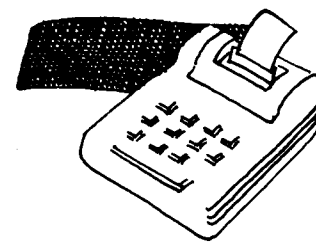


# Technical Note

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## **BLS job cross-classification system relates information from six sources**

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The Bureau of Labor Statistics has developed a cross-classification system designed to make occupational information more useful in career guidance and job placement (exhibit 1).<sup>1</sup> It enables researchers to integrate and compare data from six sources and represents a major step toward completing a coordinated system now being developed by the National Occupational Information Coordinating Committee (NOICC). Although the crosswalk itself offers no data, it provides a comparison of job-content information, permitting users to combine occupational data from the six sources. The "crosswalk" was built by using previous cross-classification efforts, not only from the Bureau of Labor Statistics, but also from the Employment and Training Administration, the Department of Commerce, and the Department of Education.

The crosswalk contains cross-classified codes for the Dictionary of Occupational Titles, 4th Edition; Occupational Employment Statistics Survey (OES); OES industry-occupational matrix; 1977 and 1980 Standard Occupational Classification system (SOC); 1970 Census of Population; and the Office (now Department) of Education's Instructional Programs Classification categories.

### **Dictionary of Occupational Titles**

The Dictionary of Occupational Titles is the largest and most comprehensive system of classifying occupations. It contains titles and descriptive information for purposes of job placement, employment counseling, occupational guidance and career guidance, and other labor market information services. Its need was recognized in the mid-1930's with the establishment of the Federal-State Public Employment Service system. As one facet of public employment services operations, an occupational research program was initiated, using analysts in field stations throughout the country to collect job information. Based on the field centers' work, the

first edition of the Dictionary was published in 1939.

The first edition contained job definitions that were assigned a 5-digit or 6-digit code, placing them in one of 550 occupational groups and indicating if the jobs were skilled, semiskilled, or unskilled. Subsequent editions reflected continued field-center work and changes in occupations and the economy, including scientific and technical developments.

The latest dictionary (fourth edition, 1977) defines 12,099 occupations, organized according to their similarities. Definitions are based on studies of how similar jobs are performed throughout the Nation. The dictionary's occupational structure contains 9 broad occupational categories, 82 divisions, and 559 groups. Each occupation in the Dictionary has a 9-digit code that reflects the kind and level of work performed.

For example, the job "cloth printer" has the code 652.382.010. The first digit (6) is the occupational category and indicates that the job is a machine trade. The second digit (5) is the division level and indicates the job is in printing. The third digit (2) is the occupational group and indicates the job involves a printing machine. The middle three digits are the worker function ratings of the tasks performed. They indicate the degree of the job's relationship to data, people, and things. In this example, the digits indicate that the job has an average relationship to data (3), a lower relationship to people (8), and a strong relationship to things (2). The last three digits of the code have no special significance; they indicate the alphabetical order of the defined job titles within the first six digits. A number of defined occupations may have the same first six digits, but no two can have the same nine digits.

### **Occupational Employment Statistics Survey**

The Occupational Employment Statistics Survey is the most detailed survey that gathers data on occupational employment. Its classification system, developed especially for it by the Bureau of Labor Statistics, is composed of specifically defined occupations.

The need for current, reliable, national and local data on job skills in industry was realized when the President's Committee to Appraise Employment and Unemployment Statistics (the Gordon Committee, 1962) evaluated all the available data collected at that time. The committee concluded that relatively little is known

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about current changes in the number of workers employed in each important occupation, and in the economy's occupational structure as a whole.

In addition, legislation calls for programs to train workers, enhancing the need for gathering detailed job data by industry. The Manpower Development and Training Act of 1962 directed the Secretary of Labor to develop, compile, and make available information regarding skill requirements, job outlook, job opportunities, labor supply in various skills, and employment trends. This was to be done on a national, State, area, or other basis for purposes of education, training, counseling, and job placement. Also, the Vocational Education Act of 1963, as amended, called for the development of State vocational education plans that consider projections of occupational requirements. The Comprehensive Employment and Training Act of 1973 called for development of a comprehensive system of labor market information.

