



Australian Government



Jobs and Skills Australia

# Skills Shortages Drivers - A companion paper

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# Introduction

Australia's economy is facing complex challenges, including the dynamism of its labour market. Among these are skills shortages that have not been so acute since the 1960s. While the national unemployment rate has risen in recent months, the rate continues to be historically low – one of the factors contributing to a tight labour market. In some occupations such as trades, health-related, IT-related or some other “niche” occupations, the shortages are negatively affecting the economy in a significant way (Australian Chamber of Commerce and Industry, 2022; Jobs and Skills Australia, 2023).

The accumulated and flow on effects of the COVID-19 pandemic, while potentially unwinding now, such as rising inflation and interest rates, global economic uncertainty, and disrupted supply chains have aggravated the skills shortages in the Australian labour market.

Consistent with the above, the 2023 Skills Priority List (SPL) showed that 36% of occupations assessed were in national shortage (332 out of 916) in 2023, 5 percentage points higher than the 2022 SPL. Shortages were most common for Technicians and Trades Workers, with 50% of occupations in the category assessed as being in national shortage. Among Professionals, 48% of the occupations within the group were in shortage. Shortages were also prevalent among Community and Personal Service Workers (24% of occupations in shortage).

The SPL does not identify the potential causes or drivers of occupations in shortage. Understanding the reasons for these shortages is critical for generating insights on what can be done to address them. Classifying skills shortages is important for developing targeted policies and strategies to enable employers, industry bodies and training providers to identify opportunities and tailor their pathways to employment to address these shortages.

## Skills Shortage Drivers

The SPL is produced at both the Australian New Zealand Standard Classification of Occupation 4-digit level (ANZSCO4) and 6-digit level (ANZSCO6). Further, the list is produced on both the 2013 and 2022 versions of ANZSCO. For more information on the SPL, including the definition of shortage used please refer to the [SPL methodology](#).

The ANZSCO framework groups occupations (ANZSCO6) that are similar into higher level categories called Unit Groups (ANZSCO4). As a result, ANZSCO4 has fewer categories and more general titles than ANZSCO6. For instance, in the 2022 ANZSCO, there are 916 occupations at the ANZSCO06 level in scope for the SPL; these are grouped into only 311 distinct unit groups at the ANZSCO4 level. The ANZSCO framework is produced by the Australian Bureau of Statistics (ABS). Please see the ABS website for details about ANZSCO versions.

The Skills Shortage Drivers (SSD) analysis builds on the outcomes of the ANZSCO4 level SPL as this more easily aligns with other Jobs and Skills Australia and ABS products that are readily available at ANZSCO4. This overcomes data limitations that arise when using more granular levels of data.

The SSD is a preliminary attempt to classify the skills shortages in the SPL into four types based on the likeliest cause of shortage. The categorisation was first introduced in the inaugural 2023 Jobs and Skills Report, “Towards a National Jobs and Skills Roadmap” (See References). The four types are discussed in the **Concepts and definition** section of the paper. The data sources and methodology are described in **Data sources and Methodology**. As new data becomes available, the methodology used to categorise the skill shortages will be refined.

# Concepts and definitions

## Four different types of skills shortage

The SSD categorises skills shortages listed in the SPL into four types based on data from the Survey of Employers who have Recently Advertised (SERA). The downloadable workbook and SSD dashboard also provides the ANZSCO4 result on the 2013 and 2022 ANZSCO versions.

The categorisation was based on a typology published in Richardson (2007), which proposes four classifications of skills shortages with different policy implications (Table 1).

**Table 1: Richardson’s skills shortage classification**

<b>Classification</b>	<b>Definition</b>
<b><i>Level 1 shortage</i></b>	Only a few people have the essential technical skills and there is a long training time for development.
<b><i>Level 2 shortage</i></b>	Only a few people have the essential technical skills and there is a short training time for development.
<b><i>Quality gap</i></b>	There are sufficient people with the essential technical skills, but they lack some qualities that employers consider important.
<b><i>Skills mismatch</i></b>	There are sufficient people who have the essential technical skills, but they are not willing to apply for the vacancies under current conditions.

Source: Richardson (2007)

Considering Richardson’s typology and using data from SERA, Jobs and Skills Australia has produced the following skills shortage typology described in Table 2.

