MONTHLY LABOR REVIEW

May 2013

Implementing the 2010 Standard Occupational Classification in the Occupational Employment Statistics

Nurse practitioners, web developers, and fundraisers were among the occupations for which the Occupational Employment Statistics (OES) program published data for the first time as part of the May 2012 OES estimates release, which occurred on March 29, 2013. All of these occupations were added as part of the 2010 revision of the Standard Occupational Classification (SOC) system, used by federal government agencies producing statistical data. Although the OES program began implementing the 2010 SOC with the May 2010 OES release, because of unique features of the OES methodology, data for some new 2010 SOC occupations could not be published until the release of the May 2012 estimates. This article presents data highlights for occupations published for the first time in the May 2012 OES estimates; outlines the implementation of the 2010 SOC process; provides examples of different types of revisions to the SOC structure, ranging from minor editing changes to the addition of new occupations; and discusses the effects of these revisions on the OES data.

Nurse practitioners earned an annual mean wage of $91,450 in May 2012, nearly $24,000 more than registered nurses who are not advanced practice nurses. Annual mean wages for web developers were less than $45,000 in West Virginia and Montana but more than $75,000 in Maryland, New York, and the District of Columbia. State colleges and universities employed 42 percent fewer fundraisers than private sector colleges, despite higher overall employment.

Audrey L. Watson
Watson.Audrey@bls.gov

Audrey L. Watson is an economist in the Division of Occupational Employment Statistics, Bureau of Labor Statistics.

Nurse practitioners, web developers, and fundraisers were among the occupations for which the Occupational Employment Statistics (OES) program published data for the first time as part of the May 2012 OES estimates release, which occurred on March 29, 2013. All of these occupations were added as part of the 2010 revision of the Standard Occupational Classification (SOC) system, used by federal government agencies producing statistical data. Although the OES program began implementing the 2010 SOC with the May 2010 OES release, because of unique features of the OES methodology, data for some new 2010 SOC occupations could not be published until the release of the May 2012 estimates. This article provides an overview of the implementation of the 2010 SOC in the OES program. The first half of the article presents data highlights for occupations published for the first time in the May 2012 OES estimates. The remainder outlines the implementation process; provides examples of different types of revisions to the SOC structure, ranging from minor editing changes to the addition of new occupations; and discusses the effects of these revisions on the OES data.

Data highlights for new 2010 SOC occupations

In addition to introducing nurse practitioners (an advanced practice nursing occupation), web developers, and fundraisers, the May 2012 OES release introduced data for several other occupations, including two more advanced practice nursing occupations, eight additional healthcare-related occupations, three computer occupations, two human resources occupations, and two occupations related to renewable energy. Table 1 contains employment, hourly and annual mean wages, and annual median wages for SOC 2010 occupations published for the first time in the May 2012 OES estimates.[1] The following subsections present additional data for selected occupations from table 1.

Table 1. National occupational employment and wages for 2010 Standard Occupational Classification (SOC) occupations published for the first time in the May 2012 Occupational Employment Statistics data

2010 SOC code	2010 SOC title	Employment	Hourly mean wage	Annual mean wage	Annual median wage
00–0000	All occupations	130,287,700	$22.01	$45,790	$34,750
13–1071	Human resources specialists	394,380	29.16	60,660	55,800
13–1075	Labor relations specialists	75,930	27.02	56,210	54,660
13–1131	Fundraisers	48,530	26.55	55,220	50,680
15–1122	Information security analysts	72,670	42.93	89,290	86,170
15–1134	Web developers	102,940	31.78	66,100	62,500
15–1143	Computer network architects	137,890	45.19	94,000	91,000
15–1152	Computer network support specialists	167,980	30.27	62,960	59,090
21–1094	Community health workers	38,020	18.02	37,490	34,620
25–2051	Special education teachers, preschool	21,770	(1)	57,770	52,480
29–1128	Exercise physiologists	5,820	22.89	47,610	44,770
29–1141	Registered nurses	2,633,980	32.66	67,930	65,470
29–1151	Nurse anesthetists	34,180	74.22	154,390	148,160

See footnotes at end of table.

Table 1. National occupational employment and wages for 2010 Standard Occupational Classification (SOC) occupations published for the first time in the May 2012 Occupational Employment Statistics data

2010 SOC code	2010 SOC title	Employment	Hourly mean wage	Annual mean wage	Annual median wage
29–1161	Nurse midwives	5,710	43.78	91,070	89,600
29–1171	Nurse practitioners	105,780	43.97	91,450	89,960
29–2035	Magnetic resonance imaging technologists	29,560	31.45	65,410	65,360
29–2057	Ophthalmic medical technicians	29,170	17.11	35,590	34,240
29–2092	Hearing aid specialists	4,980	22.49	46,780	41,430
29–9092	Genetic counselors	2,000	26.84	55,820	56,800
31–1015	Orderlies	53,920	12.35	25,700	23,990
31–9097	Phlebotomists	100,380	14.86	30,910	29,730
39–4031	Morticians, undertakers, and funeral directors	23,070	25.33	52,690	46,840
47–2231	Solar photovoltaic installers	4,710	19.53	40,620	37,900
49–9081	Wind turbine service technicians	3,200	23.23	48,320	45,970

Notes:

(1) Wages for some occupations that do not generally work year-round, full time, are reported either as hourly wages or annual salaries, depending on how they are typically paid.

Note: Excludes residual ("all other") occupations.

Source: U.S. Bureau of Labor Statistics, May 2012 Occupational Employment Statistics data.

Registered nurses and advanced practice nurses. Under the 2000 SOC, all registered nurses, including advanced practice nurses, were classified under a single occupational category. The 2010 SOC breaks out three types of advanced practice nurses into separate occupations:

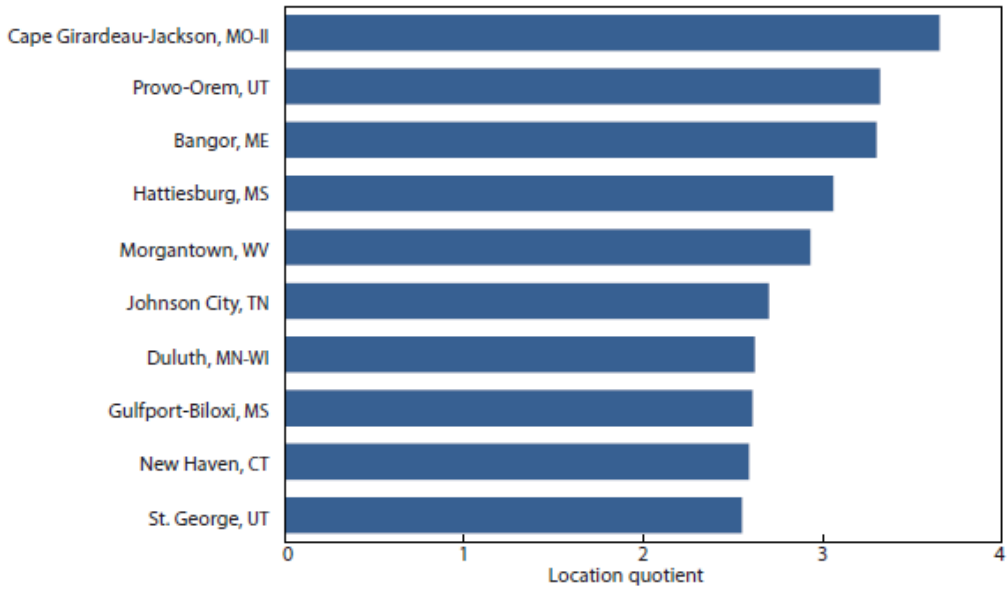
- Nurse anesthetists, who administer anesthesia, monitor patients' vital signs, and oversee patient recovery from anesthesia
- Nurse midwives, who diagnose and coordinate all aspects of the birthing process, either independently or as part of a healthcare team
- Nurse practitioners, who diagnose and treat acute, episodic, or chronic illness, independently or as part of a healthcare team

All other types of registered nurses are classified under a redefined registered nurses code. Even after the three types of advanced practice nurses were excluded, the redefined registered nurses occupation remained the fifth largest occupation in the United States, with over 2.6 million jobs in May 2012. About 62 percent of registered nurses were employed in private, state government, and local government hospitals. Industries with the highest employment of registered nurses also included ambulatory health care services (17 percent); nursing and residential care facilities (7 percent); federal, state, and local government, excluding state and local government schools and hospitals (6 percent); and educational services (3 percent).

The three advanced practice nursing occupations were considerably smaller. The nurse practitioners occupation was the largest of the three, with employment of 105,780. Total employment was 34,180 for nurse anesthetists and 5,710 for nurse midwives. Like registered nurses, most advanced practice nurses were employed in hospitals or ambulatory health care services. However, the relative importance of the two industries was reversed: 65 percent of nurse anesthetists, 60 percent of nurse practitioners, and 55 percent of nurse midwives were employed in ambulatory health care services, primarily in offices of physicians, while hospitals accounted for slightly less than a third of jobs in each occupation. About 11 percent of nurse midwives and 3 percent of nurse practitioners were employed in educational services, which contain some teaching hospitals. Unlike registered nurses jobs, which were more prevalent in elementary and secondary schools, most nurse midwife and nurse practitioner jobs in educational services were in colleges, universities, and professional schools.

Metropolitan areas with the highest employment of both registered nurses and nurse practitioners tended to be those with high overall employment, such as New York, Los Angeles, and Boston. However, some smaller metropolitan areas had high concentrations of these occupations relative to total area employment. Metropolitan areas with the highest location quotients for nurse practitioners are shown in chart 1.[2] Cape Girardeau-Jackson, MO-IL, had nearly 4 times as many nurse practitioners as a percentage of total employment than the United States as a whole. The employment share of nurse practitioners was over 3 times the U.S. average in Provo-Orem, UT; Bangor, ME; and Hattiesburg, MS. Two of the areas in chart 1--Cape Girardeau-Jackson, MO-IL, and Johnson City, TN--also had among the highest concentrations of registered nurses. Other areas with high concentrations of registered nurses included Gainesville, FL, and Lima, OH. States with the highest concentrations of nurse anesthetists included Tennessee, Louisiana, and both Dakotas. Indiana and Oregon had among the highest concentrations of nurse midwives.

Chart 1 **Location quotients for metropolitan areas with the highest concentrations of nurse practitioners, May 2012**



NOTES: The location quotient is the ratio of the area concentration of occupational employment to the national average concentration. A location quotient greater than 1 indicates the occupation makes up a higher percentage of area employment than of national employment.

SOURCE: U.S. Bureau of Labor Statistics, May 2012 Occupational Employment Statistics data.

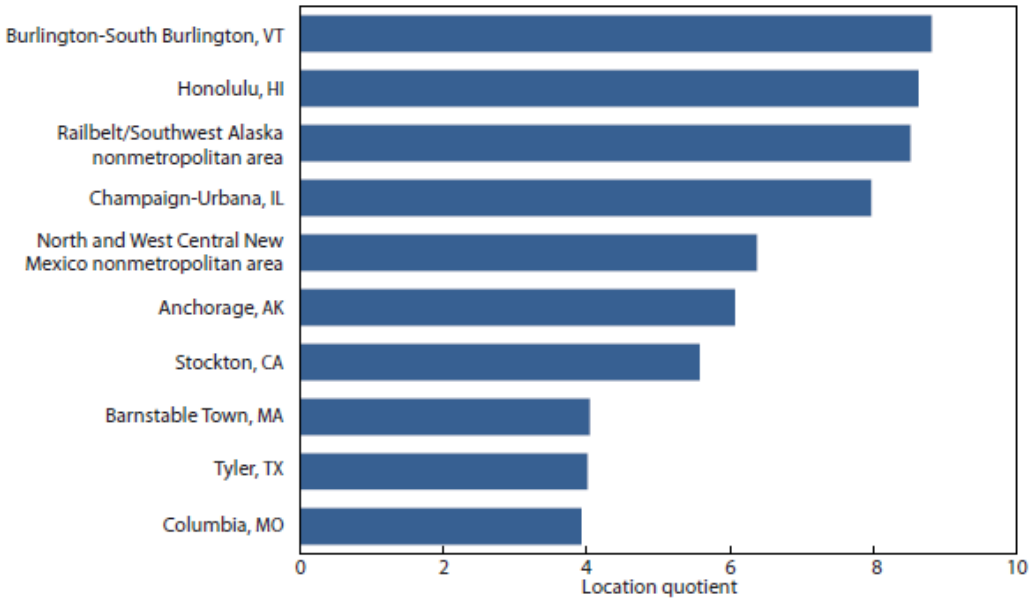
All four of these nursing occupations had above-average pay. With an annual mean wage of $154,390, nurse anesthetists was among the 20 highest paying occupations in the United States; occupations with similar wages included general dentists ($163,240) and petroleum engineers ($147,470). Both nurse practitioners and nurse midwives had annual mean wages of approximately $91,000. At $67,930, the annual mean wage for registered nurses was considerably lower than the wages for the advanced practice nursing occupations but more than $20,000 above the U.S. average of $45,790 across all occupations.

Except for the nurse midwives occupation, for which average wages were similar in both industries, nurses in hospitals tended to earn more than did those in ambulatory health care services. For example, the annual mean wage for nurse practitioners in hospitals was $95,870, compared with $90,740 in ambulatory health care services.

