Australian Government

National Skills Commission

Australian Skills Classification

BETA release discussion paper

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Commissioner's foreword

Skills are widely recognised as the new currency of workforce development; however, skills data can lag workforce needs.

The National Skills Commission (NSC) has now released the beta version of its new Australian Skills Classification as an interactive online interface.

While training packages, industry and private sector organisations have defined specific skill sets, there was not a consistent framework to identify and measure skills across the board.

Instead, education levels, qualifications and occupations are generally used as proxies for skill levels. This means recognising the importance of individual occupations, qualifications, and skills, but lacking an understanding of how bundles of skills combine within occupations across the labour market.

The Australian Skills Classification systematically sets out the structure of, and relationships between, skills within occupations and across the labour market. As a pillar of the NSC's Jobs and Education Data Infrastructure (JEDI) project, it represents an important step in the NSC's broader work to develop an economy-wide skills analysis and apply this information to help improve the operation of the labour market and the vocational education and training system

This paper provides the context for the first release of the Australian Skills Classification. The NSC is seeking feedback to help improve subsequent updates and ensure it remains relevant to the current and changing Australian context.

The NSC is also interested in exploring the possible broader opportunities and applications of this data driven resource, which can improve our understanding of skills, how they work together and transfer across occupations.

The Australian Skills Classification has the potential to significantly assist the entire skills system, including those who ultimately will benefit the most from an improved understanding of both current and emerging skills needs – students, workers and job seekers.

I look forward to reviewing the feedback on this important development.

Adam Boyton, National Skills Commissioner

Executive summary

The National Skills Commission (NSC) has released the beta version of its Australian Skills Classification in an interactive online interface on its website at https://www.nationalskillscommission.gov.au.

To encourage take up of this new resource, the CSV files of the complete classification are also available for download.

The Classification offers a common language of skills, enabling stakeholders to identify and articulate skills using a comprehensive and universal taxonomy.

The NSC developed the classification system using a mix of machine learning and human judgement and drew on different data sources including O*Net and the Australian Employability Skills Framework. Employer surveys, Australian job advertisement data, and education and training course documentation were used for validation and refinement purposes.

The NSC will continuously expand and amend the Classification using stakeholder feedback and a data driven methodology.

The dynamic nature of the Classification means it can be used to help identify changes to occupations not yet picked up in traditional labour market data.

The Classification offers a deeper understanding of the labour market. Rather than using occupations or qualifications as proxies for skills, it offers a new way of identifying the range of skills linked to occupations.

The Classification also identifies common and transferable skills between occupations, and reveals the connections within, and across, occupations at the level of skills.

The Australian Skills Classification structure

The Classification contains three categories of skills:

- core competencies: commonly used in all occupations (sometimes called 'soft skills' or 'employability skills')
- specialist tasks: work activities a person undertakes specific to a job
- technology tools: a technology, such as software or hardware, used within an occupation.

Occupation profiles

The Classification currently provides occupation profiles outlining the core competencies, specialist tasks and technology tools for 600 occupations.

These profiles are detailed but not fully comprehensive, as granular-level detail can make it harder to recognise common and transferable skills.

Instead, this framework facilitates comparisons, offering data-driven insights into the relationships of skills and occupations.

Skills clusters

The Classification shows how skills are distributed across occupations, forming skills clusters of similar specialist tasks.

Skills clusters provide another way to conceptualise the distribution of skills across the labour market at a deeper level than occupation classifications or qualifications.

This new perspective illustrates the relationships – and potential transferability – of specialist tasks across occupations.

Practical and strategic applications

The Classification can improve job matching by systematically linking the skills required in one occupation

to another. This can help workers identify common and transferable skills, skills gaps and training opportunities.

The Classification also provides a more detailed framework to identify critical skills and potential labour market skills gaps. Combined with other information, this resource can help stakeholders including training sectors, industry and governments to research and develop new training options.

Widespread adoption of this skills framework can help employers in multiple sectors to better access skilled workers, and offer working-age Australians opportunities for skills development, employment and career advancement.