The four classifications may appear mutually exclusive; however, not all shortage occupations fit neatly in one category or another. Some occupations assigned to one category may have some issues in common with occupations in other categories. For example, an occupation may be simultaneously experiencing a lack of qualified applicants and a large amount of turnover. As such, the skills shortage driver given by Jobs and Skills Australia for an occupation simply states the foremost driver of shortage (based on available evidence).

For all categories, economic theory suggests that increasing wages is one lever that employers can pull to attract more workers. How successful that will be depends on the 'elasticity of supply of labour' which is contingent partly on how many people have the skills required. For empirical estimation of elasticities, see Booth and Katic (2010).

**Table 2: JSA's skills shortage typology**

<b>Classification Definition</b>	
<b>Long training gap</b>	Analogous to Richardson's level 1 shortage. Longer training gap shortages are defined by few qualified applicants per vacancy and a long training pathway – corresponding to a certificate III or above.  This suggests a need to increase the number of available skilled workers but with significant time lags involved in the training process.
<b>Short training gap</b>	Analogous to Richardson's level 2 shortage. Shorter training gap shortages arise when there are few applicants per vacancy and qualifications less than a Certificate III are required.  This suggests a need to increase the number of available skilled workers, with shorter time lags involved in the training process.
<b>Suitability gap</b>	Analogous to Richardson's quality gap. The suitability gap category is those occupations where there are enough qualified applicants, but they are not regarded as suitable. Reasons cited include a lack of employability skills and work experience. Another factor which may be in play is unconscious bias of employers.  This is a category where simply increasing the throughput of qualified people is a questionable strategy. The solution is to enhance the attributes of qualified applicants through investing in their employability skills and work experience.
<b>Retention gap</b>	Analogous to Richardson's skills mismatch. Retention gap shortages are where there are below average rates of retention, potentially reinforced by low numbers of new applicants per vacancy.  This is a category where increasing the throughput of qualified applicants is unlikely to solve the problem because of the low likelihood of retaining them. Ways to enhance the attractiveness of the occupation through improved remuneration and/or working conditions, professional development and clearer career pathways would be potential solutions to alleviate this kind of shortage.

Source: Jobs and Skills Australia

### **Training gap (long and short training gap)**

Occupations may be in shortage due to a lack of qualified applicants. These shortages can be partially addressed by employers by increasing employee retention, but solutions will largely come from policy and educational providers.

Occupations where shortage pressures may be caused by a training gap include Early Childhood (Pre-primary School) Teacher; Occupational Therapist; Physiotherapist; Registered Nurse; Solicitors; Social Worker; Metal Fitters and Machinists; and Electricians.

While some occupations require a qualification due to knowledge or licensing requirements, others can be more flexible and use on-the-job training as a replacement for formal qualifications.

### **Suitability gap**

Even if an applicant possesses the requisite qualifications an employer may still deem them to be unsuitable for the job. They may still lack the skills or the experience that the employer

has deemed necessary. Using data from the SERA, the suitability gap may be the reason for shortage for occupations for which the number of qualified applicants is high but suitable applicants is low. This may point to an issue in the training programs (both VET and higher education) for these occupations which may not adequately prepare individuals for entry into the workforce. Alternatively, this may indicate that employers have unrealistic expectations of graduates; or, are recruiting for a more senior role within an occupation category (for example, ANZSCO does not distinguish between an ICT Manager supervising five staff members and a Senior ICT Manager with more complex responsibilities who is accountable for 50 staff members).

Occupations where shortage pressures may be caused by a suitability gap include Advertising, Public Relations and Sales Manager; Construction Manager; Advertising and Marketing Professional; and Civil Engineering Professional.

## **Retention gap**

A retention gap occurs when there is a sufficient number of people with the requisite skills, qualifications, and experience to fill vacancies in each occupation, but they are unwilling to accept offers from employers under the current conditions. Using data from the ABS Job Mobility survey and the SERA, these are the occupations with a higher-than-average job mobility, potentially reinforced by low numbers of new applicants per vacancy.

Occupations where shortage pressures may be caused by a retention gap include Human Resource Professional; Chef; Child Carer; and Aged and Disabled Carer.

Recent analysis by both Jobs and Skills Australia and the Reserve Bank of Australia highlights that wage adjustments are rarely used by employers as a short-term response to skills shortages.