Other healthcare-related occupations. In addition to the advanced practice nursing occupations, the 2010 SOC introduced several new healthcare occupations and a healthcare-related community and social service occupation, community health workers. Community health workers assist individuals and communities to adopt healthy behaviors by, for example, conducting outreach activities, providing information on available resources, or providing informal counseling. In May 2012, employment of community health workers was about 38,020. Over a third of community health workers were employed by either the individual and family services industry (7,960) or local government (5,700). General medical and surgical hospitals (2,920) and outpatient care centers (2,720) also were among the industries with the highest employment of this occupation.

Metropolitan and nonmetropolitan areas with the highest concentrations of community health workers are shown in chart 2. Compared with the United States as a whole, Burlington-South Burlington, VT, and Honolulu, HI, had nearly 9 times as many community health workers as a percentage of total employment. Champaign-Urbana, IL, and two areas in Alaska also were among the areas with the highest location quotients for this occupation. Except for Honolulu, which had about 1,090 community health worker jobs, the areas shown in chart 2 had employment of 320 or below in this occupation.

Chart 2 **Location quotients for metropolitan and nonmetropolitan areas with the highest concentrations of community health workers among areas with employment of at least 100 in this occupation, May 2012**



NOTES: The location quotient is the ratio of the area concentration of occupational employment to the national average concentration. A location quotient greater than 1 indicates the occupation makes up a higher percentage of area employment than of national employment.

SOURCE: U.S. Bureau of Labor Statistics, May 2012 Occupational Employment Statistics data.

Community health workers had an annual mean wage of $37,490, below both the U.S. mean for all occupations and the $44,240 average for all community and social service occupations. The industry with the highest employment of this occupation, individual and family services, also was one of the lowest paying for the occupation, with an annual mean wage of $30,810; the mean wage for community health workers employed in local government was $39,670, slightly above the average across all industries.

After nurse practitioners, phlebotomists (draw blood for tests, transfusions, donations, and research) and orderlies were the largest healthcare occupations introduced in the SOC revision, with May 2012 employment of 100,380 and 53,920, respectively. About 40 percent of phlebotomists were employed in general medical and surgical hospitals. Most of the remainder were employed in medical and diagnostic laboratories; other ambulatory health care services, which includes blood and organ banks; or offices of physicians. About 72 percent of orderlies were employed in a single industry, general medical and surgical hospitals. Both of these occupations were relatively low paying, with annual mean wages of $30,910 for phlebotomists and $25,700 for orderlies.

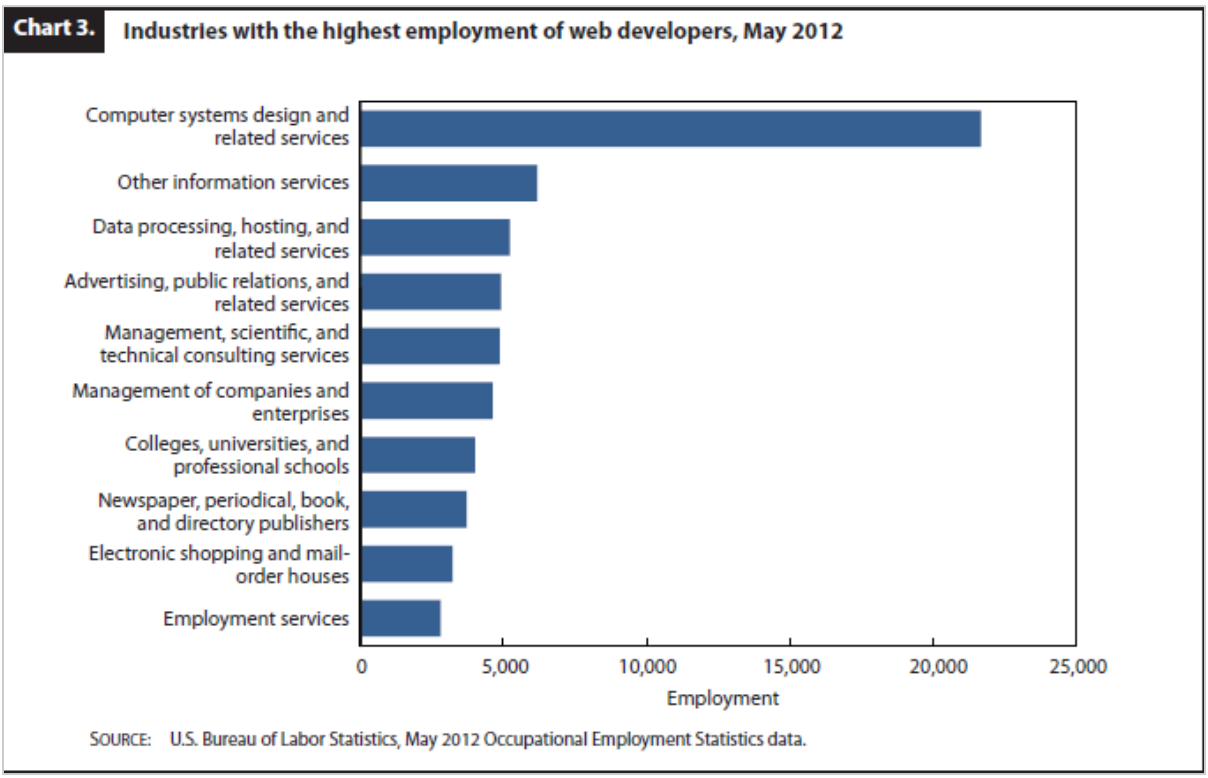
Ophthalmic medical technicians (assist ophthalmologists by performing ophthalmic clinical functions) and magnetic resonance imaging technologists (operate magnetic resonance imaging [or MRI] scanners) had May 2012 employment of 29,170 and 29,560, respectively. Over 70 percent of ophthalmic medical technicians worked in offices of physicians, while the majority of magnetic resonance imaging technologists (56 percent) were employed in general medical and surgical hospitals. Employment levels were much lower for the three remaining healthcare occupations introduced as part of the 2010 SOC revision: exercise physiologists (5,820), hearing aid specialists (4,980), and genetic counselors (2,000). About 54 percent of exercise physiologists worked in general medical and surgical hospitals. Sixty percent of genetic counselor jobs were found in either general medical and surgical hospitals or offices of physicians. Two retail trade industries, health and personal

care stores and other general merchandise stores, accounted for about 58 percent of employment of hearing aid specialists.

Annual mean wages for magnetic resonance imaging technologists ($65,410) and genetic counselors ($55,820) were above the U.S. all-occupations average. The annual mean wage for exercise physiologists ($47,610) also was slightly above average. Annual mean wages for hearing aid specialists ($46,780) and ophthalmic medical technicians ($35,590) were similar to or below the average across all occupations.

