International Labour Organization

The International Standard Classification of Occupations (ISCO-08) companion guide

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Department of Statistics

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Department of Statistics

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About this guide

Statistics and information classified by occupation are essential to support the formulation and evaluation of public policy in relation to labour market programmes, vocational education and training, social protection, wage determination, and occupational safety and health, etc. Occupation classification schemes are also required for operational purposes in activities such as employment services and managing employment-related migration.

The International Standard Classification of Occupations (ISCO-08) provides a framework for the international comparability of occupational information. It also serves as a model for the development of National Occupation Classification (NOC) but requires adaptation for use at national level.

The ISCO-08 companion guide (the guide henceforth)[1] provides guidance on the practical aspects of adapting ISCO-08 for national use or developing a national classification related to it. The guide is intended for use by national statistical offices, ministries of labour and other agencies that wish to adopt ISCO-08.

The guide is organized in a modular fashion, such that each module can be used independently or in conjunction with other modules, depending on the needs of the user, and it is structured as follow:

Module 1 provides an overview of occupation classifications and what they are used for. It describes the principles and requirements for their development and design and gives a general description of the design of ISCO-08.

Module 2 focuses on areas requiring special attention when adapting ISCO-08 for national use and clarifies areas where the boundaries between related groups may be difficult to delimit consistently in national contexts.

Module 3 describes the process of adapting ISCO-08 for national use. It provides concrete guidance on stakeholder consultation and engagement, the roles and responsibilities of different agencies, project governance and planning and managing the work. It also describes the possible approaches to adopting or adapting ISCO-08 for national needs, along with the needed time frame.

Module 4 provides practical guidance on the design and construction of a national occupation classification and the various elements and components that need to be brought together, including the underlying conceptual framework, the classification structure, descriptions, and definitions of categories. It describes the nature and relevance of different sources of information to the development of the classification.

Module 5 provides practical advice on data collection methods, the development and use of coding procedures, and a coding index to ensure sufficiently consistent and accurate assignment of occupation codes.

Module 6 describes procedures for mapping between occupation classifications and developing correspondence tables to show the relationship between different versions of a national classification, and between national classifications and ISCO-08.

Module 7 provides an overview of dissemination of NOC and the uses of data classified by occupation in various types of economic, labour market and social analysis, and offers guidance on the dissemination of occupational data in statistical outputs.

The guide includes examples and links to various national practices, sources of information and material useful for various aspects related to the use of an occupation classification or ISCO-08. However, the ILO does not favour or endorse one national practice or source or material over another. These examples were given to illustrate practical cases on how selected issues are dealt with at the national level.

1 The ILO extends its appreciation to David Hunter from StatClass Consulting Services who developed most content of this guide. Lara Badre, Senior Statistician of the ILO Department of Statistics, reviewed the guide, drafted additional sections and provided examples of country practices.

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Abbreviations and acronyms

ABS	Australian Bureau of Statistics
ANZSCO	Australian and New Zealand Standard Classification of Occupations
APEC	Asia Pacific Economic Cooperation
BERUFENET	Lexikon der Berufe (Dictionary of occupations used by German employment services)
BLS	Bureau of Labor Statistics (United States)
ESCO	Classification of European Skills Competences and Occupations
Eurofound	European Foundation for the Improvement of Living and Working Conditions
GASTAT	General Authority for Statistics (Saudi Arabia)
GSIM	Generic Statistical Information Model
ICLS	International Conference of Labour Statisticians
ICT	Information and Communications Technology
ILO	International Labour Organization
INSEE	Institut national de la statistique et des études économiques (France)
ISCED	International Standard Classification of Education
ISCO	International Standard Classification of Occupations
ISCO-08	International Standard Classification of Occupations, 2008
ISCO-88	International Standard Classification of Occupations, 1988
ISIC	International Standard Industrial Classification of All Economic Activities
KNOCS	Kenya National Occupation Classification Standard
LFS	Labour Force Survey
n.d.	No date
n.e.c.	Not elsewhere classified (in reference to classification category)
n.f.d	Not further defined (in reference to classification category)
NOC	National Occupation(al) Classification
OFS	Office Fédéral de la statistique (Switzerland)
ONS	Office for National Statistics (United Kingdom)
O*NET	US Occupational Information Network
PACSCO	Pacific Standard Classification of Occupations
PCS	Nomenclature des Professions et Catégories Socioprofessionnelles (Classification of occupations and socio-professional categories) (France)
PSA	Philippine Statistics Authority
SINCO	Sistema Nacional de Clasificación de Ocupaciones (National Occupation Classification System) (Mexico)
SKP	Standard Occupation Classification of the Republic of Slovenia (SKP-08)
SOC	Standard Occupational Classification
UIS	UNESCO Institute for Statistics
UN	United Nations
UNCEISC	United Nations Committee of Experts on International Statistical Classifications
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organization
US	United States (of America)
WHO	World Health Organisation

1. Overview of occupation classifications: purpose, requirements and design

This module explains what classifications of occupations are and what they are used for. It gives an overview of the principles and requirements for their development and design, along with a general description of the design of ISCO-08.

1.1. What is a statistical classification?

According to the UN Best Practice Guidelines for International Statistical Classifications:

> A statistical classification is a set of categories which may be assigned to one or more variables registered in statistical surveys or administrative files and used in the production and dissemination of statistics. The categories are defined in terms of one or more characteristics of a particular population of units of observation. A statistical classification may have a flat, linear structure or may be hierarchically structured, such that all categories at lower levels are sub-categories of a category at the next level up. The categories at each level of the classification structure must be mutually exclusive and jointly exhaustive of all objects in the population of interest.
>
> A statistical classification is a set of discrete, exhaustive, and mutually exclusive categories which can be assigned to one or more variables used in the collection and presentation of data, and which describe the characteristics of a particular population (UNCEISC 2022).

The Statistical Classifications Model, which forms part of the Generic Statistical Information Model (GSIM)[2] developed by the United Nations Economic Commission for Europe (UNECE), defines a statistical classification as:

> A set of categories which may be assigned to one or more variables registered in statistical surveys or administrative files and used in the production and dissemination of statistics.

1.2. Purposes and uses of an occupation classification

An occupation classification arranges jobs[3] into categories based on similarities in the kind of work performed. In official statistics, classifications of occupations are essential for the collection and dissemination of statistics on occupation from sources such as population censuses, Labour Force Surveys (LFS), other household surveys, employer surveys and other sources. Occupations classification allow detailed information about jobs obtained in statistical and administrative data collections to be arranged into meaningful and useful groups for analysis. Equally importantly, occupation classifications are used by governments and companies for operational purposes in activities such as matching jobseekers with job vacancies, reporting of industrial accidents, administration of workers' compensation, and the management of work-related migration. (Also see Module 7).

The International Standard Classification of Occupations ISCO-08 (ISCO-08) is a four-level hierarchically structured classification that allows all jobs in the world to be classified into 436 unit groups and then into progressively larger groups. It is intended to provide a basis for the international reporting, comparison, and exchange of

[2] The GSIM Statistical Classifications Model is both a terminology and a conceptual model. It defines the key concepts that are relevant to structuring statistical classification metadata and provides the conceptual framework for the development of a statistical classification management system.
[3] In some instances, it can be used to arrange and code work activities. See Section 1.4.2 the concept of occupation.

statistical and administrative data about occupations. It also provides a useful model for the development of national and regional classifications of occupations. (Read more about ISCO-08 design in Section 1.4).

Statistics on occupation are needed for formulation and evaluation of government and corporate policies such as those related to labour market programmes, identification of skill shortages, educational planning, recruitment and migration of workers, rates of pay, and occupational safety and health.

Reflecting of these requirements, occupation is recommended as a core topic in the Principles and Recommendations for Population and Housing Censuses (UN 2017). It is usually included in population censuses and almost always included in labour force surveys (LFS). It is also commonly included in other household surveys as well as in establishment surveys with a focus on employment. Data on occupation are also derived from the records of agencies involved in activities such as the provision of employment services, issuance of work permits and visas, employment registration, and the provision of vocational education and training.

These various types of data source can provide statistics classified by occupation on a wide range of topics including job seekers and job vacancies, numbers of places and enrolments in training programmes, migrant and expatriate labour, employment, wages, hours worked and so forth. To make sense of the information obtained from the different data sources, and to provide coherent information on the functioning of the labour market, a harmonized occupation classification system should be used in each of the data sources. Data compiled for different purposes and from different sources can then be drawn together to produce integrated and comprehensive information of both a quantitative and qualitative nature on topics such as rates of pay, job prospects, working hours, nature of work performed, skills required for specific occupations and groups of related occupations (see examples of national integration of occupational information drawn from a wide range of sources such as the US O*NET and Jobs and Skills Australia). This type of information can be used in activities such as the identification of skills shortages or oversupply, the provision of careers guidance for young people, and the provision of advice to both jobseekers and employers wishing to fill vacancies.

The integration of occupational information from different sources most commonly involves the use of a single national classification of occupations (NOC). When this is the case, the national classification has to meet the operational, analytical and statistical requirements of the different agencies that need to use it in a wide range of administrative and statistical requirements. However, there may be cases where the requirements of one agency conflict with or are less than optimal those of another agency. This topic is dealt with in Module 3.

1.3. Principles and requirements for an occupation classification

Any classification to be used for statistical purposes should adhere to a set of principles and include certain components that allow it to be used for the compilation of meaningful and useful statistics. These principles are described in the Best Practice Guidelines for Developing International Statistical Classifications (UNCEISC 2022). [4]

According to the Standard Statistical Classifications: Basic Principles, statistical classifications are developed or revised on the basis of established practices and principles; these are listed in Box 1.1.

[4] These principles are also reflected in the Statistical Classifications Model (UNECE 2013) and in the Standard Statistical Classifications: Basic Principles (Hoffmann and Chamie 1999) which was adopted by the UN Statistical Commission.

▶ Box 1.1 Principles of statistical classifications

- The objectives and statistical priorities to be served must be clearly stated
- The organization responsible for the preparation and maintenance of a classification (the custodian) should be clearly identified and responsibilities stated
- A timetable for the work must be well publicised and allow substantive experts who are users and producers of statistics, to contribute to the process at appropriate moments
- A well-defined classification structure must be prepared. Depending on descriptive and analytical needs, aggregated categories of statistical classifications may be organized in a hierarchy representing different levels of detail for the measurement of the variable
- Descriptive definitions or exhaustive listings of the contents of the defined categories are needed. Listings will not be needed for aggregate groups when the codes are constructed to make transparent where the correspondent groups are located in the hierarchical structure
- Instructions are needed on effective use of classifications for data collection and analysis
- Guidance and training materials are a necessary part of the development process for a new or revised classification

Source: Hoffmann and Chamie 1999.

According to the Best Practice Guidelines (UNCEISC 2022, 5-6), the essential components of a statistical classification are:

- a consistent conceptual basis
- a flat or hierarchic structure
- categories that are mutually exclusive and exhaustive
- definitions that are clear and unambiguous, and which define the content of each category
- that it is up-to-date and relevant
- that it is robust enough to last for a period of time
- that it meets user needs
- that it provides comparability over time and between collections
- statistical feasibility, balance, and guidelines for coding
- that it provides guidelines for coding and output of data collected using it

1.3.1. Conceptual basis

A consistent conceptual basis is required to define the underlying concept that is measured or described by the classification, the nature and type of object or unit to be classified, and the classification criteria used. Classification criteria describe the characteristics of the objects classified that are used to arrange them into groups based on their similarities. The categories in a classification are thus defined with reference to one or more characteristics of a particular population of units of observation (UNECE 2013, 24). When multiple classification criteria are used, the conceptual basis should define the way each criterion or characteristic is used to design the classification.

In the case of ISCO-08 and many other occupation classifications, the units classified are jobs. The underlying concept in ISCO-08 is occupation, and the classification criteria are skill level and skill specialization. Skill level is used primarily to differentiate groups at the top level (major groups) of the classification, while various aspects of skill specialization are used to differentiate categories at the more detailed levels. In some occupation classifications, different approaches are used. For example, skill level may not always be used systematically to differentiate categories at the higher levels of the classification.

1.3.2. Classification structure

The term “classification structure” generally refers to the structured list of categories, each of which describes a possible value of the classification variable. Such a structured list may be linear or hierarchically structured. The categories in the classification structure are termed “classification items” in the GSIM Statistical Classifications Model.

A linear or “flat” classification is a simple listing of categories that are all at one and the same level (e.g., a classification of marital status, or sex). A hierarchical classification is a classification with more than one level of aggregation with a logical and sequential hierarchy of categories ranging from detailed to broad levels. In a hierarchical classification the categories are arranged in a tree-structure with two or more levels of aggregation. Hierarchical classifications are structured with the most general or broad categories at the top and the most detailed categories at the bottom (UNCEISC 2022). The items of each level except the highest (most aggregated) are aggregated to the nearest higher level.

In view of the large number and diversity of occupations that exist, and the large number of categories required to meet user requirements in both statistical and client-oriented applications, almost all occupation classifications have a hierarchical structure. For example, ISCO-08 is a hierarchically structured classification with four levels of aggregation. Some national classifications have a fifth level which specifies more detailed categories than those at the most detailed level of ISCO-08.

1.3.3. Mutually exclusive and jointly exhaustive categories

The categories at each level of the structure of a statistical classification must be mutually exclusive and jointly exhaustive of all objects/units in the population of interest (UNECE 2013). This means that each member of the population of units classified should only be able to be classified to one category. There can be no overlap between categories. If the categories are not mutually exclusive, there may be confusion about where in the classification individual survey responses or observations should be classified. If observations are classified in more than one place there may also be a risk of overcounting, and that the sum of observations in each category would exceed the total.

It should also be possible to classify all units in the population to be measured to a category in the classification. When this is the case, the categories are jointly exhaustive. In many classifications, exhaustiveness is achieved by creating residual categories. Residual categories are designed to classify units that do not fit into the other, fully specified, classification categories.

1.3.4. Descriptors and definitions of categories

A classification category is a group of units or objects, that have similar characteristics in terms of the classification criteria. Each category at each level in a statistical classification is represented by a code and an official name (or title). The code should be in accordance with the code structure of the relevant level of the classification and should be unique within the classification. The official name or title of the classification item should be as unambiguous as possible, and should be unique within the classification, except for categories that are identical at more than one level in a hierarchical classification.

Explanatory notes, or descriptive definitions, are also needed when the official name of a category is not sufficient to unambiguously define the nature, scope and boundaries of a classification category (UNECE 2013, 19-20). In ISCO-08 they are called “group definitions” and have a standardized structure and content made up of several different components.

1.3.5. Up-to-date and relevant

The occupational structure of the labour market is constantly evolving reflecting both technological developments and new ways of organizing work. It is important to ensure, therefore, that classifications of occupations are kept up-to-date and adequately reflect new developments in the labour market as new occupations emerge and new skills are required. A national classification should also reflect the realities of the national labour market and be relevant to contemporary policy concerns at both national and international levels. Periodic revision and update of the national occupation classification (NOC) are therefore essential to reflect both occupational change and new information needs.

1.3.6. Robustness over time

Occupation classifications used for statistical purposes are not usually updated or revised on an ongoing or rolling basis, as this would lead to instability in the resulting statistics and compromise time-series. Procedures are therefore needed to determine where in the classification new occupations and job titles should be classified. New job titles can then be included in the coding index, which may be updated more frequently or on an ongoing basis. The classification categories should be designed in such a way as to accommodate new occupations when necessary. This can be achieved by avoiding defining the categories too narrowly or prescriptively and by providing residual categories where necessary.

1.3.7. Meeting user needs

When a national occupation classification is developed or revised it is essential that it meets the needs of users. A full understanding of user needs and how to meet these needs requires close engagement and consultation with users of the classification.

1.3.8. Time series and international comparability

When an occupation classification is updated or revised, it is important to consider comparability between the revised and previous versions of the classification to facilitate the compilation of time-series statistics. Important time-series breaks should be avoided to the extent possible but may sometimes be unavoidable when required to reflect changes to the realities that the classification should mirror.

International comparability of occupation data is essential to facilitate the international reporting of statistics, comparison with other countries and in activities such as the management of international migration of workers. This can generally be achieved through linkages to ISCO-08 which may be based on correspondence tables, or on dual coding to both the NOC and ISCO-08. Such linkages are easier to achieve and generally more robust when the NOC is based on or follows similar principles as ISCO-08.

1.3.9. Statistical feasibility, balance, and guidelines for coding

The statistical feasibility of a classification refers to the extent to which it is possible to distinguish between the categories effectively, accurately, and consistently in the classification on the basis of the information available. In the case of an occupation classification these distinctions need to be able to be made based on the responses to questions that can be reasonably asked in household surveys, establishment surveys and/or on administrative forms.

In general, an occupation classification to be used for statistical purposes should not have categories at the same level in its hierarchy which are too disparate in their population size. This concept of statistical balance allows the classification to be used effectively for the cross-tabulation of aggregate data from sample surveys and is

particularly relevant given the importance of household surveys, such as labour force surveys, as sources of occupational data.

Testing of the feasibility of the classification, and the development and testing of questions, coding procedures, guidelines, and materials should therefore be undertaken as part of the process of developing the classification. A coding index and set of procedures are needed to assign responses to questions on occupation to the categories in the classification. This process is known as "coding".

1.3.10. Guidelines for output of data

Any classification designed to be used for statistical purposes should be accompanied by guidance on how the classification should be used to compile statistical outputs such as tables and indicators. This will promote consistency and coherence between different statistical reports and provide users with information on how the classification is intended to be used.

1.4. Overview of ISCO-08

ISCO-08 is intended to provide a basis for the international reporting, comparison, and exchange of statistical and administrative data about occupations. It also provides a useful model for the development of national and regional classifications of occupations but is not a framework for the administrative regulation of occupations. It may be used directly in countries that, for one reason or another, have not developed their own national classifications (ILO 2012, 4). To the extent possible, however, a classification of occupations for use at national level should reflect the occupational structure of the national labour market and national policy concerns and user requirements.[5]

1.4.1. The design of ISCO-08

ISCO-08 is a four-level hierarchically structured classification that allows all jobs in the world to be classified into 436 unit groups and then into progressively larger groups. Each group has a title and a descriptive definition that specifies the scope of the group, summarizes the main tasks and duties performed in occupations included in the group, and provides a list of the occupational groups included or, in the case of unit groups, examples of the occupations included.

The unit groups at the most detailed level in ISCO-08 are arranged into minor groups. Minor groups are arranged into sub-major groups, and sub-major groups are arranged into major groups as follows:

- 10 major groups (1-digit code),
- 43 sub-major groups (2-digit code),
- 130 minor groups (3-digit code),
- 436 unit groups (4- digit code).

Each group in the classification is designated by a title and code number as shown in the example below:

Major Group	**5 Services and Sales Workers**
Sub-major Group	51 Personal Services Workers
Minor Group	511 Travel Attendants, Conductors and Guides
Unit Groups	5111 Travel Attendants and Travel Stewards
	5112 Transport Conductors
	5113 Travel Guides

[5] A detailed explanation of the ISCO-08 conceptual approach, structure and design, including code structure and conventions, and other useful information are available in the ISCO-08 Introductory and Methodological Notes (ILO 2012).

By convention, when unit groups in ISCO-08 are the only member of a group at the higher level, the final digit of the 4-digit code is zero. (See Box 4.3 in Module 4).

ISCO-08 arranges occupations into groups according to two criteria: skill level and skill specialization**.** Skill, for the purposes of ISCO-08, should be interpreted simply as the ability to carry out the tasks and duties of a job. *Skill level* is defined as a function of the complexity and range of tasks and duties performed in an occupation. *Skill specialization* in ISCO-08 is considered in terms of four concepts or dimensions:

- the field of knowledge required,
- the tools and machinery used;
- the materials worked on or with: and
- the kinds of goods and services produced.

Skill level is applied mainly at the top level (major group) of the classification. Within each major group occupations are arranged into unit groups, minor groups and sub-major groups, primarily on the basis of aspects of skill specialization.

There are ten major groups and four skill levels. Two ISCO-08 major groups include sub-major groups at more than one skill level (see Module 4, Table 4.1). All sub-major groups are made up of minor groups and unit groups of occupations at the same skill level. Major groups that include occupations at the same skill level are differentiated from each other by broadly interpreted dimensions of skill specialization. [6]

1.4.2. The concept of an "occupation"

The term "*occupation*" in ISCO-08 refers to the kind of work performed by a person in a *job,* where *Job* is defined as a 'set of tasks and duties performed, or meant to be performed, by one person, including for an employer or in self-employment'. The concept of "*occupation*" is defined in ISCO-08 as a "set of jobs whose main tasks and duties are characterized by a high degree of similarity" (ILO 2012, 11).

The ILO 19th ICLS resolution I concerning statistics of work, employment and labour underutilization (ILO, 2013) adopted an updated definition of the concept of job (See § 12) which was also used by the 20th ICLS Resolution I concerning statistics on work relationships (ILO 2018, §8)[7] where § 8 reads:

> 'A job or work activity is defined as a set of tasks and duties performed, or meant to be performed, by one person for a single economic unit.
>
> (a) The term *job* is used in reference to employment.[8] This statistical unit, when relating to own-use production work, unpaid trainee work and volunteer work is referred to as work activity.[9]

While ISCO-08 was designed primarily with the intention of classifying jobs in employment for pay or profit, it can, nevertheless, be used to classify work activities in other forms of work,[10] including own-use production work. It provides separate categories for subsistence farmers, fishers, hunters and gatherers, partly because at the time the classification was developed, production of goods for subsistence purposes was included in employment, and partly because this important group was not captured or defined in any other international statistical standard. However, ISCO-08 is not particularly well suited to the classification of work activities in own-use production work-

[6] For more detail, see Sections 4.1.2 and 4.1.3.

[7] A fuller discussion of the definition of jobs and work activities, and the identification of the main job, can be found here: Conceptual framework for statistics on work relationships (ILO 2020). Also see Section 4.3 in Module 4 of this guide.

[8] In the 19th ICLS resolution I, persons in employment are defined as all those of working age who, during a short reference period, were engaged in any activity to produce goods or provide services for pay or profit (see ILO 2013 § 27).

[9] In the 19th ICLS resolution I, persons in own-use production work are defined as all those of working age who, during a short reference period, performed any activity to produce goods or provide services for own final use (see ILO 2013 § 22).

[10] Such as in the case of unpaid trainees and apprenticeships and volunteer work. See ILO guidance on how to code volunteer work using ISCO, the ILO Volunteer work measurement guide (ILO, 2021).

provision of services, even though it also provides categories for domestic housekeepers, childcare workers, home-based personal care workers, and domestic cleaners and helpers, all of which are significant activities in both paid employment and own-use provision of services. Therefore, we can extend the unit in ISCO-08 and consider that both jobs and work activities can, in theory, be classified in ISCO-08 when needed,[11] where occupation shall refer to the type of work performed by a person in a *job* or *work activity*.

It is important to note that the concept of occupation should not be confused with the concepts of industry (or branch of economic activity) and status in employment.

- Industry refers to the activity of the establishment in which an employed person works. It is concerned with what the establishment does, not what the individual does when working for that establishment. Workers in some occupations such as miner or shepherd are found mainly in a relatively narrow range of economic activities, while others such as accountants, secretaries and car drivers are found in a wide range of industries.
- Status in employment and the broader concept of status at work refer to the authority relationships between persons who work and the economic units in which or for which the work is performed - and to the nature of the economic risks that follow from the contractual or other conditions under which the work is performed (ILO 2018, §1). Persons employed in the same occupation may therefore have different statuses in employment depending on whether they own and operate the enterprise in which they work or are engaged by that enterprise as employees or dependent contractors. A person whose job is classified by occupation as butcher or baker, for example, may have a status in employment in that same job as employer, independent worker without employees, dependent contractor, or employee.

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[11] There may not always be a need to classify work activities in own-use production work to the national occupation classification, as many of the categories would not be relevant or used.

2. Areas requiring special attention when developing or adapting a NOC based on ISCO-08

This module discusses and clarifies areas of ISCO-08 where the conceptual boundaries between related groups may be difficult to delimit consistently in national contexts. It provides advice on situations where the process of determining the most appropriate ISCO-08 code for a particular job or occupation may be difficult.

2.1. Occupations with a broad range of tasks and duties

ISCO-08 defines occupations and occupational groups by reference to the most common combinations of tasks and duties in countries around the world. When a national occupation classification based on ISCO-08 is developed, groups of similar jobs that cut across the boundaries of categories in ISCO-08 may be identified. If there is a need to create a new occupation or group to accommodate these jobs, it will be necessary to determine where in a classification structure based on ISCO-08 they should be classified. In such cases application of the following principles is suggested, in the order of precedence given below.[12]

1. If managerial tasks are the ***major component of the work performed***, the occupation should be classified in Major Group 1, Managers. It should be borne in mind, however, that many occupations not classified as managers, include tasks such as supervision of staff and operation of a business. An explanation of what should be understood by managerial tasks, and the classification of occupations involving them, is provided in section 2.3 on managers, supervisors, and operators of businesses.
2. In cases where the tasks and duties performed require skills usually obtained through different levels of training and experience, the occupation should be classified in accordance with those ***tasks and duties which require the highest level of skills***. For instance, an occupation which consists of driving a van, loading and unloading it and delivering goods by hand should be classified in Unit Group 8322: Car, Taxi and Van Drivers.
3. In cases where the tasks and duties are connected with different stages of the processes production and distribution of goods, tasks and duties related to the ***production stage should take priority*** **over associated ones,** such as those related to the sales and marketing of the same goods, their transportation or the management of the production process. For example, a butcher who bones cuts and dresses meat and prepares meat for sale in a shop, is classified in Unit Group 7511, Butchers, Fishmongers and Related Food Preparers, even if the job also involves advising selling and marketing the products.
4. Where the tasks and duties performed are both at the same skill level and at the same stage of production, jobs should be classified according to ***the predominant tasks performed***. For example, a "fire door installer" may assemble and install doors, door frames and fittings and also install and connect electrical wiring systems so that the door will close automatically in the event of a fire alarm. In this case, the job requires skills both as a carpenter and as an electrician, but the most time-consuming part of the work relates to carpentry. It should therefore be classified in Unit Group 7115: Carpenters and Joiners, rather than in Unit Group 7411: Building and Related Electricians.

2.2. Apprentices and trainees

Most apprentices and trainees perform the same tasks as those performed by fully qualified workers but do so under varying degrees of supervision. Responses in statistical collections frequently do not contain information

[12] Procedures for assigning survey responses to job descriptions that cut across the distinctions made in the national classification are discussed in Module 5, which also provides practical advice on data collection methods and the development of coding procedures.

about apprentice or trainee status, unless specific questions are asked to identify this group. In ISCO-08, therefore, apprentices and trainees are classified according to the occupation they are training for.

Apprentice carpenters and apprentice electricians, for example, are classified as carpenters and electricians. Medical and legal interns are similarly classified as doctors and lawyers. Where trainees also have jobs in a related occupation, these jobs should be classified according to the work required to be performed, such as when medical or legal students, for example, are employed as ward attendants, medical assistants, or legal clerks.

If information about apprentice or trainee status is required, it is more appropriate to collect this information as part of the status in employment (ICSE-18) ,or status at work variables (ICSaW-18), rather than to attempt to identify apprentices and trainees as separate occupations in a national occupation classification.

2.3. Managers, supervisors, and operators of small businesses

2.3.1. Managers and supervisors

The distinction between managers and supervisors may frequently cause difficulties. The critical difference is that supervisors are responsible only for supervision of the activities of other workers, whereas those classified in Major Group 1, Managers, have overall responsibility for the operations of a business or an organizational unit. Both managers and supervisors plan, organize, coordinate, control and direct the work done by others. In addition, managers usually have responsibility for and make decisions about:

(a) the overall strategic and operational direction of a business or organizational unit (for example about the kinds, quantity and quality of goods to be produced);
(b) budgets (how much money is to be spent and for what purposes); and
(c) the selection, appointment, and dismissal of staff.

It is not a necessary condition that managers have responsibility for all three of strategic and operational direction, budgets and staff selection and dismissal. The degree of autonomy they exercise may also vary. Supervisors may provide advice and assistance to managers on these matters, especially in relation to staff selection and dismissal, but do not have authority to make decisions. Managers do not necessarily know how to perform the work of all the staff employed in the units they manage, although in some circumstances they may. It is frequently the case that managers plan, coordinate and control the activities of workers employed in a wide range of occupations.

Supervisors, usually have experience as workers in one or more of the occupations they supervise, and do not usually supervise the activities of workers employed in a wide range of occupations. Their primary skills, therefore, are frequently concerned with the performance of the tasks performed by the staff they supervise, and a part of their own work may involve the performance of these tasks. In some sectors, however, supervisors do not mainly perform the same tasks as the workers supervised, and additional technical skill are required in some cases. For these reasons, separate unit groups are provided in ISCO-08 for selected supervisory occupational groups. The supervisory unit groups in ISCO-08 are:

3121 Mining Supervisors
3122 Manufacturing Supervisors
3123 Construction Supervisors
3341 Office Supervisors
5151 Cleaning and Housekeeping Supervisors in Offices, Hotels and Other Establishments
5222 Shop Supervisors

All other supervisory occupations are classified in ISCO-08 in the same unit group as the most skilled workers supervised. In some national occupation classifications skills in supervision are always considered to require a higher level of skill than required for the workers supervise, and separate categories are provided for a wider

range of supervisory occupations. When mapping national occupation classifications to ISCO-08, groups for supervisory occupations can be mapped to one of the six supervisory groups listed above if relevant. If no relevant ISCO-08 supervisory group exists, then national supervisory groups should be mapped to the ISCO-08 group or groups that include the most skilled occupation supervised.

2.3.2. Managers and operators of small businesses

Owning and operating a small business, or being self-employed workers, who operate their own business either independently or with assistance from a small number of others, inevitably involves the performance of some tasks of an administrative or managerial nature as part of their normal activity. The approach taken in ISCO-08 is that jobs should be classified by occupation according to the main tasks or duties performed in that job, and the skills required to perform those tasks. Such jobs are only classified in Major Group 1: Managers if there is evidence that management, including supervision of staff, is the major component of the work performed. For example, in ISCO-08, a motor vehicle mechanic who owns and operates his or her own workshop and employs a small number of other mechanics, a receptionist and a cleaner, but spends most of the time repairing vehicles and/or supervising the work of the other mechanics, is classified in Unit Group 7231: Motor Vehicle Mechanics and Repairers. Similarly, a “baker” who operates his or her own business should therefore be classified in ISCO-08 Unit Group 7512 Bakers, Pastry-cooks and Confectionary Makers, unless the main tasks and duties performed relate to managing the business.

In this context, it is important to note that ISCO-08 does not take into consideration whether a worker is the owner-operator of a business or not, as this and similar attributes of the labour force, such as being an employer or an employee, reflect status in employment and not the tasks and duties of the worker. It is better therefore to treat this characteristic of jobs as a separate variable, classified according to a classification such as the International Classification of Status in Employment.

2.3.3. Size of the organization

There is an evident relationship between the size of the organization in which a worker is employed and categories in ISCO-08 related to management. For example, those occupations classified in Minor Group 112: Managing Directors and Chief Executives are usually senior managers in organizations that are large enough to have a hierarchy of managers. Similarly, most jobs classified in Sub-major Group 14: Hospitality, Retail and Other Services Managers are the managers of relatively small organizations that do not usually have hierarchies of managers. Workers classified in Sub-major Groups 12: Administrative and Commercial Managers and 13: Production and Specialized Services Managers, may be employed in large hierarchical organizations or in relatively small organizations that provide specialist services to other organizations.

Despite these relationships, information about the size of the organization in which an individual manager is employed is not generally relevant to decisions about the most appropriate ISCO-08 code. This is because ISCO-08 Major Group 1 is organized according to functional specialization and not according to the size of the organization managed.

Although most traditional shop managers, for example, are responsible for relatively small establishments, the managers of large supermarkets and department stores are still shop managers and require essentially similar skills. They are classified with other shop managers in Unit Group 1420: Retail and Wholesale Trade Managers, as it was not considered feasible or appropriate to classify managers of large shops separately from managers of relatively small shops. However, someone who operates a small retail shop, either without help from others, or with help from a small number of others, is classified as a shopkeeper in Unit Group 5221, Shopkeepers, as the main tasks performed do not involve the management and supervision of staff. Supervisors of departments in large stores and supermarkets have responsibility for the supervision of staff but are not responsible for management of the establishment and are classified in Unit Group 5222, Shop Supervisors.