Stakeholder engagement

The NSC introduced the Australian Skills Classification in its July 2020 report, '*A snapshot in time: The Australian labour market and COVID-19*'. This report included a chart outlining the competency level required for core competencies within the 10 largest employing occupations in Australia.

The NSC received stakeholder feedback on one of these occupations and expanded and amended the occupation profiles using this feedback and data driven methodology.

With the release of the online interface and downloadable CSV files, the NSC invites further stakeholder engagement.

The NSC encourages stakeholders to explore the classification and see how it can add value to their operations.

To provide feedback please visit the NSC website.

Part 1
Introduction

Note: the data in this report are accurate at the time of writing (18 March 2021).

COVID-19 is accelerating workforce change due to the increased digitisation of many parts of the economy, e- commerce, changing business models and a more complex global trading environment.

A wider range of businesses and sectors now have greater incentives to adopt new technologies, update systems, diversify markets, products or services and change working arrangements or delivery models.

As workforces and individuals become more focused on skills development, education and training sectors are under more pressure to meet the growing and changing needs of employers and students.

Having the right combination of skills will continue to be a competitive advantage for workforces and individuals. However, until now we have lacked a high quality, data driven, publicly available classification of skills for the Australian labour market.

While training packages, industry and private sector organisations have defined specific skill sets, we have lacked a consistent framework to identify and measure skills across the board.

Instead, we generally use education levels, qualifications and occupations as proxies for skill levels. This means we recognise the importance of individual occupations, qualifications and skills, but we have lacked an understanding of how bundles of skills combine within occupations and across the labour market.

Developing a skills classification was a recommendation of the 2016 CSIRO report, *Tomorrow's Digitally Enabled Workforce*. The Australian Skills Classification, and the Jobs and Data Infrastructure (JEDI) project, were developed in response to the report's finding that companies, industries, government agencies and regions needed more holistic, fine-grained and dynamic labour market information.

This discussion paper provides context for the Australian Skills Classification and outlines how the NSC developed this new framework and next steps. Part of this context summarises potential pragmatic and strategic use cases, consistent with Australian and international research, policy and practice.

The Australian Skills Classification can assist governments, industries and organisations to align around a common skills framework and develop skills-based approaches to recruitment, education and training, workforce planning and policy development.

By enhancing information and communication about skills, the Classification also creates an opportunity to strengthen labour market alignment. Stakeholder engagement is critical to achieve this goal. Encouraging stakeholders to explore the online interface, download the CSV files, start using the Classification and provide feedback is the purpose of the beta release of the Australian Skills Classification and this discussion paper.

1.1 Context

The Australian Skills Classification complements the Australia and New Zealand Standard Classification of Occupations (ANZSCO).

Occupation is a broad term for a set of jobs involving similar tasks, while a *job* refers to a specific position. ANZSCO outlines the tasks performed within an occupation, and the level of education needed for a specific job.

Currently the Classification identifies:

- 10 core competencies: common skills used in all occupations
- 1925 specialist tasks: detailed work activities required within a job
- 88 technology tools: a technology, such as software or hardware, associated with a job.

This new level of detail about skills can help us to identify change within jobs more quickly. The titles of occupations and qualifications do not always keep pace with change. Some occupations and qualifications might keep the same titles, even as their skills change. Their titles are inexact proxies for skills.

Combined with other data and information, the Classification will also assist us to identify new and emerging jobs more readily, compared to occupational frameworks or training packages with slower update cycles.

The Classification is a practical framework for people to use. Like ANZSCO, the more people use it, the more useful it becomes.

1.2 A pillar of JEDI

The Classification is a pillar of JEDI, an NSC flagship project. Data from the Classification enables JEDI to compare the skills in one occupation to another. This capacity allows JEDI to work as the data engine behind some Department of Education, Skills and Employment (DESE) job matching tools.

Better skills identification is only one factor in more efficient job matching, but it can encourage greater skills utilisation and occupational mobility. Research indicates job seekers have higher interview rates when they broaden their job search and include seemingly unrelated jobs that use similar skills. However, data from the Australian Taxation Office reveals that, while pathways into new occupations or industries are possible, most workers tend to transition to similar occupations when moving jobs.