Because of these laws, and to meet the needs of government planners and researchers in the field of employment and industrial management, the Bureau of Labor Statistics and the Employment and Training Administration initiated the OES Survey program. OES has been adopted as the primary source of occupational demand data for NOICC purposes.

Since 1971, in cooperation with the State employment agencies, OES has conducted yearly surveys of nonfarm establishments to obtain estimates of wage and salary employment by occupation and industry. The survey is conducted by industry sector on a 3-year cycle and consists of specially prepared lists of jobs for each industry. The occupations were derived primarily from the Dictionary of Occupational Titles. In general, however, specific OES occupations represent groups of the Dictionary's occupations and are more broadly defined. In addition to the Dictionary, the OES occupations reflect input from the 1970 Census of Population and Housing. The OES Survey currently provides national, State, and area occupational employment estimates for nearly 1,650 job categories in more than 300 industries.

The OES classification structure provides for seven major occupational divisions that are common to all segments of the economy. These consist of (1) managers and administrators; (2) professionals; (3) technicians; (4) service workers; (5) production, maintenance, construction, repair, material handling, and powerplant workers; (6) clerical workers; and (7) sales workers. These divisions are further divided into 24 subdivisions and minor job groups. Each occupation has been given a 5-digit code.

For example, the job of "statistician" has the code 22104. The first digit, 2, indicates the job is grouped in the major occupational division of professional worker. The second digit, 2, indicates the subdivision of natural

and mathematical scientist. The third digit, 1, indicates the minor group of mathematical scientist. The last two digits identify the specific job and have no special classification significance.

### **Industry-occupation matrix system**

The OES industry-occupation matrix is a system of occupational staffing patterns cross-classified by industry. It provides the foundation of the BLS national occupational projections efforts. The staffing patterns are used with industry employment estimates and projections to estimate national occupational employment and future occupational requirements. Like the OES Survey, the concept of a matrix system was partly the result of the Manpower Development and Training Act of 1962, which stressed the need for such information.

Originally, the industry-occupation matrix was based on data from the Census Bureau's 1950 and 1960 censuses adjusted by BLS annual data for total U.S. employment by industry. This census-based matrix contained a cross-relationship of employment for 173 occupations in 124 industries. In subsequent years, it was expanded to cover approximately 400 occupations in 200 industries and was based on data from the 1970 census. In the late 1970's, the primary occupational employment data source for the matrix was changed to the new OES Survey, although the census is still used for supplemental data. The current survey-based matrix contains approximately 1,700 occupations in more than 375 industries. BLS is considering revising the classification structure and the number of occupations in the matrix.

The current matrix classification structure is a 4-level system: major group, division, subdivision, and detailed job category. The structure contains nine major groups, and 226 divisions and subdivisions. Each OES survey-based matrix code contains eight digits that allow for aggregation at intermediate levels. The older census-based matrix code uses a similar but distinct 8-digit coding scheme.

For example, in the current OES survey-based matrix, the occupation of physical therapist is coded 10101804. The first two digits, the major group (10), indicate a professional category. The second two digits, the division (10), indicate medical worker other than technician. The third set of two digits, the subdivision (18), indicate therapist. The last two digits, the occupational category (04), identify the specific job.

### **Standard Occupational Classification system**

In 1977, the first SOC manual was published by the Office of Federal Statistical Policy and Standards, U.S. Department of Commerce. It was similar to the Standard Industrial Classification system and established a new governmentwide standard for occupational classifi-