Computer occupations. The SOC structure for computer occupations was significantly updated in the 2010 revision, reflecting the effects of technological change on this group of occupations. Four new computer occupations were introduced as part of the revision: web developers, information security analysts, computer network architects, and computer network support specialists. Changes to the remaining computer occupations ranged from title and editing changes to changes in the occupations' content. For example, the definition for *computer software engineers, applications*, was edited and the title changed to *software developers, applications*; the revised computer systems analysts occupation had a substantive change to the occupation's content, with some workers previously classified in this occupation moved to the new computer network architects occupation. In addition, all the computer occupations were assigned new codes as part of the revision.

In May 2012, web developers filled 102,940 jobs. About one-fifth of these jobs were in the computer systems design and related services industry; other industries with high employment of web developers included data processing, hosting, and related services (5,230); advertising, public relations, and related services (4,930); and management, scientific, and technical consulting services (4,880). (See chart 3.) Metropolitan areas with the highest concentrations of web developers included the San Francisco-San Mateo-Redwood City, CA, metropolitan division; Boulder, CO; and the Seattle-Bellevue-Everett, WA, metropolitan division, each of which had more than 3 times as many web developers as a percentage of total employment than the United States as a whole.



The annual mean wage for web developers was $66,100, above the U.S. all-occupations average of $45,790 but below the average wage for computer occupations of $80,020. By comparison, the highest-paying computer occupations, computer and information research scientists and systems software developers, had average wages of $103,670 and $102,500, respectively. Among the industries shown in chart 3, wages for web developers ranged from $57,390 in colleges, universities, and professional schools to $79,520 in employment services.

Total employment of information security analysts was about 72,670 in May 2012. Computer systems design and related services was the industry with the highest employment of information security analysts, with about 20,040 jobs, or 28 percent of total occupational employment. Industries with the highest employment of this occupation also included management of companies and enterprises (5,810); depository credit intermediation (5,000); and management, scientific, and technical consulting services (3,930).

The St. Mary's County, MD, nonmetropolitan area had the highest concentration of information security analysts of any local area, with a location quotient of over 11 for this occupation. Local areas with the highest concentrations of this occupation also included Washington-Arlington-Alexandria, DC-VA-MD-WV; Fayetteville-Springdale-Rogers, AR-MO; and the Northern Virginia nonmetropolitan area.

Information security analysts earned an average of $89,290 annually, nearly $44,000 above the U.S. all-occupations mean. The industry with the highest employment of information security analysts, computer systems design and related services, also had a slightly above-average wage of $91,880 for this occupation. Among areas employing at least 500 information security analysts, the highest paying included the New York-White Plains-Wayne, NY-NJ, metropolitan division ($117,860); the San Francisco-San Mateo-Redwood City, CA, metropolitan division ($115,660); and the Bethesda-Rockville-Frederick, MD, metropolitan division ($111,010).

Employment patterns for the two remaining new computer occupations (computer network architects and computer network support specialists) were similar to one another, perhaps reflecting the relationship between these occupations' duties. Computer network architects design and implement computer and information networks, such as local area networks (or LANs) and Intranets, while computer network support specialists focus on analyzing, testing, and maintaining existing networks. The computer network support specialists occupation was the largest of the four new computer occupations, with May 2012 employment of 167,980; employment of computer network architects was about 137,890. As with the other new computer occupations, computer systems design and related services had the highest employment of both computer network architects and computer network support specialists, with 28 percent and 21 percent of total employment in these occupations, respectively. Wired telecommunications carriers and management of companies and enterprises were the industries with the second- and third-highest employment of both of these computer occupations.

The Washington-Arlington-Alexandria, DC-VA-MD-WV, and Olympia, WA, metropolitan areas had among the highest employment concentrations of both new computer network occupations. Other areas with the highest employment concentrations of computer network architects included Tallahassee, FL; Gainesville, FL; and Durham-Chapel Hill, NC. The Madison, WI; Boulder, CO; and Raleigh-Cary, NC, metropolitan areas had among the highest concentrations of computer network support specialists. The Washington-Arlington-Alexandria, DC-VA-MD-WV, and New York-White Plains-Wayne, NY-NJ, metropolitan divisions had among the highest employment of both computer network architects and computer network support specialists, although unlike the Washington, DC, metropolitan area, New York-White Plains-Wayne did not have an above-average concentration of either occupation.

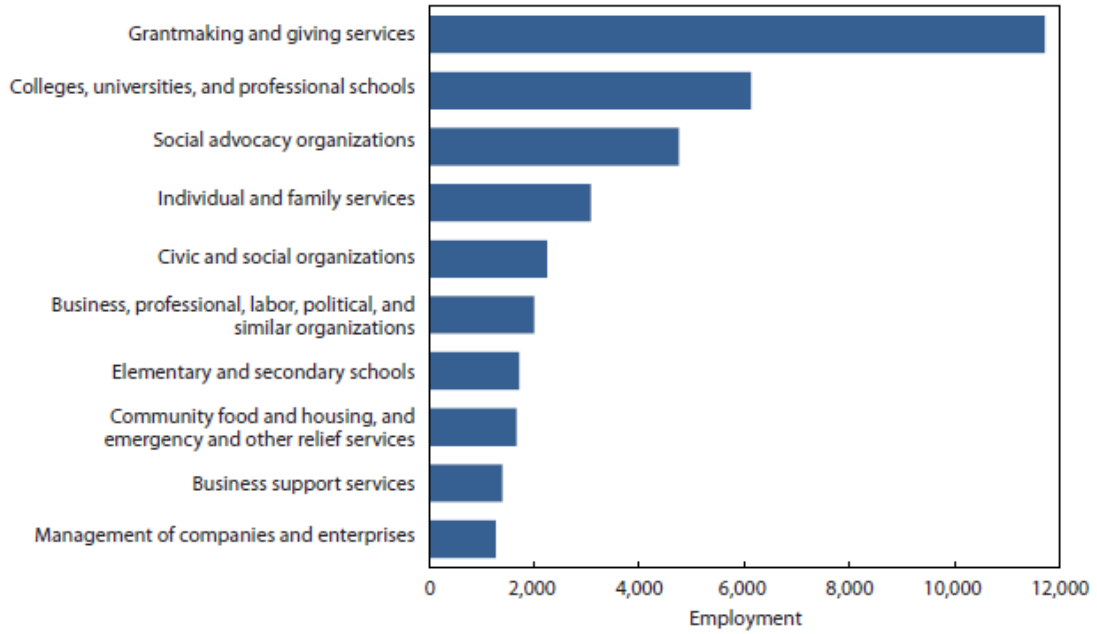
Mean wages for the two new computer network occupations were both above average but were significantly different from each other. Computer network architects earned an annual mean wage of $94,000, more than double the U.S. all-occupations average of $45,790. Among industries employing 500 or more computer network architects, the highest paying included other information services ($113,400), semiconductor and other electronic component manufacturing ($112,600), and two financial services industries, securities and commodity contracts intermediation and brokerage ($111,560) and other financial investment activities ($111,320). The lowest paying industries employing 500 or more computer network architects were state government ($63,550); local government ($74,620); elementary and secondary schools ($59,110); and colleges, universities, and professional schools ($71,730).