Some DESE tools, including Job Switch, use JEDI to make it easier for job seekers to identify their skills and see how these skills can be transferred to other occupations, potentially with additional training. The information and advice available through these tools will be further refined following feedback on the Classification.

1.3 A multi-purpose resource for multiple users

The applications and opportunities of the Australian Skills Classification are broader than expanding an individual's job search results. For example, this resource provides the basis to better map qualifications to jobs and enable existing training courses to be matched to emerging or changing jobs.

Many public and private sector organisations are also taking skill-based approaches to policy, recruitment and training. The NSC is looking to facilitate these approaches by providing a data driven and dynamic classification of skills that is high quality, independent and publicly available free of charge.

It is important to note that the Classification does not duplicate job search tools. The Classification framework alone does not make career recommendations or link to employment vacancies. The interface does not provide advice about skills demand, emerging or declining occupations or labour market trends. But it can do these things when linked with data on job vacancies, skills demand and labour market conditions.

Similarly, the Australian Skills Classification interface does not identify pre-requisite qualifications or credentials for jobs. Nor does it try to classify the knowledge, experience or the broader context in which a job is performed.

As the Classification is a data-driven skills language, it is a practical resource to support communication and decision making by multiple users.

In the longer term, a consistent framework to define and articulate skills needs can create labour market efficiencies, helping to promote choice, opportunity and labour market agility.

Part 2
The Australian Skills Classification

Note: the data in this report are accurate at the time of writing (18 March 2021)

The Australian Skills Classification currently sets out the key core competencies, specialist tasks and technology tools required for 600 occupations in Australia.

Subsequent versions of the classification are likely to include additional occupations, and update existing ones, with continuous improvement using a combination of stakeholder feedback, review and analytics.

2.1 Core competencies

Core competencies are common to all jobs. The core competencies align to the definitions of foundation skills typically used in the Australian VET system – specifically, the Employability Skills Framework developed by the Australian Skills Quality Authority, with minor differences recommended by education system experts.

About core competencies

Currently there are different terms for core competencies, including employability skills, soft skills, foundational skills and transferable skills.

The Australian Skills Classification provides a consistent language and a way to compare the level of competency rather than proxies like education levels or occupation classifications.

The Australian Skills Classification uses a 10-point scale to describe the competency required for a core competency within an occupation. Each value has corresponding description to explain what it means. These definitions are general and not specific to occupations.

Wider applications

The skills classification offers researchers, governments, industry, education and training sectors a common way to identify, measure, assess or compare core competencies. This can help to focus and align efforts to develop core competencies in high demand.

The classification of core competencies also makes it possible to consider their role in the development and application of transferable skills. Core competencies are as important to skill transferability as specialist tasks. For example, businesses may need workers with technical skills, but they may not be productive without core competencies such as oral communication, teamwork or problem solving.

2.2 Specialist tasks

Specialist tasks describe day to day work within an occupation. While specialist tasks can be transferrable across occupations and sectors, they are not universal -- unlike core competencies.

About specialist tasks

Specialist tasks are useful for differentiating occupations. Specialist tasks change more frequently than core competencies, making it possible to identify trends.

This information adds to our understanding of how jobs may be changing in response to factors including increased digitisation or changing business models.

Wider applications

Industry and employers can use the classification of specialist tasks to define critical skills and identify skill gaps that could be met by learning on the job, short courses or accelerated training.

Governments and education and training sectors can also use this as an additional source of information to identify further opportunities to develop timely and targeted short courses or adapt curriculum.

2.3 Technology tools

Technology tools are the technologies such as software or hardware required in an occupation.

The classification of technology tools describes software and equipment types or categories and provides specific packages or products as examples.

About technology tools

Common technology tools (such as search engines and email) are featured across most occupations, and these are captured in the core competency of digital engagement.

The remaining technology tools are highly specialised and occupation-specific (like computer aided design and carbon monoxide analysing equipment).

