THE CROSSWALK VALIDATION PROJECT: FINAL REPORT

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Crosswalk Validation Project: Final Report

In 2007, a set of seven tables was produced with the goal of providing a comprehensive and standardized mapping of Classification of Instructional Program (CIP) codes and O*NET Standard Occupational Classification (SOC) occupational codes into Career Clusters and Career Pathways.[1] This project was coordinated by DTI Associates, Inc., under contract with the Office of Vocational and Adult Education (OVAE) of the U.S. Department of Education.

Starting in 2010, the National Research Center for Career and Technical Education (NRCCTE) at the University of Louisville undertook the task of revising and updating the original 2007 crosswalks, specifically focusing on decision rules that connect the SOCs to the CIPs. The NRCCTE also sought to re-examine the underlying relationships between the SOCs, CIPs, Career Clusters, and associated Career Pathways. The overall purpose of the NRCCTE's Crosswalk Validation Project[2] was to capture the evolving multi-state, multi-institutional collaborative efforts being made to bring greater consistency and clarity to Perkins secondary and postsecondary data collection and reporting.

The Crosswalk Validation project is a joint effort by the NRCCTE and the National Association of State Directors of Career-Technical Education Consortium (NASDCTEc). The primary product created through this project was a national[3] crosswalk that links educational programs (CIPs) to occupations (SOCs) with Career Clusters and Career Pathways. The resulting crosswalks produced by this project have created a foundation for more standardized accountability requirements, which the project's directors believe should be a major focus of future Perkins legislation.

Overview of Crosswalk Validation and Update Process

The Crosswalk Validation project used the original tables (Perkins Tables 1, 5, and 7) created by the 2007 crosswalk effort as its starting point. The CIPs and SOCs are each matched to one of the 16 Career Clusters and the 79 related Career Pathways that are used by state education agencies (SEAs) and local education agencies (LEAs) when reporting their Perkins accountability results to the U.S. Department of Education. The matching of CIPs to SOCs was made possible through the use of the 2010 National CIP-SOC crosswalk.

This report describes the process by which the Crosswalk Validation project developed a set of crosswalks that connected CIPs, SOCs, Career Clusters, and Career Pathways. The crosswalks produced by the project can be accessed electronically at the NRCCTE and NASDCTEc

[1] CIP codes are assigned to postsecondary educational programs by the U.S. Department of Education. The latest version of these codes is referred to as CIP 2010, although many agencies are still using CIP 2000. SOCs provide a coding structure for all occupations within U.S. industry. The U.S. Department of Labor is responsible for developing SOC codes and is currently engaged in updating them.

[2] See http://www.nrccte.org/resources/studies/crosswalk-validation-project for more information.

[3] The revised tables produced by the Crosswalk Validation project are based on national data. The corresponding Excel tables provided on the NRCCTE (www.nrccte.org) and NASDCTEc (www.careertech.org) websites can be downloaded by individual states. These crosswalks can be customized to reflect the relationships between education programs, occupational information, Career Clusters, and Career Pathways specific to individual states.

websites.[4] An executive summary of this project is available online.[5]

Summary of Earlier Crosswalk Validation Work

Formal crosswalks that connect education to labor market information have existed for over three decades (Flanders, 1988). These crosswalks were constantly being developed, modified, and updated throughout the 1980s when the National Occupational Informational Coordinating Committee (NOICC) and the state-level occupational coordinating committees (SOICCs) were fully functional. Later, in the 1990s, with the advent of the U.S. Department of Labor-led National Skills Standards Board, which defined 15 industry clusters, the connection of occupations and industry to educational programs required the use of crosswalks. In the 2000s, first led by the U.S. Department of Education, and then by the NASDCTEc, the National Career Clusters Initiative set the stage for CTE to become part of the larger crosswalk discussion. Finally, the National Alliance for Partnership in Equity (NAPE) began developing and using crosswalks to identify those occupations and education programs that were classified as non-traditional, defined as occupations and programs in which either men or women were under-represented.

Crosswalks come in various sizes, shapes, and forms. They can be developed at the national level, like the CIP-SOC[6] crosswalk that is maintained at the National Crosswalk Center in Iowa. Crosswalks have also been developed at the state level to meet states' unique needs in the areas of program planning, career guidance, and accountability. In their most basic form, CTE-related crosswalks should connect occupations (SOCs) to educational programs (CIPs). However, sometimes these relationships are broken out for different industries, Career Clusters, and Career Pathways. The occupation-education program linkages can also be classified as representing nontraditional programs and occupations. The CIP-SOC linkages can also be identified as high-skill, high-wage, or high-demand. By considering all of these relationships, the Crosswalk Validation project intended to create more standardization when relating education programs, Career Clusters, Career Pathways, and occupations.

Under U.S. Department of Education direction, DTI Associates, Inc., produced a set of seven tables in 2007 that was intended to provide a comprehensive and standardized mapping of CIP and SOC codes into Career Clusters and Career Pathways. Dick Dempsey, formerly with the U.S. Department of Labor, was retained to produce the materials, and state accountability, assessment, and career resource network experts were asked to review the products as they were being developed. DTI Associates made additional formatting changes, sorts, and extractions in preparation for posting and distributing these materials in alignment with instructions for the Perkins Consolidated Annual Report, which specifically references these crosswalks as a reporting tool. Seven tables were produced under the following major headings.

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[4] See http://www.nrccte.org and http://www.careertech.org.

[5] See http://nrccte.org/resources/studies/crosswalk-validation-project.

[6] CIP stands for Classification of Instructional Programs, and are the codes assigned to postsecondary educational programs by the U.S. Department of Education. The latest version of these codes is referred to CIP 2010, although many are still using CIP 2000. SOC refers to Standard Occupational Classification and provides a coding structure for all occupations that are employed within American industry. The U.S. Department of Labor is responsible for developing these SOC codes and is currently updating them.

Instructional Programs by Career Clusters/Career Pathways. The three tables in this set map instructional programs and their corresponding CIP codes into each of the Career Clusters and Career Pathways, assigning each program to only one pathway. One table also contains programs that have been designated as leading to non-traditional occupations for males and females (determined from BLS occupational data mapped in the next set and utilizing the National Center for Education Statistics [NCES] Occupation to CIP crosswalk).

> ***Perkins Table 1:*** CIPs in Pathways contains a list of every CIP code organized by the one Career Pathway it best belongs in.
>
> ***Perkins Table 2:*** CIP-Pathway-Cluster takes the information in Perkins Table 1 and presents it as a matrix with each CIP code assigned to a Career Pathway and consequently to a Career Cluster.
>
> ***Perkins Table 3:*** CIP-Nontrad-Cluster-Pathway is a matrix that repeats the Table 2 assignments, and for each CIP also depicts whether it is an instructional program that has been designated as leading to a nontraditional occupation for males or for females.

Occupations by Career Clusters/Career Pathways. The following table links O*NET and SOC occupations to each of the Career Clusters and Career Pathways, assigning each occupation to only one pathway. In the same table, occupations have been designated as nontraditional for males and females using 2006 BLS data.

> ***Perkins Table 4:*** O*NETs in Pathways contains a list of every occupation code organized by the one Career Pathway it best belongs in.
>
> ***Perkins Table 5:*** SOC-O*NET-Nontrad-Cluster-Pathway is a matrix that takes the assignment of O*NET occupations to pathways and provides information on each occupation's pathway, cluster, the SOC it belongs in, and whether each occupation is considered to be nontraditional for males and for females, based on 2006 data collected using SOC coding.

Occupations and Instructional Programs by Career Clusters/Career Pathways. This table maps O*NET and SOC occupations into each of the Career Clusters and Career Pathways, assigning each occupation and each instructional program to all Career Pathways to which they might apply, and hence to all of the Career Clusters.[7]

> ***Perkins Table 6:*** Cluster-Pathway-CIP-SOC-O*NET is meant to replace previous versions of the Master Mapping Table which contained old CIP codes, outdated assignment of CIP codes to Career Clusters, old Career Cluster names, no information on Career Pathways and several coding systems that are no longer used.

Primary Occupations and Instructional Programs by Clusters/Pathways. One additional table was extracted from these underlying data sets in order to meet the needs of national Perkins

[7] See http://cte.ed.gov/accountability/crosswalks.cfm.

projects that are anticipated as implementation gets underway.

> ***Perkins Table 7:*** Cluster-Pathway-SOC-CIP combines information from the first two data sets into one table. It uses SOC as the underlying occupational code so labor market information can be readily attached to pathways and clusters. It lists the CIP codes primarily assigned to each pathway but does not further assign them to particular occupations.

The 2007 tables and additional information regarding their recommended use is available on the Perkins Collaborative Resource Network website.[8]

The NRCCTE Crosswalk Validation Project

Building on the efforts of the NRCCTE's Postsecondary CTE Data Dictionary project (see Kotamraju, Richards, Wu, & Klein, 2010), the NRCCTE's Crosswalk Validation Project was initiated to review and update the crosswalk tables that were produced in 2007. Although the review and update of Perkins Table 7 was a major focus of the Crosswalk Validation project, the project actually had three main goals:

- Review and update CIP assignments to Career Cluster in order to meet the need of providing national standardization for accountability reporting (Perkins Table 1). Review and update SOC assignments to Career Cluster/Career Pathway in order to provide planning and career counseling data (Perkins Table 5)
- There was concern expressed among the State Directors regarding the assignment of particular CIPs to particular Career Clusters. As such, the second goal of the project was to produce a set of decision rules that would guide the classification process.
- Perkins Tables 1, 4, and 7 needed to be updated because of changes to the original Career Cluster/Career Pathway structure and because the CIP and SOC taxonomies had been updated.

The resulting crosswalks produced by this project have created a foundation for more standardized accountability requirements, a key focus for how future Perkins legislation needs to be built (U.S. Department of Education, 2012).

Crosswalk Validation Project Milestones

Several important meetings and activities occurred during the life of this project.

In January 2010, a meeting was held at the NRCCTE's home at the University of Louisville that was attended by several national organizations that research and advocate for CTE, as well as state accountability specialists. The purpose of the meeting was to come to agreement about how best to update the education-employment crosswalks that were being used for (a) accountability, (b) career counseling, and (c) marketing education programs. Two outcomes resulted from this meeting. One, meeting attendees achieved consensus that the NRCCTE should proceed with updating the earlier 2007 work on connecting CIPs, SOCs, Career Clusters, and Career

[8] See http://cte.ed.gov/accountability/crosswalks.cfm.

Pathways. Two, the NRCCTE combined forces with the NASDCTEc to jointly establish the Crosswalk Validation project, with Bruce Steuernagel being hired as a consultant to the NASDCTEc to lead the project on the NASDCTEc's behalf.

In the fall of 2010, NRCCTE began working with the Georgetown University Center on Education and the Workforce (CEW) to reconfigure an earlier CEW report, *Help Wanted: Projections of Jobs and Education Requirements through 2018* (Carnevale, Smith, & Strohl, 2010) using the 16 Career Clusters developed by the NASDCTEc. The report resulting from this work (see Carnevale et al., 2011) was published in November 2011 and used Perkins Table 5 (as discussed above). The use of SOC employment and wage data organized by the existing Career Cluster assignments highlighted the strengths and weaknesses of Perkins Table 5 and reinforced the need to update the 2007 work.