**Exhibit 1. Description of data sources in the Bureau of Labor Statistics occupational cross-classification system**

Data	Source	Frequency	Occupational structure	Coverage	Reference	Contact
Occupational Employment Statistics Survey	Occupational demand information derived from a sample survey of wage and salary employees. Survey provides estimates of current occupational employment by industry	One-third of economy annually	7 major occupational groups, 13 minor occupational groups, Approximately 1,650 occupations	Wage and salary employees in nonagricultural establishments. Excluded are proprietors, self-employed, unpaid volunteer or family workers, private household workers, and active duty military personnel	Occupational Employment Statistics <i>Dictionary of Occupations</i>	U.S. Department of Labor, Bureau of Labor Statistics, Division of Occupational and Administrative Statistics
Occupational Employment Statistics Matrix	An occupation by industry data base using OES and Census employment estimates showing current and projected occupational demand	Biennially updated	9 major occupational groups, 36 divisions, 190 subdivisions (approximately 1,700 occupations)	All occupations and industries, except active duty military personnel	<i>Tomorrow's Manpower Needs</i>	U.S. Department of Labor, Bureau of Labor Statistics, Office of Economic Growth and Employment Projections
Dictionary of Occupational Titles	Classification system of occupations and definitions developed by the U.S. Employment Service to classify job openings and job applications	Periodically updated	9 occupational categories, 82 occupational divisions, 559 occupational groups, 12,099 occupations	All occupations and industries	<i>Dictionary of Occupational Titles, 1977</i>	U.S. Department of Labor, Employment and Training Administration, U.S. Employment Service, Office of Technical Support, Division of Occupational Analysis
Standard Occupational Classification	Classification system of occupations and definitions developed by the Office of Federal Statistical Policy and Standards as a model for Federal occupational classification	Periodically updated	22 occupational divisions, 60 major occupational groups, 214 minor occupational groups, 538 unit occupational groups, 649 occupations	All occupations and industries	<i>Standard Occupational Classification Manual</i>	U.S. Department of Commerce, Office of Federal Statistical Policy and Standards
Bureau of the Census	Occupational demand information from the decennial sample survey of households. Survey yields estimates of current occupational employment, by industry	Entire economy surveyed once every 10 years	12 major groups, 27 minor groups	All industries, except active duty military personnel	<i>Alphabetical Index of Industries and Occupations</i>  <i>Classified Index of Industries and Occupations</i>	U.S. Department of Commerce, Bureau of Census, Population Division
Department of Education	Classification system of enrollments and completions in courses of instruction. Data provides information relative to enrollments and completions in courses of instruction	Classification system periodically updated. Data collection annually	22 subjects	Vocational education programs at the secondary and post-secondary levels	<i>Standard Terminology for Curriculum and Instruction in Local School Systems, State Education Record and Report Series, Handbook VI</i>	U.S. Department of Education, National Center for Education Statistics, Division of Post-secondary and Vocational Education Statistics

cation. The SOC issuance generated a great deal of interest and much comment among persons involved in job classification. Accordingly, a revised edition of the SOC was published in 1980.

Lack of comparability among occupational statistics classification systems used by different government agencies has been a recurrent problem. In 1938, the Central Statistical Board (now the Office of Federal Statistical Policy and Standards) and the American Statistical Association established the Joint Committee on Occupational Classification to develop a standard classification system. By 1940, the committee developed the Convertibility List of Occupations with Conversion Tables and Industrial Classification for Reports for Individuals. The primary purpose for the convertibility list and conversion table was to make it possible to compare the data collected by the U.S. Employment Service (using the Dictionary of Occupational Titles system) with the 1940 census data.

By 1966, however, the convertibility list was obsolete because both the Dictionary of Occupational Titles and the census classification system had been extensively modified. The development of a SOC system began in 1966 on the recommendation of the Government's Interagency Committee on Occupational Classification. In addition to the lack of consistency between the Dictionary of Occupational Titles and census classification systems, several government agencies had created unique job classification systems for their own specific purposes. Yet, demands for more comparable occupational data had increased. The 1977 edition and the subsequent 1980 SOC are a response to those demands. The 1980 SOC contains approximately 650 occupations based on a 4-level system: division, major group, minor group, and unit group. Each level represents occupations grouped in successively finer detail.

For example, the occupation "welding machine operator" has the code 7532. The division can only be determined by referring to the SOC manual. In this example, the occupation is grouped within the 18th division—"production working occupations." The first two digits (75), represent the major group, "machine operating and tending." The third digit (3), is the minor group. It indicates that the job involves metal fabricating by machine. The fourth digit (2), is the unit group, and identifies the specific occupation.

