusetts residents aged 25 or older with a bachelor's degree or higher rose from 27% in 1990 to 39% in 2010 – the largest percentage point gain among the fifty states. Migration was key to Massachusetts' success: workers moving into Massachusetts from other states and countries accounted for more than half (57%) of the state's total increase in residents with a bachelor's degree or higher.

Figure Three. Earnings and Unemployment Rates by Educational Attainment, 2014



This chart, published by the Bureau of Labor Statistics using data from the Current Population Survey, displays both unemployment rates and median annual earnings in 2014 for full-time workers at eight common educational attainment levels. The graph highlights that earnings are related to education, and that workers with higher levels of education have lower unemployment rates. The original chart and data table are available at http://www.bls.gov/emp/ep_chart_001.htm.

Chapter Three. Understanding the Structure of the Economy: Industry Sectors

Learning goals for this chapter:

- Learn how business establishments are organized into industry sectors using the NAICS classification system.
- Understand and be familiar with the two-digit, three-digit, and four-digit NAICS levels – how are they defined, how you would research different sectors, when would you use the different levels.

This Chapter is About Industry Sectors. An industry sector is a group of companies that operate in the same segment of the economy or share a similar business type. In general, these companies are in competition with each other, serve similar markets, create similar products, use similar production technologies, follow the same kinds of work organization, and typically deploy a similar (but not necessarily identical) mix of occupations to accomplish their business purposes.

Understanding sectors, and being able to conduct simple research about sectors, is helpful for several reasons:

- many economic forecasts are based on projections of the growth of industry sectors;
- historical graphs and charts that describe changes in the economy generally track employment by industry sector;
- larger measures of the strength or growth within an economy – like gross domestic product, or gross national product – look at the aggregate value of products and services delivered by industry sectors;
- understanding sectors is one way to access occupational information and better understand whether jobs are likely to increase or decrease – having a broader understanding of sectors provides a stronger base for occupational exploration.

Background. Every business activity in the entire economy – private, public, non-profit, product or service – can be found somewhere within the comprehensive North American Industry Classification System (NAICS, pronounced like “nakes”).²⁰ The idea for a single

²⁰ <http://www.census.gov/eos/www/naics/index.html>.

approach to organizing industry sectors came about many decades ago. Prior to the 1930s, each federal agency had its own classification system, and there was no common, uniform way to measure or report data on industrial production, labor statistics, foreign trade, or commerce. In 1937, the federal government released the Standard Industrial Classification system (SIC), which was adopted across all executive agencies, and quickly adopted by business groups and academic researchers.

The SIC coding system was used until 1997, when it was replaced by NAICS. The SIC approach worked well in a stable and static economy, but proved unworkable as the U.S. shifted to a more complex service economy. The implementation of new technologies and new business functions necessitated a different approach to classifying business organizations – and required a more flexible approach that could grow and change to accommodate rapid change in the economy.

The federal Office of Management and Budget worked together with its counterparts in Canada and Mexico to replace the SIC system by creating a single, new industry sector classification system for *all* of North America. Definitions, hierarchies, and organizational codes within NAICS cover all businesses in the continent – Canada, Mexico, and the United States are signatories to the North American Free Trade Agreement (NAFTA), and they adopted a single comprehensive classification system makes it easier to track firms, sectors, and products across all of North America.

NAICS is a system that classifies *all* business activities within the economy. Its definitions of industries and industry sectors are articulated through (1) a **six-digit code** that is (2) applied to every **site-specific address** or business location.

The NAICS Coding System. NAICS uses a 2- through 6-digit hierarchical coding system, offering five levels of detail. Each digit in the code is part of a series of progressively narrower categories, and the more digits in the code signify greater classification detail.

- The **first two digits** of the NAICS code designate the major economic sector. There are twenty numbered sectors at this level, listed in Table Two (79 other two-digit numbers are left blank);
- The **third digit** designates the subsector;
- The **fourth digit** designates an industry group;
- The **fifth digit** designates a specific industry; and
- The **sixth digit** is reserved for any special designations that need to be made within any of the three member countries of Canada, Mexico, and the United States. This digit is almost always a zero.

Where is NAICS data located? The complete NAICS system is available on-line at a website managed by the U.S. Bureau of the Census.

<http://www.census.gov/eos/www/naics/index.html>

It is searchable either by key word or by NAICS code – at any level from two to six digits.

Table Two. Twenty NAICS Categories at the Highest (Two-Digit) Level

Sector	Description
11	Agriculture, Forestry, Fishing and Hunting
21	Mining, Quarrying, and Oil and Gas Extraction
22	Utilities
23	Construction
31-33	Manufacturing
42	Wholesale Trade
44-45	Retail Trade
48-49	Transportation and Warehousing
51	Information
52	Finance and Insurance
53	Real Estate and Rental and Leasing
54	Professional, Scientific, and Technical Services
55	Management of Companies and Enterprises
56	Administrative and Waste Management Services
61	Educational Services
62	Health Care and Social Assistance
71	Arts, Entertainment, and Recreation
72	Accommodation and Food Services
81	Other Services (except Public Administration)
92	Public Administration

Note that the NAICS website can be searched by NAICS *version*. The current version is one that was released in 2012. Earlier versions exist for 2007 and for 2002. In general, classification groupings do not change from version to version, but new categories are coded as new sectors grow or change.

The easiest way to conduct a search in NAICS, and to quickly learn the internal structure of the classification system, is to start a search at the two-digit level. As presented in Table Two, there are twenty NAICS categories at the highest (two-digit) level. Note: The table includes hyperlinks to the NAICS system. Pressing **Control** on your keyboard and clicking on any of the sector digits provides a direct link to the sector summary at the NAICS website.

Example: Grocery Stores. NAICS assigns the code 445110 to grocery stores – in Massachusetts, we think of such supermarkets as Star Market, Big Y, Hannaford, or Wegmans.

Grocery Stores – NAICS Code:

4	4	5	1	1	0
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- The first two digits of this code are **44**, which designate the **Retail Trade** economic sector. NAICS defines Retail Trade as the sector that

“comprises establishments engaged in retailing merchandise, generally without transformation, and rendering services incidental to the sale of merchandise. The retailing process is the final step in the distribution of merchandise; retailers are, therefore, organized to sell merchandise in small quantities to the general public. This sector comprises two main types of retailers: store and non-store retailers. Store retailers operate fixed point-of-sale locations, located and designed to attract a high volume of walk-in customers. In general, retail stores have extensive displays of merchandise and use mass-media advertising to attract customers. They typically sell merchandise to the general public for personal or household consumption, but some also serve business and institutional clients. These include establishments, such as office supply stores, computer and software stores, building materials dealers, plumbing supply stores, and electrical supply stores”²¹

- The third digit of this code is **5**, which designates an industry subsector defined as **Food and Beverage Stores**. According to the NAICS definition “industries in the Food and Beverage Stores subsector usually retail food and beverage merchandise from fixed point-of-sale locations. Establishments in this subsector have special equipment (e.g., freezers, refrigerated display cases, refrigerators) for displaying food and beverage

²¹ [http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=44&search=2012 NAICS Search](http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=44&search=2012%20NAICS%20Search)

goods. They have staff trained in the processing of food products to guarantee the proper storage and sanitary conditions required by regulatory authority.”²²

- The fourth digit in this code is **1**, which designates the industry group of **Food Stores**. NAICS defines the industry group of Food Stores as the group that “comprises establishments primarily engaged in retailing a general line of food products.”²³
- This fifth digit in this code is **1**, which designates the specific industry known as **Supermarkets and Other Grocery (except Convenience) Stores**. According to NAICS, “this industry comprises establishments generally known as supermarkets and grocery stores primarily engaged in retailing a general line of food, such as canned and frozen foods; fresh fruits and vegetables; and fresh and prepared meats, fish, and poultry. Included in this industry are delicatessen-type establishments primarily engaged in retailing a general line of food.”²⁴
- The sixth digit in this code is **0**, which signifies that there is no unique ‘national’ example of supermarkets in the U.S. that differs from those in Canada or Mexico. A supermarket is comparable in all three countries.