A follow-up meeting to the initial January 2010 meeting was held in July 2011, again organized and held by the NRCCTE and attended by the same set of stakeholders. The following logic model (see Figure 1) was discussed, modified, and refined at this meeting.

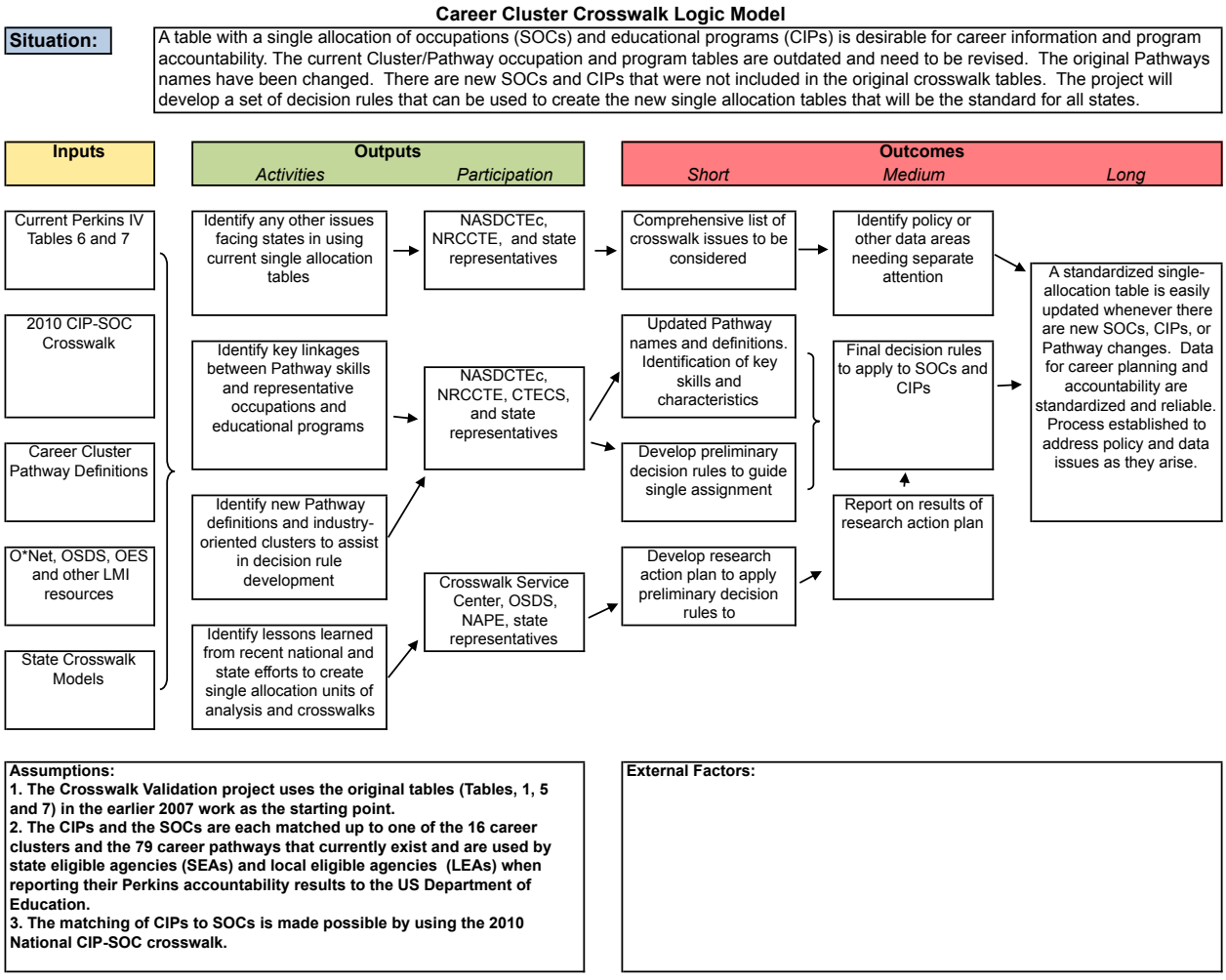

FIGURE 1. Crosswalk Validation Project logic model.

The following plan of action was developed at the July 2011 meeting:

1. Any participants who had historic correspondence or notes relating to decision rules or other documentation concerning the development of Perkins Table 7 were to send these data to the NRCCTE.
2. Bruce Steuernagel (NASDCTEc), Les Janis (Occupational Supply Demand System, Georgia State University), and Steve Rosenow (National Crosswalk Service Center) were to begin to analyze the Units of Analysis and Career Cluster comparisons to identify the patterns that probably indicate decision rules that were used. The analysis was to focus first on the CIP-Cluster rules.
3. A final CIP-SOC-Clusters-Pathway crosswalk that updates the original OVAE crosswalk work was to be produced.

This report describes the process of developing a set of crosswalks that connected CIPs, SOCs, Career Clusters, and Career Pathways.[9] An initial set of Draft Recommendations of the CIP to Career Cluster assignments was sent to a group of experts for their review in March 2012. Based on that review, the crosswalk was further modified and updated. In May 2012, the updated crosswalk was sent to CTE accountability specialists for review. An initial report on the work was given in presentation format at the 2012 Career Clusters Institute. This document represents the final report of the Crosswalk Validation project.

The Four Stages of the Crosswalk Validation and Update Process

The project was divided into four stages.

1. Personnel reviewed the existing historical correspondence on decision rules that were used in the CIP 2000 to Career Clusters assignments in Perkins Table 1 and made recommended revisions.
2. Personnel reviewed the SOC 2000 assignment in Perkins Table 5 and recommended assignments to Career Clusters and Career Pathways.
3. Initial work was completed using the CIP 2000 and SOC 2000, which was then updated to the CIP 2010 and SOC2010 taxonomies.
4. Using the current NCES CIP-SOC Crosswalk, project personnel connected the SOC-Cluster-Pathway to the CIP-Cluster tables to create a linked crosswalk.

As readers review the details for each step described below, they should keep in mind that the Crosswalk Validation project used the original Perkins tables (Tables, 1, 5 and 7) produced in 2007 as its starting point. Further, the CIPs and the SOCs are each matched up to one of the 16 Career Clusters and the 79 Career Pathways that currently exist and are used by state eligible agencies (SEAs) and local eligible agencies (LEAs) when reporting their Perkins accountability results to the US Department of Education. Finally, the matching of CIPs to SOCs is made possible by using the 2010 National CIP-SOC crosswalk.

[9] The crosswalks can be accessed electronically at www.careertech.org or at www.nrccte.org.

Stage 1: Revise Perkins Table 1 CIP 2000 Assignment to Career Clusters

At the commencement of the project, a process was developed to determine the best Career Cluster to which to assign individual CIPs. As a part of this process, guidelines or decision rules were developed to assist in the assignment of future CIP codes after reviewing the original CIP-Career Cluster assignments. This stage involved reviewing historical correspondence and revising and updating, as required, the CIP/Career Cluster matches from the original Perkins Table 1. Decision rule development and validation was accomplished by reconciling information previously produced by the National Crosswalk Center and the Occupational Supply Demand System (OSDS) project. Differences were discussed with the OSDS and National Crosswalk Center staff. These discussions were helpful in identifying guidelines and information that could help make reasonable classifications offering the best fit. A revised Perkins Table 1 can be found on the NRCCTE and NASDCTEc websites in Excel and PDF formats.

Step 1a: Review of historical correspondence. In the month or so following the July 2011 meeting, email correspondence from the 2007 OVAE-led crosswalk work was examined for any decision rules that might have been established during that process. After additional searching, it was concluded that this email correspondence appeared to have contained the only decision rules that were documented for the 2007 OVAE-led crosswalk work. The following were the main issues addressed and the decision rules that were specified in the correspondence.

1. Should *all* CIPs be assigned to a Cluster/Pathway or not? The 2007 OVAE-led crosswalk work proposed to exclude a number of CIP codes because they did not prepare students for specific career fields. These CIP codes were:

05 – Area, Ethnic, Cultural, and Gender Studies
16 – Foreign Languages, Literature, and Linguistics
23 – English Language and Literature/Letters
24 – Liberal Arts and Sciences, General Studies, and Humanities
28 – Reserve Officer Training Corps
39 – Theology and Religious Vocations
54 – History
60 – Dental, Medical and Veterinary Residency Programs

The following CIPS were not mentioned, but presumably would also be excluded:

32 – Basic Skills
33 – Citizenship Activities
34 – Health Related Knowledge and Skills
35 – Interpersonal and Social Skills
36 –Leisure and Recreational Activities
37 – Personal Awareness and Self-Improvement
38 – Philosophy and Religious Studies
53 – High School/Secondary Diplomas and Certificates

In the final Perkins Tables 1 and 7, the following CIPs were excluded:

05 – Area, Ethnic, Cultural, and Gender Studies
16 – Foreign Languages, Literature, and Linguistics
32 – Basic Skills*
33 – Citizenship Activities*
34 – Health Related Knowledge and Skills*
35 – Interpersonal and Social Skills*
36 – Leisure and Recreational Activities*
37 – Personal Awareness and Self-Improvement*
53 – High School/Secondary Diplomas and Certificates**

* These programs are not formal academic or occupationally-specific and do not result in transferable credit.
** General High School Programs not assigned to a Career Cluster.

2. How should CIPS that are general in nature be assigned (i.e., general or other, such as 14.0101 Engineering, General and 14.9999 Engineering, Other)? The 2007 OVAE-led crosswalk work made the decision to choose the pathway that would appear to have the most enrollees.

3. Should all science CIPs go to the Science Cluster/Pathway or to a specific related cluster (i.e., "plant science" to Science or to Agriculture)? When there was no clear-cut indication from the CIP description, the 2007 OVAE-led crosswalk work assigned the cluster and pathway using the following rules and ensured that there existed some consistency in assigning clusters/pathways.

- Where there is a prefix, put in the more specific pathway (such as soil science in the Agriculture cluster and not the STEM cluster)
- Where there is only a general category, put in the more general cluster and the broadest pathway within it.
- Use resources as a check before applying rules (e.g., occupational handbooks, programs of study from community college website)

Work began on the current Crosswalk Validation project after personnel (a) reviewed the historical information from the earlier 2007 OVAE-led crosswalk work and (b) established the need to expand and refine the original decisions and create new additional decision rules.

Step 1b: Classifying CIPS. After gathering the available information used in the original Perkins Table 1, the next phase was to begin an independent examination of the CIPs and the recommended Career Cluster for each CIP.

Many of the Career Clusters in Perkins Table 1 did not require change and were the recommended Career Cluster. After a review, it was observed that 110 (about 9%) of the recommended CIP=Career Cluster matches were different from the assignment made in the original Perkins Table 1.

Coming up with recommended clusters for each CIP required personnel to examine the descriptions of CIPS, related SOCs, and compare these descriptions with the Career Cluster and Pathway definitions. Although the CIPs were not assigned to a Career Pathway, it was still important to use the Pathway definitions in order to determine the best Cluster for the CIP code.