### **Census Occupational Classification system**

Census occupational data result from two sample survey efforts, the decennial Census of Population and Housing and the monthly Current Population Survey (CPS). The most currently available decennial census occupational data are from the 1970 census, which collected data from about 20 percent of households, using two types of questionnaires. The responses were classified

into 417 occupations in 215 industries. The monthly CPS collects occupational data from about 60,000 of the approximately 82 million households (0.7 percent) in the United States. The CPS data provide national occupational trend information. However, the limited sample does not support State or State subdivision occupational estimates. The CPS uses the decennial census classification structure of occupational coding.

For many years, the only comprehensive occupational data source was from the decennial census sample. The Bureau of the Census began collecting occupational data in 1850. However, during 1870–1930 the classification was primarily of employment in large industrial divisions and did not represent occupational classification systems structured around common worker tasks. In 1940, the census classification scheme began to change direction, moving toward an occupational classification structure that categorized workers by job duties and not solely on the basis of the industries where workers were employed. Since 1940, the occupational structure has been revised and expanded with each decennial census.

The 1970 census classification structure is arranged into 12 major occupational groups and contains 417 occupational categories, each of which is assigned a 3-digit code. For example, the occupation "dental hygienist" has the code 081. However, the major group can only be determined by referring to the classification manual; in this case it is within the first major group—"professional, technical, and kindred workers."

### **Department of Education program**

In 1966, the Office (now Department) of Education developed a classification system of instructional programs to identify, classify, and describe information about subject matter and curriculum. For planning purposes, the system categorizes enrollments and completions in various vocational education programs, and it provides information relative to the supply of trained applicants in various fields. This classification system is distinct from the other five in the crosswalk because it pertains primarily to a classification of instructional programs, not to occupations. However, users often need to relate instructional programs to occupational data, so instructional program codes are included in the crosswalk.

The Department of Education's classification system and definitions were developed by a Federal-State task force that studied education records, reporting forms, and professional literature; and that conducted numerous conferences with educators. Twenty subjects are defined, plus one area for co-curricular activities and one for general education, both elementary and secondary. The OES crosswalk currently uses the seven subjects that specifically identify vocational-technical instruction-

al programs. The coding system provides a distinct, 2-digit identification code for each educational program area and more detailed codes for a classified programs within each area. The codes for a specific program usually are limited to six digits. However, in a few cases, 8-digit codes are assigned. The classification structure is based on a 4-level system: subject, principal segment of subject, division of principal segment, and first-level detail of division of principal segment. Each level represents programs grouped in successively finer detail.

An example of an instructional program in the crosswalk is that of heavy equipment maintenance, coded 17.100301. The first 2-digit position, the subject, is 17, and indicates the program concerns trade and industrial occupations. The second 2-digit position, the principal segment of the subject matter, is 10, and indicates the program concerns construction and maintenance trades. The third 2-digit position, division of principal segment, is 03, and indicates the program involves heavy construction equipment. The last 2-digit position, first-level detail, is 01, and indicates maintenance of heavy equipment.

#### **Future directions**

The 1981 OES crosswalk allows occupational data users to draw from many diverse sources. Although the crosswalk greatly facilitates cross-classification analysis, users should note that many compatibility problems remain. The future, however, is brighter, because some of the programs are undergoing classification changes. In

many cases, the new Standard Occupational Classification has provided the much needed focus for these changes, which will greatly reduce, although not eliminate, cross-classification problems.

The Occupational Employment Statistics Survey program is currently doing conversion work that will make the survey classification system generally compatible with the 1980 SOC. The 1980 Census of Population data are being coded to a revised classification system that is also generally compatible with the 1980 SOC. In addition, the National Occupational Information Coordinating Committee has adopted the 1980 SOC as its principal classification structure. The Department of Education has recently completed a change in its basic classification structure that, when implemented, will organize the classification of all educational programs into a single unified system, called Classification of Instructional Programs (CIP). Work is now underway to cross-classify the new CIP codes to the Dictionary of Occupational Titles and the 1980 SOC.

The OES crosswalk will be expanded to include the new information when any occupational data program becomes cross-classified with any program already in the crosswalk. These additions and updates to the crosswalk system will increase its utility for users. □

#### —FOOTNOTE—

<sup>1</sup> For more information about the OES crosswalk, contact the Division of Occupational and Administrative Statistics, Office of Employment Structure and Trends, Bureau of Labor Statistics, 441 G Street, N.W., Washington, D.C. 20212.