When is something sufficiently different that it is not a grocery store? Cross-references and other definitions at the NAICS site clarify that a convenience store or food mart is coded as 445120 (Convenience Stores), but if it is a location that also sells automotive fuels, it is coded as 447110 (Gasoline Stations with Convenience Stores). Retail food stores that specialize in other products have their own definitions and coding, including meat markets (445210), fish and seafood markets (445220), fruit and vegetable markets (445230), and bakeries (445291).

NAICS Codes Apply to ‘Establishments’. Earlier in this chapter, we noted that NAICS classified business functions by assigning a classification code to a specific business site or location. In labor market terms, a street address or location is an ‘establishment’ – a single physical location where business is conducted or where services or industrial operations are performed (e.g., factory, mill, store, hotel, movie theater, mine, farm, airline terminal, sales office, warehouse, or central administrative office).

An enterprise, on the other hand, may consist of more than one location performing the same or different types of economic activities. Each separate establishment of that enterprise is assigned a NAICS code based on its own primary business activity.

²² <http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=445&search=2012%20NAICS%20Search>.

²³ <http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=4451&search=2012%20NAICS%20Search>.

²⁴ <http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=445110&search=2012%20NAICS%20Search>.

For example, Raytheon Corporation is an international aerospace and defense firm based in Waltham, Massachusetts – a large, well-known company that has several locations within the state. Raytheon’s headquarters location in Waltham, where the top management and administrative staff work, is a separate ‘establishment’ from the rest of its locations. That headquarters has a NAICS code of 551114 (Corporate, Subsidiary, and Regional Managing Offices). Raytheon’s plant in Andover builds the Patriot Missile system, along with other military defense products. The Andover plant is a separate establishment, and has a NAICS code of 336415 (Guided Missile and Space Vehicle Propulsion Unit Manufacturing).

Raytheon has several other business functions – many of which are their own separate establishments. One of their other business units conducts basic science research, focusing on quantum physics and quantum mechanics. Such a research lab, if it has a location separate from other business units, would be coded as 541712 (Research and Development in the Physical, Engineering, and Life Sciences).

An ‘establishment’ can also be a public sector employer. School districts are classified in Group 20 (Educational Services) even if they are part of the government of a city or town. Governmental offices are themselves usually classified in Group 92 (Public Administration). So, NAICS codes encompass all types of establishments from public to private, as well as non-profit organizations.

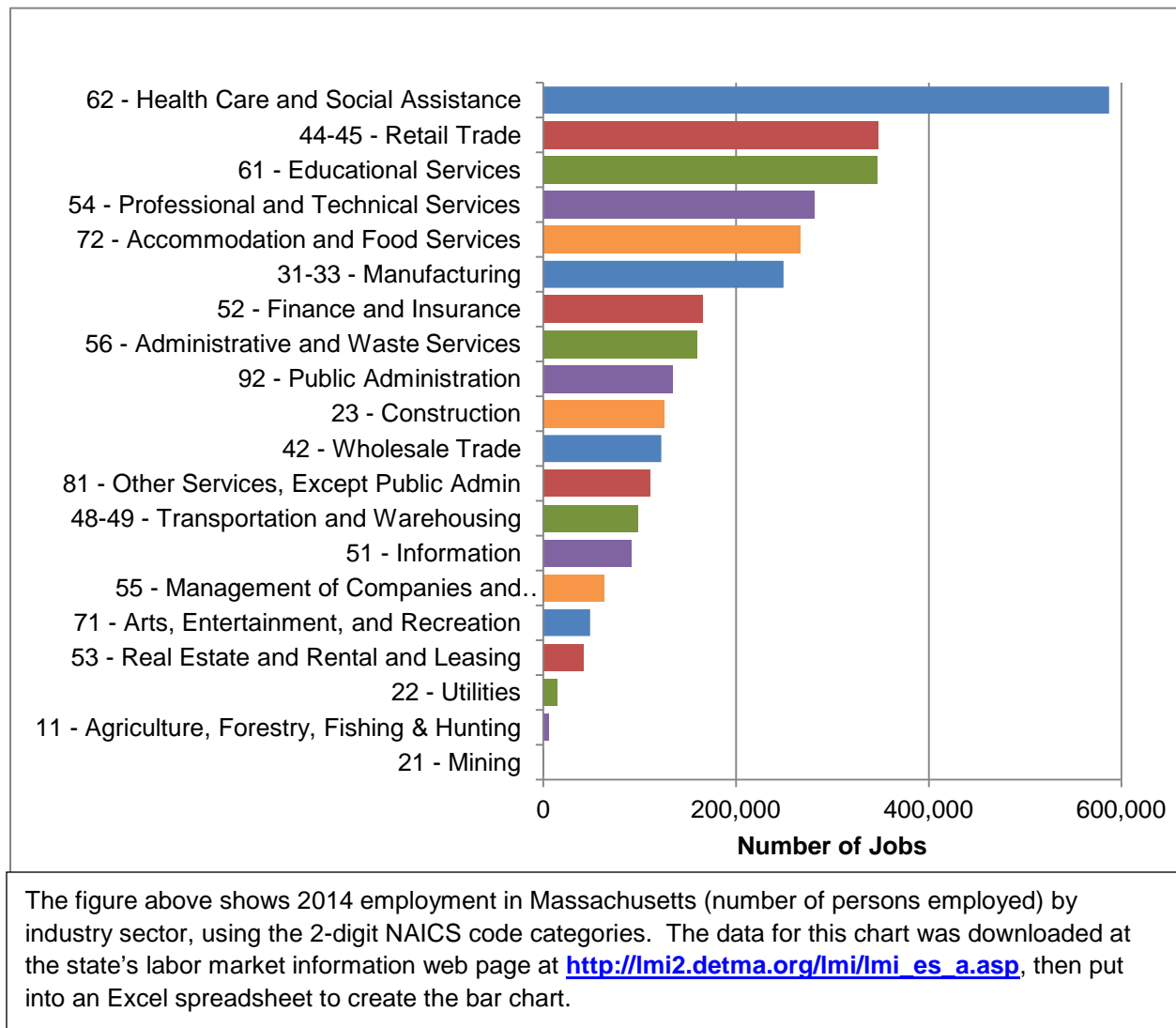
Three More NAICS Examples. The following tables show the hierarchies of three other industry sectors:

Architectural Design	
<u>540000</u>	Professional, Scientific, and Technical Services
<u>541000</u>	Professional, Scientific, and Technical Services
<u>541300</u>	Architectural, Engineering, and Related Services
<u>541310</u>	Architectural Services
NAICS Definition: This industry comprises establishments primarily engaged in planning and designing residential, institutional, leisure, commercial, and industrial buildings and structures by applying knowledge of design, construction procedures, zoning regulations, building codes, and building materials.	

High Schools	
<u>610000</u>	Educational Services
<u>611000</u>	Educational Services
<u>611100</u>	Elementary and Secondary Schools
<u>611110</u>	Elementary and Secondary Schools
NAICS Definition: This industry comprises establishments primarily engaged in furnishing academic courses and associated course work that comprise a basic preparatory education. A basic preparatory education ordinarily constitutes kindergarten through 12th grade. This industry includes school boards and school districts.	

Banks	
<u>520000</u>	Finance and Insurance
<u>522000</u>	Credit Intermediation and Related Activities
<u>522100</u>	Depository Credit Intermediation
<u>522110</u>	Commercial Banking
NAICS Definition: This industry comprises establishments primarily engaged in accepting demand and other deposits and making commercial, industrial, and consumer loans. Commercial banks and branches of foreign banks are included in this industry.	

Figure Four. Employment in Massachusetts by 2-digit Industry Sector, 2014



Chapter Four. Understanding Occupational Structure

Learning goals for this chapter:

- Learn how jobs in the economy are organized into occupational titles using the Standard Occupational Classification (SOC) system.
- Understand and be familiar with the two-digit, three-digit, and four-digit SOC levels – how they are defined, how you would research different occupations, and when you would use the different levels.

This Chapter is about Occupational Groupings. This chapter provides some basic strategies for researching general occupational structure, occupational classifications, and groupings of occupations within the economy. It does not describe details regarding specific occupations – such as credentials, typical job tasks, salary levels, educational requirements, or employment opportunities.