A comparison of Career Cluster titles to the 2-digit CIP Code titles shows a fair amount of similarity, which was very helpful for assigning the more detailed CIP code to a Career Cluster. The 47 two-digit CIP 2010 codes fall into four types:

1. Seven two-digit CIP codes had been excluded from Career Clusters in the past because they generally are considered not to be occupationally specific or because they are not formal academic credit programs. (CIPs 32, 33, 34, 35, 36, 37, and 53)
2. Five two-digit CIP codes are in liberal arts and sciences. Some these of codes were excluded from the original Perkins Table 7 (CIPs 5 and 16), and some were included (CIPs 24, 38, and 39).
3. Twenty-six two-digit CIP codes have a strong identification with a single Career Cluster. For example, CIP 46—Construction Trades, is clearly identified with the Architecture and Construction Cluster.
4. Nine two-digit CIP codes have some identification with more than one Career Cluster. For example, CIP 47—Mechanic and Repair Technologies/Technicians. Three Career Clusters have maintenance pathways—Architecture and Construction, Manufacturing, and Transportation, Distribution, and Logistics.

Although there is often a clear signal on where to begin assigning the CIP to a Career Cluster, sometimes the more detailed CIP codes give mixed signals. For this reason, a set of steps were developed to serve as decision rules. In the end, although these steps helped assemble information from which to make a decision, there can still exist some uncertainty because of ambiguity in the Career Cluster definition itself. Two specific examples help demonstrate this:

> ***CIP 47.0106 Appliance Installation and Repair Technology/Technician:*** A program that prepares individuals to apply technical knowledge and skills to repair, install, and service major gas, electric, and microwave consumer appliances such as stoves, refrigerators, dryers, water heaters, washers, dishwashers, and commercial units such as ice makers and coffee makers. As mentioned above, the two-digit CIP 47 can be associated with three Career Clusters: Construction, Manufacturing, and Transportation. In this case, however, the Appliance Repair person, the occupation most closely related to this CTE program, typically works for a retail appliance company or has his or her own repair service.[10] However, the Career Clusters pathways for maintenance and repair are in the Construction, Manufacturing, and Transportation Clusters rather than in the Trade or Service Clusters. Of the three alternative Career Clusters, Manufacturing seemed to be the best fit because there would be recommended procedures and ongoing training provided by the product manufacturer.
>
> ***CIP 47.0606 Small Engine Mechanics and Repair Technology/Technician:*** This

[10] http://www.onetonline.org/link/summary/49-9031.00 - Top industries employed in 2010 based on BLS data.

program prepares individuals to apply technical knowledge and skills to repair, service, and maintain small internal-combustion engines used on portable power equipment such as lawnmowers, chain saws, rotary tillers, and snowmobiles. As was the case with the occupations related to the Appliance Repair program, employment for Outdoor Power Equipment and Other Small Engine Mechanics is primarily found in retail trade and self-employment. In this case, Transportation was selected as the best fit, because some of the equipment, such as motorcycles, ATVs, and snowmobiles, could be used for transportation.

Decision Rules for CIPs: Some General Considerations

1. Does the 2-digit CIP title clearly match a Career Cluster area?
    a. If yes, assign to the Career Cluster.
        i. *Example: CIP 01.0102 Agribusiness/Agricultural Business Operations* is a clear fit with Agriculture, Food, and Natural Resources
    b. If no, read the description of the CIP and examine related occupations in the NCES CIP-SOC Crosswalk to get an idea of possible alternative Career Clusters.
        i. *Example: CIP 49.0304 Diver, Professional and Instructor.* The two-digit CIP (49) is Transportation and Materials Moving. However, diver is not an occupation one initially associates with transportation. The CIP description is, "A program that prepares individuals to apply technical knowledge and skills to function as professional deep-water or scuba divers, diving instructors, or diving support personnel. Includes instruction in the use of diving equipment and related specialized gear; diving safety procedures; operation and maintenance of underwater life-support systems; underwater communication systems; decompression systems; underwater salvage; exploration, rescue, and photography; and installation and fitting of underwater mechanical systems and their maintenance, repair or demolition."

            The underlined phrases indicate that one of the career-related tasks this program prepares someone for is underwater salvage and installation, maintenance, repair, or demolition. The NCES CIP-SOC Crosswalk relates this program to *SOC 49-9092 Commercial Divers.* According to O*Net, the top knowledge area for Commercial Divers is Building and Construction. Also, according to O*NET, the top industry for employment of Commercial Divers was Construction.[11] Assign CIP 49.0304 to the Architecture and Construction Cluster.

2. What if the CIP title indicates more than one possible Career Cluster? For example, *CIP 01.0802 Agricultural Communication/Journalism* or *CIP 52.2001 Construction Management*. In the first case, should the CIP code be categorized in Agriculture, Food, and Natural Resources or in Arts, Audio/Video Technology, and Communications? In the second case, should CIP 52.2001 be categorized in Architecture and Construction or in Business Management and Administration?

[11] http://www.onetonline.org/link/summary/49-9092.00

a. What is the description of the CIP? Does it point to a particular cluster?
    i. Agricultural Communication/Journalism: "A program that prepares individuals to apply journalistic, communication, and broadcasting principles to the development, production, and transmittal of agricultural information."
    ii. Construction Management: "A program that prepares individuals to manage, coordinate, and supervise the construction process from concept development through project completion on timely and economic bases."
b. What are the related occupations in the NCES CIP-SOC Crosswalk?
    i. Agricultural Communication/Journalism is related to the following SOCs: SOC 27-1024 Graphic Designers; SOC 27-3022 Reporters and Correspondents; and SOC 27-4011 Audio and Video Equipment Technicians.
    ii. Construction Management is related to the following SOC: 11-9021 Construction Managers
c. What knowledge area is most important for the related occupations?
    i. Reporters and Correspondents' key knowledge areas are English language and communication and media.[12]
    ii. Construction Managers' key knowledge area is Building and Construction.[13]
d. What is the clearest or most logical Career Cluster and Career Pathway for the related occupations?
    i. Agricultural Communications/Journalism: There is a Journalism and Broadcasting Pathway in Arts, Audio/Video Technology, and Communications Cluster, whereas there is no clear pathway in the Agriculture, Food, and Natural Resources Cluster.
    ii. Construction Management: There is a Construction Pathway in the Architecture and Construction Cluster, and a General Management Pathway in Business, Management, and Administration Cluster
    iii. The decision rule for cases like Construction Management, Music Management, Restaurant/Food Service Management, and Resort Management is to categorize them in the cluster that is more related to the specific economic or industry activity, rather than the more generic business management cluster.

3. How to assign CIPs in CIP 15: Engineering Technologies/Technicians and CIP 41: Science Technologies/Technicians?
    a. As was the case in the original Perkins Table 1, the detailed CIPs in CIP 15 and CIP 41 are categorized to various Career Clusters based on the employment concentration of related occupations, rather than to only one Career Cluster, which, under most circumstances, would be Science, Technology, Engineering and Mathematics (STEM).
        i. For example*, CIP 15.0405 Robotics Technology/Technician* is categorized in Manufacturing, because this program is associated with Electro-

[12] See http://www.onetonline.org/link/summary/27-3022.00.
[13] See http://www.onetonline.org/link/summary/11-9021.00.

Mechanical Technicians (SOC 17-3024), and 49% of them are employed in Manufacturing. [14]

4. How to assign General CIPs (typically ending in either 0000 or 0101)?
    a. Does the 2-digit CIP title clearly match a Career Cluster area? If yes, assign it to the matching Career Cluster.
        i. *Example: CIP 01.0000 Agriculture, General* would be assigned to Agriculture, Food, and Natural Resources.
    b. If not, assign the general CIP to the same Career Cluster that the detailed CIPs in that major group are most often assigned.
        i. *Example: CIP 47.0000 Mechanics and Repairers, General* would be assigned to Transportation, Distribution, and Logistics because 20 of the 35 detailed CIPs in CIP 47 are classified in Transportation.
    c. The exception to this rule was made for *CIP 15.0000 Engineering Technologies/Technicians* and *CIP 44.0000 Human Services, General*.
        i. As mentioned above, CIP 15 includes detailed CIPs that are categorized in the specific Career Cluster that has the strongest employment connection. In addition to Manufacturing, other detailed CIP codes in CIP 15 are assigned to Architecture and Construction; Agriculture, Food, and Natural Resources; Government and Public Administration; Transportation, Distribution, and Logistics; and STEM. Because of this wide variety of Career Clusters, the *General CIP 15.0000* was assigned to STEM.
        ii. CIP 44 includes both Human Services and Public Administration Programs. Even though there were more detailed CIPs classified in the Government and Public Administration Cluster, the direct connection of *CIP 44.0000 Human Services, General* to the Human Services Cluster made a compelling case for coding it in the Human Services Cluster
    d. It should be noted that, although the classification of a general CIP to a Career Cluster has implications for the accountability aspect of the project, there is less reason to be concerned about the classification of general CIPs in the crosswalk, because the NCES CIP-SOC Crosswalk does not show matches for most general CIPs. Consequently, they do not show up in the SOC-CIP Cluster/Pathway Crosswalk.

5. How to assign Social Science CIPs? In the original Perkins Table 1, most social science CIP codes (CIP 45 and 54) were assigned to STEM. The Career Cluster definition for STEM is, "Planning, managing, and providing scientific research and professional and technical services (e.g., physical science, social science, engineering) including laboratory and testing services, and research and development services." Social science CIP codes were also coded in STEM in the Crosswalk Validation project.

6. Should all science CIPs go to the Science Cluster/Pathway or to a specific related cluster, (i.e., "Plant science" to Science or to Agriculture)?
    a. As was the case in the original Perkins Table 1, Agriculture and Environmental Science CIPs were classified in the Agriculture, Food, and Natural Resources

[14] See http://www.onetonline.org/link/summary/17-3024.00.

Career Cluster rather than the STEM Career Cluster.

Step 1c: Comparison of Perkins Table 1, Recommended Cluster, and OSDS Unit of Analysis Cluster. At the July 2011 meeting, there was a recommended action step to use the OSDS Units of Analysis as a tool for determining the best Cluster assignment. A process was set up to compare the CIPs where there was a difference between the new recommended CIP Cluster and those in original Perkins Tables 1 and 7 with the OSDS Unit of Analysis cluster assignment. Even though OSDS had cluster codes based on the original Perkins Table 7 CIP assignments, there were a number of differences.

- The most common changes made to the CIP Cluster assignments involved reassignment based on the consultant's interpretation of the CIP definition compared to the Career Cluster definitions. Three areas where a significant number of CIP codes were changed based on interpretation involved Family and Consumer Science, Philosophy and Religious Studies, and Psychology.
  - Most Family and Consumer Science and Philosophy and Religious Studies CIPs classified in Education and Training instead of Human Services
  - Most Psychology CIP classified in Human Services instead of Health Sciences
- The second source of CIP Cluster changes was created by the need to change the Cluster due a new pathway definition. This was primarily the case for CIPs that moved from Business Management and Administration to Finance.

Differences were discussed with the OSDS and Crosswalk Center staff. The discussions were helpful for identifying guidelines and information that could help make a reasonable classification. There will always be some differences of opinion, however, as to the best fit.