2.4 Occupation profiles

Occupation profiles are a new source of information about jobs and skills, providing detailed and up to date insights not necessarily reflected in aggregate data or broader labour market trends.

About occupation profiles

These profiles highlight key skills attached to an occupation. Organisational or sector-specific taxonomies often include granular-level profiles. However, fine detail

in an economy-wide skills classification emphasises the differences between occupations.

The Australian Skills Classification has a different purpose – to reveal the connections between occupations at the level of skills.

This does not mean that occupations with similar skills profiles must be very similar. They might require different knowledge, qualifications, credentials or other qualities not captured by the Australian Skills Classification.

Instead, occupation profiles reveal that even different occupations can share common and transferable skills. By providing a shared understanding of skills transferability, occupation profiles can make skills more easily transferable in practice.

Wider applications

Over time, using this new common language can improve cross-sectoral communication about skill needs and thus improve the coordination of workforce development – in particular, by providing a means to more closely align education and training with the skills needs of employers.

This new capacity can also bring greater flexibility to the operation of the labour market. By clearly defining transferable skills and skills gaps, occupation profiles can allow for the development of innovative targeted skills initiatives and new career pathways.

Skills based recruitment

Broad adoption of this skills classification can have network effects: when one person uses the occupation profiles, it creates value for others. For example:

- Employers can develop skills-based advertisements more efficiently, which helps job seekers more clearly understand their skill needs and promote their skills in language employers recognise.
- Job seekers can describe their full range of skills, including relevant skills picked up through work experience as well as formal education and training. This can assist employers to consider a wider range of candidates and employ people with the right skill sets.

Potentially this capability may improve job matching and help reduce the time and cost of filling vacancies.

Occupation profiles could also assist employers to identify jobs where it might be appropriate to hire for competencies rather than using higher education levels as proxies for skills. A follow-on effect from this could be the broader social and economic benefits derived from expanding possibilities for job seekers from underrepresented groups to take up occupations or industries they may not otherwise consider.

Benchmarking

Occupation profiles can serve as a benchmarking tool – a source of comparison businesses can use to identify differences in what skills they require from someone doing the same job in another business.

Research and analysis

Occupation profiles can also contribute to a more informed public debate about how Australian jobs are performed, whether this is changing and what this means for our current and future skills needs at a more detailed and practical level.

Subsequent releases of the Australian Skills Classification will include emerging occupations. In the future these additional occupation profiles could provide insights into whether new jobs in the Australian labour market involve new skills or simply new combinations of skills.

2.5 Skills clusters

Skills clusters show clusters of similar specialist tasks. These tasks are broadly transferable – if you can do one task in the cluster, you can do the others.

About skills clusters

Skills clusters illustrate a new way of looking at the labour market at a 'deeper' level than occupational classifications or qualifications.

This view shows how skills are related and connected to one another and illustrates the transferability of skills across occupations.

Skills clusters show how skill types are distributed across occupations. In doing so they can provide another perspective on skills gaps. Skills clusters do not measure a skills gap, or provide data, but are a unique way of determining whether an already identified skills gap is similar or quite different from the existing skills supply. This visualisation may provide an additional indicator of whether a skills gap can be met by recruitment or on-the-job training.

In the longer term, this perspective can enhance the conceptualisation of skills portfolios across the workforce, industry or business and expand our understanding of skills beyond traditional labour market information.

Wider applications

Visualising common and transferable skills across occupations

For individuals, skills clusters provide a way to plan career pathways around in-demand skills rather than occupations which may change over time. Skills clusters

indicate the skills offering broad transition options. That is, they provide a way to visualise the range of occupations that require a skill, similar skills, and transferable skills across the labour market.

Education and training implications

By revealing the range of occupations requiring a specialist task, skills clusters could inform skills packages and the way education and training providers market their course offerings over the longer-term.

Planning and workforce development

By identifying skills that are required by a range of occupations, and similar skills, skills clusters provide an indication of the potential return on training investments.

Mapping skills clusters could also inform workforce analysis over time. For example, combining this data with other data and information to understand the existing skills clusters within a region or industry could inform forward strategy to attract new business, develop new products or open new markets.