Understanding occupational groupings is helpful for many reasons:

- Most forecasts of job growth focus on growth or declines in occupations (even if the projection methodologies start with trends within industry sectors).
- Many published tables and charts are based on data that reflect occupational groupings, and the resources described in this chapter will help both students and educators better understand how to interpret such graphs.
- Looking at occupations is the most typical way students think about potential careers.
- Similar occupations can show up in many different industry sectors.
- It is often helpful to look at occupations as a cluster of related jobs, rather than a single job. This helps students begin to better understand career ladders, job progressions, entry-level jobs compared with advanced or mid-career jobs, and how similar occupational categories relate to each other.

Background. Employers and job seekers see job titles in an employment posting as a way to distinguish one occupation from another. Every occupation requires a different mix of knowledge, skills, and abilities, and is performed using a variety of activities and tasks. Labor market researchers have reviewed job similarities and differences to create a classification system that encompasses all occupations.

Just like NAICS provides a comprehensive classification system for industry sectors, the Standard Occupational Classification (SOC) system²⁵ is the prevailing scheme for occupational groupings used in the United States. The SOC was developed by federal statistical agencies, especially the Department of Labor, Bureau of Labor Statistics, to classify workers into occupational categories for the purpose of collecting, calculating, or disseminating data. Detailed occupations within the SOC that have similar job duties, and in some cases skills, education, and/or training, are grouped together.

The occupations in the SOC are classified at four levels of aggregation. There are 23 major groups, 97 minor groups, 461 broad occupations, and 840 detailed occupations in the SOC system. The structure is comprehensive, and encompasses all occupations in the U.S. economy. If a specific occupation is not listed, it is included in a residual category with similar occupations. Detailed occupations are identified and defined so that each occupation includes workers who perform similar job tasks.

Where is SOC data located? The complete SOC system is available on-line at a website managed by the U.S. Bureau of Labor Statistics.

<http://www.bls.gov/soc/classification.htm>

The SOC Coding System. Each item in the SOC is designated by a six-digit code. Normally, an SOC code includes a hyphen between the second and third digit; this is used only for clarity.

Similar to the NAICS codes, SOC uses a 2- through 6-digit hierarchical coding system, offering five levels of detail. Each digit in the code is part of a series of progressively narrower categories, and the more digits in the code signify greater classification detail.

- The **first two digits** of the SOC code designate the major occupational group;
- The **third digit** designates the minor occupational group;
- The **fourth and fifth digits** designate the broad occupational area; and
- The **sixth digit** designates the detailed occupation.

Table Three presents a list of the 23 SOC occupational categories at the highest (two-digit) level groupings.

²⁵ <http://www.bls.gov/soc/>

Table Three. 23 SOC Categories at the Highest (Two-Digit) Level

SOC Code	Description
11	Management
13	Business and Financial Operations
15	Computer and Mathematical
17	Architecture and Engineering
19	Life, Physical, and Social Science
21	Community and Social Services
23	Legal
25	Education, Training, and Library
27	Arts, Design, Entertainment, Sports, and Media
29	Healthcare Practitioners and Technical
31	Healthcare Support
33	Protective Service
35	Food Preparation and Serving Related
37	Building & Grounds Cleaning and Maintenance
39	Personal Care and Service
41	Sales and Related
43	Office and Administrative Support
45	Farming, Fishing, and Forestry
47	Construction and Extraction
49	Installation, Maintenance, and Repair
51	Production
53	Transportation and Material Moving
55	Military Specific

Example: Physical Therapists. The SOC assigns the code 29-1123 to physical therapists.

Physical Therapists – SOC Code:

2	9	-	1	1	2	3
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- The first two digits of this code are **29**, which designate the **Healthcare Practitioners and Technical Occupations** major occupational group.
- After the hyphen, the third digit of this code is **1**, which designates the minor occupational group of **Health Diagnosing and Treating Practitioners**.
- The fourth and fifth digits are **12**, which designate the broad occupational area of **Therapists**. Eight different types of therapeutic occupations are grouped into this area (others include audiologists, occupational therapists, radiation therapists, and speech-language therapists).
- The sixth and final digit is **6**, which identifies the detailed occupation of **Physical Therapists**.

Example: Elements of an SOC Definition. Each occupation within the SOC scheme is searchable, and has a unique web page showing the results. The SOC entry for Physical Therapists, for example, includes the following information:²⁶

29-1123 Physical Therapists

Assess, plan, organize, and participate in rehabilitative programs that improve mobility, relieve pain, increase strength, and improve or correct disabling conditions resulting from disease or injury.

Illustrative examples: *Physiotherapist, Pulmonary Physical Therapist, Geriatric Physical Therapist*

Broad Occupation: 29-1120 Therapists

Minor Group: 29-1000 Health Diagnosing and Treating Practitioners

Major Group: 29-0000 Healthcare Practitioners and Technical Occupations

Note there are common elements that appear in all SOC entries: a unique occupational number, a title, a definition for the occupation, illustrative examples, and links to all higher-level categories within the occupational groupings. Some of the occupational definitions provide additional information about the occupational classification – showing, for example, that this job typically includes certain job functions or excludes others, and may also provide links to similar jobs that are actually categorized elsewhere.

²⁶ <http://www.bls.gov/soc/2010/soc291123.htm>

Occupations are searchable only by key word, not by SOC code. Other resources on the SOC home page include links to a page that lists all 23 two-digit groupings,²⁷ an alphabetical index of all 840 occupations,²⁸ or files that include all definitions for all occupations.²⁹

Three More SOC Examples. The following tables show the hierarchies of three other occupational groupings:

Architects	
<u>17-0000</u>	Architecture and Engineering Occupations
<u>17-1000</u>	Architects, Surveyors, and Cartographers
<u>17-1010</u>	Architects, Except Naval
<u>17-1011</u>	Architects, Except Landscape and Naval
SOC Definition: Plan and design structures, such as private residences, office buildings, theaters, factories, and other structural property. Excludes "Landscape Architects" (17-1012) and "Marine Engineers and Naval Architects" (17-2121). Illustrative examples: Building Architectural Designer, Structural Architect, Building Architect	

High School Teachers	
<u>25-0000</u>	Education, Training, and Library Occupations
<u>25-2000</u>	Preschool, Primary, Secondary, and Special Education School Teachers
<u>25-2030</u>	Secondary School Teachers
<u>25-2031</u>	Secondary School Teachers, Except Special and Career/Technical Education
SOC Definition: Teach students in one or more subjects, such as English, mathematics, or social studies at the secondary level in public or private schools. May be designated according to subject matter specialty. Substitute teachers are included in "Teachers and Instructors, All Other" (25-3099). Excludes "Career/Technical Education Teachers, Secondary School" (25-2032) and "Special Education Teachers" (25-2050). Illustrative examples: High School History Teacher, High School English Teacher, High School French Teacher	

²⁷ http://www.bls.gov/soc/major_groups.htm

²⁸ http://www.bls.gov/soc/major_groups.htm

²⁹ http://www.bls.gov/soc/soc_2010_definitions.pdf. This file is also available for download in Excel format.

Bank Teller	
43-0000	Office and Administrative Support Occupations
43-3000	Financial Clerks
43-3070	Tellers
43-3071	Tellers
<p>SOC Definition: Receive and pay out money. Keep records of money and negotiable instruments involved in a financial institution's various transactions.</p> <p>Illustrative examples: Securities Teller, Money Order Clerk, Foreign Exchange Clerk</p>	

Tip: Be sure to write down the SOC number and title of occupations that you are interested in researching. Other databases, including O*NET (the national occupational information network described in Chapter Seven) use the SOC code for keyword search and other data organization, so it will come in handy in other situations!