Table 1
Comparisons between Cluster Assignments in the Original Perkins Table 1 (Left) and After Review (Right)

Career Cluster Code	Career Cluster Title	Number of CIPs	Percent Dist.
1	Agriculture, Food and Natural Resource	93	7.5%
2	Architecture and Construction	55	4.4%
3	Arts, Audio/Video Technology and Communications	87	7.0%
4	Business, Management and Administration	51	4.1%
5	Education and Training	113	9.1%
6	Finance	12	1.0%
7	Government and Public Administration	14	1.1%
8	Health Science	323	26.0%
9	Hospitality and Tourism	21	1.7%
10	Human Services	79	6.4%
11	Information Technology	25	2.0%
12	Law, Public Safety, Corrections and Security	37	3.0%
13	Manufacturing	66	5.3%
14	Marketing Sales and Service	19	1.5%
15	Science, Technology, Engineering and Mathematics	214	17.2%
16	Transportation, Distribution, and Logistics	34	2.7%
	TOTAL	1,243	100.0%

Career Cluster Code	Career Cluster Title	Number of CIPs	Percent Dist.	Numerical Change in Number of CIPs
1	Agriculture, Food and Natural Resource	85	6.8%	-8
2	Architecture and Construction	49	3.9%	-6
3	Arts, Audio/Video Technology and Communications	95	7.6%	8
4	Business, Management and Administration	37	3.0%	-14
5	Education and Training	136	10.9%	23
6	Finance	19	1.5%	7
7	Government and Public Administration	16	1.3%	2
8	Health Science	296	23.8%	-27
9	Hospitality and Tourism	24	1.9%	3
10	Human Services	67	5.4%	-12
11	Information Technology	29	2.3%	4
12	Law, Public Safety, Corrections and Security	36	2.9%	-1
13	Manufacturing	73	5.9%	7
14	Marketing Sales and Service	26	2.1%	7
15	Science, Technology, Engineering and Mathematics	222	17.9%	8
16	Transportation, Distribution, and Logistics	33	2.7%	-1
	TOTAL	1,243	100.0%	0

Based on the review of the 1,243 CIP codes, the Cluster designation changed for 119 or 9.6% of the codes. Table 2 shows the movement of CIP codes out of the original Perkins Table 1 Cluster and the new Cluster based on the decision rules used in the revision process. The Health Science Cluster experienced the greatest net reduction in CIPs, as over 20 Psychology CIP codes (42) were moved from the original Table 1 Health Science Cluster to the Human Services Cluster.

Table 2

Number and Movement of CIP Codes by Career Cluster

Revised Table 7 CIP Career Cluster Categorization	Original Table 7 CIP Career Cluster Categorization																	
	Agriculture, Food and Natural Resource	Architecture and Construction	Arts, Audio/Video Technology and Communications	Business, Management and Administration	Education and Training	Finance	Government and Public Administration	Health Science	Hospitality and Tourism	Human Services	Information Technology	Law, Public Safety, Corrections and Security	Manu-facturing	Marketing Sales and Service	Science, Technology, Engineering and Mathematics	Transportation, Distribution, and Logistics	Grand Total Moved In Rev T7
Agriculture, Food & Natural Resources																	
Architecture & Construction	1		1										1				3
Arts, Audio/Video Technology & Communications	1			1	4					3							9
Business Management & Administration							1		1					1		1	4
Education & Training								1		26							27
Finance				7													7
Government & Public Adminstration										1			2		1		4
Health Science															2		2
Hospitality & Tourism	3							1									4
Human Services								23									23
Information Technology			1	3													4
Law , Public Safety, Corrections & Security																	
Manufacturing		6						2							1	1	10
Marketing				4			1	1		1						1	8
Science, Technology, Engineering & Mathematics	3	2		2						4		1					12
Transportation, Distribution & Logistics		1		1													2
Grand Total Moved Out of T7	8	9	2	18	4		2	28	1	35		1	3	1	4	3	119

The Education and Training Cluster experienced the largest net increase in the number of CIPs. In the original Perkins Table 1, a number of Family and Consumer Science CIPs (19) and Philosophy and Religious Studies CIPs (38) were classified in the Human Services Cluster. Based on the guidelines and decision rules used in the review process outlined above, these CIPs were classified in the Education and Training Cluster in the revised Perkins Table 1.

In order to help the reader navigate the use of Table 2 and see its connection to Perkins Table 1, we will use changes to the CIPs originally categorized in the Business, Management, and Administration Cluster in Perkins Table 7 as an example.

According to Perkins Table 1, the number of CIPs categorized in the Business Cluster went from 51 to 27, a net change of -14 CIP codes, as a result of the review of the original Perkins Table 7 assignments. In Table 2, the vertical column headed Business, Management, and Administration shows that 18 CIPs were reassigned from Business to six other Career Clusters. For example, seven CIPs were reassigned from the Business Cluster to the Finance Cluster, and four CIPs were reassigned from the Business Cluster to the Marketing Cluster. On the horizontal row labeled Business Management & Administration, note that four CIPs moved from four different Clusters into the Business Cluster. For example, 1 CIP that had been assigned to the Government and Public Administration Cluster was reassigned to the Business Cluster. The net change in the number of CIPs in the Business Cluster was -14 [-18 (moved out) + 4 (moved in) = -14].

The decision was made to assign CIPs to only Career Clusters, not Career Clusters and Career Pathways. Assigning Career Pathways to CIPs is problematic because:

- Pathways are employment-focused whereas CIPs tend to be curriculum-focused.
- CIPs can justifiably be in multiple Pathways. Having this possibility creates more mismatches between CIP pathway assignment and SOC pathway assignment.
- It greatly increases the need for reconciling CIP and SOC pathway assignments.

A similar set of tables will be presented for the impact of the review process on the SOC codes later in the report.

Stage 2: Revise Perkins Table 5 SOC2000 Assignment to Career Clusters/Pathways

A process similar to Stage 1 was conducted to determine the best Career Cluster and Career Pathway to assign the SOCs. As a part of this process, guidelines or decision rules were developed to assist in the assignment of future SOC codes. The revision of Perkins Table 5 for SOCs was needed for two reasons. First, the Cluster/Pathway structure has changed since the original Perkins Table 5 was released. Consequently, there was a need to revise the Table to accurately reflect the current location and names. Second, questions have been raised regarding why certain SOCs were classified in a particular Career Cluster or Career Pathway. The Crosswalk Validation project attempted to develop a set of decision rules that would bring consistency and establish a rationale for making assignments. As was the case in the assignment of Career Clusters and Career Pathways to CIPs, the process used for SOCs relied on a comparison of SOC occupational definitions to existing Career Cluster and Career Pathway definitions and determining the best fit. The following steps were undertaken:

- Project staff looked at SOC coding structures and definitions and compared these to Career Pathway definitions to make assignment.
- Pathways have changed since the production of Perkins Table 5, so adjustments of SOC to Career Clusters and Career Pathway relationships had to be made (e.g., *accountant* was formerly located in the Business Career Cluster but was moved to the Finance Career Cluster because a new Accounting Career Pathway was located under Finance).
- Project staff drew upon O*NET knowledge to verify the accuracy of assignments, particularly in STEM occupations.

The assignment process included deciding: (a) if there was a clear match to a Career Cluster and associated Career Pathway. If there was, the SOC was assigned to the Career Cluster/Pathway. If there was not, the SOC description was used to examine alternative Career Clusters/Pathways. This process required staff to make some basic assumptions based on the premise that "occupations are classified based on work performed and, in some cases, on the skills, education, and/or training needed to perform the work at a competent level."[1] A revised Perkins Table 5 can be found on the NRCCTE and NASDCTEc websites in Excel and PDF formats.

Step 2a: Need for Updating the Decision Rules for SOCs. The revision of Perkins Table 5 for SOCs was necessary for three reasons: (a) changes made in the Cluster/Pathway structure, (b) the need to make recommended changes after verifying the accuracy of Cluster/Pathway classifications, and (c) changes made in SOC2010.

Over the past five years, the Career Clusters/Career Pathways have been modified in various ways. Some Career Pathways have been deleted (e.g., E-Marketing), some Career Pathway names have been changed or modified (e.g., Interactive Media became Web and Digital Communications; Management and Entrepreneurship became Marketing Management), and some pathways have moved from one Career Cluster to another (Business Financial Management and Accounting went from the Business Management and Administration Cluster to the Accounting Pathway in the Finance Cluster).

A similar independent process was conducted to determine the best Career Cluster and Career Pathway to which to assign the SOCs. As a part of this process, guidelines or decision rules were developed to assist the assignment of new SOC codes in the future.

- Personnel should look at SOC coding structure and definitions and compare to Career Pathways definitions to make assignment.
- Pathways have changed from Perkins Table 5, so adjustments of the SOCs to the Career Clusters and Career Pathway relationships needed to be made (e.g., *accountant* was in the Business Cluster but moved to the Finance Cluster because a new Accounting Pathway was located under the Finance cluster).

Table 3 shows the Career Pathways, and the associated Career Clusters that were reassigned as a result of coding structure and Career Pathway definitional changes.

[1] See http://www.bls.gov/soc/soc_2010_class_prin_cod_guide.pdf, Page 1.