Taking another example, the key characteristics of chief executives, classified in Minor Group 112, are that they coordinate and direct the activities of other managers who have a range of specialized functions, and that they report to a board of directors. This is a result, primarily, of the way in which management and governance of the organization is arranged and reflects the complexity of the organization's functions as much as its size.

It is therefore **not** recommended to use information about the size of the organization in which a worker is employed, measured in terms of number of employees or turnover, or about the number of staff supervised, to differentiate between managers classified in the different sub-major groups of Major Group 1. Similarly, information about organization size should not be used to differentiate managers from operators of small businesses classified in other major groups. The most reliable way to make these distinctions in statistical and administrative collections is likely to be to collect information about both the **occupation or job title** and the **main tasks or duties** performed. Probing or asking for further information during data collection might be useful in these cases to make sure management is a major component of the work performed.

2.4. Related occupations at different skill levels

2.4.1. General principles

There are many cases, in both ISCO-88 and ISCO-08, where occupations that are relatively similar in terms of aspects of skill specialization are classified in different major groups because of differences in skill level. Whilst the distinctions between such occupations are frequently clear cut and well understood, there are some cases where care needs to be taken to ensure that specific occupational groups in the national context are mapped appropriately to ISCO-08 categories. In general, the following principles should be applied in making decisions about where in ISCO-08 to classify particular occupations with respect to skill level:

1. Decisions should be made on the basis of the tasks actually performed, rather than on the level of qualifications required in a particular country, or on the extent to which the occupations concerned are formally regulated. In this way, occupations that involve performance of the same tasks are always classified in the same ISCO-08 group, regardless of differences in national training or regulation.
2. The actual qualifications held by the person holding a particular job should not be taken into consideration.
3. Jobs held by experienced or highly qualified individuals are classified in the same group as those held by less well qualified individuals when the tasks performed are essentially the same, even though the more qualified individuals may sometimes perform more difficult or complex tasks. For example, master carpenters, senior carpenters, junior carpenters and apprentice carpenters, who build structures using wood and other materials, are all classified in Unit Group 7115: Carpenters and Joiners. Skill level is determined on the basis of the requirements for entry-level jobs for fully qualified workers.

The boundaries between occupations classified in Major Group 9: Elementary Occupations and those that are related in terms of skill specialization but classified in Major Groups 6, 7 and 8 may cause particular difficulty when occupation titles such as "farm hand", "construction worker", "process worker" or "factory worker" are used. The general principle to be adopted is that occupations classified in Major Group 9 typically involve the performance of simple and routine manual and physical tasks that require limited training and no more than basic skills in numeracy, literacy and interpersonal communication. Whilst the operation of complex machinery is not involved, the use of hand-held mechanical tools may be required.

Where boundary issues are of particular concern, guidelines are provided in the notes included with the ISCO-08 group definitions. Examples of occupation titles included in each group are also given. Where it is known, however, that the same or similar terms are used in different countries to refer to occupations classified in different occupation groups, these terms have not generally been listed in either the list of included occupations or in the *Index of occupational titles*. In these and other cases, decisions will need to be made in the national

context, based on the nature of the work performed. The examples discussed below may require particular attention and may serve to illustrate the points made above.

2.4.2. Early childhood educators and child care workers

Occupations involved in the care and development of children below primary school age may be classified in Unit Group 2342: Early Childhood Educators; 5311: Child Care Workers; or 5312: Teachers' Aides.

Jobs classified in Unit Group 2342 differ from those included in the other two unit groups in that they plan, organize and conduct educational and play activities that are intended to promote the development of children below primary school age. Although it is not advisable to consider the formal qualifications held by individuals, it should be noted that tertiary qualifications in education and early childhood development are normally required.

Child care workers provide care and supervision for children. Teachers' aides perform similar duties and also perform a range of other non-teaching duties to assist teaching staff. Neither of these two groups generally plans and organizes structured play or educational activities, although they may assist in the provision of these activities.

2.4.3. Traditional and complementary medicine professionals and associate professionals

The distinction between occupations classified in Unit Group 2230: Traditional and Complementary Medicine Professionals, and 3230: Traditional and Complementary Medicine Associate Professionals, has the potential to be a source of uncertainty, especially in countries where this type of practice is not part of mainstream health service provision.

A key point is that traditional and complementary medicine professionals develop and implement treatment plans for human ailments by applying knowledge, skills, and practices for which competent performance requires extensive study of theories, beliefs and experiences originating in specific cultures. Those occupations whose practice requires a less extensive understanding based on relatively short periods of formal or informal education and training or acquired informally through the traditions and practices of the communities where they originated, are included in Unit Group 3230: Traditional and Complementary Medicine Associate Professionals.

A comprehensive list of the occupational titles included in each of these groups is included in the unit group definitions and in the ISCO-08 *Index of occupational titles*. Care should be taken, however, in interpreting these occupational titles in national contexts, as the scope of practice and nature of the tasks performed by individuals using these and similar occupation titles may vary from country to country. In some countries there may be a limited framework for the recognition of qualifications in the field of complementary medicine, or the regulatory framework may not allow the performance of certain tasks. As with other occupational groups, the distinction between these two groups should be made on the basis of the tasks performed in these occupations in the national setting, rather than on the qualifications held by individuals. For example, it may be appropriate to classify practitioners who administer treatments within the framework of a treatment plan established by others in Unit Group 3230 rather than in Unit Group 2230.

2.4.4. Occupations in food preparation

Occupations that mainly involve the preparation, assembly, and presentation of food for immediate consumption may be classified in one of the following unit groups:

3434	Chefs
5120	Cooks
9411	Fast Food Preparers
9412	Kitchen Helpers

In determining the boundaries between these groups, the following points are of particular relevance:

- Chefs, classified in Unit Group 3434, plan and develop recipes and menus, create dishes and oversee the planning, organization, preparation and cooking of meals.
- Whilst cooks, classified in Unit Group 5120, plan, organize, prepare, and cook a range of dishes, they do so according to recipes or under the supervision of chefs. They do not generally develop menus or create new dishes.
- Fast food preparers, classified in Unit Group 9411, prepare, and cook to order a **limited range** of foods or beverages involving simple preparation processes and a small number of ingredients. The key point is that they prepare foods and beverages for which extensive training in food preparation is not required.
- Kitchen helpers, classified in Unit Group 9412, mainly provide support to cooks, chefs, and waiters by keeping kitchens and food service areas clean and tidy and assisting with basic food preparation tasks.
- Jobs that combine simple preparation of food with a significant element of client service should normally be classified in one of the following unit groups as appropriate:

5131	Waiters
5212	Street Food Salespersons
5246	Food Service Counter Attendants

  In this case the higher level of skill required for client service takes precedence over the simple food preparation tasks,
- Chefs and cooks who prepare more complex dishes and also provide direct service to clients should be classified as chefs or cooks.

Although the boundaries between these groups are relatively clear conceptually, it may be more difficult in practice to establish national rules on how to classify particular jobs based on limited information, such as the occupation title and a short task description. Occupation titles like “chef” and “head cook” may generally be coded with confidence to Unit Group 3434: Chefs. The term “cook” without further qualification or information would generally be coded to 5120: Cooks.

When the type of food cooked is specified it may be necessary to consider the cooking process used and whether, in the national context, such items are generally cooked according to a simple predefined process. For example, occupation titles such as “hamburger cook” would generally be coded to Unit Group 9411: Fast Food Preparers. In many cases information about the employer may be helpful in determining the most appropriate code. For example, it may be appropriate to consider “cooks” employed by certain well-known fast food chains, specializing in hamburgers or fried chicken, as fast food preparers.

Those cooks who specialize in preparing dishes according to a particular traditional national or regional cuisine and generally prepare a wide range of dishes should be classified in Unit Group 5120: Cooks, even if the food is served in a fast food or take-away outlet, or from a food truck, stall, or similar facility.

2.4.5. Domestic housekeepers, domestic cleaners, and bed and breakfast operators

Domestic Housekeepers, classified in Unit Group 5152, and Domestic Cleaners and Helpers, classified in Unit Group 9111, have a number of tasks in common. The key difference is that domestic housekeepers take responsibility for the organization and supervision of housekeeping functions in private households, as well as carrying out some or all of the functions of domestic cleaners and helpers. Domestic cleaners and helpers, on the other hand, work under the supervision either of a person employed as a domestic housekeeper or of a member of the household who takes responsibility for the organization of housekeeping functions.

In line with the general principles applying to owner-operators of businesses, operators of small guest houses, bed and breakfast operators and others providing overnight accommodation in a private dwelling are also classified Unit Group 5152 Domestic Housekeepers, unless the tasks performed are primarily managerial, in

which case they should be classified in Unit Group 1411, Hotel Managers. In some countries there may be an interest in identifying this group separately from those working in private households.

2.4.6. Nursing and midwifery

Occupations whose titles contain the word “nurse” or “nursing” may be found in ISCO-08 Unit Groups 2221: Nursing Professionals and 3221: Nursing Associate Professionals, as well as in Minor Group 532: Personal Care Workers in Health Services.

Nursing professionals assume responsibility for the planning and management of the care of patients, working autonomously or in teams with medical doctors and others. Nursing associate professionals provide basic nursing and personal care and generally work under the supervision or in support of medical, nursing or other health professionals. Personal care workers provide personal care and assistance with mobility and activities of daily living but do not provide nursing care beyond assisting patients with oral medications and changing dressings. However, not all of these nursing roles exist in all countries.

Historically, nursing professionals were educated through hospital-based training programmes typically lasting about three years and leading to the award of a diploma. In some countries these training programmes and qualifications have been replaced by degrees in nursing awarded by universities and other higher education institutions. Nursing associate professionals receive a shorter period of hospital-based or vocational education and training. Care should be taken in using information on the qualifications required for employment in nursing jobs in the country, or held by employed nurses, in mapping national job titles to the ISCO-08 groups related to nursing. Some nurses qualified through hospital-based training may be highly experienced and hold senior positions and supervise the work of more recently qualified nurses holding university degrees.

Occupational titles such as “nursing sister”, “registered nurse”, “charge nurse”, “enrolled nurse”, “assistant nurse”, “nursing assistant”, “auxiliary nurse” and “nurse aide” need to be mapped to the appropriate ISCO-08 unit group or minor group, based on the usage of these terms in the national context. Although some of these occupation titles are listed in the ISCO-08 group definitions and index, the scope of practice for such titles may vary between countries and within countries over time. It is necessary, therefore, to consider the tasks that workers in jobs with these titles are competent or authorized to perform in the national context, and to compare these tasks with those listed in the ISCO-08 group definitions, in order to determine where in the classification each title will be classified; and what categories need to be included in the national classification.

2.5. Boundaries between occupational groups in agriculture, forestry and fisheries

In classifying occupations in agriculture, forestry and fisheries, particular attention should be paid to the boundaries between the following groups provided in ISCO-08:

- agricultural production managers, classified in Minor Group 131: Production Managers in Agriculture, Forestry and Fisheries, and farmers and farm managers, classified in Sub-Major Group 61, Market-oriented Skilled Agricultural Workers;
- mixed producers of both crops and animals, and specialist producers of crops or animals;
- occupations classified in Sub-major Group 63: Subsistence Farmers, Fishers, Hunters and Gatherers and those classified in the “market-oriented” Sub-major Groups 61 and 62;
- skilled agricultural, forestry and fishery workers classified in Major Group 6 and labourers, classified in Major Group 9: Elementary Occupations;
- skilled farm workers, who normally operate a variety of types of farm machinery among other tasks and duties, and workers who specialize in the operation of agricultural machinery classified in Unit Group 8341, Mobile Plant and Machinery Operators.

It is essential for the accurate classification and coding of data on agricultural occupations to understand how the occupations and job titles that exist in the country relate to the boundaries between these groups. It may be necessary to consider the way in which agricultural production is organized at the national level, as well as the use of occupational titles in the national context, in order to develop suitable national approaches. These issues may impact on both procedures for coding occupational data as well as on the classification structure, especially if there is a need for more detailed categories than those included in ISCO-08.

2.5.1. Agricultural production managers, farmers, and farm managers

Minor Group 131: Production Managers in Agriculture, Forestry and Fisheries is restricted to those who manage production in large-scale agricultural, horticultural, forestry, aquaculture and fishery operations. Such operations would include large plantations, large ranches, collective farms and cooperatives. Typically, such enterprises have a hierarchy of managers, and the production manager reports to a managing director.

“Farmers” on the other hand generally own and operate their own farm. They perform a range of management tasks as well as tasks directly associated with agricultural production. Both farmers and farm managers (excluding the agricultural production managers mentioned in the previous paragraph) are classified in the appropriate unit group in Major Group 6: Skilled Agricultural, Forestry and Fishery Workers, depending on the type of farm they operate.

Whilst the distinction between these two groups is conceptually quite straightforward, it may be difficult, in practice, to determine whether a job with an occupation title like “farm manager” should be classified in Major Group 1 or Major Group 6. Such terms may most commonly be used in situations where the owner of a farm has engaged an employee to operate the farm. This employee effectively performs the same tasks as a farmer who owns and operates the farm and should be classified in Major Group 6. The distinction between the farmer and farm manager in such cases is primarily a function of status in employment (ILO, 2018) rather than occupation, defined in terms of the type of work performed, and is not generally relevant for assigning the most appropriate ISCO-08 code to information about specific jobs. (See Managers, supervisors, and operators of businesses).

There may be cases, however, where occupation titles such as “farm manager”, “plantation manager” and “ranch manager” may refer to the management of production in large-scale enterprises with hierarchies of managers. When this is the case, it may be necessary to consider the way in which agricultural production is organized at the national level, as well as the use of occupational titles in the national context, in order to develop suitable national approaches to the coding of such occupation titles.

2.5.2. Mixed and specialist crop and animal producers

The notes provided with the definition of Unit Group 6130: Mixed Crop and Animal Producers in ISCO-08, state that agricultural workers whose tasks predominantly involve either raising animals or growing crops, but also involve some incidental activity in crop growing or tending animals, respectively, should not be included there. In statistical collections the boundaries between mixed producers and specialist producers may, however, pose some problems.

In some cases, the occupation title used will be sufficient. For example, if the response to a survey question on occupation stated that someone was a “fruit and vegetable grower” or a “shepherd”, it should not be necessary to seek additional evidence. In many cases information about the main tasks performed will also provide satisfactory evidence. For example, a “farmer” whose main tasks are “raising sheep and growing wheat” or “operating a livestock and wheat farm” would be coded to Unit Group 6130: Mixed Crop and Animal Producers.

If information about the occupation title and tasks performed is inconclusive, information about the kind of economic activity (industry) of the establishment in which the person is employed may be helpful – but should be treated with caution. For example, it would be reasonable to assume that a skilled farm worker on a livestock farm should be classified to Unit Group 6121: Livestock and Dairy Producers. It is possible, however, that some

individual workers on mixed farms may specialize in either animal production or crop production. Mixed farms may, for example, employ both shepherds and tree pruners.

Particular care needs to be taken when using coded information on the kind of economic activity of agricultural establishments to help assign occupation codes for workers. This is because precedence rules used to determine the predominant activity, for the purposes of economic statistics, may not be compatible with the purposes of an occupation classification based on the kind of work performed, defined in terms of skill requirements. For example, the International Standard Industrial Classification of All Economic Activities (ISIC Rev. 4) specifies that "if either production of crops or animals in a given unit exceeds 66 per cent or more of standard gross margins, the combined activity should not be included" in Class 0150: Mixed Farming but allocated to crop or animal farming (UN, 2008, p. 72). Workers who specialize in crop or animal farming may thus be employed on mixed farms that have been classified to ISIC categories associated with crop or animal production.

Information about economic activity of the establishment should not normally take precedence over information given about occupation title and tasks performed in the job. The important point is that the skills required for performance in the job are the main consideration in determining the most appropriate occupation code. Thus, if skills associated with both animal raising and crop production are essential requirements, then the job should be classified as mixed crop and animal production.

2.5.3. Market-oriented and subsistence workers

ISCO-08 Major Group 6, Skilled Agricultural, Forestry and Fishery Workers, is divided into the following sub-major groups:

61 Market-oriented Skilled Agricultural Workers
62 Market-oriented Skilled Forestry, Fishery and Hunting Workers
63 Subsistence Farmers, Fishers, Hunters and Gatherers

Workers should be classified in ISCO-08 Sub-major Group 63: Subsistence Farmers, Fishers, Hunters and Gatherers, if the main aim of production is to provide food, shelter, and other goods for consumption by members of the worker's own household.

When ISCO-08 was developed the international standards for employment statistics (ILO, 1982) considered workers engaged in the production of goods for own or household consumption, including subsistence workers, to be in employment. In October 2013, the 19th ICLS Resolution concerning statistics of work, employment and labour underutilization excluded subsistence activity from employment. According to this resolution subsistence workers are now counted in a different form of work - own-use production work. Persons in own-use production work are defined as "all those of working age who, during a short reference period, performed any activity to produce goods or provide services for own final use". "For own final use" is interpreted as production where the intended destination of the output is *mainly* for final use by the producer in the form of capital formation, or final consumption by household members, or by family members living in other households. (ILO 2013).

In most cases of subsistence activity, some goods are sold to provide a minimum of cash income. Even if a large surplus is produced, and more goods are sold than consumed, when the main aim of production was for own consumption, these work activities should nevertheless be classified in Sub-major Group 63. Activities should only be classified as jobs market-oriented agricultural forestry, fishery or hunting if the main aim of the activity was to produce goods for the market.

In statistical collections that collect data on own-use production work in accordance with the 19th ICLS standards, subsistence activities may be identified through a module or set of questions on own-account Agricultural Work and destination of production, as suggested in the ILO model LFS questionnaires. If these work activities are classified by occupation, they should not be coded to either of the two ISCO-08 market-oriented sub-major groups

for agricultural forestry and fisheries workers.[13] Work activities in own-use foodstuff production would mainly be classified in one of the categories of ISCO-08 Sub-major Group 63: Subsistence Farmers, Fishers, Hunters and Gatherers, or in some cases in Sub-major Group 92: Agricultural, Forestry and Fishery Labourers.

However, there may not be a need to classify work activities in own-use production work to the national occupation classification, as many of the categories would not be relevant or used. Indeed, the ILO model LFS questionnaires provides fields for the International Standard Industrial Classification (ISIC) codes but not for ISCO codes. If work activities in own-use production work are not classified by occupation, there may be no need to retain a category for subsistence farmers, fishers, hunters and gatherers, in the national occupation classification. Similarly, in some (mainly industrialized) countries, subsistence farming may be rare or even non-existent, in which case there would be no need to include a group for subsistence activities in national adaptations of ISCO-08. In many countries, however, subsistence farming represents a large share of economic activity, and the distinction between market-oriented and subsistence activity may be important for a wide range of purposes associated with social, economic, and labour market policies.

If labour statistics in these countries continue to be compiled according to the superseded standards adopted at the 13th ICLS (ILO 1982), it will therefore be important to identify subsistence farmers, fishers, hunters and gatherers separately from those working in market-oriented activities. If separate job titles are used for subsistence workers and market-oriented workers, these titles should be included in the national index of occupation titles, along with the appropriate classification codes. Where this is not the case, it is unlikely that information about the tasks performed would provide sufficient information to reliably identify subsistence workers, as they have many tasks in common with market-oriented workers. It may be necessary, therefore, to consider an additional question asking whether or not production is mainly for sale or mainly for own or family/household use. This question may be asked in the context of other questions on occupation (title and tasks) or in association with questions on economic activity and status in employment.

Various approaches to identifying own-use production work in agriculture, forestry and fishery are proposed in the ILO Model LFS Questionnaires, depending on the questionnaire structure chosen. For example, the following question is asked in the Model LFS – Agriculture work start:

▶ Box 2.1 ILO Model LFS question on own-use production work in agriculture and fishing

AWD_2	Are the (farming, animal [and/or fishing]) products that (you/NAME) (are/is) working on intended...?	
	READ AND MARK ONE	
	Only for sale	01☐
	Mainly for sale	02☐
	Mainly for family use	03☐
	Only for family use	04☐
	DO NOT READ	
	CANNOT SAY	05☐

ILO Model LFS questionnaire- Agriculture work start

2.5.4. Skilled farm workers and farm labourers

Workers in Sub-major Group 92: Agricultural, Forestry and Fishery Labourers perform a limited range of simple and routine manual tasks requiring limited training or experience. Those classified in Major Group 6: Skilled Agricultural, Forestry and Fishery Workers, generally perform a wide range of tasks, typically involving skills

[13] Sub-major Groups 61: Market-oriented Skilled Agricultural Workers; and 62: Market-oriented Skilled Forestry, Fishery and Hunting Workers

acquired through considerable experience and/or training. It should be noted that routine manual tasks may involve the use of mechanized hand-held tools, for which limited training is required.

In some cases, the occupation title alone may be sufficient to distinguish between skilled and elementary farm workers. For example, occupation titles where the key noun is “farmer”, “grower”, “shepherd”, “pruner”, or “shearer” would all indicate occupations that involve the performance of a wide range of tasks, or highly specialized skills requiring considerable training or experience, and are classified in Major Group 6. Similarly, occupation titles such as “farm labourer”, “fruit picker” or “cane cutter” would indicate routine or repetitive tasks requiring limited training or initiative.

Occupation titles such as “farm worker” or “farm hand”, however, may require more consideration, as they refer to the fact that the worker is an employee on a farm, rather than to the level of skill or responsibility required. In such cases it is necessary to consider the use of terminology in the national context and in particular agricultural settings. For example, the term “stock hand” may be used in some countries to refer to a worker who looks after the care and well-being of animals on a livestock farm, classified in Unit Group 6121: Livestock and Dairy Producers. An “orchard hand”, however, may be more likely to refer to someone who picks fruit and performs other routine manual tasks than to someone who prunes trees, checks crops for disease and ensures that fruit-bearing trees are healthy and productive.

The combination of occupation title with task information or other qualifying information may therefore be useful. For example, a “dairy farm worker” who milks cows should be classified in Unit Group 6121: Livestock and Dairy Producers, whilst a “dairy farm hand” who cleans animal enclosures should be classified in Unit Group 9212: Livestock Farm Labourers. Where a combination of tasks is performed including some that involve higher skills or initiative, then Major Group 6 would be more appropriate.

It is also important to note that some elementary occupations that commonly occur in rural or farm settings also occur in non-agricultural settings and do not require direct involvement with animals or crops. Such occupations are classified in relevant groups outside Sub-major Group 92: Agricultural, Forestry and Fishery Labourers. For example, ditch digging labourers are classified in Unit Group 9312: Civil Engineering Labourers, and water carriers are classified in Unit Group 9624: Water and Firewood Collectors.

2.5.5. Operation of farm and forestry machinery

Many skilled agricultural and forestry workers operate specialized machinery such as tractors and drive motorized vehicles as part of their normal duties. Jobs that require operation of machinery combined with a range of other skilled farm work are classified in Major Group 6. Workers such as harvester operators, who specialize in the operation of machinery but may perform other farm or forestry duties, incidentally, should be classified in the appropriate unit group for the type of machinery operated. In most cases this would be Unit Group 8341: Mobile Farm and Forestry Plant Operators.

2.6. Armed forces occupations

There are varied national practices concerning the classification by occupation of members of the armed forces. Many jobs performed by members of the armed forces are similar, in terms of the nature of the work performed, to civilian occupations such as medical doctors, radio operators, cooks, secretaries and heavy truck drivers. Conceptually, and from the perspective of labour market analysis on work force mobility between the military and civilian employment, it may be useful and appropriate, therefore, to classify these jobs along with the equivalent civilian jobs. This approach is adopted in several national occupation classifications. Typically, such classifications also identify a number of military-specific occupational groups. (ILO 2012, 357).

For example, the Canadian NOC 2021 includes four separate unit groups at different skill levels for members of the armed forces:

- Commissioned officers of the Canadian Armed Forces (40042)
- Specialized members of the Canadian Armed Forces (42102)
- Operations members of the Canadian Armed Forces (43204)
- Primary combat members of the Canadian Armed Forces (44200)

In many countries, however, it is not possible to collect information on the nature of the work performed by members of the armed forces and all have to be classified together. It is mainly for this reason that ISCO-08 provides a separate Major Group 0, Armed Forces Occupations, even though there is a great variety in the nature of the work performed, and the skills required in jobs held by members of the armed forces. This group is further subdivided into three sub-major groups depending on the level of seniority of the armed forces member, as follows:

01 Commissioned Armed Forces Officers
02 Non-commissioned Armed Forces Officers
03 Armed Forces Occupations, Other Ranks

These sub-major groups are not further disaggregated, which gives countries the opportunity to create more detailed categories for national use if so desired. To code jobs in national armed forces to these three categories it will be necessary to map national military ranks and job titles to them based on the descriptions and examples provided in the ISCO-08 group definitions.

The description of Major Group 0, Armed Forces Occupations states that it "incudes all jobs held by members of the armed forces" who are defined as:

> … those personnel who are currently serving in the armed forces, including auxiliary services, whether on a voluntary or compulsory basis, and who are not free to accept civilian employment and are subject to military discipline. Included are regular members of the army, navy, air force and other military services, as well as conscripts enrolled for military training or other service for a specified period.

Members of "other military services" would include members of official services such as special forces and official militias. They would also include members of unofficial military groups such as mercenaries, guerrillas and members of non-government militias.

Jobs held by persons in civilian employment of government establishments concerned with defence issues are excluded. Jobs held in non-military services which may be armed such as police, prison, customs, and border services are also excluded, as are security guards. Many of the jobs in these services are classified in one of the unit groups in Sub-major Group 54, Protective Service Workers. Military police and other workers in protective services that are formally part of the military, however, should be classified in Major Group 0, Armed Forces Occupations.

In adapting ISCO-08 for national use there may be a need to consider the relevance in the national context of a separate major group for the armed forces. If such a group is retained in the national classification, it would be necessary to decide whether it should be limited to core military personnel who are mainly engaged directly in activities related to combat, or readiness for combat. If it is restricted to these core military personnel, jobs held by members of military services that have equivalents in civil life would be classified together with the civilian equivalent.

In summary, there are three broad options for the classification of military personnel in adapting ISCO-08 for national use, as described below:

- Retain a major group for armed forces occupations and include all members of the armed forces in that group, as in ISCO-08

- Retain a separate group for military or armed forces occupations but restrict the scope of that group to specific occupations defined as those directly involved in activities related to military command, combat or readiness for combat. Other types of job would be classified in the same unit groups as equivalent civilian occupations.
- Classify all jobs in the armed forces based on the nature of the work performed together with equivalent civilian occupations and create one or more separate categories for specifically military occupations at a detailed level of the classification. Some of these occupations might be included in sub-major group 54 Protective Services Occupations, while those involved in military command or requiring high levels of technical skills would need to be classified in other parts of the classification.

A decision on which of these broad approaches to adopt, and which occupational groups should be separately identified, will depend on assessment of:

- the needs of users of occupational information, including military and other government agencies concerned with defence, and
- the feasibility and legality of collecting and disseminating information about the nature of work performed by members of the armed forces.

For the purposes of international reporting according to ISCO-08 any groups in the national classification that are specifically for members of armed forces should be mapped to the relevant category in ISCO-08 Major Group 0, Armed Forces Occupations. Jobs in the armed forces that are classified in the same detailed groups as their civilian equivalents, however, could not be assigned to ISCO-08 Major Group 0 in a correspondence table. This would have a small impact on comparability of data for most occupational groups, but the impact would be significant for ISCO-08 Major Group 0. If source data are dual-coded to both the national classification and ISCO-08, however, it could be possible to assign codes for ISCO-08 Major Group 0 if the job titles used are unique to the armed forces.

2.7. The need for detailed categories at the national level

There has been a demand by some countries for more detailed categories than those provided in ISCO-08, such as in the case of the health workforce or ICT occupations, or engineers among others.

For example, some countries wish to cater to more detailed categories, such as is the case with Unit Group 2212, Specialist Medical Practitioners. In the case of Nursing and Midwifery occupations, it may be relevant for some countries to identify qualified associate professional midwives separately from uncertified traditional midwives or provide detailed categories for nursing occupations. An updated and expanded set of categories was provided in ISCO-08 for occupations involved in the provision of goods and services in information and communications technology (ICT). However, the occupational structures and skill requirements in the ICT labour market continue to evolve and remain fluid. There may, therefore, be a need to assess the suitability of the ISCO-08 categories pertaining to ICT when adapting ISCO-08 for national use and provide relevant, detailed categories that are frequent at the national level. There might be other areas where countries may wish to have detailed categories within their NOC, such as in the case of traditional handicraft occupations, as these occupations are often unique within a country or region and may need to be separately identified and recognized in the national occupation classification. Any work of this sort should be guided by national needs and circumstances.

One way to achieve this in a national classification would be to split a specific unit group or groups into several groups to provide further detail to reflect a national situation or need. Another approach that would avoid the creation of groups that may be difficult to measure in sample surveys due to small numbers would be to identify these groups or more detailed groups at a fifth level. (Additional details are provided in Section 4.2).

References used in this module

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3. The process of adapting ISCO-08 for national use

This module describes the process of adapting ISCO-08 for national use. It provides concrete guidance on stakeholder consultation and engagement, the roles and responsibilities of different agencies, project governance and planning and managing the work. It also describes the possible approaches to adopting or adapting ISCO-08 for national needs, along with the needed time frame.

3.1. The need for stakeholder engagement

Fundamental requirements for a national occupation classification are that it meets user needs, and that it is up-to-date and relevant to the realities of the contemporary labour market, while being sufficiently robust to allow for the production of statistics over time without introducing unnecessary breaks in series (See Section 1.3). This requires close engagement and consultation with users of the classification. When a national classification of occupations is to be developed or updated, whether or not the classification is an adaptation of ISCO-08, it is therefore essential to establish arrangements to involve key stakeholders in the work, and to consult with the full range of users of the classification, and to establish arrangements for the governance, planning and funding of the work.

Adequate stakeholder engagement is needed to ensure that the classification:

- can be used to compile statistics and other information classified by occupation that are relevant and useful to inform national labour market, social and economic policy concerns
- is up-to-date and reflects the contemporary realities of the national labour market
- is feasible for use in the classification of data on occupation collected in both statistical surveys and the administrative and operational activities of relevant agencies
- is useful for relevant operational and administrative purposes such as matching jobseekers with job vacancies, managing employment-related migration, and managing and planning vocational educational and training programmes.

Users of the classification fall into several distinct groups:

- those who will use it to collect data and compile statistics
- those who will use it in operational activities such as matching jobseekers with job vacancies, careers advice, development of vocational education and training programmes, and managing employment related migration and
- users of the resulting statistics and information.

The first two groups of users have a major stake in the project to develop or update a national occupation classification, as they will need to implement it in their operational activities. The main government agencies responsible for these activities need to be involved in the project, as they have input to the development work.

Close collaboration between the agencies concerned is essential in developing or revising the NOC to ensure that the needs of each agency are taken into consideration and that each agency is able and willing to use the classification in its own activities. Ongoing coordination and collaboration between agencies is also essential in the implementation, maintenance, and revision of the classification. This is especially the case if some elements are to be updated on a dynamic basis in between major revisions, as there is a risk that agencies will develop different and potentially conflicting solutions, for example, in determining how to deal with new and emerging occupations.

In addition to these key stakeholders who use an occupation classification in their operations, input is also needed from the main users of statistics and other information classified by occupation. This is essential to

ensure that major policy concerns requiring occupational information are identified and reflected in the new or revised national occupation classification.

Additional stakeholders who may not be expert users of the classification itself include workers, jobseekers, those seeking to develop their skills through vocational education and training, and employers wishing to recruit skilled workers. Input from these additional stakeholders can be provided to a certain extent through workers' and employers' representatives nominated by their peak bodies. Professional associations for specific occupational groups, as well as employer bodies in specific industries also have a special interest in ensuring that the occupations of interest to them are appropriately represented and can be a useful source of information.