Figure Five. Occupational Distribution within the Top Ten Manufacturing Sub-sectors in Massachusetts, 2014

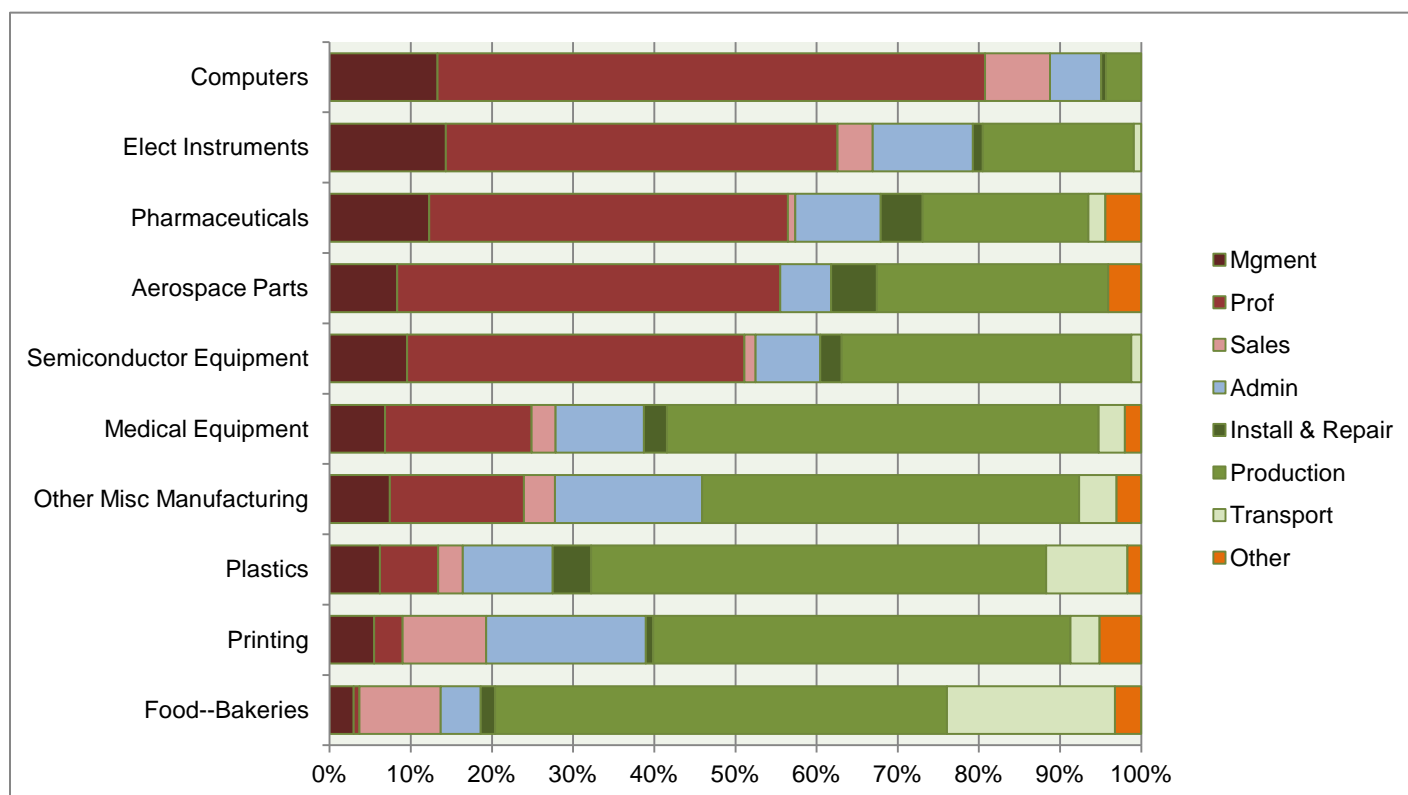


Figure Five shows the occupational composition for the top ten manufacturing industry subsectors in Massachusetts in 2014 – staffing patterns at the 2-digit SOC level within the state’s largest manufacturing sectors at the 4-digit NAICS code level. In general, the red and pink colors show jobs that tend to require at least a college degree or higher, while the blue and green colors indicate jobs that do not require a four-year degree. Sectors have been arranged by educational attainment level necessary.

Chapter Five. Industry-Occupation Crosswalks

Learning goals for this chapter

- Learn how to use national database tools that serve as crosswalks between NAICS and SOC.
- Use the National Employment Matrix to understand the occupational structure (staffing patterns) within industry sectors.
- Use the National Employment Matrix to identify all industry sectors that hire workers in that target occupation.

The Bureau of Labor Statistics maintains the **National Employment Matrix**, an on-line database that serves as a crosswalk between industry sectors and occupations – specifically, between NAICS and SOC. Once you know an industry sector code, you can identify all the occupations that are utilized by business firms that fall within that sector. Similarly, once you know an occupational code, you can search and identify all the industry sectors that employ workers in that occupation.

National Employment Matrix home:	http://www.bls.gov/emp/home.htm
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Once you are at the URL listed in the box above, scroll down to **EP Databases** to find clickable links to the Matrix – by occupation or by industry.

Tip: It helps to have a NAICS or SOC code and the actual text that BLS uses to describe the sector or occupation before using the National Employment Matrix. Some of the searches use drop-down menus where the sector descriptions are used as the keyword search terms. You will get faster, more accurate results if you are already familiar with either the codes or the language used in the sector and occupational categories.

Searching by Industry Sector. The first way to look at industry-occupation crosswalks is by industry sector. The key place to start is **Table 1.9 2014—24 Industry-Occupation Matrix Data, By Industry**³⁰ This table lists industry sectors by sector title and the corresponding 4-digit NAICS code. The right-most column in the table is a link to download an Excel spreadsheet file

³⁰ www.bls.gov/emp/ep_table_109.htm

showing the occupational composition and employment projections by occupation by the year 2022.

For example, click on the XLS link for NAICS Code 325400--Pharmaceutical and medicine manufacturing, then open the spreadsheet that automatically downloads into your computer's Downloads folder (see Figure Six). This spreadsheet contains rich, national data on employment in that industry sector. This includes employment by occupation in 2012, and projections for all occupations within the sector in 2022, along with the percent change and numerical change in employment.

Figure Six. XLS Download for NAICS Code 325400-Pharmaceuticals and Medicine Manufacturing

Employment by industry, occupation, and percent distribution, 2014 and projected 2024
325400 Pharmaceutical and medicine manufacturing
(Employment in thousands)
Occupations with fewer than 10 jobs, confidential data, or poor quality data are not displayed

Sort Order	Code	Title	2014			2024			Percent change	Employment change
			Employment	Percent of industry	Percent of occupation	Employment	Percent of industry	Percent of occupation		
1	0000	Total, all occupations	278.5	100.0	0.2	277.4	100.0	0.2	-0.8	-2.1
2	11-0000	Management occupations	31.3	11.2	0.3	31.2	11.2	0.3	-0.8	-0.2
3	11-1000	Top executives	5.8	2.1	0.2	5.5	2.0	0.2	-1.6	-0.1
4	11-1011	Chief executives	0.8	0.3	0.2	0.7	0.2	0.2	-10.7	-0.1
5	11-1021	General and operations managers	4.8	1.7	0.2	4.8	1.7	0.2	-0.3	0.0
6	11-2000	Advertising, marketing, promotions, public relations, and sales managers	2.9	1.0	0.4	2.8	1.0	0.4	-0.3	0.0
7	11-2011	Advertising and promotions managers	0.1	0.0	0.2	0.1	0.0	0.2	-0.3	0.0
8	11-2020	Marketing and sales managers	2.7	1.0	0.5	2.7	1.0	0.4	-0.3	0.0
9	11-2021	Marketing managers	1.6	0.7	0.9	1.6	0.7	0.9	-0.3	0.0
10	11-2022	Sales managers	0.9	0.3	0.2	0.9	0.3	0.2	-0.3	0.0
11	11-2031	Public relations and fundraising managers	0.1	0.0	0.1	0.1	0.0	0.1	-0.3	0.0
12	11-3000	Operations specialties managers	11.8	4.2	0.7	11.8	4.2	0.6	-0.3	0.0
13	11-3011	Administrative services managers	1.1	0.4	0.4	1.1	0.4	0.3	-0.3	0.0
14	11-3021	Computer and information systems managers	1.8	0.6	0.5	1.8	0.6	0.4	-0.3	0.0
15	11-3031	Financial managers	1.7	0.6	0.3	1.7	0.6	0.3	-0.3	0.0
16	11-3051	Industrial production managers	4.9	1.8	2.8	4.9	1.8	2.8	-0.3	0.0
17	11-3061	Purchasing managers	0.7	0.3	0.9	0.7	0.2	0.9	-0.3	0.0
18	11-3071	Transportation, storage, and distribution managers	0.5	0.2	0.5	0.5	0.2	0.4	-0.3	0.0

Data is presented for all SOC levels, including 2-digit, 3-digit, 5-digit, and 6-digit levels.