The Reserve Bank of Australia has noted that firms facing skills shortages have responded by means other than increasing wages such as hiring less-skilled workers, increasing training for existing staff, and increasing automation (Leal, 2019). Increasing wages is one of many strategies firms use to address skills shortages. However, such strategies are generally chosen only after a range of other responses. There may be limited scope for the education and training system to provide solutions to these types of skills shortages. Further analysis of wage growth over a longer time horizon may shed light on whether wage adjustments are being used as much as they could be, particularly for occupations that have been in persistent shortage.

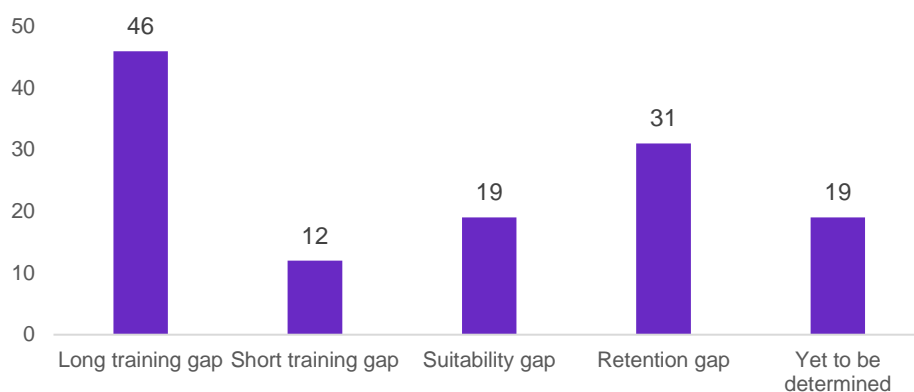
## **Interpretation**

This typology is a useful way to understand a complex set of dynamics in the labour market. In reality, for some occupations it is likely that there are several factors leading to a shortage and elements from more than one of the categories outlined in this section may be at play. This means that responding to the shortage may require multiple strategies. For example, resolving a particular occupational shortage may involve increasing training places, combined with higher wages to attract more workers to the roles.

# Summary of results

As shown in Figure 1, the most common Skills Shortage Driver was Long Training Gap, with 46 of the 127 ANZSCO 4-digit occupation Unit Groups (Unit Groups) allocated to this category. This was followed by Retention Gap, with 31 Unit Groups.

**Figure 1: Skills Shortage Drivers by number of Unit Groups**



Source: Jobs and Skills Australia

Long Training Gap was also the most common driver among the highest employing Unit Group in shortage (Table 3).

**Table 3: Skills Shortage Drivers for the highest employing Unit Groups**

Occupation title	National Skills Shortage Driver Rating	Number Employed*
Registered Nurses	Long Training Gap	262,700
Aged and Disabled Carers	Retention Gap	227,500
Retail Managers	Short Training Gap	194,800
Primary School Teachers	Long Training Gap	164,900
Child Carers	Retention Gap	162,500
Truck Drivers	Short Training Gap	161,600
Secondary School Teachers	Long Training Gap	155,900
Advertising, Public Relations and Sales Managers	Suitability Gap	135,800
Electricians	Long Training Gap	131,900
Software and Applications Programmers	Suitability Gap	117,700

Source: Jobs and Skills Australia and ABS Census 2021. \*Census 2021, rounded to nearest 100

A Suitability Gap was the most likely shortage driver for ANZSCO Skill Level 1 (equivalent to a bachelor degree or above) Unit Groups, with 18 of the 19 Suitability Gap groups at this skill level. This may be because these occupations require high level interpersonal skills in addition to qualifications or because roles in these categories tend to span a wide range in terms of seniority.



# Data Sources and methodology

## Data sources for the SSD

The SSD requires the use of 5 data sources. These data sources are listed in Table 4 below.

**Table 4: Data sources used for Skills Shortage Drivers assessment**

Data Source	Information Used
Survey of Employers who have Recently Advertised (SERA)	Qualified applicants per vacancy
JSA Similar Occupations dataset	Occupation to occupation similarity scores
ABS Participation, Job Search and Mobility (PJSM) Survey	Occupation replacement rates
ABS 2021 Income and Work Census	Number of people working in the occupation
Skills Priority List (SPL)	National shortage rating

Source: Jobs and Skills Australia

### Survey of Employers who have Recently Advertised

The Survey of Employers who have Recently Advertised (SERA) is designed for assessing occupational shortages and provides direct measures of employer experiences when recruiting.

The SERA is a telephone-based survey of employers who have advertised vacancies. These employers have had recent interactions with the labour market and are, therefore, able to provide information on current recruitment conditions and identify issues for selected occupations. The survey asks employers a range of questions regarding their recruitment experience for an advertised vacancy, collecting both quantitative and qualitative data.