All these groups of users and stakeholders can provide important information not only about their needs as users of the classification and data compiled according to it, but also about the detail, skill content, and changing nature of occupations that currently exist in the country. Managing the wide range of inputs received from the various types of stakeholders may be challenging, however. It may at times be difficult to accommodate the competing needs and interests of different stakeholders. The desire of some professional associations to have separate categories for the occupational groups they represent may be difficult to reconcile with broader considerations in the design of the classification, such as statistical balance and the need to keep the number of categories and volume of documentation to manageable levels.

3.2. Governance arrangements

Bearing in mind the wide range of stakeholders and inputs to the work that can be expected, the arrangements for governance and planning of the work will need to define:

- the roles and responsibilities of the different agencies contributing to the work
- the methods for consultation with stakeholders
- the mechanism for reconciliation and resolution of conflicting requirements and views
- the procedure for final approval and adoption of the classification as the national standard for information on occupation.

The specific mechanisms and arrangements adopted will depend on national circumstances, such as the number of agencies contributing to the work, sources of funding, and the types of arrangements that usually exist in the country for collaboration between government agencies. A recommended approach that has been used successfully in some countries is to establish both a steering committee (or similar arrangement), and a technical committee or working group, in addition to the project team responsible for driving and carrying out the work.

The functions of a **steering committee** would generally be to establish sources of funding and budgets, to approve workplans and agree on the roles and responsibilities of the different agencies contributing to the work. It would make key decisions on the direction and scope of the project, review plans for implementation, and resolve any major issues that cannot be resolved within the technical committee or working group. The members of the steering committee would generally be relatively senior technical officials (such as the heads of technical or subject matter divisions) from at least the main government agencies contributing funds or significant other resources to the work, and potentially also from other agencies whose activities and operations are expected to be impacted by the implementation of the new classification.

The functions of a **technical committee** or working group would be to advise and assist the project team and steering committee on technical issues, on potential sources of information and on the operational and analytical requirements of the agencies expected to use the classification and data classified to it. Its members would generally include users and developers of the classification at the operational or expert level from key agencies that will use it for operational purposes, such as in the compilation of statistics and matching jobseekers with job vacancies. It would also include selected users of occupational information from research institutions, government agencies involved in labour market and occupational analysis, and from peak workers' and employers' organizations.

The functions of the **project team** are to drive and carry out the work, including the development and adaptation of workplans, consulting with users and stakeholders, organizing meetings of committees and working groups, undertaking research, building the classification structure, drafting and editing definitions of groups, coordinating testing and implementation plans, and developing coding materials and procedures, including a coding index and the correspondence table (or crosswalk) between the various versions of the classification. The members of the project team will usually be staff from the agency or agencies designated as custodian of the classification but may also include staff from other agencies contributing to the work, or external consultants engaged to support the project team with elements of the work. When this is the case, there will need to be clarity on leadership, responsibilities, and decision-making within the team.

A division of labour between agencies may frequently be necessary, due to both the volume and nature of the work to be carried out. For example, the national statistical office has an interest in ensuring that the classification categories are mutually exclusive, jointly exhaustive, and can be used to produce statistical information that is meaningful and useful for users of the statistics. It will therefore be concerned primarily with developing the classification structure and tools for its implementation in statistical collections, including the coding index, and could be expected to have the expertise required to undertake the necessary testing and analysis. The national statistical office will also want to ensure that the scope of each category is clearly defined, without overlapping with other categories at the same level. However, it may not have an interest in, or the expertise needed to develop detailed statements of the tasks performed by workers in each group, or of the specific skills required to perform these. This is more the domain of employment services and ministries of labour where information about tasks performed and skills required will be used to match jobseekers with job vacancies, in occupational analysis, and to identify skill shortages.

One possible approach, therefore, is that the statistical office takes prime responsibility to develop the classification structure and implementation tools, while the Ministry of Labour, or national employment service takes responsibility for the development of detailed definitional material, task statements, and other materials relevant for employment services and occupational analysis. If this is the case, however, it is essential to ensure that the individuals working on the classification can function as a single project team. Sharing of information within the project team on the content of the definitional material and coding materials is critically important to ensure that the agencies concerned agree on where specific detailed occupations and job titles are classified.

3.3. User consultations

Several rounds of consultations with users should be envisaged during the development or revision of a national occupation classification. These consultations should not be restricted to the key stakeholder agencies that will use the classification in their operations. They should also involve users of information classified by occupation in research institutions, government departments, the workers' and employers' organizations, and professional and industrial associations. This is needed to ensure that all the issues that need to be addressed are identified, and that the classification as developed is useful to address these issues.

A consultation schedule could be prepared and communicated ahead of time to relevant stakeholders and/or to the public and could also provide information about the global revision time plan. The consultation schedule could contain a list of topics to be addressed or areas of the classification to be revised. General guidance on how collected feedback could be treated, communicated or discussed with key stakeholders involved in the various rounds of consultations. (See example from Australia).

A first round of consultation with this wider group should identify relevant policy concerns, gather insights about how information classified by occupation is used in the country, identify issues with classifications that are currently used (and/or with ISCO-08) and seek comments and advice on proposed solutions to known problems. This type of consultation can be conducted by circulating or publishing a discussion paper describing the project, the known issues being addressed, and the proposed solutions to these issues along with a questionnaire inviting users and stakeholder to comment on these issues and provide additional information. Online platforms and

either face-to-face or online workshops are also a convenient and useful way to obtain the information needed and to promote discussion, once a discussion paper summarizing the issues has been circulated. (See an example of the consultations related to the revision of the UK SOC 2010).

Further consultations with the wider group of users should seek input on how well the proposed new or updated classification addresses the issues that have been identified and meets the needs of users. At a minimum, this should include circulating a draft of the new or revised classification structure for comment, together with an explanation of changes that have been made to previously used classifications, and of the differences between the new draft and ISCO-08. (See example on the Summary of changes from the Canadian NOC 2016 Version 1.3 to NOC 2021 Version 1.0). Comments should also be sought on the underlying conceptual model and the way it is applied, especially if significant departures from previously used classifications or from ISCO-08 are proposed. Depending on the extent of change proposed, and the time and resources available, this could be a single round of consultations or several rounds.

As the classification is developed, consultation with stakeholders with a special interest in specific areas of the classification are also likely to be necessary. This type of consultation is needed to obtain detailed information on the occupations and job titles used, for example in areas such as heath and teaching, and on how these occupations should be classified. Professional associations and industry associations, as well as agencies involved in vocational education and training, may also provide useful detail on the nature of the tasks preformed in particular occupations and the type of required skills to perform the work, that will be relevant for defining new groups and for adapting ISCO-08 and existing NOC group definitions to reflect up-to-date national realities. This type of consultation need not necessarily be undertaken for all areas of the classification. It should target areas of the classification that are proposed to differ from previously used classifications, or ISCO-08. These consultations should therefore focus primarily on emerging and new occupations, and on national specificities with respect to the occupations that exist, job titles used, the tasks performed, and the skills and knowledge required.

3.4. Planning the work to update or develop a national occupation classification

3.4.1. Project initiation

Once a need to develop or update a national classification has been established, it is essential to seek input from the key stakeholder agencies that need to use an occupation classification in their activities. This initial consultation is effectively part of the project initiation and should identify each agency's operational and analytical needs and the issues they consider need to be addressed, as well as their capacity and interest in contributing to the work. See for example, the case to update the US SOC regarding the "Input Requested by the SOC Policy Committee". A technical committee or working group, as suggested in the section on governance arrangements, can provide a good means to obtain this information. Ongoing input from the key stakeholder agencies should be obtained throughout the project, through regular consultation with such a group and through the direct involvement of its members in the work.

Following initial consultation with key stakeholders, it will be possible to develop at least a preliminary work plan and timetable for the work, identify sources of funding as well as available and required human resources, and establish a budget. The roles and responsibilities of the stakeholder agencies should be defined in the workplan. Each agency should be committed to the workplan and to implementing the new classification their operations. It should be foreseen, however, that modifications to the workplan may be necessary as the work progresses, especially if new issues or requirements are identified in consultations with the wider body of users of statistics and other information classified by occupation.

An important element in the early stages of planning the development or updating of a national occupation classification is the identification and evaluation of the available sources of information about the occupations

and job titles that exist in the country. In general, there is no need to conduct a new survey only for the purpose of updating a classification. [14]

▶ Box 3.1 Key elements to be considered in the workplan to update or revise a NOC

- Consultations with users and stakeholders
- The financial and human resources needed and available
- Defining the principles to be used to allocate occupations to categories and to arrange them into broader groups
- Identifying and analysing available information about the occupations that exist in the country, and assessing the extent to which these occupations are adequately covered in ISCO-08, and/or in the current version of the national classification
- Developing and validating the different components of the classification, including:
  - the classification structure
  - descriptive definitions of each of the categories in the classification
  - the coding index and coding procedures
  - mapping to previous versions of the classification and to ISCO-08 (if the classification is not or not fully based on ISCO-08)
- Developing the needed material for implementation, including methodological notes and guidance[15]
- Implementation schedule of the classification in the various operational activities of the agencies that will use the classification, in alignment with the planning for implementation of the classification in the various statistical and non-statistical activities.

To a large extent, the timetable for the work and the deadline for completion of the development work, will be dictated by the plans and required timeframe for the first implementation of the classification in a specific activity. The planning process should therefore start by planning the end stages of the workplan – that is implementation in specific activities in which the classification will be used, such as a census, a survey, or a system to be used in employment services. Planning for implementation of the classification in surveys and administrative activities, and for transition from previous classifications, should be integrated with the planning for the development of the classifications, and agreed with the agencies and organizational units expected to implement the new classification. Since the timing for surveys and especially censuses is not generally flexible, the deadline for completion of a useable classification is likely to be unmovable. The other activities in the workplan will need to be planned by working back from the implementation date, and identifying what elements need to be in place by when. (See example from the US 2018 SOC revision).

It is also important to consider, clarify, and plan the expected maintenance and update cycle for the national occupation classification (NOC). In many countries the revision cycle for the NOC is long (typically five to ten years in line with the population census). On the other hand, some countries have adopted an 'evergreening' approach for the maintenance of the NOC between major revisions, in which new categories can be created at the most detailed level of the classification, the titles and definitions of categories can be updated. See for example, the ANZSCO 2022 Australian update and the Canadian NOC update. In either case, communication with users and stakeholders about these plans is essential.

[14] The relevance of different potential sources of information is discussed Module 4.

[15] A checklist of possible content for the Introduction to a Statistical Classification is provided as Appendix 2 of the GSIM Statistical Classification Model.

3.4.2. Scenarios, approaches and timeframe for developing a national classification

The relative importance of the various activities included in the workplan, and the amount of work involved, will depend on the extent of adaptation of ISCO-08 to be undertaken, which may in turn be dependent on the time and resources available.

When countries wish to develop or update a national occupation based on, or related to ISCO-08, there are three broad approaches they may choose to follow:

1. adopt ISCO-08 for national use directly or with minimal change
2. adapt ISCO-08 to reflect national circumstances
3. review a national classification that is not based on ISCO-08, making adjustments and providing linkages to improve comparability with ISCO-08.

Whatever approach is taken to developing the NOC, the volume of work involved is significant, and requires careful planning and the allocation of suitable resources in all agencies involved.

3.4.2.1. Adopting ISCO-08 for national use directly or with minimal change

Where countries do not have the resources, capacity, time, or information needed to develop a national occupation classification designed to suit the country's specific needs and realities, there may be little choice other than to adopt ISCO-08 with minimal change. In this scenario, all categories in the national classification are the same as categories in ISCO-08.

This situation is less than ideal as the occupational structure of the work force varies greatly between countries. The provision of comprehensive labour market information at national level requires a national occupation classification that reflects the structure of the national labour market and provides data to inform national policy concerns. The ideal situation is that countries develop national classifications that are tailored to meet both national requirements and requirements for international reporting and comparability.

Significant work at national level is still required to adopt ISCO-08 directly in national surveys or censuses without changing the ISCO-08 structure. Questions and methods to collect occupational information may need to be developed and tested, even if they have previously been used in national surveys, their relevance for collecting data to be coded to ISCO-08 should be assessed. If the questions included in the ILO model LFS questionnaire are to be adopted, their usefulness in the national context should be assessed. To ensure that the questions used will elicit the types of information needed to distinguish between categories in ISCO-08, the responses to these questions from previous surveys or from survey pilot tests should be coded to ISCO-08.

The nature of the work that needs to be undertaken to adopt ISCO-08 directly is listed briefly below, it may vary according to various factors and is discussed in more detail where necessary in the relevant modules of the guide.

▶ Box 3.2 Checklist for adopting ISCO-08 for national use directly of with minimal change

- Identify national stakeholders and establish governance and consultation procedures and define the role of each party.
- If a suitable version of ISCO-08 is not already available in the national language (s) translate both the classification structure and the group definitions to the national language(s).
- Identify all classifications and lists of occupations currently or recently used by agencies in the country and determine whether those agencies are willing and able to adopt ISCO-08. If all agencies use the same classification, it allows data from different statistical and administrative data sources to be brought together and compared in a meaningful way.
  - If any classifications or lists of occupations are currently used in administrative or statistical operations in the country, it would be advisable to map them to ISCO-08 and these occupations should be included in a national index of occupational titles (coding index). If there are no existing occupation classifications or list, then this task will obviously not be required.
- Identify where occupational groups and job titles that exist at national level should be classified in ISCO-08.
  - For example, occupations in nursing may be classified in major groups 2, 3 or 5 depending on the nature of their responsibilities, which vary between countries. In some cases, occupations and job titles that exist at national level may not be listed in ISCO-08, either because they are specific to the country or region or have emerged since ISCO-08 was adopted in 2008. In these cases, it would be useful to determine where in ISCO-08 these occupations have been included in other national or regional classifications based on ISCO-08.
- Develop and maintain a national index of occupational titles (a coding index).
  - When ISCO-08 is used directly, it may be possible to adapt the ISCO-08 index of occupational titles for national use so as to reflect the terms used to describe occupations in the country. Attempting to use the ISCO-08 index directly and without adaptation could result in high rates of error and low coding rates, as these terms may vary significantly from those used in the ISCO-08 index. The job titles that exist in the country need to be mapped to ISCO-08 and included in a national index of occupational titles. Developing this index or adapting the ISCO-08 index for national use, will be the most time-consuming part of the work when ISCO-08 is adopted directly for national use. (See Module 5).
- If need be and if resources are available, amend existing group descriptions to reflect any relevant specific national situation, such as describing tasks and duties related to specific national jobs (specific trades, or crafts, etc) or including nationally specific occupation titles among the lists of occupations included in each group.
- In all cases it is necessary to develop and test the procedures for implementation of the classification national data collections, including data collection methods, question design, coding procedures and guidelines and the presentation of statistical output.

Bearing these interrelated streams of work in mind, work on adopting ISCO-08 directly for national use should start **at least 12 months**, before the classification is intended to be used in data collection. The amount of time needed will vary depending on various factors – especially availability of resources. The work should be planned and scheduled as part of planning for the development of the data collection(s) in which the classification is to be used.

In adopting ISCO-08 directly, it is likely that there will be a need for more detail than provided in ISCO-08 for occupations that are common in the country, that are in high demand, or that are specific to the country or to a group of similar countries or for occupations that have emerged since the launch of ISCO-08. In other cases, the occupational groups provided in ISCO-08 may be more detailed than required at national level or some ISCO-08 categories might not be relevant in the national classification if the jobs concerned are not considered to exist in the country. If ISCO-08 categories are split or merged in the national classification, or if new categories are added or removed, then the steps outlined in the section on adapting ISCO to reflect national circumstances and needs should be followed to some degree, even if only a small number of changes to the ISCO-08 structure are made.

3.4.2.2. Adapting ISCO-08 to reflect national circumstances and needs

Where countries have the resources, capacity, time, or information needed, they can adapt ISCO-08 to suit national needs and realities. This is relevant when there is a need for more detail than provided in ISCO-08 for occupations that are common in the country, that are in high demand, or that are specific to the country or to a group of similar countries or for occupations that have emerged since the launch of ISCO-08. In some cases, the occupational groups provided in ISCO-08 may be more detailed than required at national level.

Significant work at national level is required to adapt ISCO-08 to reflect national needs. In-depth consultation with users and stakeholders is necessary to gain a comprehensive understanding of the needs of users of the classification for analytical and operational purposes in statistical, administrative and research activities. It also requires field work and/or desk research to identify the occupations that are important in the country. Questions and methods to collect occupational information may need to be developed and tested, even if they have previously been used in national surveys, their relevance for collecting data to be coded to ISCO-08 should be assessed. If the questions included in the ILO model LFS questionnaire are to be adopted, their usefulness in the national context should be assessed. To ensure that the questions used will elicit the types of information needed to distinguish between categories in ISCO-08, the responses to these questions from previous surveys or from survey pilot tests should be coded to ISCO-08.

Adapting ISCO-08 to reflect national requirements involves adjusting its structure and/or group definitions to reflect national realities and policy concerns, as well as accompanying material. It may include splitting some ISCO-08 groups to provide more detail for occupations that are important in the country, creation of new categories to reflect national realities and needs, and/or adding a fifth level in the hierarchical structure of the classification if there is a need for more detail across the occupational spectrum. If some occupational groups provided in ISCO-08 are more detailed than required at national level, it may be possible to merge some ISCO-08 unit groups or remove groups for occupations that are not thought to exist in the country.

There are two different types of situations in which ISCO-08 may be adapted for national use, depending on whether there is an existing national classification.

- When one or more existing occupation classifications are used in the country, each of these classifications will need to be mapped to ISCO-08, and ultimately to the new national classification. If existing national classifications are based on ISCO-88, the ISCO-88 to ISCO-08 correspondence table will be a useful tool. Countries can then identify which features of the existing classification(s) and of ISCO-08 they want to include in the new classification. The features from the existing classification that are to be retained can then be reflected within an overall framework based on ISCO-08.

- When there are no existing occupation classifications used in the country, the task of mapping the existing classifications to ISCO-08 will obviously not be required. However, the work involved in identifying the occupations that exist at national level and understanding the occupational make-up of the employed population may be more significant. If data on occupation have previously been classified directly to a version of ISCO, this may be of assistance. Records of previous censuses and labour force surveys and other relevant surveys should therefore be examined to identify what materials were used, and what statistics classified by occupation were produced. Partial lists of occupations used in activities such as employment services, issuance of work permits, vocational education and training and other activities are also potentially useful sources of information. If no useful information is available about the occupations that exist in the country, or if this information is very limited in scope or not recent enough, it may be preferable to initially adopt ISCO-08 directly in a national data collection as described in the above approach. The information obtained can subsequently be used as input to future work on adapting ISCO-08 for national use.

The nature of the work that needs to be undertaken to adapt ISCO-08 to reflect national needs is listed briefly below, it may vary according to various factors and is discussed in more detail where necessary in the relevant modules of the guide.

▶ Box 3.3 Checklist for adapting ISCO-08 to reflect national requirements

- Identify national stakeholders and establish governance and consultation procedures and define the role of each party.
- Identify all classifications and lists of occupations currently or recently used by agencies in the country for statistical or administrative purposes and determine whether those agencies are willing and able to adopt a national classification based on ISCO-08. If any classifications or lists of occupations are currently used in administrative or statistical operations in the country, it would be advisable to map them to ISCO-08. For national classifications based on ISCO-88, the ISCO-88 to ISCO-08 correspondence table will be a useful tool.
- Identify additional recent and relevant sources of information about occupations in the country, such as data from recent censuses, Labour Force Survey or other (nationally) representative household surveys, databases of job vacancies, information from placement agencies, information from employer's organizations, etc.
- If a version of ISCO-08 is not already available in the national language(s) it will be necessary to translate both the classification structure (name of categories) and the group definitions to the national language(s). If developers of the classification are able to work in both languages involved, it may be preferable to translate only the ISCO-08 structure in the first instance, and to translate definitions of the ISCO-08 categories to be used in the new classification as part of the development of group definitions.
- Decide on and document the principles to be used to arrange occupations into groups: Will the ISCO-08 principles be adopted directly? Are modifications needed to reflect national circumstances?
- Identify what features of existing national classification(s) and ISCO-08 are to be retained or not to create a model classification structure based on ISCO-08.
- Identify occupations and job titles that exist in the country but are not covered or separately identified in ISCO-08.
- Identify where occupational groups and job titles that exist at national level should be classified in ISCO-08.
    - For example, occupations in nursing may be classified in major groups 2, 3 or 5 depending on the nature of their responsibilities, which vary between countries. Occupations that exist at national level may not be listed in ISCO-08, either because they are specific to the country or region or have emerged since ISCO was adopted in 2008. This is essentially a part of mapping existing classifications to ISCO-08 but is also needed for new and emerging occupations that are not included in existing classifications.
- Collapse ISCO-08 categories that are too detailed for national requirements, for example by making a minor group into a unit group or by merging two or more unit groups.
- Create more detailed categories where needed to reflect the national labour market and user requirements, for example by adapting the 4th level of ISCO-08 or creating a 5th level or by splitting existing ISCO-08 categories to provide further detailed categories.
- Decide at what level of ISCO-08 to provide internationally comparable data (E.g., 3 or 4 digits).
- Discuss and agree on modifications with key and relevant stakeholders as described in the sections on planning the work to update or develop a national occupation classification and stakeholder involvement.
    - This is a critical step that is needed to confirm that the proposed modifications adequately reflect user needs. If it does not take place before the remaining steps, it will result in reworking of these steps to reflect revisions to the classification structure. Some elements of the steps listed below may nevertheless be required at this stage, such as preparing draft definitions of proposed new categories, so that stakeholders can understand what is being proposed.

- Develop or update a national index of occupation titles (coding index) containing the new classification codes and ideally the old national classification and ISCO-08 codes.
- If the index is to be used to code to the new and old national classifications and ISCO-08 then there would be a need for three sets of codes. If there is more than one previously used national classification, there may need to be additional code sets.
  - Alternatively, the index may include codes for the new national classification only, and data coded to it can be mapped to other classifications using correspondence tables. However, this type of mapping will be less accurate and may require estimation procedures if there are many-to-one correspondences between the national classification and the target classification. (See Module 6)
  - If a national index already exists it should be mapped to the revised classification and extended if necessary.
  - The ISCO-08 index can be adapted for national use but should be based on the terms used in the country which may vary significantly from those used in ISCO-08. (See Module 5)
- Develop definitions of new or changed categories and adapt definitions of categories imported from existing national classifications.
- Review and amend ISCO-08 definitions of categories that are included in the national classification to ensure national relevance. This would include, for example, lists of included occupations.
- Validate the definitions in consultation with relevant industry and professional associations and other stakeholders.
- Adjust the classification code structure as needed while maintaining a correspondence table with ISCO-08 and, if necessary, the existing national classification(s).
- Develop correspondence tables between the revised NOC and ISCO-08 and possibly a dual-or multi-coded index with codes for the national classification versions and ISCO-08.[16]
- In all cases it is necessary to develop and test the procedures for implementation of the classification in national data collections, including the presentation of statistical output (See Module 7).

Detailed planning and the extent of modifications made to ISCO-08 will depend on national resources available, capacities and circumstances, and the amount of time available. In general, **at least three years** should be envisaged between starting work on adaptation of ISCO for national use and initial implementation. A shorter period would imply relatively limited modification to ISCO-08, such as the addition of nationally specific handicraft occupations. Planning for implementation of the classification in surveys and administrative activities, and for transition from previous classifications, should be integrated with the planning for the development of the classifications, and agreed with agencies and organizational units expected to implement the new classification.

3.4.2.3. Reviewing a national classification that is not based on ISCO-08

Many countries have a tradition or history of occupation classification and wish to continue using a national classification that is not based on ISCO-08. Such countries, when reviewing their NOC may make adjustments to improve comparability with ISCO-08 or take advantage of specific features in ISCO-08.

Many of the steps involved in reviewing or developing a NOC are similar, whether or not the NOC is based on ISCO-08. The broad steps involved in improving comparability with ISCO-08 when reviewing a national classification not based on ISCO-08 are summarized below.

[16] See example of tri-coded index from the UK SOC

Box 3.4 Checklist for reviewing classification not based on ISCO-08

- Consult with users to identify their needs and changes taking place in the labour market.
- Map the existing national classification to ISCO-08 if this has not already been done. (See Module 5).
- Identify features of ISCO-08 that are to be incorporated in the revised classification.
- Make any adjustments to the conceptual model and organizing principles of the national classification required to reflect features of ISCO-08 to be incorporated in the national classification.
- Adjust NOC structure, for example by adding new groups, to facilitate reporting to ISCO-08 and incorporate new features within the framework of the NOC structure and organizing principles.
- Develop definitions of new or changed categories and adapt definitions of any categories imported from ISCO-08 or from other classifications.
- Validate the definitions in consultation with relevant industry and professional associations.
- Develop correspondence tables between the revised NOC and ISCO-08 and possibly a dual-or tri-coded index[17] with codes for the national classification versions and ISCO-08.
- Document differences and similarities between the conceptual approaches taken in ISCO-08 and the national classification, explaining implications for international comparability.

When countries wish to continue using a national classification that is not based on ISCO-08, a timeframe of **at least three years** should also be considered, when reviewing and updating their NOC and making adjustments to improve comparability with ISCO-08.

3.5. A single national classification or multiple classifications designed for different purposes

To make sense of developments and trends in the labour market, for purposes such as analysis of skill shortages, and the provision of comprehensive information about job prospects, pay and working conditions by occupation, it is generally necessary to bring data together from different statistical and administrative data sources. If different occupation classifications are used in these different sources this type of data integration can be difficult to achieve. It is much easier to achieve when a single national classification of occupations (NOC) is used in all of these sources. When this is the case, however, the national classification has to meet the operational, analytical and statistical requirements of the different agencies that need to use it in a wide range of administrative and statistical applications.

There may be cases where the requirements of one agency conflict with or are less than optimal for those of another agency. Agencies using an occupation classification in employment services or for the management of skilled migration, may require more detail than is feasible in statistical surveys. Sampling and confidentiality considerations frequently mean that survey data for small occupational groups cannot be published. Typically, agencies using an occupation classification for administrative and service provision activities will also want to update the classification dynamically on a frequent basis to reflect the emergence of new occupations and skill requirements. Agencies using a classification for the compilation of statistics, however, will want the classification to remain stable over a relatively long period and minimize to some extend breaks in the series to provide comparable statistics that can accurately show the extent of change over time. Analysis of change over time becomes difficult if the instrument used to measure this change (the occupation classification) is frequently changed.

In addition, the broad categories defined at the higher levels of statistical classifications that are useful for analytical purposes may not be intuitively understood by users in client-oriented applications where jobseekers,

[17] See example of tri-coded index from the UK SOC

for example, may want to look for jobs in specific fields such as health or construction. There may also be a demand for statistical data on occupations in these fields.

However, the agencies using occupation classifications in client-oriented applications and administrative records are also among the main users of the statistics compiled in surveys and from their own administrative records. In general, therefore, the different agencies using the classification have a strong mutual interest in the use of a single national classification. Where there is a will to resolve problems arising from conflicting requirements, mutually acceptable solutions can generally be found with a degree of negotiation and flexibility, such as through classification variants based on the main statistical classification and/or through the creation of a fifth level more detailed than the ISCO-08 unit groups, as discussed below.

In administrative applications such as employment services a separate interface to the classification can be provided for use by jobseekers, employers, and employment consultants. Categories that are intuitively meaningful to users can be linked through this interface to occupations defined in the national classification. These categories can also be used as the basis for a series of alternative aggregations, or thematic views of the classification, where similarities based on skill specialization take precedence over those based on skill level. Statistics can then be compiled according to these thematic groups (classification variants), as well according to the standard aggregate groups in the classification. For example, a set of “alternative views” of the Australian and New Zealand Standard Classification of Occupations (ANZSCO) was developed for occupations in agriculture, health, culture and leisure, hospitality and tourism, and information and communication technology (ICT) (ABS 2006), similarly a series of *‘job families’* is developed by the US Occupational Information Network (O*NET).

To achieve a balance between the need for dynamic updating and the need for stability over time, it may be agreed that the most detailed level of the classification, typically a fifth level below the fourth (unit group) level of ISCO-08, can be updated by administrative agencies on a dynamic basis. This more detailed level would not necessarily be used in frequently compiled statistical outputs from surveys, meaning that changes at the detailed level would have only a small impact on time series. The series for groups at aggregate levels would remain stable until the next revision of the classification. Statistics on small occupational groups can still be compiled from population census data every five or ten years, or in special reports. Links to updated information about skills required and job prospects may also be updated on a dynamic basis by employment services and agencies responsible for vocational education and training.

Similarly, tools to support implementation of the classification in statistical collections, especially the coding index, can and should be updated dynamically as new occupations emerge and as new job titles for existing occupations are identified.

In some countries, different agencies have long established approaches to occupation classifications that cannot easily be reconciled with each other. In these countries separate classification systems based on different principles have been retained for use in applications such as employment services and compilation of statistics on employment. In these cases, harmonized information can be compiled, in principle, through establishing and maintaining linkages between different classifications that are used for specific purposes at national level, or from each national classification to ISCO-08. For example, the German BERUFENET which is used in employment services lists 16 occupational fields, while the German classification used for statistics arranges its 1300 occupations into five occupational sectors, (Bundesagentür für Arbeit 2021) and occupational statistics in Germany are also classified to ISCO-08. This would not be an optimal solution, however, for countries that do not have established national traditions in occupation classification.

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4. Developing a national occupation classification related to ISCO-08

This module provides practical guidance on the design and construction of a national occupation classification and the various elements and components that need to be brought together, including the underlying conceptual framework, the classification structure and descriptions of categories[18]. It describes the nature and relevance of different sources of information to the development of the classification.

4.1. Defining the conceptual model

4.1.1. The need for a conceptual basis and model for the design of the classification

It is essential to specify the conceptual basis of a classification, and a model for its design, at the beginning of the process of developing or updating it. The conceptual basis of a classification should define:

- the underlying concept measured or described by the classification
- the nature and type of entities to be classified
- the characteristics of the objects classified that are used to arrange units into groups (the classification criteria).

Once the classification criteria are defined it is necessary to determine how these criteria are to be applied in a way that allows the classification to meet the analytical and operational requirements and needs of users and reflect national circumstances. This includes deciding on the number of hierarchical levels to be included in the classification, and the relative importance of the different elements of the classification criteria in creating categories at each level of the classification hierarchy. This provides conceptual model for the design of the classification.

As work to develop the national classification proceeds, it may be necessary to revisit the conceptual model and make refinements or modifications if, for example, new user requirements are identified, or if problems are found in applying the classification criteria according to the model. Once the classification structure is finalized, the final conceptual model underpinning the design of the classification should be clearly documented and described in the introduction to the classification.[19]

When a national occupation classification is based on ISCO-08 it may adopt the ISCO-08 conceptual model directly, or it may be decided to make modifications to the ISCO classification criteria, or to the way they are applied to the design of the classification, to reflect national requirements. Following an initial round of consultations with key stakeholders and users of occupational information, it should be possible to:

- assess what (if any) modifications to the ISCO-08 conceptual model are needed to meet national needs;
- define the underlying concepts to be used in the design of the national occupation classification (its conceptual basis), and
- specify how these concepts are to be used to arrange occupations into groups in the classification structure (the conceptual model).

[18] Also see Box 1 on the principles and requirements of a statistical classification.

[19] A checklist of possible content for the Introduction to a Statistical Classification is provided as Appendix 2 of the GSIM Statistical Classification Model. A checklist of requirements for developing classification is provided as Appendix 1 of the Best practice guidelines for developing international statistical classification, UNCEISC 2022.

In the case of ISCO-08 and related national classifications, the underlying concept is occupation (See Section 1.4.2). This refers to the type of work performed by a person in a job or work activity. The units classified are therefore jobs and work activities. Occupations are arranged into progressively broader groups based on two classification criteria: skill level and skill specialization.

In ISCO-08 skill level is used mainly to differentiate groups at the top level (or major groups) of the classification. Although in Major Group 1, Managers and Major Group 0, Armed Forces Occupations, skill level is also used to distinguish between sub-major groups (See Table 4.1). The four dimensions of skill specialization are used to differentiate between major groups at the same skill level, and to break these groups down into progressively smaller groups (See Table 4.3). Skill level therefore takes precedence over skill specialization in determining the placement of an occupation in the classification. Skill levels and the dimensions of skill specialization are complementary and should be thought of as a complete set of components within the ISCO-08 skill model.