Table 3

Original and Current Cluster/Pathway Structure

Original Perkins Table 5				Revised Perkins Table 5	
Cluster Code	Cluster Title	Pathway Code	Original Pathway Title	Pathway Code	Current Pathway Title
1.0000	Agriculture, Food and Natural Resource	1.10000	Food Products and Processing Systems	1.1	Food Products and Processing Systems
1.0000	Agriculture, Food and Natural Resource	1.20000	Plant Systems	1.2	Plant Systems
1.0000	Agriculture, Food and Natural Resource	1.30000	Animal Systems	1.3	Animal Systems
1.0000	Agriculture, Food and Natural Resource	1.40000	Power Structural and Technical Systems	1.4	Power, Structural & Technical Systems
1.0000	Agriculture, Food and Natural Resource	1.50000	Natural Resources Systems	1.5	Natural Resources Systems
1.0000	Agriculture, Food and Natural Resource	1.60000	Environmental Service Systems	1.6	Environmental Service Systems
1.0000	Agriculture, Food and Natural Resource	1.70000	Agribusiness Systems	1.7	Agribusiness Systems
2.0000	Architecture and Construction	2.10000	Design/Pre-Construction	2.1	Design/Pre-Construction
2.0000	Architecture and Construction	2.20000	Construction	2.2	Construction
2.0000	Architecture and Construction	2.30000	Maintenance/Operations	2.3	Maintenance/Operations
3.0000	Arts, Audio/Video Technology and Communications	3.10000	Audio and Video Technology and Film	3.1	Audio and Video Technology and Film
3.0000	Arts, Audio/Video Technology and Communications	3.20000	Printing Technology	3.2	Printing Technology
3.0000	Arts, Audio/Video Technology and Communications	3.30000	Visual Arts	3.3	Visual Arts
3.0000	Arts, Audio/Video Technology and Communications	3.40000	Performing Arts	3.4	Performing Arts
3.0000	Arts, Audio/Video Technology and Communications	3.50000	Journalism and Broadcasting	3.5	Journalism and Broadcasting
3.0000	Arts, Audio/Video Technology and Communications	3.60000	Telecommunications	3.6	Telecommunications
4.0000	Business, Management and Administration	4.10000	Management	4.1	General Management
4.0000	Business, Management and Administration	4.20000	Business Financial Management and Accounting	4.2	Business Information Management
4.0000	Business, Management and Administration	4.30000	Human Resources	4.3	Human Resources Management
4.0000	Business, Management and Administration	4.40000	Business Analysis	4.4	Operations Management
4.0000	Business, Management and Administration	4.50000	Marketing	4.5	Administrative Support
4.0000	Business, Management and Administration	4.60000	Administrative and Information Support		
5.0000	Education and Training	5.10000	Administrative and Information Support	5.1	Administrative and Information Support
5.0000	Education and Training	5.20000	Professional Support Services	5.2	Professional Support Services
5.0000	Education and Training	5.30000	Teaching/Training	5.3	Teaching/Training
6.0000	Finance	6.10000	Financial and Investment Planning	6.1	Securities & Investments
6.0000	Finance	6.20000	Business Financial Management	6.2	Business Finance
6.0000	Finance	6.30000	Banking and Related Services	6.3	Accounting
6.0000	Finance	6.40000	Insurance Services	6.4	Insurance
6.0000	Finance			6.5	Banking Services
7.0000	Government and Public Administration	7.10000	Governance	7.1	Governance
7.0000	Government and Public Administration	7.20000	National Security	7.2	National Security
7.0000	Government and Public Administration	7.30000	Foreign Service	7.3	Foreign Service
7.0000	Government and Public Administration	7.40000	Planning	7.4	Planning
7.0000	Government and Public Administration	7.50000	Revenue and Taxation	7.5	Revenue and Taxation
7.0000	Government and Public Administration	7.60000	Regulation	7.6	Regulation
7.0000	Government and Public Administration	7.70000	Public Management and Administration	7.7	Public Management and Administration
8.0000	Health Science	8.10000	Therapeutic Services	8.1	Therapeutic Services
8.0000	Health Science	8.20000	Diagnostic Services	8.2	Diagnostic Services
8.0000	Health Science	8.30000	Health Informatics	8.3	Health Informatics
8.0000	Health Science	8.40000	Support Services	8.4	Support Services
8.0000	Health Science	8.50000	Biotechnology Research and Development	8.5	Biotechnology Research and Development

Table 3

Original and Current Cluster/Pathway Structure (continued)

Original Perkins Table 5				Revised Perkins Table 5	
ClusterCode	Cluster Title	Pathway Code	Original Pathway Title	Pathway Code	Current Pathway Title
9.0000	Hospitality and Tourism	9.10000	Restaurants and Food/Beverage Services	9.1	Restaurants and Food/Beverage Services
9.0000	Hospitality and Tourism	9.20000	Lodging	9.2	Lodging
9.0000	Hospitality and Tourism	9.30000	Travel and Tourism	9.3	Travel & Tourism
9.0000	Hospitality and Tourism	9.40000	Recreation, Amusements and Attractions	9.4	Recreation, Amusements & Attractions
10.0000	Human Services	10.10000	Early Childhood Development and Services	10.1	Early Childhood Development & Services
10.0000	Human Services	10.20000	Counseling and Mental Health Services	10.2	Counseling & Mental Health Services
10.0000	Human Services	10.30000	Family and Community Services	10.3	Family & Community Services
10.0000	Human Services	10.40000	Personal Care Services	10.4	Personal Care Services
10.0000	Human Services	10.50000	Consumer Services	10.5	Consumer Services
11.0000	Information Technology	11.10000	Network Systems	11.1	Network Systems
11.0000	Information Technology	11.20000	Information Support and Services	11.2	Information Support and Services
11.0000	Information Technology	11.30000	Interactive Media	11.3	Web and Digital Communications
11.0000	Information Technology	11.40000	Programming and Software Development	11.4	Programming and Software Development
12.0000	Law, Public Safety, Corrections and Security	12.10000	Correction Services	12.1	Correction Services
12.0000	Law, Public Safety, Corrections and Security	12.20000	Emergency and Fire Management Services	12.2	Emergency and Fire Management Services
12.0000	Law, Public Safety, Corrections and Security	12.30000	Security and Protective Services	12.3	Security & Protective Services
12.0000	Law, Public Safety, Corrections and Security	12.40000	Law Enforcement Services	12.4	Law Enforcement Services
12.0000	Law, Public Safety, Corrections and Security	12.50000	Legal Services	12.5	Legal Services
13.0000	Manufacturing	13.10000	Production	13.1	Production
13.0000	Manufacturing	13.20000	Manufacturing Production Process Development	13.2	Manufacturing Production Process Development
13.0000	Manufacturing	13.30000	Maintenance, Installation and Repair	13.3	Maintenance, Installation & Repair
13.0000	Manufacturing	13.40000	Quality Assurance	13.4	Quality Assurance
13.0000	Manufacturing	13.50000	Logistics and Inventory Control	13.5	Logistics & Inventory Control
13.0000	Manufacturing	13.60000	Health, Safety and Environmental Assurance	13.6	Health, Safety and Environmental Assurance
14.0000	Marketing Sales and Service	14.10000	Management and Entrepreneurship	14.1	Marketing Management
14.0000	Marketing Sales and Service	14.20000	Professional Sales and Marketing	14.2	Professional Sales
14.0000	Marketing Sales and Service	14.30000	Buying and Merchandising	14.3	Merchandising
14.0000	Marketing Sales and Service	14.40000	Marketing Communications and Promotion	14.4	Marketing Communications
14.0000	Marketing Sales and Service	14.50000	Marketing Information Management and Research	14.5	Marketing Research
14.0000	Marketing Sales and Service	14.60000	Distribution and Logistics		
14.0000	Marketing Sales and Service	14.70000	E-Marketing		
15.0000	Science, Technology, Engineering and Mathematics	15.10000	Engineering and Technology	15.1	Engineering and Technology
15.0000	Science, Technology, Engineering and Mathematics	15.20000	Science and Mathematics	15.2	Science and Mathematics
16.0000	Transportation, Distribution, and Logistics	16.10000	Transportation Operations	16.1	Transportation Operations
16.0000	Transportation, Distribution, and Logistics	16.20000	Logistics Planning and Management Services	16.2	Logistics Planning and Management Services
16.0000	Transportation, Distribution, and Logistics	16.30000	Warehousing and Distribution Center Operations	16.3	Warehousing and Distribution Center Operations
16.0000	Transportation, Distribution, and Logistics	16.40000	Facility and Mobile Equipment Maintenance	16.4	Facility and Mobile Equipment Maintenance
16.0000	Transportation, Distribution, and Logistics	16.50000	Transportation Systems/ Infrastructure Planning, Management, and Regulation	16.5	Transportation Systems/ Infrastructure Planning, Management, and Regulation
16.0000	Transportation, Distribution, and Logistics	16.60000	Health, Safety and Environmental Management	16.6	Health, Safety and Environmental Management
16.0000	Transportation, Distribution, and Logistics	16.70000	Sales and Service	16.7	Sales and Service

As was the case in the assignment of Career Clusters/Pathways to CIPs, the process used for SOCs relied on comparing the SOC occupational definition to the existing Career Cluster and Career Pathway definitions and determining the best fit. The following section addresses some of the issues that came up during this process and which decision rules were followed.

Step 2b: Arriving at Decision Rules that Assign SOCs to Career Pathways and Career Clusters

1. Assumptions or principles
    a. Social scientists are STEM and therefore adding a new Social Science Pathway to STEM is recommended.

b. Managers are assigned to content or skill-specific clusters. For example, Construction Managers are assigned to the Construction Cluster. The IT Manager was assigned to the Business Management and Administration Cluster/Business Information Management Pathway. There were no Pathways in the Information Technology Cluster that were better.
c. The Extraction occupations, formerly assigned to the Agriculture, Food, and Natural Resources Cluster, were assigned to the Architecture/Construction Cluster. This change was made because *SOC 47: Construction and Extraction Occupations* indicates a close relationship between these occupations. The Bureau of Labor Statistics' 2010 SOC User Guide lists several classification principles that form the basis on which the SOC system is structured. One of those principles is, "Occupations are classified based on work performed and, in some cases, on the skills, education, and/or training needed to perform the work at a competent level."[2]
d. Engineering and science technicians were assigned to the Career Cluster/Pathway in which their employment concentrated.
e. Military-related SOC codes were classified in the Government and Public Administration Cluster/National Security Pathway. There are 20 military-related SOC codes in the SOC2010.
f. All Other SOC codes are those typically ending in 99. Some, but not all of the All Other SOC codes were included in the original Perkins Table 5. (49 All Other SOC codes were not included). All of the All Other SOC codes were included in the new Perkins Table 5. Generally, the All Other code was assigned to the Cluster and Pathway of the majority of the 4-digit SOC codes in which the All Other code was found.

Step 2c: Process for Assigning SOC Codes

1. Does the SOC title clearly match a Career Cluster/Pathway?
    a. If yes, assign to the Career Cluster/Pathway.
        i. *Example: SOC 11-2021 Marketing Manager* is a clear fit with Marketing/Marketing Management
    b. If not, read the description of the SOC and examine alternative Career Cluster/Pathways
        ii. *Example: SOC 11-9051 Food Service Managers*. Should it be in a pathway in the Business Management Cluster or a pathway in the Hospitality and Tourism Cluster? SOC Definition: Plan, direct, or coordinate activities of an organization or department that serves food and beverages.
        iii. Hospitality & Tourism Cluster Definition: Encompasses the management, marketing and operations of restaurants and other food services, lodging, attractions, recreation events, and travel-related services.
        iv. Assign to Hospitality & Tourism Cluster/Restaurants and Food/Beverage Services Pathway.

After combining the new Career Cluster/Career Pathway configuration, taking into consideration

[2] http://www.bls.gov/soc/soc_2010_class_prin_cod_guide.pdf

the relationship specifically between Career Pathways and the existing SOC coding structure, and developing a rational process for assigning SOC codes, the next step was to establish explicit decision rules that linked SOC codes to Career Clusters and Career Pathways.

Step 2d: Changes Resulting from New SOC Career Cluster/Career Pathway Configuration and Application of Decision Rules. Tables 4 and 5 below compare the Cluster/Pathway distribution of 749 SOC2000 codes in the original Perkins Table 5 with the distribution of those same SOC2000 codes based on the decision rules outlined in this section and the current Cluster/Pathway structure.

Based on the review of the 749 SOC codes, the Cluster/Pathway designation changed for 122 or about 16% of the codes.

The Agriculture, Food, and Natural Resources Cluster experienced the greatest net reduction in SOCs. Perkins Table 5 shows that a total of 39 SOC codes were reassigned from the original Agriculture Cluster to nine different Career Clusters, primarily Architecture & Construction (13) and Manufacturing (9). Occupations that formerly were classified in the Agriculture Cluster that were reassigned to the Architecture/Construction Cluster included the oil, gas, and mining occupations that were originally coded in the Natural Resources Pathway. However, these occupations are in the Construction and Excavation Major Group (47) in the SOC coding structure, so it is likely that the various skill and knowledge requirements will be better aligned in the revised group. The occupations reassigned to the Manufacturing Cluster included the food processing occupations, such as butchers and food cooking machine operators. All of the SOCs moved were in the Production Major Group (51) in the SOC Coding Structure.