One of the first lessons to learn from this data is that it shows the occupational staffing pattern for the industry sector – the distribution of jobs/occupations that employers use to deliver the products and services within this sector. For example, we extracted data from the full spreadsheet, pulling out jobs at every 2-digit SOC level. Table Five shows that the pharmaceutical manufacturing sector had the following occupational distribution in 2014 (counting only those job titles that had more than 1% of all employment within the sector):

Table Five. Distribution of Employment in the Pharmaceutical Manufacturing Sector by Major SOC Code

SOC Code	Cluster	% of 2014 Jobs within Sector
11-0000	Management	11.2%
13-0000	Business and financial operations	8.5%
15-0000	Computer and mathematical	3.6%
17-0000	Architecture and Engineering	6.3%
19-0000	Life, and physical science	16.1%
41-0000	Sales and related	1.5%
43-0000	Office and administrative support	9.1%
49-0000	Installation, maintenance and repair	4.1%
51-0000	Production workers	32.2%
53-0000	Transportation and material moving	3.4%

A quick review of this staffing pattern shows some interesting facts about the sector: about a third of all jobs are ‘office’ jobs (management, finance, computer and office support), about a third are engineering or science-related, and about a third are involved in the actual production of drugs and pharmaceuticals. Later analysis can track the specific education requirements and salary levels within these jobs but, in general, it appears that two-thirds of the jobs in this sector are likely to require a college degree or more, and offer a good income.

The second lesson to learn from this data is that employment growth projections vary dramatically for the various jobs that make up the sector. By 2024, jobs across the entire sector are projected to decline slightly – by -0.8%. Of the occupations that are reasonably large in 2014, several are projected to have much higher relative growth in the next ten years – computer and information analysts (7.3 percent growth), mathematical scientists (22 percent growth), biomedical engineers (29.7 percent growth), and machinery mechanics (19.7 percent growth). Several jobs, especially in the administrative support and data entry jobs, are actually projected to decline – probably reflecting a shift away from the business technologies that are currently used in this sector.

Finally, remember that Table Five shows employment data extracted for the major occupational groups – at the 2-digit SOC level. The actual data spreadsheet shows employment data all the way down to the 6-digit level. Looking at the data at such a detailed level shows the number and distribution of employment of individual occupations within the sector.

Tip: Other databases such as O*NET (see Chapter Six), MassCIS (see Chapter Seven), and statewide occupational projections (see Chapter Eight) provide growth forecasts for individual occupations, but the National Employment Matrix is the one site to see how projections of job growth vary by occupational grouping within an industry sector. These tables offer a quick glimpse at the impact of new technologies and changing business functions on the industry.

Tip: Another way to download useful files from the National Employment Matrix is go to the Bureau of Labor Statistics home page at www.bls.gov. Next, select **Subjects • Employment • Employment Projections** to get to the employment projections page. Click on **EP Topics • Occupational Projections** on the left navigational pane. At the subject heading Data Tables, click on the XLS link at the text that reads **All Occupational Tables In A Single File (XLS, 1.4 MB)**. This will download a single Excel spreadsheet that includes all analytical tables relating to occupations, including tables that show employment projections by major and detailed occupational group, fastest growing and declining occupations, the industry-occupation matrix by both industry and occupation, and educational requirements by detailed occupation.

Searching by Occupational Category. The National Employment Matrix also presents the industry-occupation crosswalk by occupational category. **Table 1.8 2014-2024 Industry-Occupation Matrix Data, By Occupation**³¹ lists more than 1,000 occupations, organized by 6-digit SOC code. After selecting an occupation for further analysis, there is an option to click on XLS to download an Excel spreadsheet that shows how those jobs are distributed across all industry sectors.

For example, download and open the spreadsheet for **SOC Code 17-2081 Environmental Engineers** (see Figure Seven). The data table looks very similar to the table we just looked at for the pharmaceutical manufacturing sector – it includes total employment, employment by NAICS code sector, and projections for employment in 2024. The table shows that there were about 55,000 environmental engineering jobs in the nation in 2014, and that employment in this occupation is projected to grow about 12.4% by 2024. About half of all environmental engineers are employed in the Professional, Scientific and Technical Services sector (52.3% in NAICS code 541000) and another one quarter of such jobs are in the Government sector (28% in NAICS code 900000). No other sector has a large concentration of such engineering jobs.

On a more detailed level, about half of the 28,000 environmental engineering jobs that fall into Professional, Technical and Scientific Services group are in the Engineering Services industry (15,300 jobs in NAICS code 541330) and another 11,200 are in the Management, Scientific, and Technical Consulting industry (NAICS code 541600). For the 15,700 engineers employed

³¹ www.bls.gov/emp/ep_table_108.htm

in government, 3,500 were in the federal government (NAICS 999100), 8,400 were in state government (NAICS 999200) and 3,800 were in local government (NAICS 999300).

Figure Seven. XLS Download for SOC Code 17-2081—Environmental Engineers

Employment by industry, occupation, and percent distribution, 2014 and projected 2024

17-2081 Environmental engineers

(Employment in thousands)

Columns with fewer than 10 jobs, combined data, and/or quality data are not displayed

Sort Order	Code	Title	2014			2024			Percent change	Employment change	Industry type
			Employment	Percent of industry	Percent of occupation	Employment	Percent of industry	Percent of occupation			
33	448000	Pipeline transportation	0.1	0.2	0.1	0.1	0.2	0.1	0.0	Summary	
34	540000	Professional, scientific, and technical services	28.9	0.3	52.5	35.7	0.4	57.6	23.4	6.8	
35	541000	Professional, scientific, and technical services	28.9	0.3	52.5	35.7	0.4	57.6	23.4	6.8	
36	541300	Architecture, engineering, and related services	16.2	1.2	29.3	19.7	1.3	31.8	21.8	3.5	
37	541320	Engineering services	13.3	1.7	27.7	18.9	1.8	29.5	22.8	3.5	
38	541360	Electrical, electronic, and computer engineering services	2.9	0.4	1.4	0.9	0.4	1.3	3.8	0.0	
39	541380	Management, scientific, and technical consulting services	11.2	0.9	20.3	14.3	0.9	23.1	27.5	3.1	
40	541700	Scientific research and development services	1.3	0.2	2.3	1.3	0.2	2.2	6.8	0.1	
41	541710	Research and development in the physical, engineering, and life sciences	1.3	0.2	2.3	1.3	0.2	2.1	6.9	0.1	
42	550000	Management of companies and enterprises	1.3	0.1	2.3	1.4	0.1	2.3	5.0	0.1	
43	551000	Management of companies and enterprises	1.3	0.1	2.3	1.4	0.1	2.2	5.0	0.1	
44	800000	Administrative and support and waste management and remediation services	2.9	0.0	5.2	2.9	0.0	4.7	1.0	0.0	
45	801000	Administrative and support services	0.4	0.0	0.7	0.4	0.0	0.7	15.2	0.1	
46	801200	Facilities support services	0.1	0.1	0.1	0.1	0.1	0.2	25.0	0.0	
47	801300	Employment services	0.3	0.0	0.5	0.3	0.0	0.5	12.4	0.0	
48	801320	Temporary help services	0.2	0.0	0.3	0.2	0.0	0.3	17.2	0.0	
49	802000	Waste management and remediation services	2.5	0.0	4.9	2.3	0.0	4.0	-1.2	0.0	
50	802100	Waste collection	0.1	0.0	0.1	0.1	0.0	0.1	17.2	0.0	

In terms of future growth, employment of environmental engineers is actually expected to decline within the federal government sector, and stay fairly stable in state and local government – compared to about a 30% growth in employment within the private sector (23.4% projected growth in NAICS Code 541000).

