DIGITAL CAPABILITY FOR WORKFORCE SKILLS

FINAL REPORT
2022

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Australian Industry Standards Limited would also like to acknowledge and thank the:

- Steering Committee including representatives from:
    - Branches of the former Department of Education, Skills and Employment:
        - Industry Advice
        - Foundation Skills
        - Qualifications Reform
        - Skills Organisation
    - Department of Prime Minister and Cabinet (PM&C)
    - Department of Industry, Science and Resources (DISR)
    - Jobs and Skills Australia (JSA) formerly National Skills Commission (NSC)
    - Australian Public Service Commission (APSC)
    - Digital Skills Organisation (DSO)
    - Training.gov.au (TGA).
- Pilot Industry Reference Committees:
    - Agriculture and Production Horticulture
    - Business Services
    - Information and Communications Technology
    - Sustainability
    - Transport and Logistics
- Industry Reference Committees
- Other stakeholders

Foreword

The impact of digital technology on our daily lives and the pace of digital transformation has become impossible to ignore.

> *"In just a couple of decades, smartphones have become ubiquitous, social media has changed the way we communicate and consume content and the volume of data we produce has increased exponentially. These trends have accelerated following the COVID 19 pandemic — e commerce via online retail purchases, online delivery of human services and digitally enabled work from home are now widespread across Australia."*[1]

CSIRO's 2022 report on global megatrends impacting Australia notes that this level of change is only the beginning:

> *"The rapid adoption of digital and data technologies in recent times has meant that many sectors and organisations have experienced years' worth of digital transformation in the space of months…. While this progress has been significant, experts predict that this is just the tip of the iceberg, with the vast majority of digitisation yet to occur."*[2]

The Productivity Commission has confirmed that the largest barriers to the use of technology by businesses (beyond inadequate internet speeds) is a lack of skills and knowledge. Similarly, Ai Group research has found the majority of businesses are already experiencing difficulties in finding and retaining staff with the required digital capabilities,[3] leading to calls for action at the recent Jobs and Skills Summit (September 2022).

> *"The high paying, high skilled jobs of now and the future are digital. We need a national strategy that includes digital capability standards and a framework that supports the digital transformation and enablement of our economy. Nobody should be left behind. We need to provide the skills to power our companies, large and small. Industry knows this, but the education and training system is just catching up".*[4]

The digital capability challenge impacts all industries in our economy. The Australian Government's Digital Economy Strategy 2030 reported that 87% of jobs, across all industry sectors, now require digital skills[5] and many have noted that a lack of digital capability compounds economic and social disadvantage by limiting individual's access to employment and services.

The need to build Australia's digital capability is becoming urgent if our citizens, our businesses and our economy are not to be left behind.

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[1] Productivity Commission, 5-year Productivity inquiry: Australia's data and digital dividend, Inquiry Interim Report, Canberra, August

[2] Naughtin C, Hajkowicz S, Schleiger E, Bratanova A, Cameron A, Zamin T, Dutta A (2022) Our Future World: Global megatrends impacting the way we live over coming decades. CSIRO, Brisbane, Australia

[3] An Ai Group Centre for Education and Training report, (2022) Skilling Australia to lock in our digital future

[4] https://www.aigroup.com.au/globalassets/news/speeches-transcripts/2022/innes_summit_skills_training_2sept.pdf

[5] Productivity Commission, 5-year Productivity inquiry: Australia's data and digital dividend, Inquiry Interim Report, Canberra, August

Work conducted for the Digital Transformation Expert Panel in 2020 found that although the importance of workforce digital capability was well acknowledged in public discourse, digital skills were not being dealt with explicitly outside of the public sector workforce. There was little policy coherence in relation to digital capability across the country and no systematic approaches to capturing information on digital skills supply and demand [6].

The *Australian Digital Capability Framework* represents a significant step forward in creating an explicit and shared approach to building digital capability across the nation's workforce and by doing so, systematically lifting productivity right across the economy and uplifting societal engagement.