Four SOC codes in Perkins Table 5 were reassigned from Career Clusters to the Agriculture Cluster. The net number of SOC2000 codes assigned to the Agriculture Cluster, therefore, dropped by 35.

Table 4

Original and Revised Distribution of SOCs by Cluster/Pathway

Original Table 5 SOCs			SOC Cluster/Pathway after Review	
Cluster/Pathway	Count of SOC Codes		Cluster/Pathway	Count of SOC Codes
Agriculture, Food & Natural Resource	**73**		**Agriculture, Food & Natural Resources**	**38**
Food Products and Processing Systems	10		Food Products and Processing Systems	4
Plant Systems	12		Plant Systems	5
Animal Systems	9		Animal Systems	4
Power Structural and Technical Systems	2		Power, Structural & Technical Systems	3
Natural Resources Systems	30		Natural Resources Systems	11
Environmental Service Systems	8		Environmental Service Systems	7
Agribusiness Systems	2		Agribusiness Systems	4
Architecture & Construction	**71**		**Architecture & Construction**	**83**
Design/Pre-Construction	7		Design/Pre-Construction	9
Construction	56		Construction	58
Maintenance/Operations	8		Maintenance/Operations	16
Arts, Audio/Video Technology & Communications	**34**		**Arts, Audio/Video Technology & Communications**	**41**
Audio and Video Technology and Film	4		Audio and Video Technology and Film	0
Printing Technology	6		Printing Technology	7
Visual Arts	5		Visual Arts	9
Performing Arts	12		Performing Arts	10
Journalism and Broadcasting	6		Journalism and Broadcasting	13
Telecommunications	1		Telecommunications	2
Business Management & Administration	**48**		**Business Management & Administration**	**46**
Management	7		General Management	3
Business Financial Management and Accounting	5		Business Information Management	1
Human Resources	7		Human Resources Management	6
Business Analysis	3		Operations Management	6
Marketing	6		Administrative Support	30
Administrative and Information Support	20			
Education & Training	**57**		**Education & Training**	**65**
Administrative and Information Support	4		Administration and Administrative Support	3
Professional Support Services	5		Professional Support Services	9
Teaching/Training	48		Teaching/Training	53
Finance	**20**		**Finance**	**20**
Financial and Investment Planning	4		Securities & Investments	3
Business Financial Management	1		Business Finance	4
Banking and Related Services	7		Accounting	1
Insurance Services	8		Insurance	6
			Banking Services	6
Government & Public Administration	**18**		**Government & Public Adminstration**	**16**
Governance	1		Governance	4
National Security	0		National Security	0
Foreign Service	0		Foreign Service	0
Planning	4		Planning	2
Revenue and Taxation	2		Revenue and Taxation	2
Regulation	5		Regulation	4
Public Management and Administration	6		Public Management and Administration	4

Table 4

Original and Revised Distribution of SOCs by Cluster/Pathway (Continued)

Original Table 5 SOCs			SOC Cluster/Pathway after Review	
Cluster/Pathway	Count of SOC Codes		Cluster/Pathway	Count of SOC Codes
Health Science	**65**		**Health Science**	**65**
Therapeutic Services	48		Therapeutic Services	46
Diagnostic Services	8		Diagnostic Services	8
Health Informatics	4		Health Informatics	3
Support Services	1		Support Services	6
Biotechnology Research and Development	4		Biotechnology Research and Development	2
Hospitality & Tourism	**51**		**Hospitality & Tourism**	**43**
Restaurants and Food/Beverage Services	20		Restaurants and Food/Beverage Services	19
Lodging	9		Lodging	7
Travel and Tourism	7		Travel & Tourism	4
Recreation, Amusements and Attractions	15		Recreation, Amusements & Attractions	13
Human Services	**34**		**Human Services**	**35**
Early Childhood Development and Services	1		Early Childhood Development & Services	1
Counseling and Mental Health Services	7		Counseling & Mental Health Services	8
Family and Community Services	7		Family & Community Services	8
Personal Care Services	17		Personal Care Services	17
Consumer Services	2		Consumer Services	1
Information Technology	**10**		**Information Technology**	**9**
Network Systems	3		Network Systems	3
Information Support and Services	2		Information Support and Services	2
Interactive Media	0		Web and Digital Communications	0
Programming and Software Development	5		Programming and Software Development	4
Law, Public Safety, Corrections & Security	**33**		**Law, Public Safety, Corrections & Security**	**34**
Correction Services	5		Correction Services	3
Emergency and Fire Management Services	7		Emergency and Fire Management Services	6
Security and Protective Services	6		Security & Protective Services	7
Law Enforcement Services	8		Law Enforcement Services	9
Legal Services	7		Legal Services	9
Manufacturing	**107**		**Manufacturing**	**126**
Production	82		Production	91
Manufacturing Production Process Development	5		Manufacturing Production Process Development	11
Maintenance, Installation and Repair	18		Maintenance, Installation & Repair	21
Quality Assurance	1		Quality Assurance	3
Logistics and Inventory Control	1		Logistics and Inventory Control	0
Health, Safety and Environmental Assurance	0		Health, Safety and Environmental Assurance	0
Marketing Sales & Service	**23**		**Marketing**	**25**
Management and Entrepreneurship	0		Marketing Management	5
Professional Sales and Marketing	14		Professional Sales	15
Buying and Merchandising	8		Merchandising	3
Marketing Communications and Promotions	0		Marketing Communications	1
Marketing Information Management and Research	1		Marketing Research	1
Distribution and Logistics	0			
e-Marketing	0			
Science, Technology, Engineering & Mathematics	**50**		**Science, Technology, Engineering & Mathematics**	**42**
Engineering and Technology	23		Engineering and Technology	15
Science and Mathematics	27		Science and Mathematics	27
Transportation, Distribution, & Logistics	**55**		**Transportation, Distribution & Logistics**	**61**
Transportation Operations	26		Transportation Operations	33
Logistics Planning and Management Services	1		Logistics Planning and Management Services	3
Warehousing and Distribution Center Operations	6		Warehousing and Distribution Center Operations	0
Facility and Mobile Equipment Maintenance	19		Facility and Mobile Equipment Maintenance	19
Transportation Systems/ Infrastructure Planning, Management, and Regulation	1		Transportation Systems/Infrastructure Planning, Management, and Regulation	3
Health, Safety, and Environmental Management	0		Health, Safety, and Environmental Management	0
Sales and Service	2		Sales and Service	3
Grand Total	**749**		**Grand Total**	**749**

Table 5

Number and Movement of SOCs by Career Cluster

Revised Table 5 SOC Career Cluster Categorization	Original Table 5 SOC Career Cluster Categorization																
	Agriculture, Food and Natural Resource	Architecture and Construction	Arts, Audio/Video Technology and Communications	Business, Management and Administration	Education and Training	Finance	Government and Public Administration	Health Science	Hospitality and Tourism	Human Services	Information Technology	Law, Public Safety, Corrections and Security	Manu-facturing	Marketing Sales and Service	Science, Technology, Engineering and Mathematics	Transportation, Distribution, and Logistics	Grand Total Moved In Rev T7
Agriculture, Food & Natural Resources		1													3		4
Architecture & Construction	13												2		2		17
Arts, Audio/Video Technology & Communications				2		1			1	1			1	2	1		9
Business Management & Administration						1	5		2		1		1	4		1	15
Education & Training	2		1						3			2			1		9
Finance				3													3
Government & Public Adminstration	3	1										1					5
Health Science	3			2													5
Hospitality & Tourism																	
Human Services					1			2				1					4
Information Technology																	
Law, Public Safety, Corrections & Security	1			2		1	1										5
Manufacturing	9	3	1					2	1						6	1	23
Marketing	2			7						1							10
Science, Technology, Engineering & Mathematics	2						1	1		1							5
Transportation, Distribution & Logistics	4			1					1					2			8
Grand Total Moved Out of T7	39	5	2	17	1	3	7	5	8	3	1	4	4	8	13	2	122

The Manufacturing Cluster experienced the largest net increase in the number of SOCs. Twenty-three SOC codes were reassigned from seven different Clusters into the Manufacturing Cluster. As mentioned, a number were food processing occupations previously assigned to the Agriculture Cluster. Six SOC codes were reassigned from the STEM Cluster to the Manufacturing Cluster. Included in these SOCs were engineering technicians that had been coded in STEM in Perkins Table 5 but were now assigned to Manufacturing because this industry represents the largest employment base for the occupation. This shift also brings consistency between the SOC Cluster and CIP Cluster assignments. In the revised Perkins Table 5, the Engineering Technician CIP codes are also assigned to a cluster based on employment concentration, rather than assigned to STEM. In the original Perkins Table 5, most Engineering Technician CIP codes (CIP 15) were assigned to the Manufacturing Cluster, but the Engineering Technician SOC codes were assigned to the STEM Cluster.

Four SOC codes in Perkins Table 5 were reassigned from the Manufacturing Cluster to three different Career Clusters. The net number of SOC2000 codes assigned to the Manufacturing Cluster, therefore, increased by 19.

Stage 3: Update CIP2000 and SOC2000 to CIP2010 and SOC2010

The third stage of the project involved updating the CIPs and SOCs to the new 2010 taxonomies. The first two stages of the Crosswalk Validation Project focused on reviewing the accuracy of the assignment of the existing CIP and SOC codes in the original Perkins Tables 1 and 5, taking into account changes made to the Career Cluster/Career Pathway structures and definitions since the Perkins tables were constructed in 2007. The updating of the crosswalks to the 2010 CIP and SOC taxonomies took into consideration the deletion, addition, and renumbering of CIP and SOC codes. The assumptions, guidelines, and decision rules used in the project's first two stages to create a consistent process for assigning new programs and occupations to Career Clusters/Pathways were again applied in order to update the crosswalks to the 2010 taxonomies.

Step 3a: CIP Code Conversion. The third stage of the project involved updating the CIPs and SOCs to the new 2010 taxonomies. Table 6 shows the distribution of CIP2000 codes in the original Perkins Table 1 compared to the number of CIP2010 codes in the revised Perkins Table 1.

- *CIP 51 Health Professions and Related Programs* and *CIP 60 Residency Programs*. [1] There are 32 new 6-digit CIP codes in CIP 51 and 61 new health residency programs in CIP 60. All of these new programs are coded in the Health Science Career Cluster.
- There are 44 new six-digit CIP2010 codes in two-digit codes often associated with the STEM Career Cluster.

The CIP2000 to CIP2010 Crosswalk was used to create the new CIP2010 to Cluster table. This procedure added new CIP codes, deleted old codes, and renumbered old codes. The new CIP2010 codes were assigned to a Career Cluster using the guidelines and decision rules that were employed in the review of the CIP2000 codes in the original Perkins Table1. The

[1] Health Residency programs in CIP 60 were included in the original Perkins Table 7. According to NCES, however, these programs are not valid for IPEDS reporting. A final decision as to whether or not to include them should be made before the revised Perkins Table 7 is finalized.

classification process was somewhat simplified because the new six-digit codes were generally closely related to the already existing codes that were in the two-digit program area.