With an annual mean wage of $62,960, the computer network support specialists occupation was one of the lowest paid computer occupations, outranking only computer user support specialists ($50,130). The highest paying industries employing 500 or more computer network support specialists included computer and peripheral equipment manufacturing ($77,590) and several financial services industries: nondepository credit intermediation ($77,020), securities and commodity contracts intermediation and brokerage ($75,630), and activities related to credit intermediation ($74,550). Electronic shopping and mail-order houses ($50,240), business support services ($51,860), and junior colleges ($52,520) were among the lowest paying industries employing 500 or more computer network support specialists.

Fundraisers and human resources workers. Changes to the business and financial operations occupational group include the introduction of a new occupation, fundraisers. Total employment of fundraisers was about

48,530 in May 2012. Nearly a quarter of fundraisers were employed in the grantmaking and giving services industry (see chart 4), which includes philanthropic trusts, grantmaking foundations, disease research fundraising organizations, and federated charities. Colleges, universities, and professional schools had the second-highest employment of fundraisers (6,130). Other industries with the highest numbers of fundraising jobs included social advocacy organizations (4,760) and individual and family services (3,080).

Chart 4. Industries with the highest employment of fundraisers, May 2012



SOURCE: U.S. Bureau of Labor Statistics, May 2012 Occupational Employment Statistics data.

Fundraisers earned an average of $55,220 across all industries, about $9,400 above the U.S. all-occupations average. Annual mean wages for fundraisers for the industries shown in chart 4 ranged from $47,010 in community food and housing, and emergency and other relief services, to $62,120 in colleges, universities, and professional schools.

Changes to the business and financial operations group also included the introduction of two revised human resources workers occupations: human resources specialists (perform activities in the human resources area) and labor relations specialists (resolve disputes between workers and managers, negotiate collective bargaining agreements, or coordinate grievance procedures to handle employee complaints). These occupations resulted from splitting and recombining two SOC 2000 occupations: employment, recruitment, and placement specialists and all other human resources, training, and labor relations specialists.

Employment of labor relations specialists was about 75,930 in May 2012. Nearly 79 percent of these jobs were in a single industry: business, professional, labor, political, and similar organizations, which includes labor unions. Employment of labor relations specialists was much lower in the remaining industries, including building material and supplies dealers (2,090), state government (1,720), and management of companies and enterprises (1,430). Several of the metropolitan areas with the highest concentrations of labor relations

specialists were in Ohio, including Youngstown-Warren-Boardman, OH-PA; Steubenville-Weirton, OH-WV; Lima, OH; Wheeling, WV-OH; and Canton-Massillon, OH.

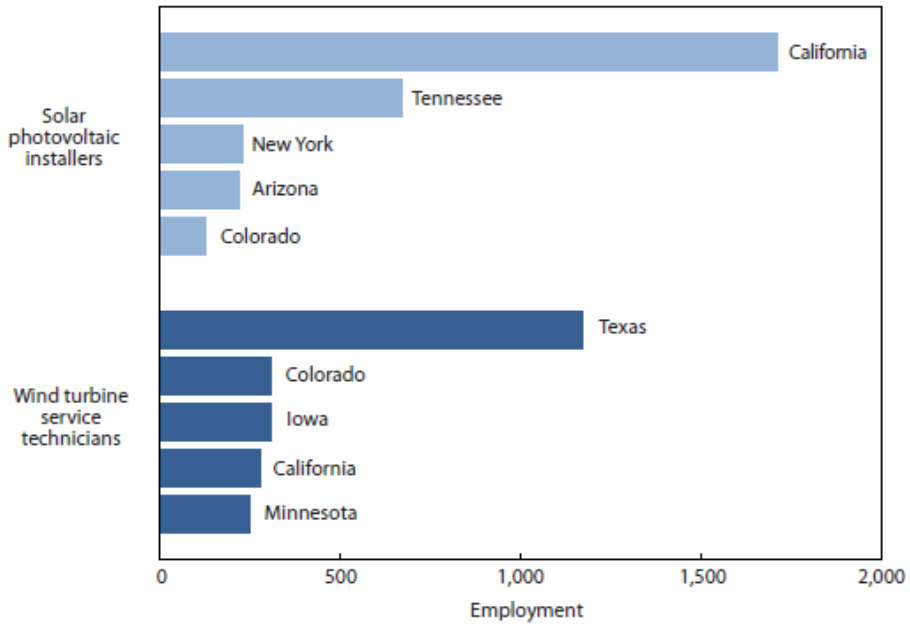
Total May 2012 employment of human resources specialists was about 394,380. Compared with labor relations specialist jobs, human resources specialist jobs were distributed more evenly across industries. About 20 percent of human resources specialists were employed in the public sector; private sector industries with the highest employment of this occupation included employment services (63,970), management of companies and enterprises (28,540), and general medical and surgical hospitals (14,600). Elizabethtown, KY; Washington-Arlington-Alexandria, DC-VA-MD-WV; Olympia, WA; and Manhattan, KS, were among the areas with the highest concentrations of human resources specialists. Although most of these areas employed fewer than 1,000 human resources specialists, the Washington-Arlington-Alexandria metropolitan division also had one of the highest employment levels for this occupation, with over 16,000 jobs.

May 2012 annual mean wages were $56,210 for labor relations specialists and $60,660 for human resources specialists. Both occupations had mean wages above the U.S. all-occupations mean wage ($45,790) but below the $69,550 average for all business and financial operations occupations. In addition, for each of the two occupations, the industry with the highest employment of the occupation had below-average wages for the occupation. Human resources specialists in the employment services industry earned an average of $57,110, more than $3,500 below the all-industry occupational mean. Similarly, labor relations specialists employed in business, professional, labor, political, and similar organizations earned an average of $53,440, more than $2,500 below the all-industry occupational mean; by comparison, mean wages for this occupation were $80,000 or more in the motor vehicle manufacturing, motor vehicle parts manufacturing, and wired telecommunications carriers industries.