The SERA collects data on the recruitment experiences on around 9,000 employers annually, spread over approximately 350 occupations. Data is collected for 6-digit ANZSCO defined occupations and focuses on relatively large occupations (national employment of at least 1,500 people), where enough job advertisements are available each year to conduct employer surveys.

### Jobs and Skills Australia Similar Occupations dataset

The Similar Occupations data set quantifies the degree of similarity between occupations based on their underlying skills.

The methodology uses a machine learning technique called Natural Language Processing to consider not only shared skills between occupations, but also the similarity in the phrasing, wording, and meaning of skills. This similarity is expressed as a 'similarity score' between two occupations. The scores have been classified as high, medium, and low in this interface. For more detailed information about the Occupation Transitions dataset, please see the website: [Australian Skills Classification | Jobs and Skills Australia](#).

### Skills Priority List

Jobs and Skills Australia's Skills Priority List (SPL) provides a detailed view of occupations in shortage and the anticipated future demand for occupations in Australia. The SPL is released annually as a point-in-time assessment of the labour market and serves as a



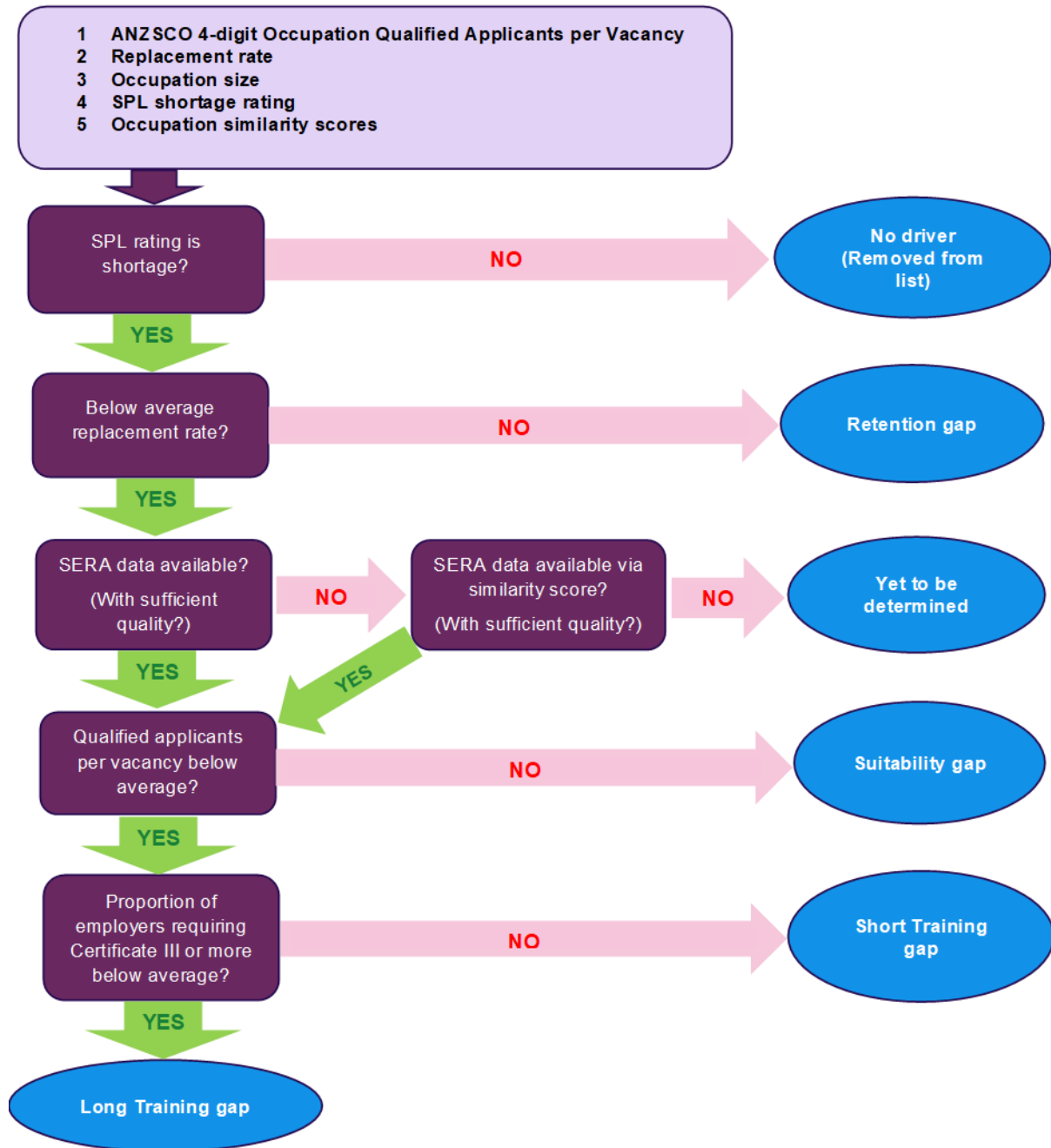
valuable tool that can inform policymakers towards aligning policies and strategies with the current demand of the labour market.