Many national occupation classifications also use a combination of skill level and skill specialization to arrange occupations into groups. In some occupation classifications, and in versions of ISCO prior to 1988, different classification criteria are used. For example, skill level may not always be used systematically to differentiate categories at the higher levels of the classification. For example, some classifications provide categories based on skill specialization applied at the top level of the hierarchy. The German BERUFENET which is used in employment services lists 16 occupational fields, while the German classification used for statistics arranges its 1300 occupations into five occupational sectors, which are further subdivided into 14 occupational segments and 37 occupational main groups, based primarily on aspects of skill specialization (German Classification of Occupations 2010 – Revised Version 2020). Similarly, in the US Standard Occupational Classification (SOC), the 867 occupations are grouped together to form 23 major groups at the top level of the classification hierarchy, based primarily on elements of skill specialization. In these cases, many of the categories are differentiated on the basis of the nature of the goods or services produced, with the result that several of them are similar to categories found in classifications of economic activities.

Basing categories on skill specialization alone may be useful for the provision of employment and careers guidance services, as these categories are intuitively meaningful for users of these services. This represents a significantly different approach from that used in the most recent versions of ISCO and basing a national classification primarily on skill specialization could not be considered to be an adaptation of ISCO-88 or ISCO-08. Differentiation and grouping of occupations based on skill level was identified as a critical requirement for many statistical and analytical purposes during the development of these versions of ISCO. Several countries that retain national classifications based mainly on skill specialization, also compile statistics on occupation classified according to ISCO. This can be achieved by mapping the detailed categories in these types of occupation classification to ISCO-08 groups, or by assigning both NOC codes and ISCO codes to source data.

4.1.2. The use of skill level in the design of ISCO-08

While skill level is defined conceptually in ISCO-08 as a function of the complexity and range of tasks and duties performed in an occupation, it is measured operationally by considering one or more of:

- the nature of the work performed in an occupation in relation to the characteristic tasks and duties defined for each ISCO-08 skill level (new for ISCO-08);
- the level of formal education defined in terms of the International Standard Classification of Education (ISCED-97) required for competent performance of the tasks and duties involved; and
- the amount of informal on-the-job training and/or previous experience in a related occupation required for competent performance of these tasks and duties.

The nature of the work performed in relation to the characteristic tasks and duties defined for each ISCO-08 skill level is the primary operational measure of skill level. It takes precedence over formal education, especially when this is not relevant for a particular occupation. The amount of informal on-the-job training and/or previous experience in a related occupation required for competent performance of the tasks and duties is also relevant as

part of the operational measurement of skill level, when formal education and training are not the only or usual pathway to gaining the skills required. On this basis, for example, managers of shops, hotels and restaurants are classified at ISCO-08 Skill Level 3, even though formal qualifications are not necessarily required for entry to these occupations.

As shown in Table 4.1, eight of the ten major groups in ISCO-08 contain occupations only at one of the four skill levels. All groups below the major group level contain occupations at only one skill level.

▶ Table 4.1 Mapping of ISCO-08 major and sub major groups to skill levels

ISCO-08 major groups	ISCO-08 sub major groups	Skill levels
1 Managers	11 Chief Executives, Senior Officials and Legislators	4
	12 Administrative and Commercial Managers	4
	13 Production and Specialized Services Managers	4
	14 Hospitality, Retail and Other Services Managers	3
2 Professionals	All	4
3 Technicians and Associate Professionals	All	3
4 Clerical Support Workers	All	2
5 Services and Sales Workers		
6 Skilled Agricultural, Forestry and Fishery Workers		
7 Craft and Related Trades Workers		
8 Plant and Machine Operators, and Assemblers		
9 Elementary Occupations	All	1
0 Armed Forces Occupations	01 Commissioned Armed Forces Officers	4
	02 Non-commissioned Armed Forces Officers	2
	03 Armed Forces Occupations, Other Rank	1

Definitions of each of the four ISCO-08 skill levels clarify the boundaries between the skill levels, including in situations where formal educational requirements are not the most suitable method of measuring the skill level of a particular occupation. Each definition provides examples of:

- the typical or characteristic tasks performed at each skill level;
- the types of skills (in broad terms) including the nature and extent of numeracy, literacy, and communication skills, manual dexterity and physical strength and endurance typically required; and
- the typical occupations classified at that skill level.

4.1.3. The use of dimensions of skill specialization to create groups in ISCO-08

Skill levels are complemented in ISCO-08 by the four dimensions of skill specialization to provide more detailed groups of occupations. The four dimensions of skill specialization used in ISCO-08 are:

- the field of knowledge required;
- the tools and machinery used;
- the materials worked on or with; and
- the kinds of goods and services produced.

These four concepts serve as grouping criteria within the skill model, in addition to the range and complexity of the tasks and duties within the occupation – i.e., the skill level.

However, ISCO-08 does not classify skills directly. The main tasks and duties performed in each group are listed, and this information is then used to determine where in the ISCO-08 hierarchy the group should be placed, with

reference both to skill level and the four dimensions of skill specialization. This is not done explicitly by specifying, for example, separate categories for each dimension of skill specialization.

A consequence of basing categories at the top level of the classification primarily on skill level, is that occupations that are similar in terms of aspects of skill specialization are classified in different major groups, when they are at different skill levels. To address this concern, some attention was given in designing ISCO-08 to creating related categories at different skill levels based on elements of skill specialization. This allows the aggregation of data according to "thematic views" in areas where there is a known demand for statistics on specific groups, such as the health workforce or for specialist occupations in ICT. In the case of the health workforce this was achieved by creating sub-major groups for health professionals, and health associate professionals, as well as a minor group for personal care workers in health services and a unit group for health services managers. This was not done in an explicit and systematic manner across the whole classification. Nevertheless, there are similarities in the sub-major group structures of Major Groups 2 and 3 as shown in Table 4.2 below.

▶ Table 4.2 Sub major groups based on similar skill specialization categories in ISCO-08 (Major groups 2 and 3).

2	Professionals	3	Technicians and Associate Professionals
21	Science and Engineering Professionals	31	Science and Engineering Associate Professionals
22	Science and Engineering Professionals	32	Health Associate Professionals
23	Teaching Professionals		
24	Business and Administration Professionals	33	Business and Administration Associate Professionals
25	Information and Communications Technology Professionals	35	Information and Communications Technicians
26	Legal, Social and Cultural Professionals	34	Legal, Social, Cultural and Related Associate Professionals

In Major Groups 2 and 3 the skill specialization categories are based primarily on the field of knowledge required and the nature of the goods and services produced. Since Major Groups 4, 5, 6, 7 and 8 are all at the same broad skill level they are differentiated from each other based on various dimensions of skill specialization. As shown in Table 4.3 below, the skill specialization concepts used are different from those used to differentiate the sub-major groups in Major Groups 2 and 3. Though they are also based at least in part on the nature of the goods and services produced and to a lesser extent on the field of knowledge required, the tools and equipment used, and the materials worked on or with play a more important role.

▶ Table 4.3 Application of skill specialization dimensions in ISCO-08 Major groups 4 to 8

ISCO 08 Major Group		Predominant broad skill specialization concepts used to differentiate from other major groups	Skill specialization concepts used to differentiate Sub-major groups within each major group
4	Clerical Support Workers	• Administrative support services • Manipulating and storing information	•Literacy and numeracy •Interpersonal communication skills
5	Services and Sales Workers	• Personal and protective services • Selling goods and services • Interpersonal communication skills	•Nature of the services provided
6	Skilled Agricultural, Forestry and Fishery Workers	•Production of goods in agriculture forestry or fisheries – i.e., based on the type of economic activity	•Market orientation •Nature of goods produced
7	Craft and Related Trades Workers	• Production and repair of goods and buildings • Manual dexterity	• Field of knowledge required • Materials worked on or with • Kinds of goods and services produced
8	Plant and Machine Operators and Assemblers	• Operation of machinery • Manual dexterity	• Type of machinery used (mobile vs stationary) • Method of production (assembly)

4.1.4. Adapting the ISCO-08 conceptual model for national purposes

In adapting ISCO-08 for national use, countries will need to make a decision on whether to apply the ISCO-08 skill level and specialization concepts directly, or to adapt these concepts to reflect national circumstances and user needs. For example, some countries may wish to split some ISCO-08 skill levels, to make adjustments to skill level boundaries, or to use additional dimensions of skill specialization. However, changes to the underlying conceptual model could have a significant impact on the design and structure of the classification and potentially affect the international comparability of information classified by occupations, especially for data tabulated at aggregate levels of the NOC.

The 2019 edition of the Mexican National Occupation Classification System (SINCO) provides an interesting example of how the ISCO-08 conceptual model can be adapted for national use. SINCO uses the same concepts of skill level as ISCO-08, but additional dimensions of skill specialization are used to arrange occupations into groups. These additional dimensions include, for example "level of responsibility", and more detailed elements related to the kinds of goods or services produced such as "modality of sale (sale or rental)". We would not consider these modifications to be a major departure from the conceptual basis of ISCO, since like ISCO-08, the SINCO applies skill level mainly at major group level and skill specialization is mainly used to differentiate between major groups at the same skill level, and between groups at disaggregate levels. These criteria are applied to produce the following nine divisions at the top level of the SINCO classification structure as follows:

1 Funcionarios, directores y jefes
2 Profesionistas y técnicos
3 Trabajadores auxiliares en actividades administrativas
4 Comerciantes, empleados en ventas y agentes de ventas
5 Trabajadores en servicios personales y de vigilancia
6 Trabajadores en actividades agrícolas, ganaderas, forestales, caza y pesca
7 Trabajadores artesanales, en la construcción y otros oficios
8 Operadores de maquinaria industrial, ensambladores, choferes y conductores de transporte
9 Trabajadores en actividades elementales y de apoyo

In Australia and New Zealand, the conceptual model adopted for ANZSCO uses a combination of skill level and skill specialisation as criteria to design major groups. The eight major groups are formed by grouping together sub-major groups using aspects of both skill level and skill specialization. In designing the major groups, intuitive appeal and usefulness in both statistical and administrative applications were also important considerations.

▶ Table 4.4 ANZSCO 2021 major groups and skill levels

Major Group		Predominant Skill Levels
1	Managers	1 ,2
2	Professionals	1
3	Technicians and Trades Workers	2, 3
4	Community and Personal Service Workers	2, 3, 4, 5
5	Clerical and Administrative Workers	2, 3, 4, 5
6	Sales Workers	3, 4, 5
7	Machinery Operators and Drivers	3,4
8	Labourers	4, 5

The skill level criterion is applied in ANZSCO as rigorously as possible at the second level of the classification, the sub-major group level, together with a finer application of skill specialization than that applied at the major group level. Minor groups are distinguished from each other mainly on the basis of a finer application of skill specialisation than that applied at the sub-major group level. Within minor groups, unit groups are distinguished from each other on the basis of skill specialization and, where necessary, skill level. Within unit groups, the distinction between occupations relates to differences between tasks performed in occupations and in most unit groups all occupations are at one skill level. (ABS 2022).

The Canadian National Occupational Classification (NOC) 2021, uses 'Training, Education, Experience, and Responsibilities' (TEER) levels and skill specialization as classification criteria, the problem of occupations at different TEER levels that are similar in skill specialization is addressed by providing separate broad aggregate

groups based on TEER level and skill specialization. This arrangement can be represented as a matrix (See Box 4.1) in which the six TEER categories appear on the horizontal axis, and the ten broad occupational categories on the vertical axis. The boundaries between the six categories based on TEER levels in the Canadian NOC are different from those used in ISCO-08, and the distinctions are finer.

▶ Box 4.1 The Canadian NOC 2021 represented as a matrix

	NOC structure	TEER categories					
		0 Management occupations	1 Occupations usually require a university degree	2 Occupations usually require a college diploma or apprenticeship training of two or more years; or supervisory occupations	3 Occupations usually require a college diploma or apprenticeship training of less than two years; or more than six months of on-the-job training	4 Occupations usually require a secondary school diploma; or several weeks of on-the-job training	5 Occupations usually require short-term work demonstration and no formal education
Broad occupational categories	0 Legislative and senior management occupations	00					
	1 Business, finance and administration occupations	10	11	12	13	14	
	2 Natural and applied sciences and related occupations	20	21	22			
	3 Health occupations	30	31	32	33		
	4 Occupations in education, law and social, community and government services	40	41	42	43	44	45
	5 Occupations in art, culture, recreation and sport	50	51	52	53	54	55
	6 Sales and service occupations	60		62	63	64	65
	7 Trades, transport and equipment operators and related occupations	70		72	73	74	75
	8 Natural resources, agriculture and related production occupations	80		82	83	84	85
	9 Occupations in manufacturing and utilities	90		92	93	94	95

It can be seen from these examples that, with relatively minor modifications to the ISCO-08 conceptual model, the classification criteria can be applied in different ways to reflect the occupational structure of the labour market in the country and national priorities and policy concerns. In these cases, the categories at the higher levels of aggregation are not all directly comparable to those in ISCO-08, while the unit groups can mostly be mapped directly to ISCO-08. Correspondence tables and/or conversion matrices are needed to compile occupational statistics according to ISCO-08. For example see the mapping between the ANZSCO 2021 and ISCO-08 .

4.1.5. Mapping national occupations and qualifications to ISCO-08 skill levels

In those cases where formal education and training requirements are used as part of the measurement of the skill level of an occupation in ISCO-08, these requirements were originally defined in terms of the version of the International Standard of Education (ISCED-97) applicable at the time. The ISCO-08 skill levels are mapped below to the updated ISCED-11 (or ISCED 2011).

▶ **Table 4.5 Mapping the four ISCO-08 skill levels to ISCED-97 and ISCED-11 levels of education**

ISCO-08 Skill Levels	ISCED-97 levels of education	ISCED-2011 levels of education
4	**6** - Second stage of tertiary education) **5a** - First stage of tertiary education, 1st degree (medium duration)	**8 –** Doctoral or equivalent **7 –** Master's or equivalent **6 –** Bachelor's or equivalent
3	**5b** - First stage of tertiary education (short or medium duration)	**5 –** Short-cycle tertiary education
2	**4** - Post-secondary, non-tertiary education **3 -** Upper secondary level of education **2 -** Lower secondary level of education	**4** - Post-secondary, non-tertiary education **3 -** Upper secondary level of education **2 -** Lower secondary level of education
1	**1 -** Primary level of education	**1 -** Primary level of education **0 –** Early childhood education

The use of formal education and training requirements as part of the measurement of the skill level of an occupation requires particular attention in adapting the ISCO-08 conceptual model for national use. To assist in determining the appropriate skill level in both ISCO-08 and in the NOC of new and emerging occupations, and of occupations that exist in the country but are not covered in ISCO-08, countries will find it useful to map national qualifications to ISCO-08 skill levels. For many countries this can be achieved by consulting the ISCED mappings, which link national education programmes and the main diplomas, qualifications or certificates awarded at the end of these programmes to ISCED levels of education.

It should be stressed, however, that formal educational and training requirements can only partly measure the range and complexity of the tasks performed in a given occupation. Level of formal education is only one component of the operational measurement of skill level and should not, therefore, be given undue priority over the other elements of the operational measurement of skill level. As we have already noted, more emphasis was given in developing ISCO-08 to the nature of the work performed in determining the skill level of an occupation, than to the formal education and training requirements, or to the amount of informal on-the-job training and experience required. (See Section 4.1.2).

If a certain level of education, or a specific qualification is a formal requirement for entry to an occupation, that should be a reasonable indication that an occupation should be classified at the related skill level or higher. However, the nature of the work performed, the amount of informal on-the-job training or the previous experience required may frequently indicate that an occupation should be classified at a higher skill level than suggested by the formal qualifications alone. At national level all three operational criteria for the measurement of skill level should therefore be taken into consideration in assessing the skill level of occupations not listed in ISCO-08.

When there is a need to obtain information about the nature of the work performed and skill requirements for an occupation at national level, relevant sources of information would include job advertisements, employers' and workers' organizations, vocational education and educational institutions, relevant regulatory or advisory bodies such as sectoral skills councils, and both public and private employment services.

It is important to bear in mind that ISCO-08 provides a standardized skills framework to facilitate international comparability. The skill levels assigned to specific occupations should be seen as indicative and may differ in some countries due either to national specificities or to changes since ISCO-08 was developed. It is essential that national adaptations of ISCO-08 should take national realities into account and be relevant for national purposes. When occupations are assigned to different skill levels in ISCO-08 and the national classification this should be noted, and the occupations concerned should be mapped to the relevant ISCO-08 groups for the purposes of international reporting and comparison.

If a NOC includes more skill levels than ISCO-08 (for example a fifth skill level), it will be necessary to map categories at a relatively detailed level of the NOC to ISCO-08 skill levels if the boundaries between skill levels are different from those in ISCO-08. This will also be the case when four skill levels are used in the NOC but some or all of the boundaries between levels are different from ISCO-08.

4.1.6. Differences between national educational training requirements and ISCO-08 skill levels

There may be cases where the national formal educational and training requirements for certain occupations are lower or higher than the levels of education implied by the associated ISCO-08 skill levels. This may be because when ISCO-08 was developed factors other than formal education and training were taken into consideration in assessing the range and complexity of tasks performed in a particular occupation. It may also reflect the reality that, for some occupations, the level of formal education required differs between countries, or has changed over time. For example, in some countries a university degree or higher qualification is required for primary school teachers, while in other countries the normal pathway is a teaching diploma obtained after two or three years of training.

However, the tasks performed, and skills required for competent performance in a particular occupation are generally the same in different countries, regardless of national differences in educational and training requirements for entry to that occupation. When these differences exist, the occupations concerned should generally be classified at the same skill level as in ISCO-08, unless there is evidence that the nature of the work performed, and the level of skill required are significantly different.

When a national classification is developed based on ISCO-08, there may nevertheless be user demand to classify some occupations at a higher or lower skill level in the national classification than in ISCO-08, due to differences in current national educational and training requirements and those associated with ISCO-08 skill levels. This may be appropriate, especially if the nature of the work performed in the country reflects the characteristic tasks and duties associated with a higher or lower skill level. A national occupation classification should primarily aim to serve national requirements of occupational information.

When national data are reported according to ISCO-08, occupations that have been assigned in the national classification to a different skill level from ISCO-08, should be mapped to the appropriate ISCO-08 group at the skill level specified in ISCO-08. Thus radiographers, for example, should be classified in ISCO-08 unit group 3211, Medical Imaging and Therapeutic Equipment Technicians (Skill Level 3), even if a separate category has been created for them at a higher skill level in the national classification. Similarly, primary school teachers should always be classified in ISCO at Skill Level 4, even if they are assigned to a category at lower skill level in the national classification.

In all cases, the skill level of an occupation should be assessed on the basis of the skill requirements for competent performance in the occupation, and not necessarily on the basis of the skills or qualifications actually held by individuals employed in the occupation. Some workers may be overqualified, and others may be underqualified, for competent performance of the tasks and duties of the occupations in which they are employed. Since one of the purposes of an occupation classification based on skill is to help measure these types of skill mismatch, it is not appropriate to assess the skill level of occupations or jobs based solely on the level of education or qualifications of the jobholders. Moreover, if the typical or required level of education for entry to an occupation has increased over time, many of the older and more highly experienced and skilled workers in that occupation may have a lower level of formal education than more recent entrants who are still learning on the job. The qualifications held by an individual should therefore not be taken into general consideration in coding occupational data to a national classification based on ISCO-08.

4.2. The structure of the classification or working with groups

4.2.1. Modifying the classification structure

By, the structure of a hierarchical classification, we mean the set of mutually exclusive categories included at the most detailed level of the classification and the arrangement of these categories into progressively broader categories in a tree-structure with the most general or broad categories at the top and the most detailed categories at the bottom (UNCEISC 2022). The categories at each level of the classification structure must be mutually exclusive and jointly exhaustive of all objects/units in the population of interest (UNECE 2013). Each member of the population of units classified should be able to be classified to only one category at each level, and there can be no overlap between categories.

When ISCO-08 is adapted for the development of a national classification, its hierarchical structure and content, and in some cases its underlying conceptual model, may need to be modified to reflect national realities, analytical requirements and policy concerns. Groups of occupations may need to be added to the classification, moved around, or grouped differently, merged with other groups or removed completely. Adaptations may need to be made for a variety of reasons including, but not limited to those listed in Box 4.2.

Whenever categories are created through merging or splitting existing categories in ISCO-08 or the previous version of the national classification, or by adding completely new categories, each new or changed category needs to be assigned a unique code and name. A definition of the group explaining its scope and boundaries and providing examples of the occupations included should be drafted or updated. The relationship of the category to categories in the previous version and/or ISCO-08 should be recorded, for inclusion in a correspondence table.

▶ Box 4.2 Cases when national adaptation of ISCO-08 structure is needed

- There may be a need to provide information about occupations that are important in the country, for example by creating categories for occupations that are not represented as separate groups in ISCO-08.
- Occupations that are (numerically) significant in the country may not be listed in ISCO-08, either because they are nationally specific (for example traditional national handicrafts), or because they have emerged since the most recent version of ISCO was developed.
- There may be a need for less detail, especially at aggregate levels of the classification, for occupational groups with low levels of employment in the country, or for occupations that have become obsolete since the development of ISCO-08.
- ISCO-08 may include groups that relate to occupations that do not exist in the country. For example, landlocked countries may have no requirement to provide information about ships' engineers or deep-sea fishery workers. In some countries subsistence agricultural activities may not exist, or there may be no requirement to classify these activities by occupation.
- There may be a need to arrange occupations into groups differently from ISCO-08 to better reflect national analytical requirements and policy concerns or because their skill requirements have changed over time since the development of ISCO-08.
- There may be a need for more detail than is provided in ISCO-08, especially if the classification is to be used in non-statistical applications such as matching jobseekers with job vacancies, careers guidance and managing employment-related migration.

Unless only a small number of changes are made, or a completely new code structure is introduced, it is likely that codes from ISCO-08 or the previous versions will need to be reused with a different meaning. For example, when ISCO-88 was updated, Unit Group 4222, Receptionists and Information Clerks was divided into 6 new unit

groups, as shown in the following extract from the ISCO-88 to ISCO-08 correspondence table.[20] In this case code 4222 was reused in ISCO-08 for Contact Centre Information Clerks.

▶ **Table 4.6 Extract from Correspondence Table ISCO-88 to ISCO-08: Receptionists and Information Clerks**

ISCO-88 title	ISCO-88 code	ISCO-08 code		ISCO-08 title
Receptionists and Information Clerks	**4222**	3341	p	Office Supervisors
		4222		Contact Centre Information Clerks
		4224		Hotel Receptionists
		4225		Inquiry Clerks
		4226		Receptionists (general)
		4229		Client Information Workers Not Elsewhere Classified

4.2.2. How many levels are needed in the national occupation classification hierarchy?

A critical issue that should be considered early in the development of a national classification is the number of levels to be included in the classification hierarchy.

National occupation classifications adapted from or related to ISCO-08, tend either to adopt a similar four-level hierarchy with modifications to the ISCO-08 structure mainly at the more detailed levels of the classification, or add a fifth level in the hierarchical structure of the classification, typically using a six-digit code. The number of levels should depend mainly on the amount of detail needed to meet the needs of users of the classification. It may also depend to a lesser degree on the extent to which there is a need to depart from the ISCO-08 structure at detailed levels, and on the capacity of the custodians of the national classification to develop and maintain a fifth level. It should take into account the statistical feasibility of the classification in major statistical operations, particularly LFS, where small sample sizes may be used.

If there is a perceived need for significantly more detail in several areas of the classification, the addition of a fifth hierarchical level will generally be the most practical solution.[21] This may make it easier to maintain comparability with the 4-digit level of ISCO-08, than making the extensive adjustments to groups at the 3- and 4-digit levels of the classification to accommodate a large amount of additional detail. Moreover, it may be easier to map categories at the fifth level to ISCO-08, if the skill level boundaries used in the national classification are different from those used in ISCO-08.

Typically, a fifth level in an occupation classification based on ISCO-08 is made up of separate categories for each significant occupation included in the unit groups of the national classification. These categories are generally referred to as “occupations” or “occupation group”.

Each category in a hierarchical classification, including those at the fifth level, should be given a unique and standard title. The only exception applies when there is only one category at the next level down, as shown in Box

[20] In this example, the letter ‘p’ indicates that only part of ISCO-08 Unit Group 3341 Office Supervisors is comprised of occupations formerly classified in Unit Group 4222 Receptionists and Information Clerks.

[21] See example from ANZSCO on the design constraints, which is further discussed in this chapter.

4.3. If a unit group, for example, is not split into smaller groups and includes only one occupation, the two categories may have the same title as they refer to the same thing.

▶ Box 4.3 Example of code and naming conventions in ISCO-08- singular categories and residuals

23	**Teaching Professionals**
231	University and Higher Education Teachers
2310	University and Higher Education Teachers
232	Vocational Education Teachers
2320	Vocational Education Teachers
233	Secondary Education Teachers
2330	Secondary Education Teachers
234	Primary School and Early Childhood Teachers
2341	Primary School Teachers
2342	Early Childhood Educators
235	Other Teaching Professionals
2351	Education Methods specialists
2352	Special Needs Teachers
2353	Other Language Teachers
2354	Other Music Teachers
2355	Other Arts Teachers
2356	Information Technology Trainers
2359	Teaching Professionals Not Elsewhere Classified

Each fifth level category should also be given a unique code made up of the 4-digit unit group code plus one or more additional digits. The number of digits needed for the codes at the fifth level will depend on the maximum number of occupations to be included in at least one unit group. When assigning codes at the fifth level, it is preferable to reserve the value "0" for use when a unit group is not broken down into more detailed occupations and therefore contains only one occupation group. This is consistent with the practice in ISCO-08 whereby unit groups that are the only member of a minor group are assigned the minor group code followed by "0". This also allows the use of trailing zeroes when assigning inadequately or vaguely described occupation descriptions to the classification. Countries may also prefer to reserve the value "9" (or "99" if two digits are added to the unit group code) for residual categories at the fifth level. The code structure used in the classification should preferably be designed without additional special characters such as the '–' which is easier for data coding and processing and from a programming and information technology perspective.

If a single additional digit is used to form a 5-digit occupation code, then no unit group can include more than 9 occupations if these conventions are followed. This still allows a significant level of additional detail to be added while retaining a high level of comparability with the ISCO Unit Groups.

In the Czech Classification of Occupations (CZ-ISCO) 434 subgroups (podskupiny) based on ISCO-08 unit groups are further disaggregated to form 1,362 categories or units (CZ-ISCO, tabulka c.3). Each of these categories or units at the fifth level is assigned a 5-digit code made up of the 4- digit subgroup code plus one digit. In some cases, residual categories at the fifth level are included and have a code ending in '9'.

In the case of Subgroup 2212, Specialist Medical Practitioners, this allows the creation of seven groups of medical specialists at the fifth level, as well as a category for those who are not fully qualified and a residual category for other medical specialists, as shown below.

▶ Table 4.7 Specialist Medical Practitioners in the Czech Classification of Occupations (CZ-ISCO)

CZ-ISCO code	Czech Title	English Title (unofficial translation)
2212	**Lékaři specialisté**	**Specialist Medical Practitioners**
22121	Lékaři v interních oborech	Doctors in internal medicine
22122	Lékaři v chirurgických oborech	Doctors in surgical fields
22123	Lékaři v gynekologii a porodnictví	Doctors in gynaecology and obstetrics
22124	Lékaři v psychiatrických oborech	Doctors in psychiatric fields
22125	Lékaři v pediatrii	Doctors in paediatrics
22126	Lékaři v anesteziologických oborech	Doctors in anaesthesiology fields
22127	Lékaři v radiologických oborech	Doctors in radiology
22128	Lékaři bez atestace (kromě oborů praktického lékařství)	Doctors without attestation (except for the fields of general medicine)
22129	Ostatní lékaři specialisté	Other specialist medical practitioners

The use of a second or third additional digit for the fifth level categories provides the flexibility to allow a significantly larger number of categories within each unit group, if needed. In the Saudi Standard Classification of Occupations, for example, the use of a 6-digit code allows 432 unit groups based on ISCO-08 to be broken down into 2013 occupations (GASTAT, 2019). While some of the unit groups include fewer than nine occupations, several include a significantly larger number. For example, Unit Group 2230, Secondary School Teachers includes 37 occupations, with separate identification of teachers by subjects taught and of intermediate teachers.

In a few national classifications a 7-digit code is used for categories at the fifth level of a classification based on ISCO-08. For example, in the Statistical Classification of Occupation, version 2020, of the Slovak Republic (SK ISCO-08 2020), 436 unit groups based on ISCO-08 are

disaggregated into 2,448 occupations with a 7-digit code formed by adding 3 digits at the end of the 4-digit ISCO code. This could allow some unit groups to be broken down into more than 99 distinct occupations. However, in the current version of SK-ISCO, the unit group with the largest number of occupations, 2212, Specialist Medical Practitioners, includes 74 distinct types of medical specialist, as well as a residual category whose code ends in 999. The use of a 7-digit code provides the flexibility to add occupations when the classification is updated without the need to change or re-use codes for occupations included in previous versions. If occupations are split or merged in future revisions of the classification the codes for the split categories can be retired and new codes assigned to the new categories. This reduces the risk of confusion when data are coded to slightly different versions of the classification over time.

4.2.3. Splitting groups and identifying occupations that exist at the national level but are not included in ISCO-08

It is appropriate to split some ISCO-08 groups in the national classification when there is a need to provide further detail to reflect a national situation or need. For example, in the Standard Occupation Classification of the

Republic of Slovenia (SKP-08), Minor Group 233 Secondary Education Teachers is split between upper secondary and lower secondary teachers as follows:[22]

2331 Upper secondary education general subject teachers and teachers in student residence
2332 Lower secondary education subject teachers

For some countries adapting ISCO-08 for national use, there might need to be a special focus on traditional handicraft occupations. These occupations are often unique within a country or region and may need to be separately identified and recognized in the national occupation classification. For example, the Pacific Standard Classification of Occupations (PACSCO) identifies the following occupations in ISCO-08 Unit Group 7317, Handicraft Workers in Textile, Leather and Related Materials.

7317_01	Wooden Articles Handicraft Workers
7317_02	Reed Weaving and Related Handicraft Workers except Mats and Kiekie (Clothing)
7317_03	Reed Floor Mat Makers and Related Handicraft Workers
7317_04	Kiekie Makers
7317_05	Tapa Cloth Makers and Related Workers
7317_99	All Other Handicraft Workers in Wood, Basketry and Related Materials N.E.C.

In these cases, it would be useful to consult with any government agencies responsible for promoting or preserving traditional handicrafts, as well as any associations or cooperative groups for specific crafts. Similarly, it may be useful to consult with agricultural associations and cooperatives, as well as government agencies responsible for agriculture, forestry and fisheries, to separately identify occupations specializing in the production of nationally important or specific products. Once again, PACSCO provides and interesting example by including, for example, 24 specialized occupations in Unit Group 6112, Tree and Shrub Crop Growers. (Pacific Community, 2016).

The decision on whether to create a new classification category when a new job title is identified, to list a new job title in an existing group description, or simply to add the new title to the index of occupational titles will depend on a number of factors, including:

- whether the tasks performed, and skills required are significantly different from those of other occupations already included in the classification;
- the extent of user demand for separate identification of the group, for example if the occupation is in high demand and there are skill shortages;
- whether the numbers of persons employed or expected to be employed in the occupation concerned is sufficient to allow statistical and other information about them to be compiled and disseminated, bearing in mind the size limits that may have been established for categories at each level of the classification.

4.2.4. Suppressing ISCO-08 groups that are non-existent or insignificant in the country

It is appropriate to exclude some ISCO-08 groups from the national classification if the occupations included in these groups do not exist in the country. If no other changes are necessary or desired, or if only small changes are made to the groups that remain in the classification, it is possible to retain the same 4-digit ISCO-08 code for the unit groups that are the same in both classifications.

[22] These groups can be mapped to ISCO-08 Unit Group 2330, Secondary Education Teachers.