Occupations related to renewable energy. In general, any classification of jobs based on the nature of the work performed does not always allow “green” jobs to be differentiated from other jobs with similar duties. For example, a worker installing electrical wiring and fixtures in a Leadership in Energy and Environmental Design (or LEED) certified building would be classified as an electrician, as would a worker performing the same tasks on a traditional building project. However, the 2010 SOC introduced two new occupations specifically associated with renewable energy generation: solar photovoltaic installers and wind turbine service technicians.

Both occupations were relatively small and geographically concentrated. Nearly 73 percent of the 3,200 wind turbine service technicians were found in only five states: Texas, Colorado, Iowa, California, and Minnesota. Solar photovoltaic installers had total May 2012 employment of approximately 4,710, with over 60 percent of these jobs in California, Tennessee, New York, Arizona, and Colorado. (See chart 5.)

Chart 5. States with the highest employment of solar photovoltaic installers and wind turbine service technicians, May 2012



SOURCE: U.S. Bureau of Labor Statistics, May 2012 Occupational Employment Statistics data.

The majority of solar photovoltaic installers--56 percent--worked for building equipment contractors. More than half of the remaining jobs were in utility system construction, state government, or construction of buildings. Approximately 58 percent of wind turbine service technicians were employed either in electric power generation, transmission, and distribution or commercial and industrial machinery and equipment (except automotive and electronic) repair and maintenance, split roughly equally between these two industries. Smaller numbers of wind turbine service technicians were employed in utility system construction (390); machinery, equipment, and supplies merchant wholesalers (190); and management, scientific, and technical consulting services (130).

Solar photovoltaic installers had an annual mean wage of $40,620, about $5,000 below the U.S. all-occupations average. Wages for this occupation varied considerably by industry, from $25,000 in building finishing contractors to $61,570 in state government. The annual mean wage for wind turbine service technicians was $48,320 and ranged by industry from $30,430 in building equipment contractors to $52,490 in architectural, engineering, and related services.

OES and the conversion to the 2010 SOC

The 2010 SOC revision. Like other classification systems used for statistical purposes, the SOC system was designed to be revised periodically to reflect changes in the structure of the U.S. economy and to update the occupational titles and definitions. The 2010 SOC revision process began in October 2005. The revision was conducted by an interagency Standard Occupational Classification Policy Committee (SOCPC) operating under the authority of the Office of Management and Budget (OMB). The Bureau of Labor Statistics (BLS) chairs the SOCPC, which includes members from four other executive departments (Commerce, Defense, Education, and Health and Human Services) in which occupational data are produced, as well as representatives from several

other federal agencies. During the revision process, the SOCPC also consulted with additional federal agencies and state workforce agencies, as well as solicited public comment through notices in the *Federal Register*.[3]

On January 21, 2009, the *Federal Register* published the final revised 2010 SOC structure, classification principles, and coding guidelines. The revised system kept the same general hierarchal structure of the 2000 SOC--major groups, minor groups, broad occupations, and detailed occupations--with a net gain of 1 minor group, 12 broad occupations, and 19 detailed occupations.

Individual detailed occupations underwent one or more of several possible types of changes, classified as content, editing, title, and code changes.[4] Of the 840 2010 SOC occupations, 61, or about 7 percent, underwent content changes, defined as splitting a 2000 SOC occupation among more than one 2010 SOC occupation or collapsing more than one 2000 SOC occupation into a single 2010 SOC occupation. Possible types of content changes included breaking a new 2010 SOC occupation out of a residual ("all other") category or moving a subset of workers in a 2000 SOC occupation into another new or existing occupation. Occupations with content changes include all the SOC 2010 occupations published for the first time in the May 2012 OES release.

About 47 percent of 2010 SOC occupations had editing changes to the occupational definitions. While some of these changes were minor, such as punctuation or slight wording changes, other definitions were substantially rewritten. Although not classified as content changes according to the definition just described, these more extensive editing changes could affect how workers are reported and therefore could affect the content of the occupation, as discussed in the subsection that follows. Other possible changes included changes to occupational titles--for example, to clarify an occupation's content or to reflect changes in the occupational definition--and changes to occupational codes to group similar occupations together in the coding structure. About 43 percent of 2010 SOC occupations had no changes.

OES 3-year methodology. Although OES began implementing the revised SOC in the May 2010 estimates, converting the OES data fully to the 2010 SOC was not immediately possible because OES produces each set of estimates by pooling survey response data collected in six semiannual panels over 3 years. For example, the May 2012 OES estimates are based on survey data collected with reference dates of May 2012, November 2011, May 2011, November 2010, May 2010, and November 2009. Each year, the two oldest panels of data are dropped and two new panels added. Combining 3 years of data allows a large sample size of approximately 1.2 million units, allowing estimates to be produced at high levels of occupational, geographical, and industry detail, while reducing the burden on survey respondents. The downside of this methodology is that changes sometimes must be implemented gradually, allowing time for the full 3 years of underlying survey data to be replaced with new data.[5]

The OES program began collecting data based on the 2010 SOC with the November 2009 survey panel. However, because of the 3-year methodology, the May 2010 and May 2011 OES estimates were based on a combination of older survey panels collected using the 2000 SOC and newer panels collected using the 2010 SOC. Many occupations either had no change or had only minor changes between the two systems, such as

Like other classification systems used for statistical purposes, the SOC system was designed to be revised periodically to reflect changes in the structure of the U.S. economy and to update the occupational titles and definitions.

new occupational codes or slight editing of the titles or descriptions. These occupations could be converted to the 2010 SOC beginning with the May 2010 data. Similarly, 2010 SOC occupations that were simple combinations of 2000 SOC occupations also could be converted immediately, for example, the 2010 SOC occupation photographic process workers and processing machine operators (51–9151), which merged two 2000 SOC occupations, photographic process workers (51–9131) and photographic processing machine operators (51–9132). Some 2000 SOC occupations that mapped to a single SOC 2010 occupation also were converted to the new system beginning in May 2010, although the content of the occupation may have changed because survey panels collected under the new 2010 SOC definition were added, as discussed in the next subsection.

However, when a 2000 SOC occupation was split into two or more 2010 SOC occupations, determining how data collected under the old system would have been coded under the revised system was not possible. For these occupations, the May 2010 and May 2011 estimates represented a transition period during which data collected under the new and old systems were combined into a temporary occupation not found in the 2010 SOC. Sometimes the data could be combined to re-create a 2000 SOC code; for example, data for registered nurses and advanced practice nurses were reaggregated into the 2000 SOC occupation registered nurses (29–1111). When this type of combination was not possible, the data were published under a temporary occupation used in OES only. For example, the OES-specific occupation information security analysts, web developers, and computer network architects combined data collected for the 2000 SOC occupation network systems and data communications analysts (15–1081) with data collected for the 2010 SOC occupations information security analysts (15–1122), web developers (15–1134), and computer network architects (15–1143), all of which were broken out wholly or partly from network systems and data communications analysts (15–1081).[6]

For production of the May 2012 OES estimates, the last of the old survey panels based on the 2000 SOC were dropped and replaced with November 2011 and May 2012 panels based on the 2010 SOC. As a result, the May 2012 estimates are the first to be based entirely on survey data collected using the revised SOC, allowing the transitional coding structure to be discontinued and replaced with the full 2010 SOC.