The development process brought together for the first time, different areas of government, industries, employers, employees, training product developers, learners and Vocational Education and Training professionals to determine how a framework can best support development of the digital capabilities needed across the Australian workforce and indeed the broader population. The result is a unique resource that provides an industry-neutral common language and a simple structure for identifying and developing the digital capabilities required for a wide variety of occupations, as well as more broadly discussing what it means to be a digitally capable individual.

The *Australian Digital Capability Framework* will enable those developing vocational qualifications and courses to employ a consistent approach to identifying digital capabilities, which in turn will enhance the transferability of skills across occupations and industries. It will also provide a basis for the schooling, Vocational Education and Training and higher education systems to talk to each other, using the Framework's common language to translate and reinforce their different approaches to building digital capability.

The *Australian Digital Capability Framework's* design draws upon the most comprehensive and contemporary thinking about the components of digital capability from across the world and the perspectives of those who will use it. It is a uniting force. It links and complements many other digital-related frameworks and taxonomies, and in doing so, has the power to focus and amplify in unprecedented ways the many disparate efforts of industries, governments, and education and training systems to build Australia's digital capability.

In an age of increasingly rapid digital transformation, issues of job mobility, portability of skills and the need for rapid reskilling and upskilling are front of mind.

[6] (2020) Unpublished paper prepared for the Digital Transformation Expert Panel

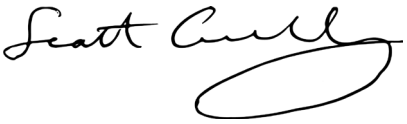
As was highlighted in the Panel's Digital Transformation Strategy:

> *Digital transformation and the accelerating speed with which technology and automation will continue to evolve, mean that we must establish ourselves as the 'learning country'. One that enables existing workers to build world class skills and knowledge throughout their working lives; regardless of geography, income, age or gender. Just as our use of technology has become the new normal, so too must our acquisition of new skills and knowledge and a culture of continuous learning.*

The *Australian Digital Capability Framework* now gives us a basis as a nation for working together to do exactly that.

Megan Lilly
Executive Director
Ai Group

Scott Connolly
Assistant Secretary
Australian Council
of Trade Unions



David Spriggs
Chair
Australian Digital
Inclusion Alliance

Mark McKenzie
Former Chair
Council of Small Business
Organisations Australia

Executive Summary

The **Australian Digital Capability Framework** Version 1.0 (referred to as "the **Framework**" or the "**ADCF**") describes the broad digital capabilities required by workers across a wide range of Australian occupations and industries. With a sector-neutral language and straightforward descriptors derived from Australian work contexts it ensures the Frameworks relevance to users in workplace, education and training contexts. The benefits for different user groups are:

the benefits

The ADCF describes the broad digital capabilities required by the Australian workforce. Using common, easily understood language, and a simple, intuitive structure, the Framework can be used for multiple purposes, thereby aligning and strengthening a wide variety of efforts to build the digital capability of the nation's workforce.

AUSTRALIAN WORKERS

- Supports labour mobility by capturing the digital capabilities common between job roles
- Drives career development and lifelong learning by identifying the digital capabilities needed to succesfully gain employment and progress in the world of work
- Establishes a common, easy-to-understand language within the workplace, between employers, and across industries

EMPLOYERS

- Captures new and emerging digital capabilities needed by the workforce
- Supports identification of skills gaps and targeting of workforce development initiatives
- Helps design job advertisements to attract a broader pool of candidates

TRAINING PRODUCT DEVELOPERS

- Enables mapping of existing training products to identify digital skill gaps, outdated content & duplication
- Informs the need for new training products and design of upskilling and reskilling pathways

VET PROFESSIONALS

- Offers explicit, detailed and contemporary information on digital capabilities that are often implicit in training products
- Maintains currency of knowledge of digital technologies and their application