Part 3
Methodology

Note: the data in this report are accurate at the time of writing (18 March 2021).

The NSC developed the Australian Skills Classification using a mix of machine learning and human judgment and drew on different data sources, including O*NET and existing skills classification systems in Australia, for the development of the Classification. The department's employer surveys, Australian job advertisement data, and education and training course documentation were used for the validation and refinement purposes.

3.1 O*NET data and the adaptation to Australian Skill Classification

The NSC considered different existing classifications with the following key principles to develop the skill classification:

- could be adapted for the Australian context
- is data driven
- would identify skills that are transferable across occupations
- is comprehensive
- identifies trending skills
- is dynamic.

Among those existing classifications, the American classification O*NET stood out with these principles.

O*NET is a rich database containing information on all American occupations through annual surveys of American workers since 2000.

To adapt O*NET data to the Australian occupation classification, we first developed a mapping system between O*NET occupations (the Standard Occupational Classifications (SOC) used in the United States) and the ANZSCO occupations (the Australian and New Zealand standard classification of occupations).

By borrowing from O*NET and mapping to ANZSCO using the concordance table, we then developed a structured skill classification, describing job requirements for the ANZSCO occupations.

3.2 The structure of the classification and its coverage

The NSC identified three essential categories of skills:

- core competencies: non-specialist skills commonly used in all occupations (sometimes called 'soft skills' or 'employability skills') - skills such as communication and teamwork which underpin successful participation in work
- specialist tasks: work activities a person undertakes specific to a job
- technology tools: a technology, such as software or hardware, used within an occupation.

The skill classification covers 600 occupations which are a mix of ANZSCO 4-digit and ANZSCO 6-digit occupations. The decision to roll ANZSCO 6-digit occupations up to ANZSCO 4-digit was made on a case-by-case basis. Considerations included:

- multiple ANZSCO 6-digit in ANZSCO 4-digit code map to the same O*NET occupation
- there being no substantial differences between the 6-digit occupations in their tasks, education and licencing, or industry distribution
- very few job listings for a given ANZSCO 6-digit code over a 5-year period (using Burning Glass Technologies job advertisement data).

3.3 Core competencies

Core competencies are the basic building blocks common across most occupations and industries. They describe a set of non-specialist skills gained in early life and schooling and provide a base to further develop skills and specialties. Popular terms for these include 'foundation skills', 'common skills', 'soft skills', 'core skills' and 'employability skills'.

Using desktop research and consultation with relevant stakeholders and subject matter experts, the NSC identified 10 core competencies required for every occupation in Australia (see Table 1).

The NSC aligned the core competencies to the definitions of foundation skills typically used in the Australian vocational education system. Specifically, the Employability Skills Framework developed by the Australian Skills Quality Authority (ASQA). The minor differences between the Commission's 10 core competencies and ASQA's foundation skills were recommended by education system experts.

Score for core competencies

The 10 core competencies are required in every occupation across the whole labour market, but different occupations require different levels of core competencies. To derive the competency required for a skill within an occupation the Commission mapped the 10 core competencies to values from three different O*NET categories of data that offered the most relevant proxy for each of the ten core competencies:

- Skills
- Work Styles
- Work Activities

The O*NET score values range between 1 and 7, where the higher the value, the higher the level of the skill is needed to perform a job. The other 7 anchor on the 10-point scales were derived from the Australian classifications and ratings systems and modified to fit the context. We used Australian references, such as the Australian Qualification Framework and Australian Core Skills Framework to fill out another 7 examples across the 10-point scale. An example of anchor values for one core competency is shown in Table 1.

Table 1: Ten point scale for the core competency "writing"

Core competency	Description	Competency Description	Value	Value Description
Writing	O*NET Skills	Communicating effectively in writing in a way that is appropriate for the audience	1	Write name and address on a membership form, copying another document
			2	Write everyday workplace specific vocabulary and abbreviations, e.g. product names
			3	Take a telephone message
			4	Write a job history as part of a job application
			5	Prepare a standard operating procedures document
			6	Write a memo to staff outlining new directives
			7	Write a detailed literature review
			8	Write a legally binding contract for services provided by one business to another
			9	Write a novel for publication
			10	Write a thesis on metaphor, syntax and grammar in nineteenth century novels

3.4 Specialist tasks

The specialist tasks are designed to describe day-to-day work within an occupation. While these skills can be transferrable across occupations and sectors, unlike core competencies, they are not universal.