For example, the Standard Occupation Classification of the Republic of Slovenia (SKP-08) does not include the following ISCO-08 groups:

1113 Traditional Chiefs and Heads of Villages

224 Paramedical Practitioners
2240 Paramedical Practitioners

63 Subsistence Farmers, Fishers, Hunters and Gatherers
631 Subsistence Crop Farmers
6310 Subsistence Crop Farmers
632 Subsistence Livestock Farmers
6320 Subsistence Livestock Farmers
633 Subsistence Mixed Crop and Livestock Farmers
6330 Subsistence Mixed Crop and Livestock Farmers
634 Subsistence Fishers, Hunters, Trappers and Gatherers
6340 Subsistence Fishers, Hunters, Trappers and Gatherers

9624 Water and Firewood Collectors

There is no requirement to provide a mapping from SKP-08 to these categories, as they are not considered to exist in Slovenia.[23]

ISCO-08 groups may also be excluded from a classification based on ISCO-08 if the numbers of people working in the occupations concerned are so small that it would not be possible to produce information about them. For example, groups at a level of the classification intended to be used for statistics from sample surveys may need to be suppressed if they are not large enough for compilation of statistically significant estimates.[24] In these cases, however, it is necessary to determine where in the classification jobs in the suppressed categories should be classified. In general, closely related groups or residual categories can be used in these cases. For example, the jobs of any water and firewood collectors found in Slovenia would be classified in Unit Group 9629, Elementary workers not elsewhere classified.

4.2.5. Using skill specialization to create occupational groups adapted for national needs

In ISCO-08 all four dimensions of skill specialization were taken into consideration in defining the sub-major groups, minor groups and unit groups within each major group. In general, none of these dimensions took precedence over the others. The groups at the detailed levels of the classification are, therefore, relatively homogeneous in terms of the required skill level and all four dimensions of skill specialization. This means that, in principle, there should be a high degree of skill transferability between the occupations included in each unit group, and to a lesser extent within each minor group.

The notion of skill transferability is highly relevant for both occupational analysis and in activities such as employment services and careers guidance. Skill transferability should therefore be an important consideration in designing the categories in a national occupation classification, especially when it is proposed to create new unit groups.

The dimensions of skill specialization that are most relevant for arranging occupations into progressively broader minor groups and sub-major groups vary to some extent depending on the major group. This reflects both the nature of the work performed in each major group, and the need to create groups that are useful for analytical

[23] If mapping from ISCO-08 to SKP-08, the map from these categories would simply be *"no correspondence".*

[24] If the occupational groups concerned are required for information from other sources, such as matching job seekers to job vacancies, they can be separately identified at a lower level of the classification.

purposes. For example, as described in the previous section, the groups in Major group 2, Professionals are differentiated from each other, primarily based on the field of knowledge required, whereas in Major group 7, Craft and Related Trades Workers the groups are based more on the materials worked on or with, although the other dimensions are also highly relevant.

The use of both skill level and the four different dimensions of skill specialization provides a degree of flexibility to create groups that reflect national requirements, without changing the underlying conceptual model. Higher or lower priority can be given to different aspects of the classification criteria to create groups that are meaningful and satisfy known user demand. For example, during the development of ISCO-08, it became apparent that it would be beneficial to identify occupations specializing in the provision of health services at the second level of the revised classification. Due to policy concerns about supply and demand in the health work force there was a desire to provide separate identification of these categories at the level of sub-major or minor group. This allows the production of aggregated statistics about these groups and allowed the breakdown of some of the existing unit groups. To achieve this, two ISCO-88 sub-major groups were split, so that Minor groups 221, Life Science Professionals, and 321, Life Science Technicians and Related Associate Professionals, were no longer classified in the same sub-major group as health workers. These two minor groups were then merged with the ISCO-88 sub-major groups for physical, mathematical and engineering science.

A similar approach was taken to create sub-major groups for specialist occupations in information and communications technology (ICT), as there was strong demand for separate identification of these rapidly growing occupations. In classifying these occupations in ISCO-08 a higher priority was given to the kinds of goods and services produced (health services, and ICT services) than to the field of knowledge required (the different branches of science and technology). The changes in the classification structure from ISCO-88 to ISCO-08 for professional occupations in science, engineering and health services are shown in Box 4.4.

These types of change can be seen as a pragmatic method to meet the demand for separate identification and more detail for certain occupational groups. However, the treatment of these occupations in both of these versions of ISCO is consistent with the underlying conceptual basis of ISCO-88 and ISCO-08 which did not change between versions. The sub-major groups are relatively homogenous in terms of both the kinds of goods and services produced and the field of knowledge required. Similar changes were made for technical occupations in these fields. The use of a consistent conceptual basis ensures that classification groups occupations based on their similarities, and are therefore meaningful, while providing the flexibility needed to create groups that meet specific user needs and can effectively be used for the compilation of statistics.

▶ **Box 4.4 Changes in the classification structure from ISCO-88 to ISCO-08 for science, engineering and health professionals**

ISCO-88		ISCO-08	
21	**Physical, Mathematical and Engineering Science Professionals**	**21**	**Science and Engineering Professionals**
211	Physicists, Chemists and Related Professionals	211	Physical and Earth Science Professionals
212	Mathematicians, Statisticians and Related Professionals	212	Mathematicians, Actuaries and Statisticians
213	Computing Professionals	213	Life Science Professionals
214	Architects, Engineers and Related Professionals	214	Engineering Professionals (excluding Electrotechnology)
		215	Electrotechnology Engineers
		216	Architects, Planners, Surveyors and Designers
22	**Life Science and Health Professionals**	**22**	**Health Professionals**
221	Life Science Professionals	221	Medical Doctors
222	Health Professionals (except nursing)	222	Nursing and Midwifery Professionals
223	Nursing and Midwifery Professionals	223	Traditional and Complementary Medicine Professionals
		224	Paramedical Practitioners
		225	Veterinarians
		226	Other Health Professionals
		25	**Information and Communications Technology Professionals**
		251	Software and Applications Developers and Analysts
		252	Database and Network Professionals

4.2.6. Residual categories

Residual categories are designed to classify units that do not fit into the other, fully specified, classification categories.[25] They may be required to ensure that all categories in a flat classification, or at all levels in a hierarchical classification, are jointly exhaustive of all units in the population. (UNCEISC 2022, 14).

The use of residual categories in ISCO-08 and related national classifications ensures that all jobs in the world should be able (in theory) to be classified in ISCO-08, and that all jobs in the country should be able to be classified in the National Occupation Classification (NOC).

In ISCO-08, the titles for residual categories at sub-major group and minor group levels start with “Other” followed by the name of a relevant higher-level category. At the most detailed level of ISCO-08, residual unit groups take the name of the minor group to which they belong, followed by the words ‘Not Elsewhere Classified’ which may be abbreviated to “n.e.c.”. The use of these residual categories in an occupation classification allows occupations and groups of related occupations that are too small to be separately identified at a particular level of the classification to be grouped together. It also provides a space to classify emerging occupations that were not considered at the time development of the classification if they cannot be placed in any of the other categories.

In designing an occupation classification, it is important to keep the number of residual categories to the minimum necessary. Residual categories should not be created when all units within a group are logically covered

[25] Vague and imprecise responses to questions in surveys should not generally be coded to residual categories (See Section 5.2 on coding).

by the categories at the next level. For example, ISCO-08 sub-major group 73, Handicraft and Printing Workers includes only two minor groups: 731 Handicraft workers, and 732 Printing Trades Workers. No other groups are logically possible. A unit group for Handicraft Workers Not Elsewhere Classified is nevertheless provided, as shown below.

73 Handicraft and Printing Workers

- 731 Handicraft Workers
  - 7311 Precision-instrument Makers and Repairers
  - 7312 Musical Instrument Makers and Tuners
  - 7313 Jewellery and Precious Metal Workers
  - 7314 Potters and Related Workers
  - 7315 Glass Makers, Cutters, Grinders and Finishers
  - 7316 Signwriters, Decorative Painters, Engravers and Etchers
  - 7317 Handicraft Workers in Wood, Basketry and Related Materials
  - 7318 Handicraft Workers in Textile, Leather and Related Materials
  - 7319 Handicraft Workers Not Elsewhere Classified
- 732 Printing Trades Workers
  - 7321 Pre-press Technicians
  - 7322 Printers
  - 7323 Print Finishing and Binding Workers

At the second level of ISCO-08, there is only one residual sub-major group: 44 Other Clerical Support Workers. The occupations in this group are relatively diverse within the scope of clerical support workers.

4.2.7. Design constraints

An occupation classification that is to be used for statistical purposes should not, in general, have categories at the same level in its hierarchy which are too disparate in their population size, based on the number of persons employed in each category. Ideally, similar numbers of jobs should be classified to each category at a particular level in the classification structure. This can reduce large variations in standard errors and the need to suppress cells in statistical tables at particular levels of the structure when using output from sample surveys (ABS and Stats NZ 2019). This is especially relevant to groups at the higher levels and can allow the classification to be used effectively for the cross-tabulation of aggregate data from sample surveys, including the labour force surveys.

The balance of the classification, including the estimated size of each group in terms of the number of jobs (or work activities) should, therefore, be assessed and tested as part of the classification development work. One possibility is to create minimum size limits for groups at particular levels of the classification. Size limits for groups at the most detailed level expected to be used for the compilation of statistics from sample surveys, typically the unit group level, can be based on the lowest frequency for national estimates of employment that can be published without an unacceptably high level of sampling error. However, there are no hard and fast rules concerning statistical balance. A degree of judgement is necessary to avoid grouping dissimilar entities together and creating categories that are not meaningful or useful.

For example, for inclusion in the Australian and New Zealand Standard Classification of Occupations (ANZSCO), a category ideally fitted within the range listed below for the number of employed persons in each group in either Australia or New Zealand. Exceptions were nevertheless made for occupations or groups of occupations of particular strategic or labour market significance (ABS and Stats NZ 2022).

▶ **Table 4.8 Minimum and maximum size guidelines for groups at each level of ANZSCO**

	Australia	New Zealand
Major Group	500,000 to 1,500,000	100,000 to 300,000
Sub-Major Group	100,000 to 300,000	30,000 to 100,000
Minor Group	50,000 to 150,000	10,000 to 30,000
Unit Group	5,000 to 30,000	3,000 to 10,000
Occupation	300 to 10,000	100 to 5,000

When occupation classifications are used in client-oriented applications such as employment services and managing employment related migration, there may be a need to create categories for occupations in which the number of employed persons is small and below the threshold needed for the compilation of statistics from household surveys. This could be the case, for example, for occupations that are in shortage, or for small highly specialized occupations. In these cases, relevant categories can be created at the most detailed level of the national classification, but statistics compiled from survey data may not be able to be published for these categories.

Categories for jobs or positions that are only held by one or a very small number of persons should be avoided, as it would not be possible or useful to produce statistical or other information about them without breaching the confidentiality of the individuals concerned. Equally, very detailed and small groups such as these would not be useful in client-oriented applications such as employment services and management of employment-related migration. For example, categories such as “President of the Republic”, “Prime Minister”, “Chief Justice”, “Archbishop or “Grand Mufti” are not needed for statistical or client-oriented applications. In some instances, such very small categories may be necessary in administrative applications of an occupation classification, for example if it is to be used in government human resource management systems. In general, however, separate categories for occupations or job titles held by a very small number of individuals should not be listed in a level of the classification structure that is to be used for statistics. The various job titles that relate to the group can be listed as part of its definition, and/or included in the index of occupational titles (or coding index), including those that refer to jobs with very small employment numbers.

When a fifth level is created during national adaptation of ISCO-08, it is important to ensure that the categories at the fifth level represent distinct occupations that do not overlap with others. It should be possible, meaningful, and useful to produce information about each category in at least one of the intended applications of the classification. In statistical applications concerns about data quality in sample surveys impose limitations on the publication of information about very small groups. Statistics at the fifth level of a NOC based on ISCO-08 might only be able to be published from sources such as the population census and administrative records but may nevertheless be constrained by concerns about confidentiality if categories are very small.

Separate categories should not be created for alternative job titles that refer to essentially the same or very similar occupations, or for categories that are not useful for the purposes of the classification. For example, the terms “Head teacher”, “Headmaster” “Headmistress” and “School principal” all refer to the job of a person in charge of a primary or secondary school, classified in ISCO-08 Unit Group 1345, Education Managers. It would not, therefore, be appropriate to create additional categories for head teachers, headmasters, headmistresses and school principals. These terms can be included in the index of occupational titles used for coding without the need to create additional categories.

4.3. Developing and reviewing descriptors and definitions of categories

Each category at each level in an occupation classification should be represented by an official name and a code and accompanied by a description or a definition and other information. Descriptive definitions are needed in a

classification when the official name of a category is not sufficient to unambiguously define the nature, scope and boundaries of a classification category (UNECE 2013, 19-20). The main purpose of the definitions of groups in a national occupation classification used for statistical purposes should be to concisely define the content of each group, so that users can determine where in the classification structure a particular occupation should be classified. Definitions of categories also provide general descriptive information about the nature of the work performed in the group of occupations concerned.

The explanatory notes in ISCO-08 are called "group definitions" and have a standardized structure and content made up of several different components, as follows:

- a lead statement that summarizes the scope and basic nature of the group and usually comprises one or two sentences
- a statement of tasks performed indicating the main tasks typically, or usually, performed in occupations classified in the group
- a list of the groups included at the next level down in the classification hierarchy or, for unit groups, a list of "examples of the occupations classified here"
- an optional list of "related occupations classified elsewhere"
- optional "notes" to clarify the boundaries between related groups where this is not entirely clear.

A similar but not always identical approach is adopted in many national classifications. Sometimes supplementary information on various characteristics such as skill requirements, licencing, certification and other requirements can be added especially when the classification is used as part of a wider occupational information system, such as in the Canadian NOC, ANZSCO , UK SOC, Saudi Standard Classification of Occupations, Occupational Information Network (O*NET), the Classification of European Skills/Competences and Occupations (ESCO), and the Indonesia's occupational tasks and skills, etc.

A widely used approach when ISCO-08 is adapted for national use is to adjust the group definitions of the ISCO-08 categories included in the national classification to reflect national realities. This involves translating the definitions into the national language or languages, if required, and reviewing them to ensure the text is appropriate and relevant to national circumstances. The lists of examples of occupations classified in each unit group should be updated to reflect the occupations that exist in the country and the terms used to describe them. If a fifth level in the classification structure is created, then each unit group definition should list the categories included at the next level.

If the structure of the ISCO-08 group definitions is followed, definitions of any new groups included in the national classification will need to be drafted and verified. The definitions should follow the same structure, style and approximate length and level of detail as provided in ISCO-08.

If it is decided that the structure or template for group definitions should be different from the approach used in ISCO-08, the nature and structure of the descriptions to be used will need to be specified in advance and examples of the types of information to be included should be provided to those responsible for developing the definitions. This also applies to definitions of fifth level categories/occupations. It will generally be preferable that definitions of categories are drafted initially by the project team tasked with development of the classification, rather than asking agencies or reference groups to develop definitions on a sectoral basis. This will ensure a degree of uniformity and control over the style, level and detail and length of definitions – and should avoid the need for extensive redrafting. Ideally, however, stakeholders with an interest in particular sectors should have the opportunity to review and suggest improvement to the categories of interest to them.

It is possible to develop concise and useful definitions of detailed occupations or categories at a fifth level of classifications based on ISCO-08, or at a fourth level that is significantly more detailed than ISCO-08. The Kenya National Occupation Classification Standard (KNOCS) is an example of a classification that provides short definitions of occupations at a significantly more detailed level than ISCO-08.

Developing concise definition can be achieved with relatively limited resources if the number of categories is not too high and if readily available resources such as ESCO and O*NET, are used as a source of information to assist in drafting definitions of occupations that exist worldwide. The need for research at national level can then mainly focus on nationally specific occupations, although some adaptations to reflect national circumstances may need to be made to definitions sourced from external sources.

4.4. Developing other relevant material

In addition to the material mentioned in the previous sections, such as the NOC structure, group descriptions, coding index and crosswalk, etc. classifications require the development of essential material to assist and support a wide range of users in understanding and using the classifications in their operations. (See Section 7.1).

This kind of material could be, for example, in the form of explanatory documentation or (self) training material. It could cover comprehensive information about the NOC or target various specific topics, such as coding guidelines, instructions and other essential information needed to understand the scope of groups or the treatment of specific groups or cases. For example, the Canada NOC offers a wide range of online material designed to support users in understanding the NOC. Informative material can also be prepared, particularly when the NOC has been revised or newly developed. For example, the GASTAT of Saudi Arabia used a short video to introduce the Saudi Standard Classification of Occupations, explaining its design, structure, and potential uses.

4.5. Sources of information to review or develop a national classification of occupations

Identification and evaluation of the available sources of information about the occupations and job titles that exist in the country is critically important and should be undertaken in the early stages of planning the development or updating of a national occupation classification.

Among the most important sources are recently conducted surveys and censuses that collected data on occupation, and ongoing field tests being undertaken as part of the development of future surveys and censuses. Therefore, in general, there is no need to conduct a new survey only for the purpose of updating a classification. If information about specific sectors of the economy or occupational groups is considered to be particularly lacking, a survey of employers in these sectors may be considered. However, this is an expensive and time-consuming option, and it may be easier to obtain the information needed directly from relevant industry and professional bodies and associations. The customizable forms of the questionnaires used in the O*NET Data Collection Program are a useful resource that could be adapted for use by agencies wishing to collect this type of information.

If there is uncertainty about the nature of the work performed in a particular occupation, or about the meaning of a particular job title, searching online for the job title is frequently a useful way to find the information needed. Information found in national and regional intergovernmental classification systems such as ESCO and the US O*NET is generally reliable and has been validated at the national or regional level. These types of sources can be useful in their own right and can also be used to validate information found in sources such as online job advertisements and descriptions from private sector careers services. However, validation at the national level should be undertaken to the extent possible to ensure that the classification structure and descriptive material is adapted to reflect national realities. This can potentially be done through consultation with relevant industry and professional associations and other stakeholders.

Employment agencies (whether public or private) can be a good source of information about occupations that are not included in ISCO-08 and are also likely to have information about the nature of the work performed in these occupations. They may also have information about occupations that are in high demand and for which employment numbers are likely to grow. If the public employment service is a partner or key stakeholder in the

development of the national classification, its involvement early in the development process will be critical to identifying occupations that need to be added to the classification and to providing information about where in the classification these occupations should be classified. However, job vacancies in some economic sectors and some occupations may not normally be filled through public or private sector employment services. It is important, therefore, not to rely on employment services as the only source.

Other important sources of information include any existing classifications or lists of occupations currently or recently used in statistical or administrative activities, as well as records of occupation titles given in activities such as employment registrations, applications for work permits, tax declarations and so forth. Online job vacancies and other types of big data are a rich potential source of information to contribute to a better understanding of labour markets, including the skills and occupations in demand, especially if complemented by more traditional sources of information (ILO 2020). Job vacancy notices appearing both on-line and in printed publications or held in the records of both public and private sector employment agencies, can be particularly useful, as they tend to include information about the nature of the work performed and the skills required. The curricula of vocational education and training programmes include information about the occupations for which people are being trained and about the skill and knowledge requirements. Professional associations and industry associations can provide useful information about the occupations that exist in their area of interest, and on the nature of the work performed in these occupations. However, these administrative sources and those related to client-service may not be fully comprehensive, and many of them are biased towards occupations in demand in the formal sector. They may have limited value in assessing the size of occupations in terms of employment numbers. Survey and census data are the most comprehensive sources of information but will frequently need to be complemented by data from other sources when there is a need for more information about the nature of the work performed.

▶ Box 4.5 Major sources of information to develop and update a NOC

- Surveys and census data that collect data on occupation, including pilot/field tests being undertaken as part of the development of future surveys and censuses
- Public and private sector employment services
- Job vacancy notices posted on-line and in newspapers and other media
- Vocational educational and training institutions establishing curricula for occupation specific training courses
- Agencies responsible for setting and assessing skills standards in specific economic activities and occupational groups
- Agencies responsible for the promotion and preservation of traditional national crafts, and associations of workers and employers in these crafts
- Agencies representing workers and employers in particular economic activities and occupational groups
- Professional associations
- Employment observatories and branches of government agencies responsible for work force planning and skills development
- Job forecasts and reports on employment prospects or outlooks
- Job monitoring and analysis exercises conducted either as part of the development and maintenance of the classification and associated occupational information systems (such as the US Occupational Information Network (O*NET) data collection programme), or by institutions undertaking research into specific segments of the labour market
- Other country or regional classification of occupations

All the types of sources listed above are likely to include information about the occupations that exist or are in demand, but also about the tasks and duties performed in these occupations and the nature of the skills and qualifications required. Online searching for information from many of these sources is a valuable method to find information about occupations that may not be adequately covered in ISCO-08. Direct consultation with the relevant agencies is essential however to verify the correctness and completeness of the information identified.

The various sources are likely to provide varying levels of detail about the tasks and duties performed in these occupations and the nature of the skills and qualifications required. It is necessary, therefore, to summarize and distil information obtained through online searching or provided directly by the agencies concerned to comply with the standardized format and length specified for the national occupation classification. Once definitions of groups have been drafted, it is essential to give relevant stakeholders with expertise in the occupational area concerned the opportunity to review them and suggest improvements.

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5. Collection and coding of occupational data

This module provides practical advice on data collection methods and on the development of coding procedures and a coding index needed to ensure sufficiently consistent and accurate assignment of occupation codes.

5.1. Type of questions to collect and code data on occupation

Three types of question have typically been used to collect data on occupations from households or individuals:

- one or two pre-coded questions (closed-ended questions) in which the respondent selects from a list
- one write-in question to obtain occupation-relevant information about an individual's job (single open-ended question)
- two or more (write-in) questions, a basic question on the title of the position held, with follow-up on the main tasks of the individual in the job (multiple open-ended questions).

5.1.1. Pre-coded questions

Pre-coded questions or closed-ended questions are questions in which the respondent selects answers from a list. Their principal advantage, and one of the reasons why they are still sometimes used, is that the responses can be processed quickly and at a low cost. However, these types of questions have limited accuracy because the names for groups in occupation classifications frequently do not equate with real world terms to describe jobs. They are also limited to a small number of categories, as it is not reasonable to expect respondents to browse through long lists to find their occupation. They do not therefore meet the needs of most data users. Even if the aim is to collect aggregate data at the level of ISCO major groups or sub-major groups, data collected by selecting from a list are likely to be inaccurate, as respondents may have difficulty in understanding where their occupation is supposed to fit in a list of broad categories. In addition, closed-ended questions with long lists of response options also take up a large amount of space on questionnaires and administrative forms.

For all of the reasons given above, the use of closed-ended questions is not recommended and not suitable for the collection of good quality or detailed information classified by occupation. If, however, this is unavoidable some steps can be taken to mitigate but not completely eliminate the inevitable data quality problems:

- Separate response categories can be provided for high priority groups.
- Accuracy can be improved through testing and refinement of questions.
- The names of categories from broad classification groups should only appear in the questionnaire if testing has shown they can clearly and unambiguously be understood by respondents and/or survey interviewer.
- Respondents can be sequenced from a broad list of occupations based on terms they can identify with, such as "health occupations" or "occupations in agriculture, forestry and fishing" to a more detailed list. The options at the next level could then include relatively detailed groups at different skill levels and classified in different ISCO-08 major groups.

5.1.2. Open-ended questions

Open-ended questions are questions designed to obtain information about the individual's job and the main tasks in these jobs. These can be in the form of a single or two or more questions. If designed well, they can and do provide sufficient information to assign a four-digit ISCO-08 code in most cases. However, adequate space must be provided on survey forms for a written response of several words. Insufficient space for recording has been shown to be a major factor leading to poor job descriptions and thus poor coding (UN and ILO 2010, 103).

Whether a single question or more than one question is used, the question design should ensure that information is collected about both job title and main tasks, or duties performed.

Examples of suitably detailed responses should be provided on questionnaires to be completed directly by the respondent or collected by the interviewer. If the data are to be collected by interviewers, examples of adequate and commonly given inadequate responses should be included in interviewer training.

A single question such as "What is your main occupation in this workplace?" or "What kind of work do you do?" may elicit adequate information from some but not all respondents. This type of question may yield responses such as "manager", "consultant" or "farm work" that cannot be coded accurately to any level of ISCO-08. The use of separate questions, or separate answer fields, to collect information on the job title and on tasks performed will assist respondents to provide sufficient information. Asking for two different types of information helps the respondent to respond fully, as most will be reluctant to give the same information in response to different questions or prompts. An example with a single question and two separate answer fields, is suggested in the ILO model questions for population censuses as shown below.

▶ Box 5.1 Model question to collect occupation data

A7. What kind of work does (name) do in (his/her) main job/business?

(Write the occupation title and main tasks and duties – e.g. [Cattle farmer – breed, raise and sell cattle; Policeman – patrol the streets; Primary school teacher – teach children to read and write])

OCCUPATION TITLE: _____

MAIN TASKS AND DUTIES: _____

Source *ILO model questions on economic characteristics for Population Censuses (Version 1)* 2020

In designing and sequencing questions on occupation, it is essential to link these questions to a particular job (or work activity) held by the person for whom the data are being collected. In the ILO model LFS questionnaire for pencil and paper interview, respondents are asked to focus on the main income generating activity in which the person usually works the most hours. This is followed by a question on the kind of work the person does in that job, with separate response fields for the occupational title and main tasks and duties. Questions on the name of the place or business where the person works, and its main activity immediately follow. The responses to all of these questions are relevant for coding both occupation and economic activity in the main job. A similar set of questions is proposed for second jobs.

Agencies using the ILO model questionnaire to develop or update national surveys will need to adapt these questions to suit national circumstances. This should include both cognitive and field testing in the language(s) in which the information is to be collected. Coding of test data should also be used to develop and improve the coding procedures and the coding index. This will allow the identification of cases where responses are frequently not detailed enough. This information should in turn be used to improve the question wording or to identify the need for additional questions. Follow-up interviews to collect more detailed information about someone's job is also a useful method to assess the quality and codability of the responses given.

▶ **Box 5.2 ILO Model LFS questionnaire for pencil and paper interview Module MJJ Characteristics of main job**

MJJ_1	Last week did (you/NAME) have more than one job or income generating activity?	ONE JOB/BUSINESS MORE THAN ONE JOB	01☐ 02☐	→**MJJ_3**
MJJ_2	*INTERVIEWER TO READ:* I am now going to ask you some questions about the income generating activity in which (you/NAME) usually work the most hours.			
MJJ_3 **MJJ_3b** **MJJ_3c**	In (your/NAME's) job, what kind of work (do/does) (you/he/she) do? *([e.g. Cattle farmer –breed, raise and sell cattle; Policeman –patrol the streets; Cook –plan and prepare meals; Primary school teacher –teach children how to read and write])*	_____ *OCCUPATIONAL TITLE, IF ANY* _____ *MAIN TASKS AND DUTIES* *ISCO CODE:*☐☐☐☐		
MJJ_4	Does the place or business where (you/NAME) work(s) have a name?	YES BUSINESS WITHOUT A NAME PRIVATE HOUSEHOLD AS A DOMESTIC WORKER	01☐ 02☐ 03☐	 →**MJJ_6** →**MJJ_7**
MJJ_5	What is the name?	_____ (NAME OF ESTABLISHMENT)		
MJJ_6 **MJJ_6b** **MJJ_6c**	What is the main activity of the place or business where (you/NAME) work(s)? *([e.g.: Police Department - public safety; Restaurant - preparing and serving meals; Transport Company - long distance transport of goods])*	_____ *MAIN ACTIVITY* _____ *GOODS OR SERVICES* *ISIC CODE:*☐☐☐☐		

Source *ILO model questionnaire*, Job-type start (V4 Jul 2020)

5.2. Coding procedures

5.2.1. What is occupation coding?

Occupation coding refers to the process of assigning occupation or job descriptions from various sources to the appropriate categories in one or more occupation classifications and recording the code for the classification category. The source data may be administrative records with varying degrees of detail, job vacancy notices posted on-line or held by employment services, and the responses to relevant open-ended questions asked in census and surveys. Responses to questions on occupation (title and tasks and possibly other information), industry and name and details about the workplace or employer are relevant. The information items that can be input to the coding process will vary depending on the items included in the data source. For the sake of simplicity, we will refer to the items relevant considered relevant in any specific data source as the "job description".

Mapping open-ended response data and job descriptions using the hierarchical structure of an occupation classification is error-prone and inefficient. The terms used in everyday job descriptions by survey respondents will frequently not be the same as those used for the names of categories in the classification. The same job titles can be used in different context to describe different occupations. For example, the job title “business analyst” may refer to analysis of business processes from an information technology perspective with a view to developing software solutions, or to jobs involved in analysing a business’s activities from the point of view or profitability, opportunities, threats and improved organization of workflows. Moreover, the terms used in a national occupation classification are not an exhaustive list of all titles used to describe an occupation. For example, the terms “head teacher”, “headmistress”, “headmaster”, “school principal” and “school director” all refer to the same occupations. The classification categories may also include several related but different occupations with different job-titles. For example, the job titles “head teacher” and “university dean” are both coded to the same ISCO-08 unit group – 1345 Education Managers.

Coding should therefore be done using a coding index whose entries comprise text drawn from terms used in real world job descriptions and codes for the relevant classification(s). However, matching free text descriptions with index entries is not a simple process and can be time-consuming and expensive.

Reliable and consistent coding results can be achieved when the job descriptions are matched by clerical staff with the entries in an index, provided well-designed and standardized procedures are followed. Manual coding will of course be more labour intensive, and there will be more opportunities for transcription and data entry errors when codes are transcribed on survey forms, or keyed into a data entry system. Relatively quick and cost-effective coding methods are possible using code search functions, or computer-assisted and automatic coding systems that can speed up the searching and matching process and improve consistency. Various examples of code and/or title search are available, such as the ILO basic search code function using ISCO-08, the CASCOT function using ISCO-08, or the coding system developed by Santé Publique France and Université de Bordeaux in France also using ISCO-08. Other examples exist, such as, the Singapore SSOC which has a basic search function to find a title or a code. A structure browsing and keyword searching of the text in a tree-like mode are also available, such as in the case of Statistics Norway. Results generated by the use of these sources can be checked and validated by a coder.

Whatever coding technology is used, the same underlying coding logic and coding index should be adopted in all coding operations for a given national occupation classification. This will allow consistency and comparability across different data sources. The exact searching and matching procedures may nevertheless be optimized to take full advantage of the capabilities of automated searching and matching engines. Significant effort is required to develop and test both the coding index and associated coding procedures for both manual and computerized coding, and to embed these procedures into the wider data capture system.

Vague and imprecise responses to questions in surveys should not generally be coded to residual categories but should be coded to the level of detail in the hierarchy supported by the information contained in the response. In such cases, it may be necessary to create supplementary categories and codes that are not formally part of the classification structure, as explained in the section on coding vague and imprecise responses (UNCEISC 2022, 16).

5.2.2. Information, steps and material needed for occupation coding

For accurate coding of job descriptions and responses to survey questions on occupation to any level of ISCO-08 or related national classifications, information is needed on both: the job title (name) and the main tasks or duties performed in the job, regardless of the method or technology used for coding – manual, computer assisted or automatic. The job title alone will frequently not contain enough information to allow accurate coding to any level of ISCO-08.

Information about the type of economic activity (industry) of the establishment for which the work is performed and whether or not the main aim of the activity is for own consumption (including subsistence work) may also be of assistance in occupation coding.

Information about the level of skill or qualifications held by an individual is neither necessary nor useful for occupation coding in ISCO-08. Since one of the purposes of an occupation classification based on skill is to help measure these types of skill mismatch, it is not appropriate to assess the skill level required for competent performance in a person's job based solely on that person's qualifications or level of education. The qualifications held by an individual should not therefore be taken into general consideration in coding occupational data to a national classification based on ISCO-08. For specific occupational groups, it may nevertheless be useful to compare the coded occupation data with information on qualifications held, as part of data validation procedures. This may be relevant, for example, if there is a need to distinguish nursing professionals from associate professionals.

Similarly, information related to status in employment should not generally be taken into consideration in assigning jobs to ISCO-08 or national classifications based on it. The fact that a worker is, for example, an owner of the business in which he or she is employed may have a limited relationship to the kind of work performed.

An occupation coding process should typically involve the following steps:

1. First line coding using standardized procedures or algorithms to match job descriptions (job title, statement of tasks performed, and other relevant information such as employer details) with entries in the coding index;
2. Query resolution, to deal with responses that cannot be coded using the index and standard coding procedures;
3. Quality control.