SOC 2010 and OES data over time. In part because of the 3-year methodology, OES data are designed primarily for cross-sectional analysis rather than for making comparisons between two periods.[7] The conversion from the 2000 SOC to the 2010 SOC further complicates the use of OES data for analyzing changes through time. For the occupations introduced in the May 2012 OES data, the challenge is clear: no previous data exist for comparison. However, for other occupations, the effects of the SOC conversion on data comparability are less obvious. The SOC revision changed the definitions of some occupations, resulting in changes to these occupations' content. Clarifications to the titles and/or definitions of other occupations may have affected how survey respondents classified workers into occupations. In addition to changes related to the SOC conversion, some OES-specific efforts to improve the accuracy of the data collected may also affect the comparability of data through time. Examples of each of these types of changes are presented in the next paragraphs.

As part of the revision, the definitions of some occupations were expanded to include related workers previously classified elsewhere or narrowed to exclude specific types of workers formerly classified in the occupation. These definitional changes were often accompanied by changes to the occupational titles and, sometimes, codes; however, because a similar-sounding occupation appears in both the 2000 and 2010 SOCs, data users

may attempt to compare the new and old versions of the occupation directly. For some of these revised occupations, the OES program began publishing data under the new code and title in May 2010, rather than using a transitional code as was done for other occupations. However, because of the definitional changes, the May 2010 and May 2011 data still represent a transition period for these occupations, because survey panels collected under the older definition were gradually phased out and replaced with data collected based on the revised definition.

For example, under the 2010 SOC, the title and definition for occupation code 13–1121 were expanded to include event planners, whose duties are sufficiently similar to those of meeting and convention planners to justify grouping them together:

· 2000 SOC: meeting and convention planners (13–1121)--Coordinate activities of staff and convention personnel to make arrangements for group meetings and conventions

· 2010 SOC: meeting, convention, and event planners (13–1121)--Coordinate activities of staff, convention personnel, or clients to make arrangements for group meetings, events, or conventions

In this example, the occupational code did not change, so OES estimates were published continually under this code during the transition period. However, May 2009 and earlier data, which do not include event planners, are not directly comparable with later data, which *do* include them. In addition, the 3-year OES methodology means that although the revised title and definition were first implemented in May 2010, the content change would have phased in gradually between May 2010 and May 2012, because survey panels collected under the narrower definition were dropped and replaced with panels collected under the new, broader definition. Data users unfamiliar with the 2010 SOC revision might attribute the 2010–2012 growth in the OES employment estimates for this occupation solely to economic factors, rather than to the broader occupational definition.

A similar example occurs in the 2000 SOC occupation market research analysts (19–3021). Originally restricted to workers who primarily researched market conditions, this occupation was expanded to include marketing specialists whose job duties involved creating marketing campaigns but not performing market research analysis. In addition, the occupation was moved from the life, physical, and social science occupational group to the business and financial operations group to reflect the shift in focus and given the new title and code market research analysts and marketing specialists (13-1161). Despite the code change, the old and new titles and definitions appear roughly comparable; in addition, all workers previously coded in the old occupation would now be classified in the new one. However, because the definition was expanded to include marketing specialists, the contents of the old and new occupations are not directly comparable, and once again, the content change would be expected to phase in gradually as a result of the 3-year OES data collection cycle. Comparisons of May 2009 and May 2012 OES data for the two versions of this occupation show a cumulative employment increase of 74 percent--from 226,410 to 392,740--with the increase occurring gradually during each year of this period.

In some cases, an occupation's definition was narrowed. For example, the 2000 SOC occupation law clerks (23-2092) was revised to restrict the occupation only to workers who assist judges by researching and preparing legal documents and to remove workers who are assisting lawyers. Workers who assist lawyers by conducting research or preparing legal documents are classified in the 2010 SOC as paralegals and legal assistants (23–

2011). As part of the revision, the occupational title and code for law clerks were changed to judicial law clerks (23–1012). Comparing the old and new versions of the occupation shows a gradual fall in employment between May 2009 and May 2012, for a cumulative decrease of about 66 percent, as the new, narrower definition was phased in. In addition, mean wages for this occupation increased by about 25 percent over the same period, compared with a 5-percent wage increase across all occupations, suggesting that the workers excluded by the new definition may have been lower paid than were those remaining in the occupation.

In addition to occupations that had content changes as part of the SOC revision, many other occupations underwent editing changes to their titles and/or definitions. In most cases, these changes were minor and unlikely to affect the OES data. However, some editing changes may have extensively clarified how workers should be classified into occupations. In such cases, even though the intended content of the occupation is unchanged, the revisions may affect how survey respondents report their workers, effectively changing content of the OES data.

An example of editing changes that may have affected occupational coding involves two related office and administrative support 2010 SOC occupations: executive secretaries and executive administrative assistants (43–6011) and secretaries and administrative assistants, except legal, medical, and executive (43-6014). The 2000 SOC titles of these support occupations were executive secretaries and administrative assistants (43-6011) and secretaries, except legal, medical, and executive (43-6014):

2000 SOC		**2010 SOC**	
Code	Title	Code	Title
43-6011	Executive secretaries and administrative assistants	43-6011	Executive secretaries and executive administrative assistants
43-6014	Secretaries, except legal, medical, and executive	43-6014	Secretaries and administrative assistants, except legal, medical, and executive

As part of the revision, the titles and definitions of both occupations were edited to clarify that “administrative assistants” who did not perform the high-level administrative support typical of the executive secretary occupation should be classified as secretaries instead.

A look at the OES data for both occupations suggests that these clarifications may have affected reporting, increasing the number of nonexecutive administrative assistants reported correctly in 43-6014 instead of 43–6011. Employment for the office and administrative support group as a whole fell by about 4 percent between May 2009 and May 2012; however, employment for executive secretaries and executive administrative assistants fell by 41 percent over the same period, while employment of secretaries and administrative assistants (except legal, medical, and executive) increased by 16 percent. Just as the changes for occupational definitions are reflected gradually in the OES data, editing changes that influence how workers are reported also would be reflected gradually, because survey panels collected under the older titles and definitions are replaced by panels collected under the revised ones.