Table 6
Comparison of the Distribution of CIP2000 to CIP2010 by Career Cluster

Career Cluster Code	Career Cluster Title	Number of CIP2000 in Table 1	Percent Distribution	Number of CIP2010 in Revised Table 1	Percent Distribution	Change in Number of CIPs
1	Agriculture, Food and Natural Resource	93	7.2%	91	5.3%	-2
2	Architecture and Construction	55	4.3%	55	3.2%	0
3	Arts, Audio/Video Technology and Communications	87	6.7%	109	6.3%	22
4	Business, Management and Administration	51	4.0%	45	2.6%	-6
5	Education and Training	113	8.8%	288	16.6%	175
6	Finance	12	0.9%	19	1.1%	7
7	Government and Public Administration	14	1.1%	68	3.9%	54
8	Health Science	323	25.0%	391	22.6%	68
9	Hospitality and Tourism	21	1.6%	28	1.6%	7
10	Human Services	79	6.1%	74	4.3%	-5
11	Information Technology	25	1.9%	33	1.9%	8
12	Law, Public Safety, Corrections and Security	37	2.9%	55	3.2%	18
13	Manufacturing	66	5.1%	76	4.4%	10
14	Marketing Sales and Service	19	1.5%	27	1.6%	8
15	Science, Technology, Engineering and Mathematics	214	16.6%	279	16.1%	65
16	Transportation, Distribution, and Logistics	34	2.6%	38	2.2%	4
	TOTAL CIPs Categorized	1,243	100.0%	1,676	100.0%	433
	CIPs not categorized	168*		57**		
	TOTAL CIPs Categorized	1,411		1,732		
* Perkins Table 1 excluded CIPs 05, 16, 32-27, and 53						
** Revised Perkins Table 1 excluded CIPs 32-37 and 53						

The new Perkins Table 1 has 433 more six-digit CIP codes than the original Perkins Table 1. There are two sources of additional CIP codes. First, detailed six-digit CIP codes in two-digit CIP codes *05 – Area, Ethnic, Cultural, Gender and Group Studies*, and *16 – Foreign Languages, Literatures, and Linguistics* were included in the new Perkins Table 1, but were not included in the original Perkins Table 1.[2] There are 47 six-digit CIP2010 programs in Group 05 and 82 six-digit CIP2010 programs in Group 16. They are all categorized in the Education and Training Career Cluster.

The second source of additional CIP codes is the expansion of about 300 new six-digit codes in CIP2010. The National Center for Education Statistics' *Introduction to the Classification of Instructional Programs: 2010 Edition (CIP-2010)* is an excellent resource to learn about the new codes.[3]

There were 354 new six-digit CIP2010 codes added, 47 six-digit CIP2000 codes deleted, and 232 six-digit CIP2000 codes moved or renumbered. There was a significant expansion of new CIP

[2] These CIP codes were included, but there are only a limited number of occupations that are currently related to them in the CIP-SOC Crosswalk. A final decision as to whether or not to include these two CIPs with other Liberal Arts CIPs is needed before the new Perkins Tables1 and 7 are finalized.
[3] See http://nces.ed.gov/ipeds/cipcode/Files/Introduction_CIP2010.pdf.

codes in three areas that show up in Table 6.

- There was a significant expansion in *CIP 28 Military Science, Leadership and Operational Art* and *CIP 29 Military Technologies and Applied Sciences*. In the original Perkins Table 1, there were only four six-digit CIP codes in these two program areas. There are 51 six-digit CIP codes in the two program areas in the new CIP2010. All of these new programs were coded in the Government and Public Administration Career Cluster.

Step 3b: SOC Code Conversion. A similar process as described above for CIP codes was conducted to convert the SOC2000 codes used in the original Perkins Table 5 to the new SOC2010 codes in the revised Perkins Table 5.

The SOC2010 taxonomy has 840 detailed occupations, compared with 821 detailed occupations in the SOC2000.[4] Table 7 below compares the number of SOC2000 codes classified by Career Cluster in the original Perkins Table 5 with the number of SOC2010 codes in the revised Perkins Table 5.

The original Perkins Table 5 had assigned a Cluster/Pathway to 749 of the 821 total detailed occupations in SOC2000. The 72 missing detailed occupations included 48 All Other occupations, 20 military-specific occupations, and four detailed six-digit SOC codes. These missing occupations were Employment, Recruitment, and Placement Specialists (13-1071), Musicians and Singers (27-2042), First-line Supervisors/Managers of Non-Retail Sales Workers (41-1012) and Gaming Change Persons and Booth Cashiers (41-2012). It is unclear why the four occupations were not included.

[4] See http://www.bls.gov/soc/soc_2010_whats_new.pdf.

Table 7
Comparison of the Distribution of SOC2010 to SOC2000 by Career Cluster

		Original Perkins Table 5			Revised Table 5		
Career Cluster Code	Career Cluster Title	Number of SOC2000 codes	Percent Distribution		Number of SOC2010 codes	Percent Distribution	Change in Number of SOCs
1	Agriculture, Food and Natural Resource	73	9.7%		39	4.6%	-34
2	Architecture and Construction	71	9.5%		88	10.5%	17
3	Arts, Audio/Video Technology and Communications	34	4.5%		44	5.2%	10
4	Business Management and Administration	48	6.4%		51	6.1%	3
5	Education and Training	57	7.6%		69	8.2%	12
6	Finance	20	2.7%		22	2.6%	2
7	Government and Public Administration	18	2.4%		37	4.4%	19
8	Health Science	65	8.7%		79	9.4%	14
9	Hospitality and Tourism	51	6.8%		49	5.8%	-2
10	Human Services	34	4.5%		41	4.9%	7
11	Information Technology	10	1.3%		12	1.4%	2
12	Law, Public Safety, Corrections and Security	33	4.4%		35	4.2%	2
13	Manufacturing	107	14.3%		136	16.2%	29
14	Marketing	23	3.1%		28	3.3%	5
15	Science, Technology, Engineering and Mathematics	50	6.7%		45	5.4%	-5
16	Transportation, Distribution, and Logistics	55	7.3%		65	7.7%	10
	TOTAL SOCs Categorized	749	100.0%		840	100.0%	91

In the updated Perkins Table 5, all "All Other" SOCs have been assigned to a Career Cluster/Pathway. All 20 of the Military-specific SOCs are included in the updated Perkins Table 5 in the Government and Public Administration/National Security Career Cluster/Pathway.

In the CIP2000 to CIP2010 conversion, nine six-digit occupations completely changed SOC Major Group. For some, but not all of these nine occupations, when the decision rules were applied to the detailed SOC2010, there was a change in the Career Cluster that they were assigned to in the revised Table 5, compared to the original Table 5 assignment.

For example, Emergency Management Directors (11-9161) moved into major group 11-0000 Management Occupations from major group 13-0000 Business and Financial Operations Occupations, where it was previously Emergency Management Specialists (13-1061). In the original Perkins Table 5, Emergency Management Specialists were classified in the Law, Public Safety, Corrections, and Security Career Cluster/Emergency and Fire Management Services Pathway. In the revised Perkins Table 5, they are categorized in the Government and Public Administration Career Cluster/Public Management and Administration Pathway.

Workers in the newly created Morticians, Undertakers, and Funeral Directors (39-4031) were previously classified with Funeral Directors (11-9061) in major group 11-0000 Management Occupations**.** However, in both the original Perkins Table 5 and the revised Perkins Table 5, the occupation remains classified in the Human Services Career Cluster/Personal Care Services Pathway.

Similarly, no change in Career Cluster/Pathway occurred for Flight Attendants (53-2031), which moved into major group 53-0000 Transportation and Material Moving Occupations from major

group 39-0000 Personal Care and Service Occupations. The occupation remains classified in the Transportation, Distribution, and Logistics Career Cluster/Transportation Operations Pathway. Some of the SOC2010 codes result from combining other occupations in various major groups.

- Fundraisers (13-1131) moved into major group 13-0000 Business and Financial Operations Occupations from Sales and Related Workers, All Other (41-9099) in major group 41-0000 Sales and Related Occupations.
- Market Research Analysts and Marketing Specialists (13-1161) moved into major group 13-0000 Business and Financial Operations Occupations from two separate and different major groups. This SOC combined Market Research Analysts in major group 19-0000 Life, Physical, and Social Science Occupations and Public Relations Specialists in major group 27-0000 Arts, Design, Entertainment, Sports, and Media Occupations.
- Workers in the newly-created Transportation Security Screeners (33-9093) were previously classified in multiple SOC occupations including Compliance Officers, Except Agriculture, Construction, Health and Safety, and Transportation in major group 13-0000 Business and Financial Operations.
- Workers in the newly created Solar Photovoltaic Installers (47-2231) were previously classified in multiple SOC occupations, including two in major group 49-0000 Installation, Maintenance, and Repair Occupations—Heating, Air Conditioning, and Refrigeration Mechanics and Installers (49-9021) and Installation, Maintenance, and Repair Workers, All Other (49-9099).

Some SOC2000 Occupations combined, thus reducing the number of SOCs classified.

- The 2010 detailed occupation 51-9151 Photographic Process Workers and Processing Machine Operators resulted from combining two detailed 2000 occupations into one.
- The detailed 2010 occupation 11-9013 Farmers, Ranchers, and Other Agricultural Managers resulted from combining two detailed 2000 occupations into one.
- The 2010 detailed occupations in minor group 51-5110 Printing Workers, 51-5111 Prepress Technicians and Workers, 51-5112 Printing Press Operators, and 51-5113 Print Binding and Finishing Workers, resulted from combining five detailed 2000 occupations into three.
- Three 2000 SOC computer occupations were revised to six detailed occupations in the 2010 SOC, four of which are included in the list of new occupations above.

Nineteen net new occupations were added in the SOC2010.

2010 SOC Code	**2010 SOC Title**
13-1131	Fundraisers
15-1122	Information Security Analysts
15-1134	Web Developers
15-1143	Computer Network Architects
15-1152	Computer Network Support Specialists
21-1094	Community Health Workers
25-2051	Special Education Teachers, Preschool
25-2059	Special Education Teachers, All Other
29-1128	Exercise Physiologists
29-1151	Nurse Anesthetists

29-1161	Nurse Midwives
29-1171	Nurse Practitioners

2010 SOC Code	**2010 SOC Title**
29-2035	Magnetic Resonance Imaging Technologists
29-2057	Ophthalmic Medical Technicians
29-2092	Hearing Aid Specialists
29-9092	Genetic Counselors
31-1015	Orderlies
31-9097	Phlebotomists
33-9093	Transportation Security Screeners
39-4031	Morticians, Undertakers, and Funeral Directors
43-3099	Financial Clerks, All Other
47-2231	Solar Photovoltaic Installers
49-9081	Wind Turbine Service Technicians
51-3099	Food Processing Workers, All Other

More information on the SOC conversion process and changes is available from the Bureau of Labor Statistics.[5]

The Career Cluster/Pathway assignments for SOC2010 occupations were reviewed to verify the initial decision rules and to ensure consistency.