The following materials or resources will generally be needed to support the coding operation:

1. a coding index;
2. the classification structure and group definitions (for query resolution only)
3. a set of standardized coding procedures, rules and conventions that define the process of matching job descriptions with entries in the coding index;
4. coding instructions for first-line coders;
5. query resolution procedures; and
6. training materials for both coders and query resolution staff.

Thorough training in the coding procedures and use of the materials provided is essential for staff undertaking both coding and query resolution. Training should be completed before new staff members start coding, and their competence should be assessed either by having their work checked by an experienced coder or by asking them to code data selected for testing purposes. (See also: Quality control)

5.2.3. The need for standardized coding procedures

Standardized and clearly specified coding principles and procedures are essential to achieve consistency and promote the accuracy of the coding process even when the data source and the coding technology used vary.

Coding principles specify the underlying logic and rules to be used to match job descriptions with classification categories. They provide the basis for the detailed instructions and procedures to be followed by coding staff and of the rules for searching and matching when computerized systems are used for coding. For example, in the United States, the coding principles for the Standard Occupation Classification (SOC) are specified in the SOC User Guide (BLS 2020). In Japan the coding principles are described in the "General Principles for the Japan Standard Occupational Classification". These documents deal with general principles, for example by specifying that when workers in a single job could be coded in more than one occupation, they should be coded in the occupation that requires the highest level of skill (BLS 2018). While these detailed procedures may vary depending on the data source, coding technology used and the specific requirements for an individual data collection, the specification of underlying coding principles promotes consistency across data collections and systems.

The detailed coding procedures need to deal with a variety of situations encountered when assigning source data to classification categories. When data on occupation are collected through a questionnaire, there is significant variation in the length, amount of detail and the degree of specificity provided by respondents. There are also variations in the amount and types of information needed to assign a classification code accurately depending on the job title given and the occupation concerned.

The coding procedures therefore need to indicate:

- how to identify keywords to search for in the index;
- how closely these words should match with words in the index;
- which words in the job description can safely be ignored; and
- when and how to use the information given in response to each of the questions on the job title, tasks and duties performed, the name and economic activity of the employer, and any other questions specified as relevant to occupation coding.

In many cases, the occupation title alone, either as a single word such as "dietician" or as more than one word such as "speech therapist", will be sufficient to allow a four-digit ISCO-08 code to be assigned with confidence. In many other cases, however, the job title alone is not sufficient to assign a code at the four-digit level of ISCO-08, or even at any level of ISCO-08.

▶ Box 5.3 Selected ISCO-08 Coding index entries for 'therapist'

ISCO-08 Code	Text description, keyword first
3255	Therapist, acupressure
2269	Therapist, arts
5142	Therapist, beauty
2269	Therapist, blind
2269	Therapist, dance
3251	Therapist, dental
2269	Therapist, drama
2635	Therapist, family
3255	Therapist, hydrotherapy
2266	Therapist, language
2264	Therapist, manipulative
2635	Therapist, marriage
3255	Therapist, massage
3211	Therapist, medical radiation
2269	Therapist, movement
2269	Therapist, music
3211	Therapist, nuclear medicine
2269	Therapist, occupational
2264	Therapist, physical
2269	Therapist, poetry
2634	Therapist, psychological
2269	Therapist, recreational
2635	Therapist, relationship
2635	Therapist, sex
3255	Therapist, shiatsu
2266	Therapist, speech
2230	Therapist, unani

Continuing with the therapist example, the single word "therapist" on its own, if given as an occupation title would not be sufficient to assign a code at the major group level of ISCO-08. The extract from the ISCO-08 index of occupational titles in Box 5.3 shows that titles in which the main noun is "therapist" can be coded to three different major groups, depending on the words that qualify it. In the case of the ISCO-08 index, the entries are arranged so that the main noun in the occupation title appears first and is used as the indexing word for searching and matching purposes.

When a job title can be matched with index entries coded to more than one group, information about the main tasks or duties performed or the economic activity of the employer, may help to select a closely matching index entry and assign the correct code. For example, the single word job title "therapist" could safely be matched with the index entry "Therapist, beauty" if we know that it refers to a job in a beauty parlour. The job description would then be coded to ISCO-08 Unit Group 5142, Beauticians and Related Workers.

If someone working in the same beauty parlour gives their job title as "dietician" that job would still be classified as dietician and coded to Unit Group 2265, Dieticians and Nutritionists. This would be the case even if the tasks performed were stated to be "cleaning the floor" or something related to beauty therapy. When there are inconsistencies between the job title and information about tasks and economic activity, the job title is usually more reliable than other pieces of information and should take precedence.

There are many cases where job titles given in job descriptions are vague or very generic or refer to the level or grade in an organizational hierarchy. In English, these commonly include terms like “consultant”, “civil servant”, “clerk”, “officer”, “worker”, “owner” and many others. In developing the coding index, it is possible to design index entries for commonly occurring combinations of these keywords with qualifying terms, such as:

- management consultant
- beauty consultant
- chief executive office
- immigration officer
- clerk of works
- bank clerk

This will result in very long sets of index entries where terms like “consultant” and “officer” are the main noun. However, the index design will not be able to anticipate all possible combinations of terms and qualifying words. Some indexing words are very general and may give no indication of the type of work being performed and may not, therefore be useful for coding purposes. Terms like “civil servant” and “owner” tell us about the nature of the employer and the worker’s relationship to the employer but can refer to a very wide range of different occupations. In some cases, survey respondents may use terms such as farming, banking or building instead of a job title.

In all of these types of case the coding procedures will need to specify what steps should be followed to assign a code and the extent to which entries for these terms should be included in the index. If there is no useable job title, or the job title given is not in the index, it will usually be necessary to convert the information given in the job description into a job title. The coders will need instructions and training on how to do this, and coding rules will be needed to indicate which words can reliably be used to create an indexing word and qualifying words. For example, in English, “packing “can safely be converted to “packer”, but “banking” cannot safely be converted to “banker” (ONS n.d.).

According to the coding rules for the UK SOC 2020 terms such as these are ignored for coding purposes, including:

- boy, employee, girl, hand, lad, man, woman, worker, workman

Terms that include these words as indexing words, are nevertheless included in the index when they are commonly used with a clear and specific meaning, as in the case of “stable lad”.

Job descriptions also frequently include words that are not relevant for occupation coding. These words may appear in the job title, the task description, or the employer information. Some commonly used terms, will never be relevant for coding to ISCO-08 when used to qualify the keyword in the job title, such as:

- apprentice, junior, principal, senior, trainee

Such words will not generally be used in the coding index, and coders will need to be given instructions to ignore them.

In other cases, the relevance of particular words to the coding process will depend on the occupational group concerned. For example, to code the job title “shop assistant” to ISCO-08 unit group 5223, Shop Sales Assistants, it is not necessary to know the type of goods or services sold or the industry of the employer, as the classification does not differentiate between different types of shop sales assistant. To code the job title “School teacher” to the 4-digit level of ISCO-08, information is needed about the type of school or level of education to differentiate between secondary education teachers, primary education teachers and early childhood teachers. Information is frequently given by secondary education teachers about the subjects they teach, for example, “maths” teacher,

which may not be relevant as ISCO-08 does not differentiate teachers by subject taught.[26] In summary, coding procedures and rules are needed for the purposes shown in Box 5.4.

▶ Box 5.4 Purposes of coding procedures and rules

- Identification of the term or terms to be used as keywords for searching in the index
- Determining the order in which keywords and qualifying terms are presented in the index
- Determining which words must be matched exactly with those appearing in the index, and the situations in which a close match is sufficient
- Dealing with vague and ambiguous responses
- Identifying the information that is relevant and not relevant for coding depending on the job description given
- Constructing job titles from qualifying words given in the job description
- Dealing with job descriptions that do not include sufficient information to be coded to the most detailed level of the classification
- Dealing with responses that cannot be coded using the standard procedures.

5.2.4. Operational coding strategies

This is not the place for a detailed discussion of operational issues and the use of technology in coding. However, it is important to be aware of the advantages and disadvantages of the different operational strategies for occupation coding, such as field coding, centralized coding, and coding technologies. It is important to stress, however, that regardless of the method or technology used for coding, information is needed on both title and the tasks performed – manual, computer assisted or automatic. The job title alone will frequently not contain enough information to allow accurate coding to any level of ISCO-08.

In field coding of open-ended responses to survey questions, the enumerator or interviewer traditionally records the response (or keywords), preferably including a job title and short description of the tasks and duties performed. She or he then assigns the code to the response after the interview using an index. Coding supervisors are then able to compare the codes assigned and responses recorded to check the quality of the coding afterwards.

There have also been attempts at coding during computer assisted personal interviews (CAPI), where the software searches and index for the words keyed in by the interviewer, allowing the interviewer to identify what additional information is needed for coding (Peycheva et al 2021, Hacking et al 2006). As far as we are aware, coding during the interview has rarely been done in large scale official surveys due to the impact on interviewing time and the risk of losing the interview when the occupation cannot be coded quickly.

In office coding, specially trained office staff assign codes to written job descriptions in connection with consistency checks and data entry (ILO and UN 2010, 169).

Both field coding and office coding can be done manually with a paper index, or with computer assistance to search for matching entries in the index and can be combined with partially automatic coding.

In automatic coding, job descriptions that have been keyed or scanned into computer system are assigned codes automatically by the computer system if they satisfy predetermined criteria. Responses that do not meet these criteria are not able to be coded automatically and are referred for human coding or resolution. Automatic coding is perhaps best undertaken in the context of an office coding operation, as responses that cannot be coded using automatic procedures will include mainly instances of responses that are difficult to code.

[26] Depending on national circumstances, however, information about the subjects taught may be relevant to differentiate secondary school teachers from primary school teachers, and also when national classifications have distinct categories for teaching according to the subjects taught.

Coding in the field by the enumerator has the advantage that, over time and through ongoing training, enumerators become aware of the type of information required to code correctly, allowing them to probe more effectively to elicit a complete response. However, occupation coding becomes one of many tasks for a large number of enumerators and they cannot be given the same amount of training, supervision and support in occupation coding as specialized coders. This approach can work in a continuous Labour Force or similar survey with a permanent field staff and good training and communication. For large-scale infrequent operations such as a population census, coding of occupation as part of the central processing operation is generally preferred (ILO and UN 2010, 171). The most suitable operational strategies for a given data collection will depend on broader decisions about the data capture methods, data processing approaches, and workflows that apply in the wider survey operation or administrative activity. Office coding is likely to be the preferred option in most cases and the use of computer assisted and semi-automatic coding can be expected to increase.

5.2.5. Level of detail of coding

Census and household survey data on occupations have sometimes only been coded to an aggregate level of ISCO or a related national classification – for example at two-digit or three-digit levels. The arguments for this have been based on assumptions that:

- it would be costly to code to a larger number of categories, both in terms of coding errors and in terms of staff hours required
- the responses would not include sufficiently detailed information to support coding to more detailed categories
- sample sizes would make it impossible publish results for the more detailed categories owing to a lack of observations

The experience and current practice of many statistical agencies indicates that these assumptions are questionable, for the reasons listed below:

- The marginal costs of coding to a lower level of aggregation are small in terms of increased error rate as well as in terms of work hours needed for coding. Many of the more difficult decisions that need to be made in coding to ISCO-08 relate to distinctions between major groups. An increase in the number of categories does not necessarily lead to an increase in coding costs. The error rate for aggregate categories does not seem to increase, and coding to a more detailed level may improve the accuracy of codes at the more aggregate levels. (UN & ILO 2010, 172; ILO 2012). Coding to a more detailed level also provides useful information to improve the coding by identifying cases where new index entries are needed.
- The responses to survey questions on occupation are very uneven in the level of detail they provide. Many responses will support coding to a detailed level, especially if the questions have been well designed and interviewers have been trained to obtain a sufficiently detailed response. There will nevertheless be a significant number of responses that do not provide enough detail to be coded to whatever level of detail has been chosen. If all responses are coded to a predefined level, the coding process may lead to an unnecessary loss of information for a large share of the responses.
- If there is an insistence that every response must be coded to a specific predefined level, then responses that do not contain enough information to be coded at that level will be arbitrarily coded to one category or another.
- The number of jobs that can be found in categories defined at a particular level in the classification may differ greatly. For example, the number of jobs in ISCO-08 Sub-major Group 42, Customer services clerks, at the second level of the ISCO-08 hierarchy may in many cases be less than that in Unit Group 5223, Shop sales assistants", defined at a lower level in the structure of the classification, but within another high-level category. This reflects both the realities of the occupational structure of the labour market, as well as decisions made in the design of the classification, for example not to disaggregate the large group of shop sales assistants according to the type of goods or services sold.

Coding all job descriptions to a predetermined aggregate level in the classification hierarchy thus involves the loss of information collected at considerable cost. This imposes limits on options for the output of statistics and to compile estimates for aggregate groups on a flexible basis to meet specific research needs. It also impacts on the capacity of agencies to compile statistics on important composite variables such as socio-economic status, and to aggregate data on a thematic basis for example for health occupations, or ICT occupations.

For all of these reasons, it is strongly recommended that occupation data collected in household surveys, censuses and other data sources be coded to the most detailed level of the classification possible based on the information provided in each job description even if the data are only expected to be disseminated at more aggregated levels of the classification. The level of coding may therefore vary from one record to another, depending on the amount of detail given in response to the relevant survey questions. Coding to at least the four-digit level of ISCO-08 or a related national classification is now the usual practice in many national statistical offices for collections such as the LFS and the Census.

5.2.6. Coding vague and imprecise responses or when the type of work is not covered by the classification

Even when the questions and procedures used to collect information on occupation are well designed and thoroughly tested, there will inevitably be survey responses that are **vague and imprecise**. Job titles such as Foreman, Supervisor, Team Leader, Consultant, Owner, Partner and so forth may in some cases be able to be coded at a detailed level if additional information on tasks performed or the economic activity are available, and index entries can be designed for commonly occurring cases.

The variation in the level of detail provided by survey respondents, however, means that procedures are needed to deal with job descriptions that are too vague or imprecise to be assigned to a category at the most detailed level of the classification. These responses should be coded to the level in the classification structure supported by the information contained in them.

The recommended practice is to assign the code for the relevant higher-level category, followed by trailing zeros. This implies the creation, when needed, of supplementary codes and titles that need to be specified as permissible values in classification databases and processing systems. The data assigned to these categories are then included by default in totals at aggregate levels. They should not, however, be considered as substantive categories in the classification.

When statistics are compiled at more detailed levels, the statistics for these supplementary categories can be released in publications labelled as "<*group name*> not further defined (n.f.d)". This will probably be the preferred approach if large numbers of jobs have been allocated to these categories. For example, the Australian Bureau of Statistics (ABS) provides a detailed explanation of the use of "n.f.d" codes as well as other supplementary codes in the Census Dictionary (ABS 2021). Alternatively, these "n.f.d" data can be allocated proportionally to the more detailed categories in a transparent manner.

It is particularly important not to force vague and imprecise survey responses into any particular detailed category where only a small proportion of the jobs would fall if the responses were adequate, as this would distort the statistics for the group concerned. For the same reason, residual groups (not elsewhere classified categories) should not be used for vague responses.

A method of dealing with commonly occurring vague job descriptions during coding, is to provide special entries in the coding index for them. Consider the following job description that might be provided in response to survey questions on the main job:

Job title:	Sales
Tasks and duties performed:	Selling
Employer:	[*name of*] enterprise
Economic activity:	Sales

Whilst there are other possibilities, it is reasonable to assume that this job should be classified in ISCO-08 Sub-major group 52 Sales workers. However, there is not enough information to code the response to any of the more detailed categories of Sales Worker. It can therefore be coded to a supplementary category: 5200 Sales workers not further defined, shown in Box 5.5.

▶ Box 5.5 Provision of a supplementary category for vaguely described sales workers

52 Sales workers

	5200	Sales workers not further defined
521		Street and market salespersons
	5211	Stall and market salespersons
	5212	Street food salespersons
522		Shop salespersons
	5221	Shopkeepers
	5222	Shop supervisors
	5223	Shop sales assistants
523		Cashiers and ticket clerks
	5230	Cashiers and ticket clerks
524		Other sales workers
	5241	Fashion and other models
	5242	Sales demonstrators
	5243	Door to door salespersons
	5244	Contact centre salespersons
	5245	Service station attendants
	5246	Food service counter attendants
	5249	Sales workers not elsewhere classified

The given job title "Sales" can easily be converted into a more recognizable job title such as "Sales worker" or "Salesperson". This type of vague response can then be quickly and efficiently assigned to the relevant "not further defined" category if the index includes entries such as:

5200 Worker, sales (no additional information)
5200 Salesperson (no additional information)

There will also be cases where the information given by the respondent will not be sufficient to assign a code at any level of the classification. For example, job titles such as consultant, civil servant and many others cannot be coded to any level of ISCO-08 in the absence of additional more precise information. Such cases should be assigned a supplementary code for inadequately described. The provision of index entries to deal with such cases can once again allow these responses to be dealt with efficiently. For example:

X001 Consultant (no additional information)
X002 Servant, civil (no additional information)

In the above examples separate supplementary codes have been given to each index entry for inadequately described jobs. These codes can be used to facilitate subsequent analysis of inadequately described responses and allow dissemination of statistics about the number of jobs assigned these codes. This could be informative for users in the event that large numbers are assigned to these categories.

When datasets coded to the national classification that include supplementary codes are to be converted to ISCO-08, these codes will need to be mapped in some way to ISCO-08. It may in some cases be possible to map these codes to ISCO-08 higher level groups using trailing zeroes. In other cases, it may be necessary to assign a "dummy" ISCO-08 code such as '*XXXX no correspondence*'. See also: Developing correspondence tables between existing occupation classifications.

The use of special index entries for commonly occurring vague responses, allows many vague and imprecise responses to be dealt with as part of the standard coding procedures, without the need to raise a coding query,

thus helping to keep the query rate to manageable levels. It is inevitable, however, that some vague responses will need to be referred for query resolution (See also UN & ILO 2010, §673 - §679).

When the **job title given by a survey respondent cannot be found in the coding index**, or if no valid job title is provided in the response, there will be cases where information about tasks performed cannot be converted to a job title listed in the coding index. In both of these situations, unless the information is simply vague or incomplete, there are two possibilities:

1. the occupation is not covered in the classification because it is either a new emerging occupation, or because the classification developers were unaware that it existed;
2. the occupation is covered in the classification, but the job title given in the response is not listed in the coding index.

In these types of case the job description should be referred as a query to supervisors or expert coders and ultimately to those responsible for maintaining the classification and index. This will allow the standard coding process to progress smoothly and efficiently, while a decision is made about where the new occupation or job title should be classified within the structure of the NOC with an existing group (the best fit), and whether one or more additional entries should be added to the index.

5.2.7. Coding job descriptions that cut across the distinctions made in the classification

Occupational classifications define occupations and occupational groups by reference to the most common combinations of tasks and duties. Problems may arise therefore when, in the case of some jobs, the range of tasks and duties performed does not correspond exactly to those specified in the classification.

When a job description implies the performance of tasks and duties that cut across the distinctions made in the classification it may be matched with index entries for more than one category. Two or more job titles may be given, or the task description for a single title may include information that matches with multiple index entries. This could be the case for relatively uncommon combinations of tasks and duties, or for relatively common combinations when, for example, a job involves both production of goods and sale or transportation of those same goods. When job descriptions can be matched with index entries with more than one code, they should be coded to only one category in the classification, for obvious statistical reasons to avoid double counting. The coding procedures should specify how these cases should be handled, so that a single code can be assigned by coders or computer programmes as quickly and efficiently as possible. The points in Box 5.6 should be taken into consideration when devising coding rules to deal with job descriptions that could be assigned to more than one category. (Also see Sections 2.1 and 2.3).

▶ Box 5.6 Order of precedence to deal with occupations with a broad range of tasks and duties

- The category with the highest skill level should generally take precedence.
- Tasks involving production of goods or services should generally take precedence over sales, transportation, and administration, unless there is evidence that management tasks are the main component of the work.
- If management of staff or budgets is mentioned in the tasks, this should take precedence and the occupation should be classified in Major Group 1, Managers.
- For responses in English, however, the term “Manager” should be treated with caution if it is given in the job title. This term may frequently be used to refer to jobs that do not have overall responsibility for the operations of a business or organizational unit. For example, the term “Train manager” is used in some countries for jobs classified in Unit Group 5112 Transport Conductors.
- Where the tasks and duties performed are both at the same skill-level and at the same stage of production, the job should be coded according to the predominant task performed. This may be operationalized in coding procedures by selecting the first job title given, or the first item listed in the task description.

Example 1

Job title: Forestry technician and logging plant operator
Tasks and duties: Conducting forest inventories and harvesting trees.

In this case both the job title and the tasks and duties imply that the job combines tasks that could be coded either to ISCO-08 Unit group 3143, Forestry Technicians, or Unit Group 8341, Mobile Farm and Forestry Plan Operators. Occupations in Major Group 3 are at Skill Level 3, while occupations in Major Group 8 are at Skill Level 2. The job should be coded to 3143 as it has a higher skill level.

Example 2

Job title: Baker
Tasks and duties: Baking and selling bread and cakes.

A baker who bakes bread and pastries and also sells these products should not be classified as a salesperson, but as a baker in Unit Group 7512: Bakers, Pastry-cooks and Confectionery Makers, as the production of goods takes precedence over sales.

To the extent possible, it is desirable to include procedures to assign a single code to job descriptions that can be matched with index entries for more than one category, as part of the standard coding procedures. This may help to keep the number of coding queries to a manageable level. As with vague responses, however, it is inevitable that some of these job descriptions will not be codable by following standard procedures and will be referred as queries.

5.2.8. Query resolution procedures

A coding query occurs when a coder is unable to assign a classification code to a job description using the standard procedures and tools. Procedures for reporting and recording queries need to be established in advance and included in the coding instructions and training material (UN and ILO 2010, 178). Equally, procedures for processing and resolving queries, and for making any consequent amendments to coding procedures and documentation need to be agreed in advance and reflected in work plans.

Whichever method is used to identify potential codes, a degree of checking using another method is advisable. (See Box 5.7). This is because breaking the coding rules necessarily introduces a degree of error and uncertainty. Words with similar meanings, may not always have the same meaning in the context of a job description. Considering the “Contact Centre Director” example, it is important to understand that “Director” and “Manager” are not always coded the same way. The term “Manager” in English may mean different things depending on the context and associated qualifying words. For example, “Manager, contact centre team” has a different code from “Manager, contact centre”. Once one or more potential codes have been identified it will be useful to look at all of the index entries with the same code, to understand the scope of occupations classified there. Reviewing the definitions of the groups concerned will also be helpful to confirm which is the most appropriate code.

The various query resolution methods described in this section would generally require the query resolver to have access to the following resources:

- A document describing query resolution procedures
- A copy of the coding index that is searchable and sortable, by code as well as alphabetically
- The classification structure and group definitions.

▶ Box 5.7 Coding query resolution approaches

One or more of the following approaches could be followed to resolve a query.

Query resolution example**:** The job title "Contact Centre Director" cannot be matched with an entry the ISCO-08 index of occupational titles.

Search the ISCO-08 index for "Contact Centre Manager" to find a match with the index entry 1439, Manager, contact centre. The first step in query resolution will generally involve breaking the coding rules, for example by **applying more relaxed matching rules**, so that words in the job description can be matched closely rather than exactly with words in the index. The procedures may also include replacing words in the job title or tasks description with words that are close in meaning, for example by replacing the term "Director" with "Manager". This method would allow the hypothetical job title "Contact Centre Director", to be matched with the index entry "Manager, contact centre".

ISCO-08 Code	Index text
1439	Manager, contact centre
3341	Leader, team: contact centre
3341	Manager, contact centre team
3341	Planner, contact centre workforce
3341	Planner, workforce: contact centre
3341	Supervisor, contact centre
4222	Clerk, customer contact centre
4222	Clerk, information: customer contact centre
4222	Coach, contact centre
5244	Salesperson, customer contact centre

Perform a **text search of the index for qualifying words rather than keywords** (See Section 5.3.2). If the index is structured according to the main noun in the job title, a free text search for qualifying words would identify all index entries containing those words. For example, all possible codes for responses containing the words "contact centre" could be identified using search or filter facilities in an electronic copy of the index. This allows the query resolver to identify the range of codes that could be applied and match the job description with the index entry that is closest in meaning. The query resolver may also review the definitions of the relevant categories to identify the most suitable code. This method would allow the hypothetical job title "Contact Centre Director", to be matched with the index entry "Manager, contact centre".

Use the **classification structure** to compare the definitions of groups that are related (based for example on the type of goods or service produced) with the given job description. This approach could involve searching the classification structure from the top down, by first selecting a major group, then a sub-major group and so forth. For example, occupations related to health care can be found in three different major groups, depending on the skill level required. A suitable category for a job in health care that cannot be coded using the index may thus be found by perusing the structure and group definitions for the following sub-major groups in ISCO-08: 22 Health Professionals; 32 Health Associate Professionals; 53 Personal Care Workers.

Search the **group definitions** (or the unit group task statements included in the group definitions) for the tasks or qualifying words described in the job description given by the survey respondent. This approach could involve searching the classification structure from the top down, by first selecting a major group, then a sub-major group and so forth. For tasks that are performed in only a few occupations, this may yield useful results. However, some words describing tasks appear in the definitions of a large number of groups. For example, searching group definitions for "conducting research" would identify too many groups to be useful. Searching for something more specific like "steering ships" might identify a small number of potential groups.

In some cases, especially for new and emerging occupations and new job titles, it may be difficult to know what kind of work is performed based on the job description given in a survey. In these cases, desk **research** such as searching the internet to find job vacancy notices and complete job descriptions may be necessary to gain an understanding of what the job entails. It will then be possible to determine how it should be classified. It is also possible to contact industry associations and training bodies to obtain more information about emerging occupations in particular fields. In these situations, it will usually be best for the desk research to be undertaken by those responsible for maintaining the classification and index. While such research is underway, it may be necessary to assign an interim code, such as a supplementary code for *not further defined* or inadequately described responses, as an outcome of query resolution.

Resolution of queries, generally requires an understanding of the classification structure and principles, as well as of the standard coding procedures. Depending on the coding operation, query resolution may be undertaken by coding supervisors, by a specially trained team, or by the organizational unit responsible for the classification - or by a combination of these groups. For example, initial query resolution may be done by coding supervisors with more difficult cases being referred to specialists in the classification. In general, any regularly occurring queries such as those relating to new job titles, should be referred to those responsible for maintenance of the classification and index. To retain appropriate levels of coding throughput and avoid unwarranted delays in survey processing, however, it may be necessary for query resolvers to assign a code quickly without waiting for a formal decision about a new job title. The outcomes of the query resolution process, and of each instance of query resolution may include:

- assignment and recording of a code for a substantive category in the classification
- assignment and recording of a code for inadequately described information or for a not further defined category
- feedback to the coder, if required, on how to use the standard coding procedures to assign a code to the job description
- updates to the coding procedures, instructions and/or index.

5.2.9. Quality control

In view of the complexity of the occupation coding process, quality control measures and adequate resources for quality control, need to be built into the design of the processing plan. Occupation coding relies to a large extent on the capacity of coding staff to follow relatively complex procedures, and to a more limited extent on their judgement. It is also reliant on various assumptions that are built into both the coding procedures and coding index. This leaves plenty of scope for intercoder variability and inconsistency, as well as error.

There is also scope for systematic error, whereby some types of response are coded incorrectly on a consistent basis, leaving a high level of error for specific groups of occupations. For example, and returning to the contact centre example given above, the job title “Contact Centre Team Manager” is frequently used to refer to the supervisor of a group of workers in a contact centre. It should be coded to ISCO-08 Unit Group 3341, Office Supervisors. However, if a coder selects the index entry, “Manager, contact centre” the job description will be coded to unit group “1439, Service Managers not elsewhere classified”. The ISCO-08 index includes an entry “Manager, contact centre team” specifically to avoid this problem – but there is a risk that some coders will consistently overlook it. Quality control and assessment procedures are needed, therefore, to:

- assess the overall reliability of the coding process and compile coding error rates, or rates of inter-coder consistency
- identify deficiencies in the performance of individual coders and of the coding procedures, so that corrective measures can be taken
- identify and correct systematic coding error.

Two possible **approaches can be taken to address coding errors and ensure coding quality control**. A common method of coding quality is to **recode a sample of job descriptions**. This may be done either by a first line coder, or by an expert or supervisor. If the coding results are different, the correct code should be determined by an adjudicator. Another method is to **review the coded results alongside the responses given sorted in code order**. This allows the identification of cases where responses are systematically being assigned the wrong code. For example, it might allow identification of cases where Contact Centre Team Managers were being consistently miscoded.

These approaches allow the identification of individual coders who have high levels of error and need additional training. They allow the identification of the types of job descriptions that are causing problems that might be resolved through adjustments to the coding procedures or index. They also provide the data needed to calculate estimates of error rates and inter-coder consistency rates.

5.3. The index of occupational titles (the coding index)

A national index of occupational titles (an occupation coding index) is the most important tool needed for implementation of the national occupation classification, whether or not it is based on ISCO-08.

5.3.1. What is a coding index?

According to the Statistical Classifications Model, which forms part of the Generic Statistical Information Model (GSIM)

> A Classification Index is an ordered list (alphabetical, in code order etc) of Classification Index Entries. A Classification Index can relate to one particular or to several Statistical Classifications.
>
> A classification Index shows the relationship between text found in statistical data sources (responses to survey questionnaires, administrative records) and one or more Statistical Classifications. A Classification Index may be used to assign the codes for Classification Items to observations in statistical collections.

A coding index (adapted for national purposes) allows textual information about jobs to be translated or mapped to the categories in the occupation classification and therefore used during the coding process. The United States Census Bureau provides a useful visualization of the way the Census Alphabetical Index of Occupations is used to assign data collected in the American Community Survey to classification codes.

The same index should be used in all coding operations when the source information is similar. Variants of the index might be needed if the types of information in the source data are different, for example in the records of employment services or in establishment surveys. However, a single index will usually be sufficient, is easier to maintain and will promote consistency when data from different sources are coded by occupation.

The index entries should include a code for one or more classification schemes, and text drawn from terms used in real world job descriptions given in response to relevant questions in censuses and surveys and in administrative records, or on the everyday terms that people use to describe their jobs. The codes included in the index entries should ideally be at the most detailed level of the (national) classification, or at least at the most detailed level at which it is intended to compile statistical outputs. Some entries may nevertheless include a code for a higher-level category, followed by trailing zeroes, to deal with vague and imprecise responses.

The formal names for classification categories such as “education manager” are not usually the same as terms normally used to describe jobs. These group names should only be used in the coding index if they are also used to describe jobs in everyday language. Terms like “registered nurse” and “ward sister” might commonly be used for jobs classified in ISCO-08 Unit Group 2221, Nursing Professionals, but the term “Nursing professional” would not commonly be used to describe jobs in everyday language. However, “roofer” is one of several commonly used terms to describe jobs classified in unit group 7121, Roofers, as shown in the extract from the ISCO-08 Index of occupational titles.

ISCO-08 code	English text description
7121	Fixer, roof
7121	Roofer
7121	Roofer, asphalt
7121	Roofer, composite materials
7121	Roofer, metal
7121	Roofer, slate
7121	Roofer, tile
7121	Roofer, wood-shingle
7121	Thatcher
7121	Tiler, roof

5.3.2. Structure and content of the coding index entries

There are two basic approaches to structuring a coding index: "**all-inclusive" and "structured**". Before the coding index is developed, a choice will need to be made as to how the index is to be structured.[27] This choice will impact not only on the index itself but also on the associated coding procedures.

When the **all-inclusive approach** is used, the index provides an extensive list of commonly used job titles in the word order that is used naturally in job descriptions and survey responses. Words that are not relevant for the purpose of distinguishing between categories in the classification are included in the index entries – and as a result the total number of index entries can be very large.