We used O*NET's Detailed Work Activities (DWA) as our starting point for technical tasks. There are approximately 2,000 Detailed Work Activities in the O*NET taxonomy. Each of these represent a distinct work activity performed in a job.

To bring the DWA into the Australian context, we manually removed or adapted tasks not commonly performed in Australia – for example we took out snow ploughing. We then modified the task to translate its academic descriptions to language that Australians are more likely to use daily. The modified tasks were called the specialist tasks thereafter.

It is important to note that several specialist tasks described the same or a very similar skill in different words. To facilitate the transferability among occupations, we clustered the specialist tasks into higher level groups using a mix of machine learning and human checking methods. The underlying intention is that if an individual can perform one task from a cluster, they can likely perform the tasks in the same cluster as well.

We used 3 different clustering algorithms, k-means, Affinity Propagation and Spectral Clustering algorithms followed by a customised cluster refining process. We then used a similar process to further group the specialist task clusters into families, to give us a true taxonomy of skills, rather than an occupation driven taxonomy which includes skills. We ended up with 29 task families, 279 task clusters and 1,925 specialist tasks.

Table 2. Example of top 10 specialist tasks for Cooks, by time spent

ANZSCO Code	ANZSCO Title	Specialist tasks	% of time spent on task	Specialist cluster	Specialist family
221111	Cooks	Cook foods	26%	Undertake food preparation	Food services
221111	Cooks	Check quality of foods or supplies	9%	Monitor food or nutrition quality	Food services
221111	Cooks	Assess equipment functioning	7%	Inspect, test or maintain equipment or systems	Quality control and inspections
221111	Cooks	Cut foods	7%	Undertake food preparation	Food services
221111	Cooks	Prepare foods for cooking or serving	5%	Undertake food preparation	Food services
221111	Cooks	Coordinate activities of food service staff	5%	Coordinate food service activities	Food services
221111	Cooks	Clean food preparation areas, facilities or equipment	4%	Clean work areas or dispose of waste	Cleaning and maintenance
221111	Cooks	Inspect facilities, equipment or supplies to ensure conformance to standards	4%	Inspect products, equipment or facilities	Quality control and inspections
221111	Cooks	Arrange food for serving	4%	Undertake food preparation	Food services

Working hours for specialist tasks: Task utilisation score

To analyse how specialist tasks are utilised by an occupation, we calculated working hours allocated to each task during a day. This also helped to rank the popularity of tasks according to working hours allocated to them.

While O*NET specifies each of the DWAs associated with an occupation, it does not provide a metric of the relative time spent in each activity for each occupation. In deriving the time spent for a DWA, we applied a similar method to that detailed in AlphaBeta's 'The Automation Advantage' (2017).

We used the task ratings survey carried out by O*NET that asks respondents how often they perform each task in their role, ranging from 'yearly, or less', to 'hourly, or more'. O*NET reports for an occupation the share of respondents and their implied frequency for a task. We derived a task utilisation score, or the working hour allocated to a task, for each occupation and task pair. This score is computed by taking the average of implied yearly frequency for a task weighted by respondent share.

Table 3: Task implied yearly frequency

O*NET Frequency	Implied yearly frequency	Rationale
Yearly or less	1	Once a year (one time)
More than yearly	2	More than once a year (2 times)
More than monthly	12	Once a month (12 times) (once a month)
More than weekly	48	Four times a month (48 times) (12 x 4)
Daily	240	At least daily, 5 times a week (240 times) (5 x 48 working weeks x 1)
Several times daily	480	At least twice daily, 5 times a week (480 times) (5 x 48 working weeks x 2)
Hourly or more	1,920	At least 8 times a day, 5 days a week (1,920 times) (5 x 48 working weeks x 8)

3.5 Technology tools

Technology tools are a technology, such as software or hardware, used within an occupation. Common technology tools, such as search engines and email, are featured across most occupations, and these are captured in the core competency of digital engagement. The remaining technology tools are highly specialised and occupation-specific, such as computer-aided design and carbon monoxide analysing equipment.