Chapter Six. O*NET Online Resource

Learning Goals for this Chapter.

- Learn more about O*NET, the national database for occupations.
- Understand how to search O*NET for occupations, and be aware of the rich content of information available about each occupation.
- Learn tools available for professionals (especially educators and guidance counselors) on how to use O*NET – tutorials, curriculum, tools and self-paced guides available through ONET Academy.

The Occupational Information Network (O*NET). O*NET is sponsored by the U.S. Department of Labor, Employment and Training Administration, and provides a wealth of detailed information about individual occupations.

The O*NET program is the nation's primary source of occupational information. Central to the project is the O*NET database, containing information on hundreds of standardized and occupation-specific descriptors. The database is continually updated by surveying a broad range of workers from each occupation. Information from this database forms the heart of O*NET OnLine, an interactive application for exploring and searching occupations. The database also provides the basis for related Career Exploration Tools, which are valuable assessment instruments for workers and students looking to find or change careers.

O*NET is an example of a website that provides users with easy access to searching and interpreting data collected and reporting in other formats. For example, O*NET uses both the NAICS and SOC classification system, and provides a user-friendly way to use those same databases.

O*Net Online Database:	https://www.onetonline.org/
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O*NET Search Categories. The home page of O*NET provides users with a variety of ways to access individual occupational information. Users can search directly using the Occupation Search field by entering a key word OR by entering a specific SOC code (at the 6-digit level). In the alternative, users can search by browsing in the Find Occupations fields – selecting different ways to search, including by industry sector (at the 2-digit NAICS code level); (b) by 'green

jobs'; (c) by bright outlook (basically, the largest occupations, the fastest growing occupations, and new and emerging occupations); (d) by career cluster (at the 2-digit SOC code level).

A second way to search is to use the **Focus** choices. Here, users may select from any of the O*NET content categories, and the search engine will produce ALL occupations that use that particular attribute. For example, if a user selects **Knowledge** as the focus choice, then chooses **Economics and Accounting** from the list of available choices, O*NET will display a list of hundreds of occupations that use that job attribute – sorted by the level of importance that knowledge attribute has for each job. Each job listed includes a 6-digit SOC code, and a hyperlink to detailed content information.

O*NET Content. Each occupation in O*NET is profiled through a wealth of specific content. Users can look at individual occupations and read about:

- related/similar job titles;
- typical job tasks;
- education levels required for job holders;
- credentials or certifications that are necessary to perform the job;
- tools & technology used on the job;
- content knowledge needed in the occupation;
- skills;
- abilities;
- work activities;
- detailed work activities;
- work context;
- descriptions of typical work;
- interests;
- work styles;
- work values;
- wages & employment – which can be researched down to the zip code or state level;
- projected job openings -- employment projections are shown at the national level and for the state selected; and

- links to additional information (usually links to the BLS Occupational Outlook Handbook³² which includes some of the same information displayed in O*NET but searchable using different methods.

Tip: On any O*NET occupational profile, click the **Details** tab at the top of the profile page to find more detailed data within each content topic. Once you are in the Details mode, all the content for the occupation being reviewed can be downloaded to an Excel spreadsheet (or in CSV format) to be filed and accessed off-line.

Tip: Most of the O*NET content can be linked to other career development tools. For example, the results of the standard Harrington O'Shea Career Interest Inventory³³ tool help a student understand their individual interests, work values, and areas of academic interest. Once a student is given the results of these standard career decision-making tools, they are better equipped to benefit from the occupational data available at O*NET.

O*NET Academy. In addition to the O*NET online database, O*NET includes several valuable tools for students, educators, and guidance counselors. Content is available at the O*NET Academy³⁴ that will help users better understand tools, searching and browsing, and other career development resources that are available at the site.

O*NET Academy	http://www.onetacademy.org
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For example, click on the O*NET Academy home page, click on the hyperlink for Educators at the top of the page. The link then displays podcasts, webinars, courses, tutorials, and PowerPoint instructions – some geared to students and some that target educators – that will help any user learn more about the O*NET site and how it can be used in career exploration.

³² <http://www.bls.gov/ooh/home.htm>.

³³ [Careercompetencies.com](http://www.careercompetencies.com). Note: this is a private commercial website. DESE makes no representation regarding the suitability of any product or service described at that site.

³⁴ <http://www.onetacademy.org/>

Chapter Seven. Massachusetts Career Information System (MassCIS)

Learning Goals for this Chapter.

- Learn more about MassCIS as a research tool for both industries and occupations.
- Summary of assessment tools – especially useful for student assessments (*e.g.*, interest inventory, etc.)

The Massachusetts Career Information System (MassCIS) is a free, online interactive career exploration and planning resource that is available to Massachusetts residents. The website includes an extensive library of career exploration tools and assessments that help users identify occupations that match an assessment profile. Career search results – which can include the results of any MassCIS assessments as well as saved occupational searches – can be captured and stored in a password-protected ‘portfolio’ or account.

Occupational information contained within MassCIS is based on the content available in O*NET, and organizes occupations according to the Standard Occupational Classification (SOC) system. Portions of MassCIS that focus on industries and sectors present data that is organized by NAICS codes.

MassCIS offers three different access portals, with the content tailored to three user types:

- **MassCIS Junior** version is targeted at middle school students who are in the early stages of career exploration. Content is written at an age-appropriate reading level, and supports reading, writing, decision-making, and critical thinking skills while developing self-awareness, career exploration, research, and planning skills. In general, this version reflects an adolescent development approach, and has tools that guide student users by asking broad questions such as ‘who am I?’ or ‘what is my learning style?’ or ‘what happens at a workplace?’
- **MassCIS High School** version provides comprehensive career information for students who are developing and updating career/educational plans. This version of MassCIS includes tools that encourage self-assessment, exploration, research, goal setting, and decision-making. Tools, assessments, and information in this version are focused on career decision-making, and are aimed at helping users choose appropriate educational pathways and programs that are linked to priority occupations. Job search resources are also provided, guiding users through resume writing, job interviews, and other more technical steps of finding employment.

- **MassCIS Adult and Agency** version is designed for use by adults and provides users a resource for practically any career information need. Adult users could include anyone, but usually consist of persons who are unemployed and looking for work. Customers at the state's public one-stop career centers can receive logon information at the Career Center. Once the adult user creates a personal account, results of their career assessments and searches can be shared with career counselors at the Career Center.

MassCIS is accessed at the following portal:

MassCIS:	https://masscis.intocareers.org
-----------------	---

Users can log in with a Username and Password, or by using the Massachusetts Resident/Zip Code Login.

Any site (school, career center, community college etc.) that wants to be able to track site usage and administer student accounts can become a MassCIS registered site. All MassCIS registered sites are assigned a Username and Password that will give their students/customers access to a specific version of MassCIS. (A site can choose up to two versions of MassCIS to access, a primary version and a secondary version.)

Students/customers of registered sites use the site's login information for their initial login. Once logged in, these users can set up a Portfolio Account, choose their own Username and Password, save and share information, develop a resume, and track activities. Their account is connected to the registered site, giving the Site Administrator, and other designated staff, the ability to manage the account and run reports about site users.

All other users can access MassCIS through the Massachusetts Resident/Zip Code login. On the login page, the user clicks on the Massachusetts Resident tab, selects a version of MassCIS, chooses a Massachusetts City/Town from the drop down menu, types in the Zip Code for that City/Town, then clicks on Sign In.

A user that logs in this way can set up a Portfolio Account and have the same access as those who set up a Portfolio Account attached to a registered site. However the user's account is not connected to any site, and cannot be administered by a Site Administrator or other designated staff.³⁵

Each version of MassCIS includes three core components:

1. Structured assessment tools that help identify and measure interest, ability, and aptitude to help users decide what types of jobs they are best suited for. Many common assessment tools are integrated within MassCIS. In some cases, depending on the

³⁵ Labor Market and College & University information for all 50 states is now available in MassCIS.

assessment instrument used, students and clients can use CIS Assessment Link to connect their results directly to CIS occupations. Students that have taken career assessments outside of the MassCIS environment can, in some cases, enter those results at the appropriate places within MassCIS and proceed with occupational searches from that point.