When the **structured approach** is used, the entries in the index are organized according to keywords. The keywords are usually the main noun given in the job description. This can be understood by coders as: *the single word in the job title that alone can serve as an occupation title, however imprecise.*

In the ISCO-08 Index of occupational titles a structured approach is used. The keyword is always listed first. If the keyword is not sufficient on its own to distinguish between classification categories, qualifying words are added that may be matched with additional information in the job title, the task description, or the economic activity of the employer. Two or more qualifying phrases can be added if necessary, with each qualifying phrase separated by a marker such as a comma, colon, or slash (, : /). Words following a comma are generally intended to be matched with qualifying words in the job title. Words following a colon are used if a third element is needed and should be matched with information about the tasks performed or economic activity of the employer, as shown in the extract here. Qualifying words that are not relevant to distinguish between the categories in the classification need not be included in a structured index, even if they commonly appear in job descriptions. This means that the number of index entries needed in a structured index will in principle be lower than in an all-inclusive index. This can be seen by comparing the large number of examples of job titles related to Dietitians and nutritionists listed in the Canadian NOC group 31121 (Box 5.8) with the small number of entries for the equivalent group in the ISCO-08 Index of occupational titles (Box 5.9).

Extract of ISCO-08 Index of occupational titles

Code	English text description
2422	Consultant, health care planning
2423	Consultant, human resources
2522	Consultant, information systems: managing system
2522	Consultant, information technology: managing system
2522	Consultant, information technology: systems administration
2356	Consultant, information technology: training
2513	Consultant, internet: developing websites
2522	Consultant, information technology: unix administration
2513	Consultant, internet: developing websites
3512	Consultant, internet: helpdesk
2513	Consultant, internet: programming
3512	Consultant, internet: support
2412	Consultant, investment: advising clients
2413	Consultant, investment: financial analysis

Examples of job titles using an all-inclusive or unstructured approach are used, for example, in the case of the US Census Index of Occupational Titles, the Singapore Standard Classification of Occupations and the Canadian National Occupation Classification.

This approach has the advantage that coders do not have to analyse the job description to identify the keyword, and that coding becomes a simple task when there is an exact match between all the words in the job description and all the words in an index entry. However, this approach also has a number of disadvantages. For example, an index can never be an exhaustive list of all possible variations of job titles. According to the coding guidelines to the Canadian NOC: "*Even though the NOC contains more than 30,000 job titles in each of Canada's official languages the list is not meant to be exhaustive*". (Statistics Canada 2021, Introduction, accessed October 2022).

[27] For a further discussion on index structure see UN & ILO 2010, §653 to §661.

▶ Box 5.8 List of examples of job titles listed in the Canadian NOC, 31121 Dietitians and nutritionists

administrative dietitian
administrative nutritionist
clinical dietitian
clinical nutritionist
community dietitian
community nutritionist
consultant dietitian
consultant nutritionist
dietetic consultant
dietician
dietitian
dietitian-nutritionist
nutrition and dietetics researcher
nutrition consultant
nutrition researcher
nutrition specialist
nutritionist
professional dietitian (P.Dt.)
professional nutritionist
public health dietitian
public health nutritionist
registered dietitian (RD)
registered dietitian-nutritionist (RDN)
registered nutritionist
registered professional dietitian
registered professional nutritionist
research dietitian
research nutritionist
therapeutic dietitian
therapeutic nutritionist

Source: Canada NOC 2021

It will always be the case that a significant proportion of job descriptions given in surveys do not match exactly with an index entry. Coders therefore need to be given rules and/or use judgement to identify the best match (UN & ILO 2010, 189). When the same job title refers to different occupations, a way needs to be found to deal with information about tasks performed and the economic activity of the employer. In an all-inclusive index, this may be dealt with by adding words to the title, structuring the information in some index entries, or only including titles in the index that can be assigned to a single category. For example, “business analyst – economics” and “business analyst – computer systems” are given as examples of job titles included in different categories of the Canadian NOC.

Words like “senior”, “junior” and “qualified” (among several others) commonly appear in job descriptions but are almost never relevant for coding. Other words such as “consultant” may also be used as an adjective as well as a noun in a job description, for example “consultant physician” or “consultant statistician”. Such words when used adjectivally may or may not be relevant for coding. It is simply not practical to include these types of words on a piecemeal basis in the index. The number of index entries starting with the word “senior”, for example, would be extremely long, making the index difficult to use and maintain.

Coding instructions are frequently needed, therefore, to ignore certain words when given in a response. If there is no matching entry with the first word in the job title, the coder then has to decide which words in the job description to search for.

The US Census Index of Occupational Titles is all-inclusive in the sense that most entries appear in natural word order. However, the size of the index is reduced by redirecting some entries to sets of entries that are presented in a more structured way. For example, several occupation titles related to sales are redirected including the following:

- Salesgirl See "Sales"
- Saleslady See "Sales"
- Salesman See "Sales"
- Salesperson See "Sales"
- Saleswoman See "Sales

The index includes a large number of entries starting with “Sales” that are not in natural work order as shown in Table 5.1.

▶ Table 5.1 Extract from US Census 2018 Occupation Index

Description	2017 Industry Restriction	2018 Census Occupation Code	2018 SOC Code
Sales abrasives		4850	41-4010
Sales accounting service		4840	41-3091
Sales advertising		4800	41-3011
Sales adviser		0710	13-1111
Sales agent advertising		4800	41-3011
Sales agent business services		4840	41-3091
Sales agent commodities		4820	41-3031
Sales agent financial services		4820	41-3031
Sales agent insurance		4810	41-3021
Sales agent pest control service		4840	41-3091
Sales agent psychological tests		4840	41-3091
Sales agent real estate		4920	41-9020
Sales agent securities		4820	41-3031
Sales agent See "Sales"			
Sales agent\ ns	6991, 6992	4810	41-3021
Sales agent\ ns	7071, 7072	4920	41-9020
Sales air conditioning equipment	4870, 4880	4760	41-2031
Sales air conditioning equipment	4070-4590	4850	41-4010
Sales aircraft		4850	41-4010
Sales aircraft equipment and parts		4850	41-4010
Sales analyst		0710	13-1111
Sales analyzer		0710	13-1111

▶ Box 5.9 List of examples of job titles listed in ISCO-08, 2265 Dietitians and nutritionists

ISCO-08	English text description
2265	Consultant, dietetic
2265	Dietician
2265	Dietician, clinical
2265	Dietician, food service
2265	Nutritionist
2265	Nutritionist, public health
2265	Nutritionist, sports

The only reason there are three entries each for the keywords “Dietician” and “Nutritionist” is that all examples of included occupations given in the group definitions are included in the index. A “pure” structured index approach would require only three entries for this group:

- Consultant, dietetic;
- Dietician;
- Nutritionist.

The inclusion of the additional entries does, however, allow the index to provide an idea of the scope and nature of the group.

In a structured index it is also possible to embed instructions to coders in the index, as shown in the extract from the ISCO-08 index in Box 5.10. In this case the entry “Consultant, sales: technical (except ICT)” is used to separate technical sales consultants in information and communications technology (ICT) from other technical sales consultants. This avoids the need to provide and entry for every type of technical sales consultant that might exist.

In some national indexes this approach has been taken further, by providing entries that can only be selected if there is no additional information about a particular subject, for example:

2000 Researcher (no additional information about type of research)

▶ Box 5.10 Extract of ISCO-08 Index of job titles containing Sales Consultant

ISCO-08	English title
5223	Consultant, sales: automobile
5249	Consultant, sales: car hire
2434	Consultant, sales: computer systems
5243	Consultant, sales: door-to-door
2433	Consultant, sales: engineering
2434	Consultant, sales: information technology
3322	Consultant, sales: manufacturing
5244	Consultant, sales: outbound calls
5249	Consultant, sales: rental
2433	Consultant, sales: technical (except ICT)
2434	Consultant, sales: technical (ICT)
5244	Consultant, sales: telemarketing

The structured approach is often considered to be more efficient for coding purposes, as the correct entries can be found quickly when searching through a paper index and it reduces the number of unsuitable entries displayed to the coder in a computer assisted coding system. It can also be argued that the inclusion in an all-inclusive index of words that are not relevant for assigning the code specified will increase the risk of error if the index is used in fully automatic coding. However, both structured and relatively unstructured approaches are used widely and successfully for manual, computer-assisted and automatic coding. National agencies will need to decide which approach is feasible and will work best in the national context.

In general, an index entry will at a minimum include one or more classification codes, and a job title. When similar job titles can be coded to more than one category, for example “Sales consultant” then additional information about the tasks performed or industry of the employer should be added after the job title, as shown in Box 5.10. This should apply whether the index is structured or all-inclusive.

If the all-inclusive approach to index design is being used, the job title should be included in full in the index entry, in natural word order – in other words in the order given in the job descriptions. However, common qualifying words that are always irrelevant to coding should not be included in either an all-inclusive or structured index. Excluding words such as “senior” and “junior” avoids the need to repeat the same index entry multiple times with and without these words deemed always extraneous. This helps to keep the index to a manageable size and can make the coding process simpler. A list of words designated as always or usually extraneous should be provided in the coding instructions. If additional information is needed to differentiate occupations with similar job titles in an all-inclusive index, this should appear after the job title, as shown below.

ISCO-08	English title
2433	Consultant, sales: technical (except ICT)
2434	Consultant, sales: technical (ICT)

If a structured index is to be used, the keyword in the job title should be given first, followed by any qualifying words. In languages such as English where adjectives generally precede the noun they are qualifying, this will require inversion of the natural word order. “Truck driver” thus becomes “Driver, truck”. Additional information to differentiate between categories can then be added as third or more element if needed.

A degree of judgement is needed in deciding how many entries need to be added for each keyword, and how much qualifying information is needed. In the example below, the job “truck driver” alone is considered sufficient information to assign a unique ISCO-08 code (8332, Heavy Truck and Lorry Drivers). However, if there is evidence that the “truck” being driven is a forklift truck, then the code for a different ISCO-08 unit group should be assigned (8344 Lifting Truck Operators). All other types of truck driver should be coded to 8332. The two entries for dumper truck driver and heavy truck driver are not strictly speaking necessary but provide clarity as to how these job titles should be coded.

ISCO-08	English title
8332	Driver, truck
8332	Driver, truck: dumper
8344	Driver, truck: forklift
8332	Driver, truck: heavy

When composite words such as “director-general” “setter-operator”, or “carpenter-joiner” are used as job titles they should be included as such in a structured index as keywords. In some cases, it will be advisable to provide index entries for composite form and non-composite forms. Multiple word job titles where the qualifiers are not adjectives may also be treated as composite keywords, for example “editor in chief” and “clerk of the court”, therefore they will respectively appear as ‘Editor-in-chief’ and ‘clerk of the court’ in the index.

Many languages have different feminine and masculine terms, such as actor and actress, for job titles. While it may be preferable to include gender neutral terms as the names for categories in the classification, the coding index should be based on terms actually given in real world job descriptions. This may require duplication of index entry sets to include both masculine and feminine terms where relevant such as in the case of ‘Seawoman, navy’ and ‘Seaman, navy’. Alternatively, coders will need to be given instructions on equivalence between masculine and feminine job titles.

Commonly occurring abbreviations such as ‘CEO’ for chief executive officer should be included in the index as keywords when they are unambiguous. Slang or informal words that are commonly used in job descriptions should also be included. For example, the term “brickie” is commonly used in English to refer to the occupation “Bricklayer” and is included in the ISCO-08 index for Unit Group 7112, Bricklayers and Related Workers.

Misspellings or alternative spellings may be included as separate index entries if they occur commonly or cause a problem for coding. However, one-off or idiosyncratic terms used in a single or small number of survey responses should not automatically trigger the creation of a new index entry. In the example of an occupation title “Duck fixer” with the task statement “Fixing air-conditioning ducks” the word “duck” is obviously a misspelling of “duct”. Such a response could be coded to ISCO-08 by matching with the index entry “Fixer, duct” and should not require a separate index entry as most coding staff would easily recognize the misspelling.

5.3.3. Developing and updating a coding index

Development of an occupation coding index is a resource intensive activity. In cases where ISCO-08 is to be implemented without change to compile statistics at national level, developing the index, or adapting the ISCO-08 index, will be the most time-consuming part of the work. Whether a structured index or an all-inclusive index is to be used, the task of developing or updating the occupation coding index will constitute a significant element of the work involved in developing or updating a national classification. It must be in place before the coding operations start.

Development of the coding index involves making decisions about where in the classification specific job titles should be classified, and what information is needed to reliably code a job description to each classification category. In some cases, this may involve research into the nature of the work performed in occupations with particular job titles. It is not, therefore, a task that can be left to software developers, or to the information technology department, even if computer assisted or automatic coding is to be used.

Collection and coding of elements to be included in the index should be done by experts in the classification concerned. These experts may be part of the team that is responsible for developing the classification structure and definitions, or a team with separate responsibility for the index and feasibility testing that is working closely with the team responsible for the classification structure. This work should be undertaken in tandem with or as part of the development of the classification structure and group definitions.

When new classification categories are proposed, at least some of the index entries that will be linked to it should be specified. Specifying the occupation titles to be included in a classification category is necessary to define the scope of the category. If these occupation titles are expected to appear in the source data to be coded to the classification, they should be included in the index.

If an existing index is to be adapted for use with a new or revised classification, codes for the categories in the new or updated classification will need to be assigned to each entry in the existing index. To ensure that the categories in the new classification are exhaustive, this should be done as part of the development of the new or

updated classification, and not left until the new classification structure is almost finalized. This can be achieved at the beginning of the process of revising a classification by creating a new field in the worksheet or database containing the index for the codes of the classification version. If the same code structure is to be used in the new version, then the codes from the old version can initially be copied into the field for the new version. When codes for new or merged categories are determined, the index entries to be associated with these new categories can be updated. Any consequential changes to codes for other categories should also be updated in the index. This can be executed manually, or in a semi-automated way if the classification structure and index are linked in a relational database.

5.3.4. Adapting the ISCO-08 index or another national index

In the absence of any national index or a useful source of information to develop a national index, the ISCO-08 index of occupational titles may be a good starting point, especially if the national classification follows ISCO-08 quite closely. Alternatively, an index may exist in one country that could be shared with and adapted by other countries with similar languages and labour market structures.

However, a great deal of care is needed in adapting the ISCO-08 index or an index developed in a different country for use at national level. Terminology used in the country to describe jobs may in some cases be quite different from the terms used in these indexes. Some of the occupations and job titles appearing in these indexes may not exist in the country. The same word might be used to refer to different occupations, depending on the country. When the ISCO-08 index or any other index from outside the country is to be adapted, suitable national sources should be used to customize the index for national use.

It's important to recognize that translating, for example, the English version of the ISCO-08 index to a national language will not work if done too directly. The number of titles used to describe each occupation will vary from one language to another, (and from one country to another) even if the same language is used in both countries. Once the ISCO-08 index has been sorted into code order of the national classification, the English terms should be replaced with terms in the national language(s) that are actually used to describe the occupations concerned. If there are no equivalent terms, the index entry should be removed.

▶ Box 5.11 Steps to adapt ISCO-08 index for national use

1. If necessary, translate the English version of the ISCO-08 index to the national language.
2. Sort the ISCO-08 index into code order
3. Add a new/ separate column in the index for the national occupation classification (NOC) codes
4. For ISCO-08 unit groups that have not been split or merged, all of the entries for the ISCO-08 group should be assigned the relevant code for the national classification, whether it is the same or different from the ISCO-08 code
5. For ISCO-08 unit groups that have been merged in the NOC, assign the relevant NOC code to the ISCO-08 index entries for the merged groups.
   - The original ISCO-08 codes should not be deleted, so that a correspondence with ISCO-08 can be maintained.
6. For ISCO-08 groups that have been split decide which index entries should be assigned to each of the new categories
   - If the national index is created at the beginning of the process of adapting ISCO-08 for national use, or if ISCO-08 is to be used without modification, skip steps 4 and 5 and copy and paste the ISCO-08 codes into the column for the NOC code. Once the index has been developed, NOC codes can be updated as the classification is developed as described in the section on developing and updating a coding index.
7. Once the ISCO-08 index entries have been assigned to a group in the NOC, review the entries in the index group by group to consider the relevance of retaining these entries in the national index. Terms that are not used in the national context should be removed or replaced with relevant national terminology that is used in the country and in the national language(s) if relevant. Job titles that are known to be used in the national context should be added. If there are differences in the meaning of terms used in the ISCO-08 index and in the national context, the index entries concerned should either have their codes changed or be removed.
8. Use the index to code job descriptions found in survey and administrative data sources and add new index entries as required.

Once the ISCO-08 index (or a foreign index) has been mapped to the national classification and converted to serve as a national index, as described in Box 5.11, it will need to be further developed, tested and exposed to real world job descriptions as described in the section on constructing and testing the index.

5.3.5. Constructing and testing the index

If no index currently exists, and it is decided to use neither the ISCO-08 index nor a foreign index, then job descriptions from test data, from previous surveys or other sources should be coded to the new classification by national experts. This may, in some cases require desk research into the nature of the work performed in occupations with certain job titles to determine to which categories in the classification the job descriptions should be assigned. The information in the job descriptions should then be used to design an additional set of index entries.

Once the index is at a stage where it is usable at least for some job descriptions, the index itself should be used to code job descriptions for the remaining test data. Job descriptions that cannot be coded using the existing entries, should be used as the basis to design new index entries, or to modify existing index entries. If a suitable category in the classification cannot be identified, then consideration should be given to the need for modifications to the classification structure. [28]

As the index develops it is important to review the entries in both alphabetical and code order to identify duplicates or near duplicates, to ensure that sets of entries for similar job titles or keywords are coherent, and to ensure that the entries for each group adequately reflect the scope to the group. This will also provide the opportunity to rationalize index entries, for example by removing extraneous words, and to add supplementary information about tasks and economic activity if required.

If an index of occupational titles has previously been used to code occupation data from censuses or surveys, this index should also be mapped to the updated or new classification, ideally while the classification is still in draft form. The index itself may be a useful source of information for developing the classification structure, especially if there is information about the number of responses assigned to each entry. If there are entries in an existing index or list of occupations that cannot be coded to a classification category, this may be an indication that there is a need for one or more new categories, or to extend the scope of an existing category. Care should be taken when an old index or list is mapped to the new classification, however, as some entries may refer to occupations or job titles that no longer exist or have very low employment numbers in the country.

5.3.6. Data sources to build the coding index

As we have stressed in other parts of this guide, the coding index needs to reflect language as used in your country in response to questions in statistical and administrative collections. Since the coding index is likely mainly to be used to code job descriptions collected in censuses and surveys, the main source of information for compiling index entries should ideally be the responses to similar questions in the last census, labour force survey, household survey and census tests. Another useful source of information is job vacancy notices posted in newspapers, on the internet and with public and private sector employment services. If a job monitoring or occupational analysis exercise is being undertaken as part of the work to develop or update the national classification (as discussed in Module 4) or for other purposes, this will be another source of information for constructing the index.

The administrative records of agencies responsible for issuance of work permits for migrant workers, and for maintaining employment and other nationally available registers may also be very useful. These agencies may maintain lists of occupation titles. If this is the case, the entries in these lists should be mapped or coded to the

[28] If an existing index has been mapped to the new classification a similar process should be followed using test data.

national classification, ideally when it is still in draft form, and then can be used to assist in the construction of a national index.

It is likely, however, that lists associated with administrative records, job vacancy notices and job monitoring exercises will not cover all occupations in the country. These sources may not include the everyday terms used to describe occupations given in response to survey questions. Coverage of occupations that are mainly found in the informal economy may be particularly poor in sources that are mainly concerned with the registration of formal employment. For these reasons, household survey or census data should be the prime source for collecting inputs for design of the index.

If there has not recently been a census or household survey that includes questions on occupation, or if the records from those data collections cannot be accessed, then the census and survey testing programme will be a critical source of data for construction of a new index or for updating an existing index – even though the samples used in tests are unlikely to be fully representative.

5.3.7. Maintenance of the coding index

Once an index is in active use for coding of live survey data, it will need to be updated from time to time. This is partly because the organization of work and the terms used to describe jobs is in constant state of evolution. Errors in the index, job titles that were not identified during initial development, and sets of index entries that coders find difficult to interpret will also be identified. The identification of required updates and modifications to the index is effectively an extension of the query resolution and quality control procedures described elsewhere in this guide.

During a census coding process, it should be anticipated that the index will need to be updated potentially several times. This is because a complete enumeration of the population is bound to identify job titles that were not picked up in tests, or even in sample surveys. Improvements to the index will be needed both to maintain coding throughput and allow the compilation of estimates for small occupational groups.

In regularly conducted monthly, quarterly or continuous surveys it may be preferable to update the index less frequently, perhaps on an annual basis, so that an entire annual sample is coded with the same index. This would ensure that annual estimates are compiled on a consistent basis and avoid introducing variability over time that might be confused with seasonal effects.

However, any index issues that are likely to have a significant statistical impact on the results should be corrected in a timely manner, both in the index and in the coded record. Bearing this in mind, there is a need for a sound index versioning system and metadata should be available to identify the version of the index that was used to code each record. Earlier versions should be destroyed, except for those held by the index maintenance and quality control staff.

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6. Mapping between occupation classifications

This module describes procedures for mapping between occupation classifications and developing correspondence tables to show the relationship between different versions of a national classification, and between national classifications and ISCO-08.

6.1. What is mapping?

Mapping between classifications refers to the process of establishing and describing the relationship or correspondence between the categories in different classifications. For many purposes mapping at coding index level instead of the classification structure (dual coding) will be the ideal solution when there is a need to assign codes for more than one classification to occupational data. This may not be feasible, however, when data have already been coded to a single classification or are available only in aggregate form. In these cases, it will be necessary to map the correspondence between occupations, unit groups and aggregate categories in different classifications at a conceptual level.

A "correspondence" details how a category in one classification relates or links conceptually to the categories in another classification (UNECE 2022). A correspondence can consist of the following relationships:

One to One (1:1)
One to many (1:n)
Many to One (m:1)
Many to many (m:n)

The correspondences from one classification to another are represented in a correspondence table (or crosswalk), which expresses the relationship between two statistical classifications. Each pairing in a correspondence table between a category in a source classification and a category in a target classification is referred to as a "map". According to the GSIM Statistical Classification Model:

> A Map is an expression of the relation between a Classification Item in a source Statistical Classification and a corresponding Classification Item in the target Statistical Classification. The Map should specify whether the relationship between the two Classification Items is partial or complete. Depending on the relationship type of the Correspondence Table, there may be several Maps for a single source or target Classification Item (UNECE 2013, §56).

Correspondence tables, therefore, show the relationship between classification items (categories) in one direction, from a source classification to a target classification[29]. The source classification is the classification from which the correspondence is made, while the target classification is the classification to which the correspondence is directed (UNECE 2013 §52). Correspondence relationships can be shown in both directions in separate, but related, correspondence tables. There may be multiple target classifications associated with a correspondence table, but a single target classification is more usual in the case of classifications of occupations.

The **relationship** between two classification items should be considered to be **complete** when the relationship between each category is one to one. This means that all units classified in the category in the source classification are included in a single category target classification, and that the same applies in the opposite direction: all units classified in the single category target classification must also be included in the same category in the source classification. All other types of relationship between categories should be considered to be **partial**.

29 The GSIM Statistical Classification Model Appendix 3 provides A Typology of Classification Item Changes, see Canada NOC as a concrete case.

Correspondence tables are normally restricted to a certain level in the source classification and to a certain level in the target classification, for example from the 4-digit level of a national classification to the 3-digit level or 4-digit level of ISCO-08. This is desirable but not essential. If no level is indicated, source classification items can be assigned to any level of the target classification. For example, the UK SOC 2000 included a unit group 2329, Researchers n.e.c. which would be difficult to map reliably to any ISCO-08 unit group, minor group or sub-major group, but could comfortably be mapped to ISCO-08 Major group 2, Professionals. If no level were specified for the target classification, it would be possible to represent this as a map in a correspondence table.

Two correspondence tables related to ISCO-08 were developed by the ILO.[30] one from the 4-digit level of ISCO-08 to the 4-digit level of ISCO-88, and one in the opposite direction from ISCO-88 to ISCO-08, also at the 4-digit level.

In the extract 'A' from the ISCO-08 to ISCO-88 correspondence table shown below, the letter "p" is used to indicate that only part of the target ISCO-88 group corresponds with the source ISCO-08 group. It shows, for example, that part of ISCO-88-unit group 9113, Door-to-door and telephone salespersons was moved to ISCO-08 unit group 5243, Door-to-door salespersons, and that part was moved to unit group 5244, Contact centre salespersons. It also shows that no other ISCO-88 groups contributed to these two new unit groups (5243, 5244) in ISCO-08.

Extract 'A' from the Correspondence Table: ISCO-08 to ISCO-88

ISCO-08 title	ISCO-08 code	ISCO-88 code		ISCO-88 title
Sales demonstrators	5242	5220	p	Shop salespersons and demonstrators
Door-to-door salespersons	5243	9113	p	Door-to-door and telephone salespersons
Contact centre salespersons	5244	9113	p	Door-to-door and telephone salespersons
Service station attendants	5245	5220	p	Shop salespersons and demonstrators
Food service counter attendants	5246	5220	p	Shop salespersons and demonstrators
Food service counter attendants	5246	5230	p	Stall and market salespersons

We can determine from the extract 'B' from the correspondence table in the opposite direction shown below, where ISCO-88 is the source classification, that ISCO-88 Unit Group 9113 door-to-door and telephone salespersons was not split into any other ISCO-08 groups than 5243 and 5244.

Extract 'B' from the Correspondence Table: ISCO-88 to ISCO-08

ISCO-88 title	ISCO-88 code	ISCO-08 code		ISCO-88 title
Street food vendors	9111	5212		Street food salespersons
Street vendors, non-food products	9112	9520		Street vendors (excluding food)
Door-to-door and telephone salespersons	9113	5243		Door to door salespersons
Door-to-door and telephone salespersons	9113	5244		Contact centre salespersons
Shoe cleaning and other street services elementary occupations	9120	9510		Street and related service workers
Domestic helpers and cleaners	9131	9111		Domestic cleaners and helpers
Helpers and cleaners in offices, hotels and other establishments	9132	9112		Cleaners and helpers in offices, hotels and other establishments
Helpers and cleaners in offices, hotels and other establishments	9132	9412		Kitchen helpers

[30] They are included in Part IV of the ISCO-08 publication (ILO 2012).

In the examples shown above, the letter 'p' does not appear next to any of the target classification (ISCO-08) categories, as they were all derived from only one category in the source classification (ISCO-88). This is reflected in the extract 'C' from the ISCO-08 index of occupational titles, which shows that all index entries assigned to ISCO-08 code 5243 are also assigned to ISCO-88 9113.

Extract 'C' from the Index of occupational titles ISCO-08 to ISCO-88

ISCO-08 code	ISCO-88	English text description
5243	9113	Canvasser, door-to-door
5243	9113	Consultant, party plan
5243	9113	Consultant, sales: door-to-door
5243	9113	Distributor, party plan
5243	9113	Distributor, selling door-to-door
5243	9113	Host, party plan
5243	9113	Hostess, party plan
5243	9113	Representative, sales: door-to-door
5243	9113	Salesperson, direct: door-to-door
5243	9113	Salesperson, door-to-door
5243	9113	Salesperson, party plan

6.2. Why is mapping needed and in what circumstances?

Mapping between different occupation classifications is needed for two main purposes:

1. to compare data classified according to different occupation classifications; and
2. to allow data from one classification to be converted to and reported according to another classification.

Data originally coded to one occupation classification may need to be converted to another occupation classification for two main purposes. The first is to facilitate the international reporting of data according to ISCO-08 when the data were originally coded to the national occupation classification. The second is to allow the reconstruction of existing statistical time-series when a new national classification is introduced. This is known as "backcasting". [31]

In general, there are two possible methods of backcasting data from an old to a new classification: the micro approach and the macro approach. In the micro approach, individual statistical units (jobs in the case of occupation classification) are classified according to both the old and the new classification. The macro approach works at aggregate levels and is based on conversion matrices (sometimes also called "transformation matrices") to redistribute the data to the revised classification. Much of the literature on backcasting data due to the introduction of new classifications is related to economic activity classification. (Brunauer et al n.d.; Buiten et al, 2009). However, these approaches are also relevant and used for classifications of other topics, including occupation (Beerten et al 2000; BLS 2018).

6.2.1. Comparing data classified according to different classifications

Comparison of data classified according to different classifications may not necessarily require a full correspondence table covering all categories in the classifications concerned. For example, a researcher may wish to compare the earnings and hours worked in selected countries for a particular occupation or group of occupations. To do this it is necessary to know whether the scope of the classification categories included in the

[31] It may also be useful to continue publication of a time-series according to the old classification for a period after introduction of the new classification, which may be referred to as "forward-casting".

analysis is the same in all classifications concerned. If the occupational group of interest were vehicle mechanics, for example, it would be important to know whether tyre fitters are included in the relevant national categories, as is the case in ISCO-08 unit group 7231, Motor Vehicle Mechanics and Repairers, or classified elsewhere as in the UK Standard Occupation Classification (SOC 2020).[32] As tyre fitters require fewer qualifications and less training than vehicle mechanics their inclusion or exclusion may have a significant impact on earnings data.

This type of comparison can be achieved by mapping in both directions between the relevant categories in the national classifications and ISCO-08, or by mapping directly between the various national classifications. When a correspondence table between a national classification and ISCO-08 already exists, then the task of the researcher who may have limited experience with classification systems will be easier.

6.2.2. Converting data from one occupation classification to another

Converting data from one occupation classification to another requires a correspondence table or conversion matrix that maps all of the categories at a defined level in the source classification to the categories in the target classification, ideally at a particular level in the target classification. For data conversion purposes countries most commonly develop correspondence tables and conversions matrices between:

- the national occupation classification and previous versions of it and/or other classifications that have been used in the country,[33] mainly needed to maintain time series data when a new classification is introduced, and to explain breaks in series and the impact on estimates when specific occupational groups are classified differently in the old and new classifications. The data coded according to the old classification are converted to the new classification using a correspondence table in one direction, and/or data coded to the new classification are converted to the old classification using a related correspondence table in the opposite direction.
- the national classification and ISCO-08, which allows national data to be compiled for the purposes of international reporting, and comparison with data from other countries with data classified according to ISCO-08.

Converting data from one classification to another using a correspondence table can work well if there is a one-to-one or many-to-one relationship from categories at one level of the source classification and one level of the target classification. This could be from the detailed level of the source classification to the same level or a higher level in the target classification. For example, if all the unit groups in the national occupation classification (NOC) have a one-to-one relationship with ISCO-08 unit groups, then it becomes easy to report the data according to ISCO-08 at unit group level. Similarly, if there are differences between the national classification at unit group level while a many-to-one relationship has been maintained from unit groups in the NOC to ISCO-08 minor groups, then data classified at unit group level in the NOC can be reported at ISCO-08 minor group level.

When there are one-to-many or many-to-many relationships between categories in the source classification and target classification, data conversion using a correspondence table is more problematical. One way of dealing with this is to develop estimation procedures to determine the distribution of data for categories that are mapped to more than one category in the target classification. Alternatively, it may be possible to convert the data for categories mapped to more than one category in the target classification to the predominant category in the target classification, for example if a high proportion of the units classified in the NOC are classified in a single ISCO-08 group. This second approach would allow codes for the target classification to be assigned at unit record level, thus allowing more flexibility for analysis and compilation of estimates. Both of these approaches would

[32] In the UK SOC 2020, tyre fitters are included within unit group 8145 tyre, exhaust and windscreen fitters and vehicle mechanics are included within unit group 5231 vehicle technicians, mechanics and electricians.

[33] When a new NOC is being developed based on ISCO, it may also be useful to map all occupation classifications currently used in the country to ISCO. This helps to identify categories and occupation titles that need to be included in a NOC based on ISCO.

introduce a certain degree of error or uncertainty, as assumptions would need to be made, and are therefore less than ideal.

The number of one-to-many relationships in a correspondence table is reduced when the source categories are at a more detailed level than the categories in the target classification. The categories in the source classification should therefore be at the most detailed level for which data are available. An advantage of developing a national classification with a 5-level hierarchy, therefore is that the categories at the 5th level can more easily be mapped to ISCO-08 unit groups without one-to-many relationships, even if there are differences between the classifications at the unit group or more aggregate levels. This can also be achieved when the categories at the fourth level of the national classification are more detailed than ISCO-08 unit groups. Careful design of categories at a fifth level, or of detailed categories at the fourth level can also avoid the need for one-to-many relationships.

Converting data from one classification to another when there are one-to-many or many-to-many relationships requires the original data to be coded to both classifications and/or the use of a conversion matrix. A conversion matrix for occupation classifications shows the distribution of observations in the categories at a specific level of a source classification among the categories at a specific level of a target classification. It can be thought of as a correspondence table with additional data in each map showing the proportion of the source category to be mapped to the target category.