Two OES-specific changes designed to improve data quality were implemented along with the SOC revision. These changes may also affect the comparability of OES data through time. One change involved the introduction of an OES-specific code for substitute teachers. According to the SOC coding guidelines, teachers whose job is to teach at different levels--for example, elementary, middle school, or secondary--should be reported in the occupation corresponding to the highest level at which they teach. State workforce agencies collecting OES data were not consistently able to obtain the information needed to code substitute teachers to the detailed teaching occupations that covered the grade taught during the reference period. After OMB released the 2010 SOC structure in the January 2009 *Federal Register*, the SOCPC decided to improve coding consistency of substitute teachers across agencies by modifying the 2010 SOC definitions to specify that substitute teachers should be coded to the residual occupation teachers and instructors, all other (25–3099). To facilitate consistent coding of substitute teachers across states, OES implemented the OES-specific code 25–3098 substitute teachers, designed to include all substitute teachers, regardless of the level at which they teach. Workers reported in this OES-specific code were incorporated into the residual occupation teachers and instructors, all other (25–3099), beginning with the May 2010 estimates. Employment in this residual category increased by about 49 percent between May 2009 and May 2012 because survey panels collected using the new code were phased in.

The second OES-specific change implemented to improve data quality involved the use in data collection of a revised title and definition for sales representatives of some services. The SOC contains separate occupations for sales representatives of several types of services, including advertising, travel, and financial services. Sales representatives of services not classified separately, such as business services or pest control services, are correctly reported in the SOC occupation sales representatives, services, all other (41-3099), defined as “all services sales representatives not listed separately.” To facilitate more accurate reporting of these workers, beginning with the November 2010 survey panel, OES placed this occupation on survey forms under an OES-specific code, title, and definition: “41-3098 Sales Representatives of Services, Except Advertising, Insurance, Travel, and Financial Services--Sell services to individuals or businesses. May describe options or resolve client problems. Excludes ‘Advertising Sales Agents,’ ‘Travel Agents,’ ‘Sales Representatives, Wholesale and Manufacturing,’ and ‘Telemarketers.’”

The intended content of this OES-specific code is identical to that of sales representatives, services, all other (41-3099), and data collected under this code are published under the corresponding SOC code and title. However, the more descriptive title and definition may help respondents correctly classify workers into the occupation. The first panels collected with this OES-specific code were introduced in the May 2011 estimates; between May 2010 and May 2012, employment in sales representatives, services, all other (41–3099), increased by about 26 percent. Because the May 2012 estimates still contain two panels of data collected before the OES-specific code was in use, any effects of this change will not fully phase in until the May 2013 estimates.

The preceding discussion provides several examples of content or editing changes to occupational categories that may affect the comparability of OES data through time. However, even occupations without obvious changes to their titles or definitions may be affected by revisions elsewhere in the structure. For example, some workers previously reported as law clerks but excluded from the revised judicial law clerks occupation may now be reported as paralegals and legal assistants (23–2011) instead. The effect may be to reduce the comparability

of the data for paralegals over time, although the direct revisions to the paralegals occupation were relatively minor. Residual (all other) occupations may also be affected by revisions elsewhere in the structure. Residuals from which new occupations were broken out as part of the 2010 revision may be indicated by the use of an OES-specific code during the 2010/2011 transition period, but data from before and after the transition may have the same titles and codes, although they are not directly comparable. Because changes to the classification system may interact in ways that are subtle and difficult to quantify, data users should be cautious in interpreting changes in the OES estimates through time. Before comparing OES data based on the 2010 SOC with data based on the 2000 SOC, users should use the crosswalk between the two systems to determine which occupations match one to one and which do not.[8] Data users should also check for revisions to an occupation's title or definition that might affect how workers are reported in that occupation or in related occupations.[9] Finally, for occupations with content changes that were published in the May 2010 and May 2011 OES estimates, data users should keep in mind that year-on-year changes during the 2010–2012 transition period may be due to a mix of both economic factors and changes in the content of the occupation.

The May 2012 OES estimates represent the final stage in a 3-year process (2010–2012) of converting the OES data from the 2000 SOC to the revised 2010 SOC. Periodic revisions allow the classification system to adapt to changes in the occupational structure of the U.S. economy, enabling OES to publish employment and wage estimates for new occupations of interest, such as advanced practice nurses, information security analysts, and wind turbine service technicians. The tradeoff is some loss of continuity in the ability to compare occupations through time. Because revisions to the classification system may affect occupational coding in ways that are not always obvious, OES data users may want to be particularly cautious in comparing data based on the 2000 and 2010 SOC systems.

NOTES

1 Table 1 excludes residual ("all other") occupations.

2 Location quotients represent area employment in an occupation as a percentage of total area employment, divided by national employment in the occupation as a percentage of total national employment. Occupations with location quotients greater than 1 make up a higher share of local employment than they do of national employment; occupations with location quotients less than 1 make up a lower share of local employment than of national employment. For example, an occupation that makes up 8 percent of area employment and 2 percent of national employment would have a location quotient of 4 for the area in question.

3 For a detailed description of the 2010 SOC revision process, see Theresa Cosca and Alissa Emmel, "Revising the Standard Occupational Classification system for 2010," *Monthly Labor Review*, August 2010, pp. 32–41, www.bls.gov/opub/mlr/2010/08/art3full.pdf.

4 A spreadsheet showing the types of change by detailed occupation in the 2010 SOC can be downloaded at www.bls.gov/soc/soc_2010_type_of_change_by_detail_occup.xls.

5 For detailed information on the OES methodology, see the OES Survey Methods and Reliability Statement at www.bls.gov/oes/current/methods_statement.htm.

6 Detailed information on the transitional coding structure used in the May 2010 and May 2011 OES data, including a link to a downloadable crosswalk between the transitional structure and the 2000 and 2010 SOC systems, is available in the OES

Frequently Asked Question (FAQ) “How were the occupations in the May 2010 estimates created from data based on the 2000 and 2010 SOC codes?” at www.bls.gov/oes/oes_ques.htm#other.

[7] For more information on using OES data to compare through time, see the FAQ “Can OES data be used to compare changes in employment or wages over time?” at www.bls.gov/oes/oes_ques.htm#other.

[8] For a crosswalk from the 2000 SOC to the 2010 SOC, see http://www.bls.gov/soc/soccrosswalks.htm.

[9] To download 2010 SOC definitions, go to www.bls.gov/soc/materials.htm. Archived materials on the 2000 SOC, including links to occupational definitions, are available at www.bls.gov/soc/2000/socguide.htm.

RELATED CONTENT

Related Articles

Revising the Standard Occupational Classification system for 2010, *Monthly Labor Review*, August 2010.

Revising the Standard Occupational Classification system, *Monthly Labor Review,* May 1999.

Related Subjects

Occupations | Statistical programs and methods