Occupations within the scope of the SPL are those defined in the ANZSCO at the 6-digit level and Skill Levels 1 to 4. The focus is on these skill level occupations due to their strong link to post-secondary school education and training. The SPL dashboard, and other accompanying reports can be found via the website: [Skills Shortages Analysis | Jobs and Skills Australia](#)

## Illustrative methodology

Figure 2 illustrates the process flow for allocating a preliminary estimated skills shortage driver (the decision tree for SSD).

Figure 2: SSD decision tree



Source: Jobs and Skills Australia

The criteria used to group the skills shortage from the SPL into the four categories are described in Table 5.

**Table 5: Criteria used to classify occupations in shortage in the 2023 SPL**

<b>Classification Definition</b>	
<b>Long training gap</b>	<p>Average or below-average job mobility of 12.17% in 2023</p> <p>Fewer than average qualified applicants per vacancy 5.57 in 2023</p> <p>Above average in requiring a Cert III or above (multiplied by needing a qualification at all), the average being 62.5% in 2023</p>
<b>Short training</b>	<p>Average or below-average job mobility of 12.17% in 2023</p> <p>Fewer than average qualified applicants per vacancy 5.57 in 2023</p> <p>Below average in requiring a Cert III or above (multiplied by needing a qualification at all), the average being 62.5% in 2023</p>
<b>Retention gap</b>	<p>Above average job mobility of 12.17% in 2023</p> <p>Below average qualified applicants per vacancy 5.57 in 2023</p>
<b>Suitability gap</b>	<p>Average or below-average job mobility of 12.17% in 2023</p> <p>Above average qualified applicants per vacancy 5.57 in 2023</p>
<b>Yet to be determined</b>	<p>Not enough data to be of sufficient quality or did not satisfy any of the above requirements.</p>

Source: Jobs and Skills Australia

A similar criterion is used to classify occupations in shortage in the 2022 SPL, based on 2022 data.

## Treatment of SERA data

To consider SERA data to be of sufficient quality, the following two conditions must be met:

- The number of businesses contacted (sample size) must be 20 or above.
- The relative standard error (RSE<sup>1</sup>) of the qualified applicants per vacancy, must be below 0.25, or the standard error of the qualified applicants per vacancy below 1<sup>2</sup>.

For the similarity scored SERA data, the same conditions apply in addition to:

- The proportion of occupation size corresponding to occupations where SERA data is available compared to the total occupation size of all similar occupations must be above 0.67.

Before any calculations are made, the SERA data is filtered based on the following criteria:

- Skill level 5 occupations are removed. This is to keep in line with the Skills Priority List methodology.
- Bulk rounds are removed. Bulk rounds are recruitment rounds which have large numbers of vacancies employers are aiming to fill. The results for these rounds tend

<sup>1</sup> The Relative Standard Error (RSE) is a measure of uncertainty of an estimated value. It is calculated by taking the standard error (standard deviation of the estimate) and dividing it by the estimated value. A low RSE implies that the level of certainty is high while a high RSE implies a very low level of certainty.

<sup>2</sup> The reason this approach is taken is because if the estimated value is low, the RSE can be quite high even if the standard error is low. Setting a separate limit on the standard error ensures that data of this type is not discarded unnecessarily.

to vary wildly and because of their size they can have an outsized impact on the qualified applicants per vacancy calculations. The definition of a bulk round is:

- A recruitment round with greater than 50 vacancies advertised: or
- A recruitment round with greater than 10 vacancies advertised and twice the average number of vacancies per round for that occupation and year.