The construction of a conversion matrix requires at least one dataset to be coded to both classifications. The distributions in the conversion matrix compiled from the dual-coded data can then be used to compile estimates for datasets that have not been dual-coded. When there is a one-to-many correspondence from the source to the target classification, the reliability of the resulting estimates will generally decrease with the difference in time between the dual-coded dataset and the dataset to be converted. This is because the real distributions between the categories will vary over time. The accuracy of the converted data will be improved, however, when the conversion matrix is applied at the most detailed levels of the source classification possible. Inclusion in the conversion matrix of additional variables such as age, sex and economic activity may also improve the precision of the converted time series.

6.3. Coding to more than one occupation classification

The use of a correspondence tables or conceptual mapping between classifications is not, of course, the only method of assigning codes for more than one classification to a single dataset. This can also be achieved by coding the job descriptions from a survey to two or more classifications as separate processes or using a coding index linked to more than one classification (dual or multi-coding).

When there is a need to assign codes for more than one occupation classification, either the use of separate coding processes for each classification or using a dual-coded or multi- coded index will generally be more accurate than mapping between the different classifications using a correspondence table. In France the occupational data from surveys conducted by the National Institute for Statistics and Economic Studies (INSEE) were previously coded to ISCO using a correspondence table from its classification of occupations and socio-professional categories (PCS) to ISCO. Since the introduction of the most recent version of this classification (PCS 2020), ISCO codes have been assigned independently of the PCS based on occupation titles and supplementary information, resulting in a significant improvement in the quality of the ISCO coding (INSEE 2022, 326).

Separate coding processes for each classification obviously has cost implications unless a large share of job descriptions can be coded automatically. However, when the data from a population census or from the labour force survey are coded to both the old and new occupation classifications following old and new coding procedures and coding indexes, the statistical relationship between the categories in the old and new classifications can be established, at least at a particular point in time. This can be used to objectively assess the impact on time series of the introduction of a new classification. The results can also be used to assist in developing conversion matrices and algorithms for converting data between the classifications. The costs of using

two separate coding processes can be kept to a manageable level if only a sample of the census or survey records is recoded.

Using a coding index linked to more than one classification allows occupational data to be assigned to multiple classifications as a single process and is therefore more cost-effective. This might be less accurate than using two separate processes to establish the statistical relationship between categories in the most recent classification and data coded to the previous classification. That is because the coding index will have been updated to reflect the new or revised classification, meaning that the process previously used to assign codes to the old classification may not be exactly replicated. Dual coding with a single index is more cost-effective, however, than backcasting or forward-casting data by recoding previously coded datasets to a new classification.

In the 2006 Australian Census of Population and Housing, occupation data were coded to the 6-digit occupation level of both the (new) Australian and New Zealand Standard Classification of Occupations ANZSCO, and the Australian Standard Classification of Occupations (ASCO) Second Edition which was used in the 1996 and 2001 censuses. The census data were published according to both classifications and a link file was created to facilitate the comparison of data on occupations from the 2001 and 2006 censuses (ABS 2008).

One way to link the entries in a coding index to more than one set of classification codes is to record a unique identifier for each index entry (for example an index line number) in the unit record as well as the code for the national occupation classification. Each index line number can be linked in a separate table, either in advance or at some point in the future to categories in other classifications and then used to assign codes for these classifications to the unit records. This has the advantage of allowing the data at unit record level to be assigned to new classifications in the future. It can also provide useful information on job titles related to emerging or growing occupations that may need to be identified separately in a future version of the national classification. The other way to link a coding index to more than one classification, is to include the codes for more than one classification in the index. The UK SOC 2020 coding index uses both of these approaches. It includes a unique identifier for each index entry, as well as unit group codes for the following NOC versions 1990, 2000, 2010, 2020 and the extended SOC 2020, and for ISCO-08.

In summary, dual coding may frequently be the most useful method to compile time series statistics for old and new classifications, or to facilitate reporting of data according to both ISCO-08 and the national occupation classification. When this is not feasible it will be necessary to create and use correspondence tables or conversion matrices between the different national classifications. The construction of a conversion matrix, however, will require at least one dataset to be coded to both classifications.

6.4. Developing correspondence tables between national occupation classifications and ISCO-08

The difficulty involved in developing correspondence tables between two classifications will depend on how closely related the classifications are, on the extent to which there are one-to-one relationships between the categories, and on whether the need for correspondence between these classifications was taken into consideration when at least one or the other was developed. Correspondence tables between related classifications can be developed as part of the development of a new classification, or after each classification has been completed.

6.4.1. Developing correspondence tables as part of the development of a new classification

When a national classification is developed by adapting a version of ISCO-08, or by updating a national classification, it will be useful to maintain a record of groups that have been split, merged or moved to different parts of the classification. If this information is held in tabular form and is updated dynamically as the work

progresses, the result can be used as the basis for correspondence tables in both directions: from the original classification (ISCO-08 or a previous national classification) to the new classification, and from the new classification to the original.

This can be achieved by creating a table in a spreadsheet or relational database software containing fields for the original and revised classification titles and codes at the most detailed levels for which correspondence is required for each classification, as well as indicators to specify whether the relationship between each category is partial or complete in each direction, or that there is no correspondence at all. If a national classification is to be developed using ISCO-08 as the starting point, this would usually be at the 4-digit level of ISCO-08 and at either the 4-digit level or a more detailed level for the new national classification.

If there is already a correspondence table between an existing classification and ISCO-08, fields can be included in the table for both ISCO-08 and the existing national classification, as well as the new classification. However, maintaining a three-way correspondence during development of a new classification could be quite complex. Either ISCO-08 or the existing national classification can be considered as the original classification, depending on whether the aim is to adapt ISCO-08 for national use, or to adapt and update a national classification while maintaining or strengthening the linkage to the most recent version of ISCO.

At the beginning of the process of developing the new classification, the codes for the original classification and the revised classification will be the same if the new national classification is intended to have a 4-level hierarchy with a 4-digit code at the most detailed level. If it is intended to add a fifth level to the national classification based on ISCO-08, or to use a code with more than four digits, the best solution at the beginning of the process would simply be to add one or more zeroes at the end of the ISCO-08 code. The titles in the original and draft classifications will also be the same, if they are in the same language.

Each line or entry in the correspondence table under development represents a map in both directions between the original classification and the draft new classification. Every time a category is merged, split or moved as the new classification is constructed, one or more new maps between the original and draft classification have to be created, and the fields for partial or complete or no relationships are updated. The titles and codes in the original classification (and any other classification included in the correspondence table) should be duplicated in each new map, while new codes and titles have to be added to the fields for the new classification. If a category in the new classification is not split or moved, it may nevertheless be necessary to update its code, or to change its name.

Once the classification is final, or close to final, the table can be sorted into code order for each classification to create separate correspondence tables with each classification as the source classification. Before the correspondence tables are finalized, however, it will be prudent to review them using the procedures described for developing correspondence tables between existing occupation classifications. This will serve as a form of quality control for the classification structure and group definitions, and for the coding index, as well as potentially identifying relationships between categories that may have been overlooked during the simultaneous development of the classification structure and correspondences.

6.4.2. Developing correspondence tables between existing occupation classifications

It will frequently be necessary to create correspondence tables between classifications that are already in use or are in the final stages of development. This will be the case when, as an input to developing a new national classification based on ISCO-08, there is a need first to map the existing classification(s) used in the country to ISCO-08. It will also be necessary if either an existing national classification or ISCO-08 were not included in the process described in the section on developing correspondence tables as part of the development of a new classification. For one reason or another, a correspondence table might not be created during development. It may have been found, for example, that maintaining a record of relationships with one or more other classifications added too much complexity to the process of developing the new classification. Moreover, the need

for correspondence with another classification may only be identified after the national classification is finalized or at an advanced stage of development.

The process of developing a correspondence table between existing classifications should start by mapping each category at the desired level of the source classification to the most detailed level possible in the target classification. It will usually be preferable to map from the most detailed level in the source classification, as the most detailed categories are the most likely to be able be mapped to only one category in the target classification. If mapping from a national classification to ISCO-08, the national classification will be the source classification and ISCO-08 will be the target classification.

Each map from the source classification to the target classification should be stored in tabular form showing the title and code for each classification, as shown in the example extracted from the ISCO-88 to ISCO-08 correspondence shown below.

Extract from Correspondence Table: ISCO-88 to ISCO-08

Source classification (ISCO-88)		Target classification (ISCO-08)	
Electrical-equipment assemblers	8282	3122	Manufacturing supervisors
Electrical-equipment assemblers	8282	8212	Electrical and electronic equipment assemblers
Electronic-equipment assemblers	8283	3122	Manufacturing supervisors
Electronic-equipment assemblers	8283	8212	Electrical and electronic equipment assemblers
Metal-, rubber- and plastic-products assemblers	8284	3122	Manufacturing supervisors
Metal-, rubber- and plastic-products assemblers	8284	8219	Assemblers not elsewhere classified
Wood and related products assemblers	8285	3122	Manufacturing supervisors
Wood and related products assemblers	8285	8219	Assemblers not elsewhere classified
Paperboard, textile and related products assemblers	8286	3122	Manufacturing supervisors
Paperboard, textile and related products assemblers	8286	8219	Assemblers not elsewhere classified
Other machine operators and assemblers	8290	3122	Manufacturing supervisors
Other machine operators and assemblers	8290	8183	Packing, bottling and labelling machine operators
Other machine operators and assemblers	8290	8189	Stationary plant and machine operators not elsewhere classified
Other machine operators and assemblers	8290	8219	Assemblers not elsewhere classified
Locomotive-engine drivers	8311	8311	Locomotive engine drivers
Railway brakers, signallers and shunters	8312	8312	Railway brake, signal and switch operators
Motor-cycle drivers	8321	8321	Motorcycle drivers
Car, taxi and van drivers	8322	8322	Car, taxi and van drivers

This allows eventual sorting in code order for each classification to produce correspondence tables in both directions. Indicators for partial or complete relationships in each direction can be added at this stage, but it may be preferable to wait until mapping in both directions has been completed.

The mapping should be conducted systematically, ensuring that at least one map is created for all categories in the source classification.[34] This can be done by starting at the beginning of the classification in code order, or by assigning different groups at the top level of the classification to different team members.

The following methods should be followed to identify correspondences from each category in the source classification, for example a national classification, to one or more categories in the target classification, using ISCO-08 as the example for the target classification, as shown in Box 6.1.

▶ Box 6.1 Methods to identify correspondences for each category in the source classification (ISCO-08 as target classification)

- Search the ISCO-08 index of occupational titles for the title of the category given in the source classification
- Search the ISCO-08 index for occupation titles listed in the group description or index of the source classification.
- Match the titles of the categories in the source classification with the ISCO-08 group titles.
    - Relying on a match between group titles alone, however, will not necessarily indicate a one-to-one match, as the scope of categories with the same name may not always be the same.
- If any datasets have been coded to both classifications, cross-tabulate the data by the two classifications at the most detailed level possible.
    - Most of the cells in the resulting matrix will be empty or have very small numbers. For any cells with significant numbers, consideration should be given to creating a map between the two categories concerned. Care should be taken, however, to avoid creating maps when there is no logical basis for a relationship between the two categories. Some cells in this type of matrix may be populated as a result of coding errors or other types of error.
- Compare any descriptive definitions of categories in the source classification with the group descriptions for relevant ISCO-08 groups, to establish the extent of overlap in the intended scope of the categories in each classification.

All of these methods should be used where relevant information is available. Searching the ISCO-08 index will frequently be the most reliable method to identify potential relationships but matches identified in this way may need to be confirmed by reviewing the group descriptions.

When the source classification includes categories that cannot be mapped to any category at the ISCO-08 unit group level, a check should first be made to determine whether it is possible to map the category in the source classification to a residual (not elsewhere classified) category in ISCO-08. If there is no such category it may nevertheless be possible to map it to a higher level ISCO-08 category. Consider, for example, an imaginary category in a national classification defined simply as “Machine operator” without any information about the type of machine. This category can certainly be mapped to ISCO-08 major group 8, Plant and Machine Operators, and Assemblers. It would be reasonable to assume that it can mapped to sub-major group 81, Stationary Plant and Machine Operators. In this case there are two choices. It can be mapped either to each of the 26 unit groups in that sub-major group, or mapped to the sub-major group only, with trailing zeroes following the major group code: 8100 Stationary Plant and Machine Operators Not Further Defined. The second choice would probably be preferable in this instance, as some of the 26 unit groups might not be represented in the country. Moreover, from the perspective of data analysis and conversion of data form one classification to another, it would be necessary to devise a method to distribute the data over (in this case) the 26 categories.

[34] There may be some categories in the target classification that are not mapped, indicating that the category concerned is not included in the source classification. In the case of mapping from a national classification to ISCO, this would mean that either there is an omission in the national classification, or (more likely) that the ISCO group does not exist in the national classification.

If a category in the national classification cannot be mapped to any category at any level of ISCO-08, this can be recorded in the correspondence table with a dummy code (for example: XXXX) and, if desired, some text in place of the ISCO-08 title, such as "no relationship to an ISCO-08 group". Similarly, if supplementary codes are used for inadequately described and not further defined data, these codes will need to be mapped in some way to ISCO-08 if the data are to be converted to ISCO-08. It may in some cases be possible to map these codes to ISCO-08 higher level groups using trailing zeroes as described in the section on coding vague and imprecise responses. Otherwise, it may be necessary to use a dummy code.

Once the entire source classification has been mapped to the target classification, the process should be repeated in the opposite direction by mapping the target classification to the source classification, using the same methods. This is recommended even if there is no requirement for correspondence in that direction. If ISCO-08 is the intended target classification, mapping from ISCO-08 to the national classification will help identify any relationships that were missed during the initial mapping exercise, as well as any occupations included in ISCO-08 but not listed in the national classification. If these occupations exist in the country, they may need to be added to the future version of the national classification.

The steps needed to carry out this reverse mapping when ISCO-08 is the intended source classification, are shown in Box 6.2.

▶ Box 6.2 Steps to carry out the reserve mapping (ISCO-08 as source classification)

- Sort a copy of the table resulting from the initial exercise of mapping the national classification into ISCO-08 code order.
- Add any ISCO-08 group titles and codes that were not included after mapping from the source classification, with the fields for the titles and codes in the national classification initially left blank.
- Map the ISCO-08 titles and index entries (sorted in ISCO-08 code order) to for each unit group to the national classification as if it were the target classification.
- Record in the table any new relationships to the national classification identified in this process.
- Make a note of any ISCO-08 unit groups not mapped to the national classification, to investigate the case for including the occupations concerned in a future national classification.
- Add identifiers for partial or complete or no relationships from ISCO-08 to the national classification. If there is more than one map for a given ISCO-08 category this means that only part of the ISCO-08 category is mapped to the category in the national classification.
- Sort a copy of the table back into the code order for the national classification and add identifiers for partial or complete relationships for the national classification.
- The table resulting from this process can now be used as a master table to create correspondence tables in each direction.
    - When sorted in national classification code order, the national classification is the source classification and ISCO-08 is the target classification. When ISCO-08 is the target classification, codes that are not mapped to any category in the national classification need not be included in the correspondence table.
    - When sorted in ISCO-08 code order, it can be used to create a correspondence table from ISCO-08 to the national classification if this is required. While this process of reverse mapping might seem time-consuming and cumbersome, it can be done relatively quickly as there is a need to search only for occupation titles in ISCO that were not identified during the initial mapping. If the ISCO-08 index is sorted in code order, this allows us to check that the occupation titles coded to each ISCO-08 unit group are mapped to a category in the national classification.

There are software solutions that can use semantic matching algorithms and machine learning to allow categories in different classification systems to be mapped to each other (see for example JANZZ Technology, 2023; European Commission and US Department of Labour 2022). These types of algorithms typically match terms that are close in meaning or appear close to each other in text. They are useful in activities such as

matching job vacancies and jobseekers to occupational categories and in various types of big data analysis of occupational skills requirements. However, they may also identify relationships that would be questionable if used directly to create correspondences for use in applications such as converting data from one classification to another and would not necessarily identify differences in scope between classification categories with similar names. Automatic mapping using semantic matching technologies may, however, be a useful first step to speed up the process of finding potential correspondences between classification categories. If technology-based solutions are used to develop correspondence tables for statistical purposes, the results should be checked and adjusted if necessary, using the procedures described in this section.

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7. Analysis and Dissemination of data classified by occupation

This module provides an overview of the uses of data classified by occupation in various types of economic, labour market and social analysis, and offers guidance on the dissemination of occupational data in statistical outputs.

Information about occupations most commonly refers to jobs held by persons in employment for pay or profit. A person may be associated with an occupation through the main job currently held, a second job, a future job or a job previously held. The concept of occupation may also be applied to job vacancies, and to unpaid work activities including own-use production work, volunteer work and unpaid trainee work.

Statistical data classified by occupation are required for a wide range of analytical purposes. They are needed to inform, monitor, and evaluate government and corporate policies and programmes related, for example, to labour market programmes, identification of skill shortages, educational planning, the provision of employment services and careers guidance, recruitment and migration of workers, rates of pay, occupational safety and health, and social inequality.

These purposes require statistics classified by occupation not only in employment (that is on the number of employed in different occupational groups), but also on topics such as job vacancies, jobseekers, wages, and earnings, working time, and occupational injuries and diseases. The level of detail of the occupational categories that should ideally be included in the analysis and dissemination of occupational data will vary depending on the specific analytical purpose, on the topic concerned, quality concerns, feasibility, confidentiality, and other factors.

For some purposes, such as assessment of the overall structure of the labour market, and of inequalities and occupational segregation among different population groups, analysis at aggregate levels such as ISCO-08 major groups, or sub-major groups will be useful. For many of the most important uses of occupational data, however, analysis and dissemination of data at the most detailed level possible may be required, in other words at the level of ISCO-08 unit groups, or at a fifth or more detailed level of the national classification.

Users of occupational statistics also need information about the classification itself so that they can understand what the categories mean and how the information was collected. Producers of occupational statistics also need information about how to use the classification in their own data collection activities. The National Occupation Classification itself should therefore be disseminated including its structure, explanatory notes, indexes, variants, and correspondence tables to ISCO-08 and related national or regional classifications. An introduction to the classification[35] should be provided and should explain:

- the nature, structure and purpose of the classification
- its underlying concepts, rules and principles
- its relationship to ISCO-08 and other relevant classifications
- information required and methods used to assign data to categories in the classification
- use of the classification for the analysis and dissemination of statistics.

7.1. Dissemination of data for small occupational groups

The requirement for statistics at detailed levels of ISCO-08 or a related national classification can pose a problem when data are sourced from sample surveys, as the levels of sampling error for small occupational groups may be

[35] A checklist of possible content for the Introduction to a Statistical Classification is provided as Appendix 2 of the GSIM Statistical Classification Model.

high. The frequent requirement for cross-classification of occupation data with other variables such as sex, age, status in employment, and branch of economic activity, etc. imposes further limitations on the use of data from sample surveys for small occupational groups.

It is advisable, therefore, to establish a level of sampling error at which estimates are considered too unreliable for the purposes required, and either suppress these estimates or flag them as unreliable. When statistical outputs or tables for dissemination are designed, it will obviously be desirable to avoid releasing tables in which a large proportion of estimates are suppressed or flagged as unreliable. It is common practice, therefore, to release tables at only relatively aggregate levels, such as major groups, sub-major groups or minor groups, depending on the topic and level of cross-classification with other variables.

However, the size of different occupational groups in terms of the number of employed persons, and therefore the number of observations in a survey, is very uneven. Some individual unit groups or occupations may represent a high share of total employment and estimates for them may not have high levels of sampling error. It is a good practice therefore, to identify individual unit groups and even occupations with large employment numbers and release statistics for them in tabulations for selected occupations, in addition to tables down to a specified level of aggregation. For example, summary statistics might be compiled for the top 10 or top 20 occupations.

Even when statistics on occupation are compiled from sources not impacted by sampling errors, such as censuses and administrative data collections, there may be issues with confidentiality when data on small occupations are disseminated for small geographic areas or population groups. In these cases, there is a need to exercise care to avoid releasing information that could allow the identification of an individual person or business. Some statistical offices, therefore, have a policy of suppressing any estimates in statistical outputs where the number of observations contributing to the estimate was below a certain threshold, whether the data are sourced from a survey, a census or administrative records.

7.2. Relevance of different data sources for the compilation of statistics on occupation

The types of statistics that can be compiled on employment by occupation, and the variables that can be included in analysis will vary depending on the source. Establishment surveys that collect information on employment by occupation are likely only to include limited information on the characteristics of jobholders, such as age, sex and possibly nationality. Household surveys generally include a wide range of information about the characteristics of employed and other persons, as well as household and family characteristics, but only limited information about characteristics of the employer, such as the branch of economic activity. In statistics sourced from administrative registers the types of information available will depend on the nature and purpose of the register. Job advertisements may include information on the nature of the job itself, required skills and qualifications, previous experience required, the industry and remuneration. However, the level of detail and the amount of information available varies greatly depending on the advertiser, not all job vacancies are advertised, and the number of jobs that need to be filled from one advertisement may not always be clear. While rich qualitative information may be gleaned from job advertisements, statistics based on job advertisements need to be disseminated and interpreted with care.

There are also differences in the units counted depending on the data source. When compiled from household surveys, statistics on employment generally refer to the occupation in the main job held by employed persons during a specific reference period. They may also be compiled in relation to multiple job holdings when this information is collected. When compiled from establishment surveys and censuses, they refer to the job held during a defined reference period by a person in a particular establishment, which may not therefore be the person’s main or only job. If statistics are compiled from administrative records of employment registrations, they will refer to a job held at the time the person’s employment with a particular employer was registered. If compiled

from records of work permits, they may refer to the occupation for which a migrant worker was permitted to enter the national labour market, but not necessarily to a job in which that person is currently employed, or to a second or more job, whether formal or informal. In data on the unemployed, occupation may refer to a job previously held, or to a job the unemployed person is qualified to perform. This may also be the case in some types of administrative data, for example when occupation is recorded on death certificates.

These differences may result not only in differences in the types of statistics that can be compiled but also in the numbers and occupational distribution of jobs counted. Most household survey data on occupation will refer only to the main job held by each employed person but will include jobs in the informal sector and informal jobs in the formal sector. Establishment survey data will include all formal jobs in the formal sector but will exclude informal employment, unless it is an informal sector survey. Employment registers will also cover only formal employment. This can result in large differences in estimates from the different sources in countries where informal employment is high, or when large numbers of people have more than one job.

Bearing all of these differences in mind it is important to select the most appropriate source of statistics classified by occupation. This will depend on the purpose of the statistics, the nature of the analysis required, and on the availability of data from different sources. The limitations arising from the use of particular sources, and differences in data compiled from different sources should be highlighted and clearly explained when the statistics are disseminated.

7.3. Statistics on employment by occupation

Statistics on the number of persons employed, or on the number of jobs, classified by occupation are very frequently compiled and may be broken down by a wide range of other variables, depending on the data source.

7.3.1. Aggregate statistics on employment

At aggregate levels, these statistics can provide useful information on the broad occupational structure of the labour market, including structural changes taking place over time, and comparison with other countries. In many countries occupation data at ISCO-08 major group level, or even broken down only by skill level, have been used to show growth in occupations requiring higher levels of skill and decline or stagnation in growth of occupations at intermediate or elementary skill levels. Statistics at major group and sub-major group level can provide objective information the extent to which jobs at intermediate skill levels are in decline due to increasing automation, whether these jobs are being replaced by higher skilled jobs requiring technical skills related to automation and/or by lower skilled jobs performing manual tasks that are difficult to automate, and on transition from production-oriented work towards care and service provision.

Aggregate statistics on employment by occupation also provide important information on inequalities and segregation in the labour market experienced by women and men, and by different population groups such as people with disabilities, migrants and ethnic minorities.

Statistics on the distribution of employment by sex and occupations with a high skill level, especially in management, can cast light on the extent to which women and men have equal access to decision-making and management roles in government, enterprises and institutions (ILO 2018a, 50). This is reflected in the Sustainable Development Goals (SDG) indicator 5.5.2 Proportion of women in managerial positions. This indicator is calculated based on data on employment by sex and occupation at either the major group or sub-major group levels of ISCO-88 or ISCO-08. It is recommended to report two different measures jointly for this indicator when data are available at ISCO 2-digit level: the share of females in (total) management and the share of females in senior and middle management (UN 2018). The first of these is calculated as the number of females employed in major group 1, Managers, as a percentage of total employment in major group 1, and thus can be calculated when data disaggregated by sex are available only at 1-digit level. The second measure, based on data at 2-digit level excludes ISCO-08 sub-major group 14, Hospitality, retail and other services managers or ISCO-88 sub-major

group 13, General Managers. Excluding this group is a more accurate measure as it mainly includes managers of small businesses.

A broader indicator of occupational segregation by sex provides information on the tendency of men and women to work in different occupations. It can shed light on the extent to which women and men benefit from different opportunities and treatment in work life (ILO 2013c, 143). The ILO manual on decent work indicators proposes three measures of occupational segregation by sex based on ISCO sub-major groups:

1. Female share of employment (relative to the male share) in each of the ISCO sub-major groups
2. Occupational distribution of employment by sex
3. Duncan Index of Dissimilarity

The methods of calculating these measures are explained in the ILO manual and need not be repeated here. In summary, the first measure indicates the extent to which the is a concentration of men and women in each occupational group. The second measure shows the number of females and the number of males employed in each occupational group, as a proportion of total female and male employment, respectively. Differences between the female and male distributions of occupations may reflect gender differences in access to employment opportunities in each occupational group. The Duncan Index of Dissimilarity measures the tendency of labour markets to be segmented on the basis of sex, but does not identify which occupational groups create these differences. (ILO 2013, 143).

These types of measure can be applied to occupational groups at any level of ISCO or a national occupation classification, subject to data availability and sampling constraints. Using the 42 ISCO-08 sub-major groups is particularly useful as these groups are reasonably homogenous in terms of both skill level and skill specialization, are generally sufficiently large to allow reliable estimation based on most labour force surveys and are nevertheless sufficiently detailed to identify occupational groups that have traditionally been dominated by males or females (for example building trades, teachers, personal care workers) to be identified. Analysis of specific occupational groups at 3-digit level, such as those in nursing and engineering, that have traditionally shown very high levels of segregation by sex should also be considered.

7.3.2. Detailed statistics on employment

Statistics on employment at more detailed levels of ISCO and related national classifications are needed for applications such as identification of skill shortages, educational planning, the provision of employment services and careers guidance, and recruitment and migration of workers. They allow identification at of occupational groups that are growing rapidly and therefore in high demand, which may require recruitment of migrant workers and investment in training and retraining.

When combined or cross-tabulated by economic activity, detailed occupational data can be used to project estimation of the potential impact on employment by occupation of industries in decline, and of industries expected to grow. This allows potential for re-employment of skilled workers form industries in decline to emerging economic activities, the extent of retraining that might be needed, and other potential sources of skilled workers.

The dissemination of statistics on detailed occupations from sample surveys can be challenging, however, especially when cross-tabulated with other variables. Moreover, detailed tabulations can be hard to interpret, containing many cells with very low estimates and may not always be useful, especially when occupational data is cross classified by industry. Some occupations, however, tend to be clustered in a small number of industries. Initial cross-classification of detailed occupational data with all economic activities, can allow identification of the main economic activities for each occupation, and of those industries in which employment in specific occupations is growing or in decline.

Similar approaches can be adopted for other variables, such as the levels and fields of education in which jobholders are qualified. These types of analysis can also be used to compile of occupational profiles that are

useful for careers guidance and employment services. For example, the US Bureau of Labor Statistics (BLS) compiles occupational profiles at the most detailed level of the US SOC, providing data on employment and wages broken down by industries with the highest concentrations of each occupation. The profile for emergency medicine physicians is one example (BLS n.d.). This type of information, together with BLS occupational projections is combined with detailed information on the type of work performed in the US O*NET for each occupation as shown in the example linked here for restaurant cooks.

As discussed above, however, the capacity to provide detailed information will depend on the size of the sample, confidentiality and privacy concerns, and the resources available, etc. For example, the US BLS occupational profiles are sourced from the Occupational Employment and Wage Statistics (OEWS) survey with a sample of approximately 1.1 million establishments.

7.4. Statistics on earnings by occupation

Statistics on earnings by occupation refer to the earnings received from employment in a particular job, and are generally expressed as average hourly, weekly, monthly, or annual earnings. According to the 16th ICLS resolution concerning statistics of employment-related income, these statistics should be classified by economic activity, status in employment and occupation or occupational group, at least according to the major groups and categories of the most recent version of the relevant international classifications.

Information at the major group and sub-major group levels of ISCO-08 can provide useful insights on earnings as a return to skill acquisition and education, on whether the gap between the highest paid occupational groups and the less well paid is growing. They also allow assessment of equity between occupational groups at similar levels of skill. A number of national reports on wage statistics by occupational groups are available, for example, the 2020 Occupational Wages Survey in the Philippines (PSA 2022), the United States Occupational Employment and Wage Statistics (OEWS), and the Gross monthly wage by major groups of occupations, using ISCO major groups, of the Office fédéral de la statistique (OFS) in Switzerland.

Analysis of the gender pay gap by occupation for ISCO-08 major groups can show how inequality in earnings between men and women may be influenced by skill level (Eurofound 2018, 12 -13). Data on the gender pay gap for detailed occupations can reveal some startling differences, however and can potentially be sourced from survey data (for example, the Gender pay gap in the UK) and administrative records, and increasingly, from big data sources. (APEC 2021; Careersmart n.d)

More detailed information is also required in applications such as determination of rates of pay and provision of careers guidance. In these cases, statistics at unit group or more detailed levels of the national occupation classification, in combination with statistics on economic activity, will often be the most useful. This allows measurement, for example, of the wage differential across occupations and industries within a country and providing input to policies and negotiations on wage determination.

7.5. Dissemination of the NOC and related material and information

As mentioned elsewhere in this guide, information about the NOC is needed for various purposes. In many countries, this is accompanied by information on the NOC conceptual design and other useful and relevant methodological material. This material can include, for example, the NOC structure and detailed group descriptions and explanatory notes, coding indexes, coding guidelines, previous versions of NOC, links to relevant or related classifications, etc. such as in the case of Argentina, Canada, Colombia, Mexico, the Netherlands, Singapore, the UK and the US and many others. Some of these countries also provide crosswalks from NOC to ISCO-08.

A national classification of occupation can be aggregated and presented according to alternative criteria from those used in the national occupation classification or in ISCO-08. For example, there might be a need for regular

outputs for standardized aggregate groups such as health services occupations or ICT specialists or farming, fishing and forestry related occupations, etc. that group together occupations classified in different major groups in the NOC or ISCO-08. There may also be a need to aggregate occupations to meet specific analytical requirements. For example, if there is a need to estimate the number of workers with an occupational safety and health risk due to exposure to welding fumes it would be necessary to aggregate all occupations in which the use of welding equipment is a regular requirement. This would include a much wider group than only those classified as welders in ISCO-08 unit group 7212, Welders and flame cutters. An example of alternative or thematic view is available from the ANZSCO. An example of job families is available from the O*NET. Examples of thematic grouping of occupations such as Healthcare Occupations or Entertainment and Sports Occupations and others are also provided by the US BLS, for example.

It is important to note that classifications require instruction and/or training in their use. Custodians of the classification often prepare needed (self) training and explanatory material to assist a wide range of users in understanding and using the classifications in their operations, some examples can be found on the Canada NOC webpage.

It is interesting to note that NOCs are often disseminated and available for download in diverse formats, such as MS. Excel, csv, etc. in addition to pdf. Furthermore, countries like Canada and New Zealand, for example, make their NOCs accessible in more user-friendly and searchable formats. The provision of an Application Programming Interface (API), such as in the case of the Swiss CH-ISCO-19 v.1.2 and New Zealand, often allows the customization and export of NOCs structure and associated material in various useful formats.

In some cases, the custodian agency or agencies of the NOC also disseminate an implementation schedule of the NOC, such as in the case of the US BLS. This schedule provides detailed information and the potential time frame for implementation of the NOC in various major operations using the NOC at the national level.

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