The data for the technology tools is originally sourced from a combination of 'software' and 'tools' found in the O*NET occupation data for the United States Standard Occupational Classification.

These occupations have been mapped to the Australian occupational classification (ANZSCO), and the technology tools have been adjusted for the Australian context by cross-reference with the Burning Glass Technologies Australian job ads data.

While O*NET contains a vast dictionary of technology tools, there are three significant drawbacks:

- it was not developed for the Australian context
- the list is extensive with over 16,000 tools (which is contrary to the idea of transferability)
- it does not provide a level of importance for the skill.

We only wanted to consider tools that are in common use in Australia, so we used Burning Glass job advertisement data to filter out low relevance skills. For example, for Accountants we removed 'Sage 50 Accounting' (software popular in the USA) because it is minimally referenced in Australian job advertisements. However, MYOB is in high demand in Australia despite being absent from the O*net taxonomy, so we added it to the Classification.

This process required significant data cleaning and natural language processing. We used fuzzy matching for skills which are in both taxonomies. We then

manually searched for digital skills in Burning Glass which are not in O*NET, such as MYOB, Xero, etc. Then we conducted an extensive review of the results to ensure the matchings and the name of the skills were correct.

As a parallel refinement process, we also used other data sources to identify whether O*NET captures all the technology tools. This involved examining results from the NSC's 'Survey of Employers Recruitment Experiences' which asked employers the digital skills they use in their work, as well as exploring popular skills in Burning Glass Technologies data. The research identified several skills for supplementation.

The technology tools were then manually checked to confirm that they met the definitions of technology tools we had determined. Some were found to not match this definition and so were manually removed.

Lastly, individual technologies with similar functionalities were aggregated together to produce the final technology tools by using the technology family-level of O*Net. For example, the technology tool 'Accounting software' consists of Xero, MYOB BusinessEssentials, Fund accounting software, Tax software and more. Noting the challenges of the O*NET and Burning Glass matching, aggregation makes the results more robust as well as improving transferability between occupations.

Ranking the technology tools

The technology tools are ranked according to an intensity score which measures their prevalence in job ads using Burning Glass. For a technology tool we measure the proportion of job ads in an occupation that require that technology tool. For individual technology tool examples within a technology tool, we measure its prevalence across all occupations.

This approach allows us to rank the prevalence of technology tools within an occupation, and of technology tool examples within a technology tool. In some cases, however, technology tools were manually supplemented and not available in Burning Glass data and have an intensity score of zero, leading them to have the lowest possible rank.

An example of technology tools used by a specific occupation is shown (see Table 4) as well as examples of technology tools commonly used in Australia (see Table 5).

Table 4. Example of Technology Tools by Occupation

ANZSCO Code	ANZSCO Title	Technology Tool	Technology Tool Ranking
221111	Accountant (General)	Enterprise resource planning ERP software	1
221111	Accountant (General)	Accounting software	2
221111	Accountant (General)	Data base reporting software	3
221111	Accountant (General)	Data base user interface and query software	4
221111	Accountant (General)	Financial analysis software	5

Table 5. Technology Tools Examples

Technology Tool	Technology Tool Examples	Technology Tool Ranking
Accounting software	MYOB BusinessEssentials	1
Accounting software	Fund accounting software	2
Accounting software	Intuit QuickBooks	3
Accounting software	Xero	4
Accounting software	Tax software	5

Deduplicating technology tools

Since O*Net maintains such a large taxonomy of individual technologies, in some cases their groupings can have significant overlap, resulting in technology tools that are highly related or even duplicate. This presents a problem for consistency between occupations – for example, the O*Net occupation 'Cashiers' has the technology 'Point of sale POS software', while the occupation 'Travel Agents' has the technology 'Point of sale POS terminal', ultimately limiting their transferability. In the Skills Classification we've attempted to reconcile these inconsistencies by combining technology tools that are deemed too similar.