Stage 4: Update the Perkins Table 7 Crosswalk

The construction of the new Perkins Table 7 discussed below was made possible from the systematic processes and procedures that were described under Stages 1, 2, and 3. The new Perkins Table 7 is basically an update of the original Perkins Table 7. The update began by first relating CIP codes to Career Clusters (Stage 1); then linking Career Clusters to SOC codes by studying the definitions of Career Pathways more closely (Stage 2); and finally checking the consistency of the results of Stages 1 and 2 with the CIP 2010 and SOC2010 coding structures. The following describes the step-by-step process used for updating the original Perkins Table 7 crosswalk.

Step 4a: Create a new Perkins Table 7 Crosswalk. In the first two stages, verification of CIP to Career Clusters and SOC to Career Clusters and Career Pathways was done separately and independently. Essentially, the previous steps have updated the CIP-Cluster assignments that are found in Perkins Tables 1, noting that no Career Pathways assignments were made for individual CIPs. Additionally, an update of the SOC-Cluster/Pathway assignments found in Perkins Table 5 was completed. However, no O*NET code or Nontraditional indicator was produced.[6]

The decision was made to modify the original Perkins Table 7 so that it would serve as a more robust crosswalk than the earlier 2007 version. The 2007 version had taken the separate

[5] See http://www.bls.gov/soc/soc_2010_whats_new.pdf.
[6] http://cte.ed.gov/accountability/crosswalks.cfm - Table 2, Instructional Programs by Clusters/Pathways and Perkins Table 5 Occupations by Clusters/Pathways.

Cluster/Pathway assignments for CIPs from Perkins Table 1 and SOCs from Perkins Table 5 and created Perkins Table 7. However, the CIPs and SOCs were not directly linked. As the note on the use of Perkins Table 7 states, "[Table 7] lists the CIP codes primarily assigned to each pathway but does not further assign them to particular occupations."[7]

In order to create a linked crosswalk, we used the 2010 NCES CIP SOC crosswalk[8] to combine the CIP-recommended cluster table to SOC-cluster pathway table. We noticed that in some cases the Career Cluster associated with a SOC diverged from the Career Cluster associated with the related CIP. In those cases, we re-verified the CIP-recommended cluster table and the SOC-cluster pathway table and cleaned up both tables.

The crosswalk that results can be very helpful for showing the potential training connections for an occupation, either to a single Career Cluster or to multiple Career Clusters. The validity of the new Perkins Table 7 crosswalk is dependent on the completeness and accuracy of the CIP-SOC Crosswalk. To read how the new 2010 CIP-SOC Crosswalk was developed, please see the *Guidelines for Using the CIP to SOC Crosswalk.*[9]

Table 8 below contains an excerpt from the new Crosswalk. We will use *Cost Estimators* (SOC 13-1051) as a sample occupation to describe the contents of the table columns, particularly the last two columns on the right. The SOC Code and SOC Title are found in Columns 1 and 2.

According to the NCES CIP-SOC Crosswalk, there are seven instructional programs that prepare individuals directly for jobs classified in the SOC category. The seven CIP codes and titles are listed in Columns 3 (CIP 6 2010 Code) and 4 (CIPTitle_2010).

The instructional programs are classified in three different Career Clusters found in Columns 5 (REC CLSTR NO) and 6 (RecommendedCluster_2010): 4-Business Management & Administration, 2-Architecture & Construction, and 15 Science, Technology, Engineering & Mathematics.

> ***Step 4b: The Mtch Clstr Variable.*** In Table 8, Column 7, *Mtch Clstr* variable, contains either a 0 or a 1. The 0 or 1 designation in the *Mtch Clstr* variable indicates how well the CIP-Career Cluster match corresponds to SOC-Career Cluster match. A value of 1 means the SOC Career Cluster match and the CIP Career Cluster match are identical. A value of 0 means the SOC Career Cluster does not match the CIP Career Cluster. For example, in Table 8 below, the occupation *Cost Estimator* is related to CIP codes found in three different Career Clusters (Business Management & Administration, Architecture & Construction, and Science, Technology, Engineering, & Mathematics). The *MtchClstr* variable of 1 is found in one of the three Career Clusters, Architecture & Construction.

[7] http://cte.ed.gov/accountability/crosswalks.cfm - Perkins Table 7, Primary Occupations and Instructional Programs by Clusters/Pathways.
[8] http://nces.ed.gov/ipeds/cipcode/resources.aspx?y=55 - CIP2010 to SOC2010 Crosswalk.
[9] See http://bit.ly/UfV44d.

Table 8
Example of Revised Perkins Table 7 Crosswalk

1	2	3	4	5	6	7	8	9	10	11	12
SOC CODE	SOC TITLE	SOC PTHWY NO	SOC PTHWY TITL	SOC Car Clstr No	SOC_Career Clusters	CIP 6 2010 Code	CIPTitle_2010	REC CLSTR NO	Recommended Cluster_2010	Mtch Clstr*	CrossWalk Rel Strength**
13-1051	Cost Estimators	2.1	Design/Pre-Construction	2	Architecture & Construction	52.0201	Business Administration and Management, General.	4	Business Management & Administration	0	1
13-1051	Cost Estimators	2.1	Design/Pre-Construction	2	Architecture & Construction	52.0101	Business/Commerce, General.	4	Business Management & Administration	0	1
13-1051	Cost Estimators	2.1	Design/Pre-Construction	2	Architecture & Construction	15.1001	Construction Engineering Technology/Technician.	2	Architecture & Construction	1	2
13-1051	Cost Estimators	2.1	Design/Pre-Construction	2	Architecture & Construction	14.3301	Construction Engineering.	15	Science, Technology, Engineering & Mathematics	0	1
13-1051	Cost Estimators	2.1	Design/Pre-Construction	2	Architecture & Construction	14.3601	Manufacturing Engineering.	15	Science, Technology, Engineering & Mathematics	0	1
13-1051	Cost Estimators	2.1	Design/Pre-Construction	2	Architecture & Construction	14.1801	Materials Engineering.	15	Science, Technology, Engineering & Mathematics	0	1
13-1051	Cost Estimators	2.1	Design/Pre-Construction	2	Architecture & Construction	14.1901	Mechanical Engineering.	15	Science, Technology, Engineering & Mathematics	0	1

Step 4c: The CrossWalk Rel Strength Variable. In Table 8, Column 8, *CrossWalk Rel Strength***, can have three values, 0, 1 or 2. If the value is 2, it means the SOC and CIP Career Clusters match *and* there is a SOC-CIP match in the NCES CIP-SOC Crosswalk. If the value is 1, it means there is SOC-CIP match in the NCES CIP-SOC Crosswalk, but the SOC and CIP Career Clusters do not match. The NCES CIP-SOC Crosswalk frequently lists a relationship for a program to postsecondary faculty and several high-level management occupations. Although it is possible students will eventually earn a master's degree or doctoral degree in preparation to become postsecondary faculty, such a goal requires many additional years of further education, and such occupations are also not as directly related to CTE. As a result, we have included the occupations but have given these occupations a lower score of 0 to reflect a weak or remote relationship.

Issues Still Needing Resolution

The Crosswalk Validation project has attempted to develop a more accurate and consistent classification of SOC and CIP codes in relation to the Career Clusters and Career Pathways. A set of guidelines and decision rules have been used which should facilitate the classification of future occupations and programs as they are added. It should be noted that the number of revised CIP codes in the Crosswalk Validation project's revised Table 1, as well as the number of SOC codes in the revised Table 5, are not the same in the revised Table 7. For example, the NCES CIP-SOC crosswalk shows that there is "NO MATCH" for some CIPs and SOCs because some occupations do not have a related academic program that prepares people for the occupation. The NO MATCH CIPs and SOCs are excluded from Table 7; consequently, the number of CIPs and SOCs differ in Tables 1 and 5, which include all SOCs and most CIPs, except for those mentioned earlier, like those that are not occupationally specific and non-academic credit CIPs (e.g., CIPs 32-37, 53). It is also the case that the differences in the numbers of CIP and SOC codes may be because of the assumptions used, guiding principles followed, and decision rules made in this project.

During the course of the Crosswalk Validation project, a number of issues arose that should be addressed in future efforts, including:

1. Whether to include some CIPs (e.g., 05, 16, and perhaps others) that are not typically associated with CTE.
2. Whether Health Residency programs (CIP 60) should continue to be included in the Perkins tables. These programs were included in the original Perkins tables and have been included in our update. According to NCES, however, these programs are not valid for IPEDS reporting. From an accountability perspective, if they are not valid for IPEDS reporting, their continued inclusion would seem unnecessary.
3. Whether Career Pathways with few or no SOCs should continue to be included in the Career Cluster/Pathway structure. Nine Career Pathways contain two or fewer occupations.
4. Whether a Social Science Career Pathway should be added to the STEM Career Cluster in order to allow a comparison of various STEM definitions.

One major issue needs immediate attention. A major reason for undertaking this project arose from the tensions that continue to exist regarding the ultimate utility of crosswalks—are they mainly to be used for career guidance and planning, or are they primarily a tool for accountability? The level of precision in matching CIPs, SOCs, Career Clusters, and Career Pathways should be much higher if crosswalks are to be used for accountability purposes, but for career guidance and planning, the latitude is much wider. Although the Crosswalk Validation project has not completely resolved the tension between the two functions (career guidance and planning and accountability), the project's addition of two indicators in the revised Table 7—*Mtch Clster* and *Crosswalk Rel Strength*—offers a step toward resolving this tension. In general, this tension often results in the need to modify the crosswalk to suit particular purposes. If this is the case, we recommend that users begin by considering these two indicators—*Mtch Clster* and *Crosswalk Rel Strength*.

How to Use the Crosswalk Validation Project's Revised Tables 1, 5, and 7

As indicated, three crosswalk files that update, revise, and modify the original Perkins 2007 Tables 1, 5 and 7 have been placed on the NRCCTE and NASDCTEc websites. The Crosswalk Validation project labels these revised crosswalks similarly. The tables are presented in two file formats, PDF and Excel. The PDF format is for use by those who wish to apply the information presented without modifying it. For example, these revised crosswalks could be very useful in demonstrating the potential training connections for a given occupation, either to a single Career Cluster or to multiple Career Clusters.

The project offers downloadable Excel files for those states that wish to customize the information presented in the three crosswalks for their own purposes. For example, because of the unique way in which certain educational programs relate to occupations within an individual state, the associated crosswalk may have to be modified for that state.

In general, it should be noted that modifying the crosswalk for an individual state carries with it certain risks of non-comparability across states. Modifying the crosswalks makes sense when the

crosswalks are used for guidance and career planning information, because in being modified they more accurately reflect the education programs, occupations, Career Clusters, and Career Pathways frameworks within a state. We caution users that modifying crosswalks to meet individual state needs may mean weakening the use of these crosswalks for presenting accountability information at the national level. We also note that because the revised crosswalks are based on national data, comparisons may be made among educational programs, occupations, Career Clusters, and Career Pathways only at the national level.

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