2. Occupations and Employment links help students learn about occupations, projected growth in jobs, wage levels for the jobs within Massachusetts, and what types of skills are needed in each job.
3. Education and Training – courses, programs, degrees, certifications that are available in Massachusetts to help develop key skills necessary to qualify for a job

Guides and Instructional Tools

MassCIS is a rich resource for educators and guidance counselors who work with students on career exploration activities. The University of Oregon, which developed CIS and maintains it for use in many states, has produced manuals and guides to help educators present MassCIS in the context of a classroom-based career information search. Key resources available as PDF documents include:

- **MassCIS overall training manual:** [CIS Training Manual](#)
- **Career Assessment:** [Setting the Stage for Using Formal Career Assessment Instruments](#)
- **Assessment Link.** Assessment Link connects the occupations, occupation categories, or personality types or other assessment results from common assessment instruments taken outside of MassCIS to occupations in MassCIS.
 - ▲ [Assessment Link Instructor Note](#)
 - ▲ [Assessment Link Quick Start](#)
- **Career Cluster Inventory.** The Career Cluster Inventory encourages career exploration by helping users identify career clusters that match their interests and linking to occupations in those clusters.
 - ▲ [Career Cluster Inventory Counselor's Guide](#)
 - ▲ [Career Cluster Inventory Quick Reference Guide](#)
 - ▲ [Career Cluster Inventory](#)

- **Skills.** In SKILLS the user discovers occupations that match his / her self-assessed or transferable skills. A list of occupations is generated for further exploration.
 - ▲ [Presenting SKILLS to Students](#)
 - ▲ [SKILLS Counselor's Manual](#)
 - ▲ [SKILLS](#)

- **Interest Profiler.** The Interest Profiler helps the user identify interests and match them with a wide variety of careers. A list of occupations matching the user's interests in six broad categories of work is generated.
 - ▲ [Interest Profiler User's Guide](#)
 - ▲ [Interest Profiler](#)

- **Work Importance Locator.** The Work Importance Locator helps the user identify the values that are important to him/her in a job. A list of occupations is generated based on choices made by the user.
 - ▲ [Work Importance Locator User's Guide](#)
 - ▲ [Work Importance Locator](#)

- **Occupation Sort.** In Occupation Sort the user chooses and ranks up to 15 of 28 factors often considered in career decision-making. As choices are made, Occupation Sort eliminates occupations that do not conform to the preferences expressed and generates a list of occupations that match the factors the user considers important.
 - ▲ [Occupation Sort Counselor's Guide](#)
 - ▲ [Using Occupation Sort](#)
 - ▲ [Occupation Sort](#)

Chapter Eight. Massachusetts-Specific Data: Labor Market Projections & Sub-state Regional Data

Learning Goals for this Chapter.

This chapter will help users access (a) state-specific data for Massachusetts; (b) sub-state regional data, especially by WIOA regions (the federal Workforce Innovation and Opportunity Areas); and (c) job growth projections.

Role and Importance of State-Specific and Sub-State Data. So far in this publication, we have focused on data sources that reflect the nation as a whole. The primary reason was to learn about the internal structure of the databases – understanding several technical terms, and learning the coding systems that underlie data on industry sectors and occupational clusters. In this chapter, we turn to a more refined geographical unit of focus. In reality, labor markets are very local. Reviewing labor market information and considering options for career choices means that students and guidance counselors should look to sub-state data to assess the location of future job opportunities.

Each state has a different mix of employers and industry sectors that comprises the state's overall economy. Massachusetts, as a state, differs greatly from states in the Great Plains, like Kansas or Nebraska, which are rooted primarily in farming and agriculture. Fast-growing sunbelt states like Florida or Texas may reflect high population and job growth, but the sectors that are important to those states are very different than the sectors that define Massachusetts.³⁶

This variation can be seen within the state, as well. The composition of the labor force and the industry sectors that are most important for employment and job growth vary considerably across the Boston region, New Bedford, Lawrence/Lowell, and Springfield. The recent health of the state's overall economic outlook is not shared equally in other towns and cities.

³⁶ For example, Florida's fastest growing industry sectors include sales, marketing, hospitality and tourism. Sectors that depend on science, technology, engineering and math are at the bottom of Florida's growth industries. <http://stateimpact.npr.org/florida/2011/11/22/the-top-5-industries-creating-jobs-in-florida>. Employment in Massachusetts is highest in health care and business/technical services; we show strong growth in life sciences, pharmaceutical manufacturing, finance, and computer systems and software development. Compared to Florida, Massachusetts workers are younger, much better educated, and earn higher wages.

Key Terms Used for Sub-State Units. When searching or interpreting labor market information, students will be confronted with one of several different ways of slicing national data into smaller units. The key units typically include:

- **Labor Market Area (LMA)** -- As defined by the U.S. Bureau of Labor Statistics, an economically integrated geographic area within which individuals can reside and find employment within a reasonable distance or can readily change employment without changing their place of residence. Some economists will use the term 'natural labor market' as a geographic area that meets the general definition of a labor market area but is not constrained by artificial political boundaries – like state borders.
- **Metropolitan Statistical Area (MSA)** – The federal Office of Management and Budget defines an MSA as one or more adjacent counties that have at least one urban core area of at least 50,000 population, plus adjacent territory that has a high degree of social and economic integration with the core as measured by commuting ties. There are 388 MSAs in the U.S., and six MSAs in Massachusetts. An MSA is similar to the older term Standard Metropolitan Statistical Area (SMSA), which is no longer used.
- **Micropolitan Statistical Areas** – defined by the OMB, Micropolitan Areas are urban areas in the U.S. centered on an urban cluster with a population of between 10,000 to 49,999. There are 576 micropolitan areas in the U.S. There are four micropolitan areas in Massachusetts, which are in addition to the six MSAs.
- **NECTAs (New England City and Town Areas):** NECTAs are special geographic units used for the six states in New England, since our traditions are based more on cities and towns and not counties (all other states used counties as a primary unit of geographical area; Louisiana uses the term 'parish' to refer to its counties). OMB defined NECTAs for New England states similarly to the way they define metropolitan and micropolitan statistical areas for the rest of the country. The term refers to a core area containing a substantial population nucleus, together with adjacent communities having a high degree of economic and social integration with that core.
- **Workforce Innovation and Opportunity Area (WIOA):** A geographical area, designated by the governor, within which employment and training services are provided under the Workforce Innovation and Opportunity Act.³⁷ Previously, labor market data was published using the WIA regional definitions, now it is published as WIOA areas. The actual geographic areas defined by WIA/WIOA did not change.

³⁷ WIOA replaced by the federal Workforce Investment Act (WIA), effective July 1, 2015. Workforce Investment Boards (WIBs) and Workforce Investment Areas (WIAs) have been re-designated as Workforce Innovation and Opportunity Boards and Workforce Innovation and Opportunity Areas.

Table Six. Designated Sub-State Labor Market Units in Massachusetts

Name	Type of Labor Market Unit
Athol	Micropolitan NECTA
Barnstable Town	Metropolitan NECTA
Boston-Cambridge-Nashua	Metropolitan NECTA
Greenfield Town	Micropolitan NECTA
Leominster-Gardner	Metropolitan NECTA
New Bedford	Metropolitan NECTA
North Adams	Micropolitan NECTA
Pittsfield	Metropolitan NECTA
Springfield	Metropolitan NECTA
Vineyard Haven	Micropolitan NECTA
Worcester	Metropolitan NECTA

The Boston-Cambridge-Nashua Metropolitan NECTA is comprised of several smaller NECTA divisions:

Boston-Cambridge-Newton	NECTA Division
Brockton-Bridgewater-Easton	NECTA Division
Framingham	NECTA Division
Haverhill-Newburyport-Amesbury	NECTA Division
Lawrence-Methuen-Salem	NECTA Division
Lowell-Billerica-Chelmsford	NECTA Division
Lynn-Saugus-Marblehead	NECTA Division
Nashua	NECTA Division
Peabody-Salem-Beverly	NECTA Division
Taunton-Middleborough-Norton	NECTA Division

Finding and Using Massachusetts Data. Insightful data for our state, as well as for smaller sub-state areas, can be downloaded from one public website operated by the Executive Office of Labor and Workforce Development.