POLICYMAKERS

- Complements existing skills frameworks
- Establishes an agreed taxonomy for labour market analysis, policy and program design to align efforts
- Supports establishment of seamless learning pathways between schools, VET & universities

About the project

In the midst of the COVID-19 pandemic, the Digital Transformation Expert Panel came together to develop a strategy that provides advice on how Australia's Vocational Education and Training (VET) system can most effectively respond to digital change underway across industry. The resulting Digital Transformation Skills Strategy laid out a series of recommended actions to equip Australia's workforce to navigate digital change and ensure ***"that we leave no worker behind"***[7].

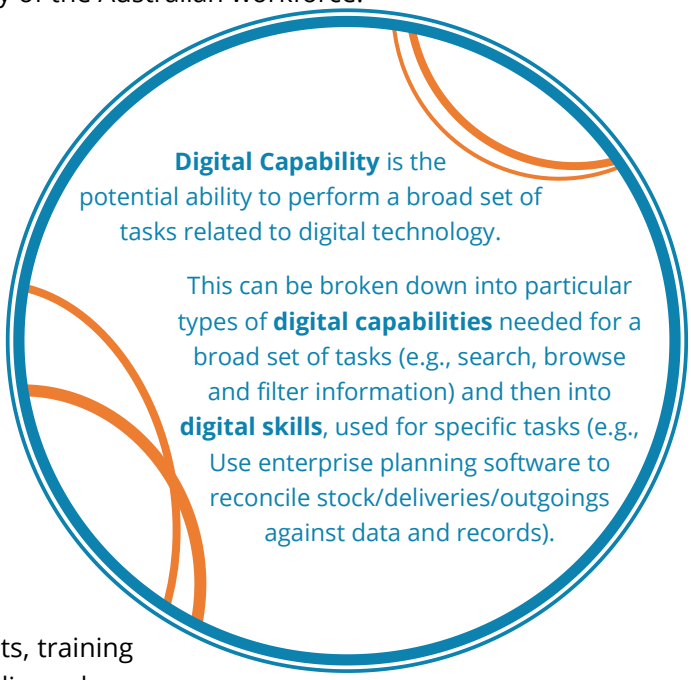
This **Digital Capability for Workforce Skills Project** has delivered on a number of these recommended actions, by:

- Developing an occupational and industry sector neutral **Australian Digital Capability Framework** for use by employers, Australian workers, students and job seekers, training product developers, VET professionals, policymakers and more
- Developing a **Digital Occupational Profile Template** and sample **Digital Occupational Profiles**, to illustrate application of the Framework to specific occupations
- Coordinating a **high-level review of training packages** (which stipulate the outcomes to be achieved by national VET qualifications), to recognise the presence of digital skills within qualifications and assess the impact of digital transformation on related occupations
- Developing a validated model and prototype of a **dynamic online Companion Volume** (a resource that provides additional information related to a training package), to support VET professionals' knowledge of digital technologies and their implications for training and assessment.

The project has achieved more than expected. It has brought together different stakeholder groups and areas of national policy to create a platform and a common language that will focus and magnify efforts to build the digital capability of the Australian workforce.

Project methodology

The project, which was conducted by Australian Industry Standards, in partnership with CSIRO's Data 61, has incorporated the insights of stakeholders and potential users throughout the work. Industry Reference Committees (the groups of industry experts responsible for oversight of training package development) and their supporting Skills Service Organisations (SSO), played a critical role in the validation of the Framework, as well as development of Digital Occupational Profiles and conduct of the high-level review of training packages.



The input of employers, employees and students, training product developers, VET professionals and policymakers informed development of a set of Design Principles that guided development of the scope, structure and functionality of the Framework.