Table 6. Examples of Duplicate Technology Tools

EFTPOS and card reading machines	GPS receivers
Electronic funds transfer point of sale equipment	Global positioning system GPS receiver
Bar coding software	Vehicular GPS
Point of sale POS terminal	Route navigation software
Point of sale POS software	GPS receivers
Point of sale POS receipt printers	Mobile location-based services software
Magnetic stripe readers and encoders	

Common technology tools

Several technology tools are so universal in 2021 that they are likely to be used by most or all occupations.

Rather than being individually listed against each occupation, we felt these common technology tools were best represented through the Digital Engagement core competency. This has the effect of ensuring the remaining technology tools only refer to more specialised technologies that are likely to be meaningfully different between occupations. It also prevents exaggerated transferability between occupations when they share only common technology tools.

The common Technology Tools included in the Digital Engagement core competency are:

- Email and calendar software
- Word processing software
- Spreadsheet software
- Presentation software
- Search engine and information retrieval software

3.6 Validation exercises

As part of the development of the Australian Skills Classification, staff from the NSC (and the Department prior to the creation of the NSC) undertook various validation exercises to ensure the accuracy Classification prior to a public release.

Independent market testing

As part of the validation activities, Nous Group was engaged to conduct independent market testing of the Australian Skills Classification. The survey investigated if the skills associated with a sample of 22 occupations in the Skills Classification match employers' understanding of the skills required.

22 occupations were chosen for testing as this project aimed to provide initial insights into the Skills Classification rather than validate it in its entirety. Test occupations were agreed with DESE and were selected on the basis of occupation size. This was to encourage a larger survey response, and to ensure coverage of multiple industries.

Responses were concentrated on two occupations, which has given us good insights about the skills classification for these occupations. The concentrated responses likely reflect the level of engagement from their skills organisations. Small numbers of responses were also received for 11 other occupations.

Broadly, the results showed that there was alignment between employers and our Australian Skills Classification on the core competencies and specialist tasks. There was a misalignment on Technology Tools, which prompted us to revisit our methodology to improve the data.

Core Competencies improvements

The core competencies element of the Skills Classification was reviewed with the aim of improving relevance to the Australian context.

Escalier McLean Consulting were engaged to support our work improving the linkages between our core competencies and the Australian Core Skills Framework (ACSF) and the Australian Qualification Framework (AQF). Based on the outcomes of this exercise, the core competency anchor values were improved.

Technical validation

Quantium were engaged to validate the overall technical approach and determine if the Australian Skills Classification we developed is reflective of the Australian labour market.

Overall, Quantium found that the Australian Skills Classification has met all the requirements of the technical assessment framework, however, several refinements to the methods and outputs have been identified. As part of the continuous improvement of the Australian Skills Classification, the NSC is considering these refinements.

Part 4
Feedback

Note: the data in this report are accurate at the time of writing (18 March 2021).

4.1 Next steps

The NSC introduced the Australian Skills Classification in its July 2020 report, *'A snapshot in time: The Australian labour market and COVID-19'*. This report included a chart outlining the level of competency required for core competencies within the 10 largest employing occupations in Australia.

Following the release of that report, the NSC received feedback about the core competencies for registered nurses. We engaged with select peak bodies, including the Council of Deans of Nursing and Midwifery, to gain vital feedback to improve our occupation profiles for Registered Nursing occupations in the Australian labour market. We are continuing to engage with peak bodies to further improve our profiles and to obtain more comprehensive data and feedback.

The NSC is now seeking feedback on the beta release of the Australian Skills Classification. We welcome engagement on all aspects of the Classification.

4.2 How to provide feedback

To provide feedback on the Australian Skills Classification please visit the National Skills Commission website.

The NSC is committed to continuous improvement of the classification based on stakeholder feedback and backed by a data-driven approach.

For more information
on this report, contact:

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Australian Government

National Skills Commission

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