Massachusetts Labor Market Data:

<http://www.mass.gov/lwd/economic-data>

This website provides links to the following:

- Click on **Maps for Current Data** (listed as an option under Key Resources) to find maps for Massachusetts and the boundaries for NECTAs, workforce investment areas, and counties. That same link lets you see which cities and towns are included in each sub-state grouping, or you can choose a city or town and see which county, WIB, or NECTA it belongs to. The link also has an interactive map of the state by city/town boundary; clicking any one of the towns will take you to both recent and historical data showing the size of that town's labor force and the number of persons employed and unemployed.
- Click on **Employment/Jobs** (under the Labor Market Information navigation pane at the left side of the web page) to find statewide and regional data on employment and job statistics. This page is a link to the Current Employment Statistics (CES-790) data, a monthly survey of more than 8,000 employers that yields estimates of employment by industry for the state and for seven Metropolitan NECTAs.

Click the hyperlink [Access Current Employment Statistics](#) to get to the CES-790 data. On that page³⁸ use the drop-down choices to filter (a) either statewide or a NECTA region; (b) select an industry sector at the 2-digit NAICS code level; and (c) a time period, either most recent month or by a year.

- Click on **Labor Force** (under the Labor Market Information navigation pane at the left side of the web page) to find statewide and regional data on the labor force and unemployment. Click the hyperlink [Access Labor Force and Unemployment Data](#) to get to the labor force data. On that page³⁹ use the drop-down choices to (a) select a unit for your search – either statewide or by NECTA region, city or town, WIOA area, or county; (b) choose a specific sub-state area to review; and (c) a time period, either most recent month or by a year.
- Click on **Occupations** (under the Labor Market Information navigation pane at the left side of the web page) to find statewide and regional data on occupations. The Occupational Market Information page⁴⁰ has data from the Occupational Employment and Wage Statistics (OES) program, operated in conjunction with the U.S. Department of Labor, Bureau of Labor Statistics, and collects occupational employment and wages for all non-farm industries statewide, for sixteen Workforce Innovation and Opportunity Areas (WIOAs), and for seven NECTAs. Click the link to [Access All Industry Occupational Employment and Wages for May, 2014](#). Use the drop-down choices to (a) select a unit for your search – either statewide or by NECTA region, or WIA area; (b)

³⁸ http://lmi2.detma.org/lmi/lmi_ces_a.asp#aIndustry.

³⁹ http://lmi2.detma.org/lmi/lmi_lur_a.asp.

⁴⁰ <http://www.mass.gov/lwd/economic-data/occupations/>

choose a specific sub-state area to review; and (c) choose an occupation at either the 2-digit or 6-digit SOC level.

Figure Eight. Employment of Network and Computer Systems Administrators in Hampden County Workforce Area, May 2014

	A	B	C	D	E	F	G	H	I
1	Occupational Employment and Wage Statistics								
2	Geography: Workforce Investment Area Area: Hampden County WIA Period: May 2014 Occupation: Network and Computer Systems Administrators								
3									
4	SOC Code	Occupation Title	Employment	Median	Mean	Entry Wage	Experienced		
5	15-1142	Network and Computer Systems Administrators	370	\$66,426	\$67,769	\$47,315	\$77,996		
6									
7									
8									
9									
10									

The example in Figure Eight is a screen shot of a spreadsheet downloaded from the state's labor market information page at [Access All Industry Occupational Employment and Wages for May, 2014](#). We filtered by geography, selecting 'WIA Areas', then selected Hampden County WIA, then selected SOC Code 15-1142. The result was downloaded as an Excel spreadsheet, and displays the number of persons employed in that occupation within the Hampden County WIA region, and showing the median, mean, entry and experienced wage levels for those 370 persons.

- **Occupational Staffing Patterns.** On the same Occupational Market Information page⁴¹, click on [Access Statewide Industry Staffing Pattern Data for May, 2013](#) to find a version of the National Industry Matrix for sub-state regions within Massachusetts. The link will take to you a page⁴² where you can select either statewide or WIOA regions, then choose an industry at the 2, 3 or 4-digit NAICS code level. The resulting download, and Excel spreadsheet, shows the major occupations that comprise that sector (by 2-digit and six-digit SOC code), employment levels, and wage levels for those jobs within the selected region.

Clicking the link for [Access Statewide Major Industry Data for Specific Occupations for May, 2013](#) will take you to a page⁴³ where you can review occupational staffing pattern data – filtered by occupations (using SOC codes). The Excel download that results from this search shows the industry sectors that offer jobs in the target occupations, and shows both employment and wages for the target industry-occupations.

⁴¹ Ibid.

⁴² http://lmi2.detma.org/lmi/lmi_OES_a_all_ind_Occ1.asp#2.

⁴³ http://lmi2.detma.org/lmi/lmi_OES_a_all_ind_Occ2.asp.

- **Projections** – Click on **Projections** (under the Labor Market Information navigation pane at the left side of the web page) to find long term (10 years) and short term (2 years) projections of employment change by industry sector (3-digit NAISC level) or occupational (major SOC codes), statewide and by WIA area. Data also includes job counts and wage levels at a detailed level.

Employer Locator. One additional valuable resource on the state LMI webpage are the resources available to show individual employers within each of the sub-state regions. These links are useful to educators and program staff who are involved in recruiting employers for job shadowing, internship, and summer work experiences for students. Students also find this resource helpful when preparing to mail out resumes and letters, or otherwise contact the employer to ask about hiring.

There are two ways to get detailed listings of employers:

- From the LMI homepage of EOLWD (<http://www.mass.gov/lwd/economic-data>) click on the link **Employers** on the navigation pane running down the left side of the page (note: you could also click **Key Resources**, then click on the link [Largest Employers](#)). The link will take you to a page titled **Massachusetts Employer Information**. Click on any of the items in these lists to obtain a table of employers – statewide, by WIOA area, by NECTA region, by county, or even by city and town. The resulting table shows a listing of employers, ranked from largest to smallest by size class of firm, along with the address, size, and 4-digit NAICS code.
- From the LMI homepage of EOLWD (<http://www.mass.gov/lwd/economic-data>) locate the heading **Key Resources**, then click on the link [Employer Locator by City and NAICS](#). The resulting page allows you to select city and town, then filter by 2-digit NAICS code to get a listing of individual employers by town.

Note that for both of these procedures, once you see the table of employers, each employer name is highlighted. Clicking on the hyperlink takes you to a new window that has specific company information, as well as a link to map the location of that establishment on a standard Internet map.

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Appendix: Table of Major Labor Market Databases and Websites

The following table lists the major websites and databases that were cited in this publication. Readers may want to copy these links into your computer's web browser and bookmark them for easy access. Links were confirmed and active as of August 1, 2015.

Site	Content	URL
U.S. Census Bureau	Decennial population data	http://www.census.gov/topics/population.html .
UMass—Donahue Institute; Population Estimates Program	Age cohort data for Massachusetts	http://pep.donahue-institute.org/
Federal Reserve Bank of St. Louis	Data on working age population	https://research.stlouisfed.org/fred2/series/LFWA64TTUSM647S .
NAICS System	Industry sector classifications and codes	http://www.census.gov/eos/www/naics
Standard Occupational Classification System	Occupational classifications and codes	http://www.bls.gov/soc/
National Employment Matrix	Industry/Occupation crosswalks	http://www.bls.gov/emp/home.htm
O*NET	U.S. occupational network	https://www.onetonline.org/
O*NET Academy	Tools and tutorials for using O*NET database	http://www.onetacademy.org
MassCIS	Massachusetts Career Information System	https://masscis.intocareers.org/materials/portal/home.html
Massachusetts Labor Market Data	Statewide and substate regional labor market information	http://www.mass.gov/lwd/economic-data
Employer Locator	Massachusetts employers by industry and location	http://lmi2.detma.org/lmi/employers.asp



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