In some cases, the SERA data is available but not considered of sufficient quality, resulting in a "Yet to be determined" category. Insufficient quality can be due to insufficient sample size, or a highly variable sample. Where SERA data is of insufficient quality, a proxy is calculated from the neighbouring similar occupations using the Occupation Transitions dataset (qualified applicants per vacancy and proportion requiring Certificate III or above).

## The use of the Similar Occupations dataset

The role of the Similar Occupation dataset is to combine information from multiple similar occupations together to create a large enough sample to be reliable.

The data is first prepared by creating a similarity score between each 4-digit ANZSCO and a 6-digit ANZSCO. If this level of granularity is not available, it is assumed that each 6-digit ANZSCO occupation inside a [4-digit ANZSCO](#) has the same similarity. This list is then filtered such that only occupations with more than 85% similarity are included.

This dataset is then merged with the SERA data such that similar occupations can be used in the below calculation.

The formula for qualified applicants per vacancy calculated via using similarity scores is:

$$\text{Qualified applicants per vacancy} = \frac{\sum_{i=0}^n \text{similarity}_i * \text{qualified applicants}_i}{\sum_{i=0}^n \text{similarity}_i * \text{vacancies}_i}$$

Where:

- *i* represents the index of each similar occupation. When *i* is zero, it is referring to the occupation itself.
- *n* is the number of similar occupations.
- Similarity is the similarity score for each occupation. When *i* is zero, the similarity score is 100%.
- Qualified applicants refer to the total number of qualified applicants received.
- Vacancies is the total number of vacancies employers were aiming to fill with their recruitment.

## ANZSCO as a base for occupation definitions

The associated SSD workbook provides the 2023 Skills Shortage Driver based on the ANZSCO at the 4-digit level (ANZSCO4). The ANZSCO framework is produced by the ABS (See Box 1).

## Box 1: Interpreting ANZSCO occupation definitions

ANZSCO occupation definitions are based on the skill level and specialisation usually necessary to perform the tasks of the specific occupation, or of most occupations in the group. The definitions and skill level statements apply to the occupation and not persons working in the occupation. The allocation of a particular occupation to a particular skill level should be seen as indicative only and should not be used prescriptively.

The definitional material describing each occupation is intended primarily as an aid to interpreting occupation statistics classified to ANZSCO. The descriptions are, therefore, only a guide to the tasks undertaken and skills involved in various occupations and are not a definitive statement of what is required.

### Format of the definitions

This classification contains definitions for all major, sub-major, minor and unit groups, and occupations. The format of the definitions may vary slightly between the hierarchical levels, but all contain similar elements.

### Major, sub-major, minor and unit group definitions

The elements of major, sub-major, minor and unit group definitions are as follows:

- Main heading - consists of the level in the ANZSCO hierarchy (e.g. minor group), the code, and the title of the group in that order.
- Lead statement - describes the main activities undertaken in the group and, indirectly, the group's boundaries.
- Inclusion and exclusion statements - are included only where necessary to avoid potential for confusion and to clarify the scope of the group.
- Task list - a representative list of the principal or indicative tasks undertaken in the group. Because of the disparate nature of the occupations contained in 'miscellaneous' and 'other' groups, no task lists are provided for these groups.
- Skill level statement - specifies the requirements for competent performance of occupations in the group, expressed in terms of the amount of formal education and training, previous experience, and on-the-job training. Any special requirements, such as registration or licensing, are indicated in this statement.
- List of lower categories - lists the categories (code and title) in the hierarchical level immediately below the group being defined.

## Occupation definitions

The elements of occupation definitions are as follows:

- Code - the numerical representation of the occupation.
- Principal title - the title which best describes the particular occupation. It is generally the most commonly used title, although there are exceptions in cases where the most commonly used title is too broad or too narrow in meaning for the purposes of the ANZSCO occupation, or where occupations of different content are usually known by the same title.
- Alternative title - any commonly used alternative title (or titles) for the occupation. These alternative titles have the same meaning as the principal title but may be less commonly used.
- Lead statement - describes the nature of the occupation, summarising the main activities undertaken and, indirectly, the occupation's boundaries. Any special requirements, such as registration or licensing, are indicated in this statement.
- Skill level - the number equating to the ANZSCO skill level of the occupation.
- Specialisation titles - any commonly used titles which refer to a subset of jobs belonging to the occupation designated in the principal title. These jobs involve the performance of specialised tasks rather than the broader range of tasks usually performed in the occupation.

Source: ABS, Definitions, ANZSCO - Australian and New Zealand Standard Classification of Occupations (November 2022)

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