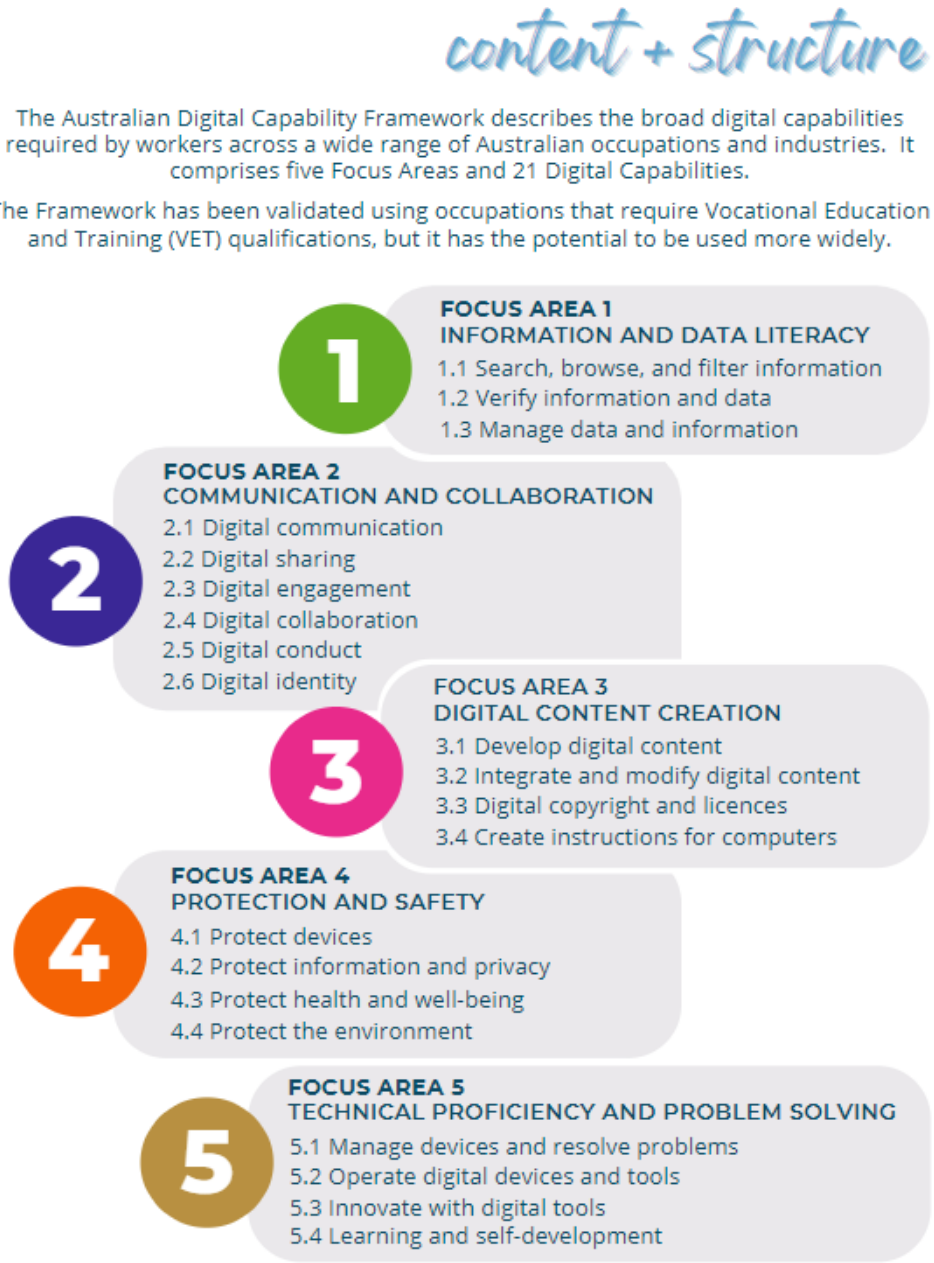
[7] Digital Transformation Expert Panel (2021) *The Learning Country: Digital Transformation Skill Strategy*. Australian Industry Standards, Melbourne

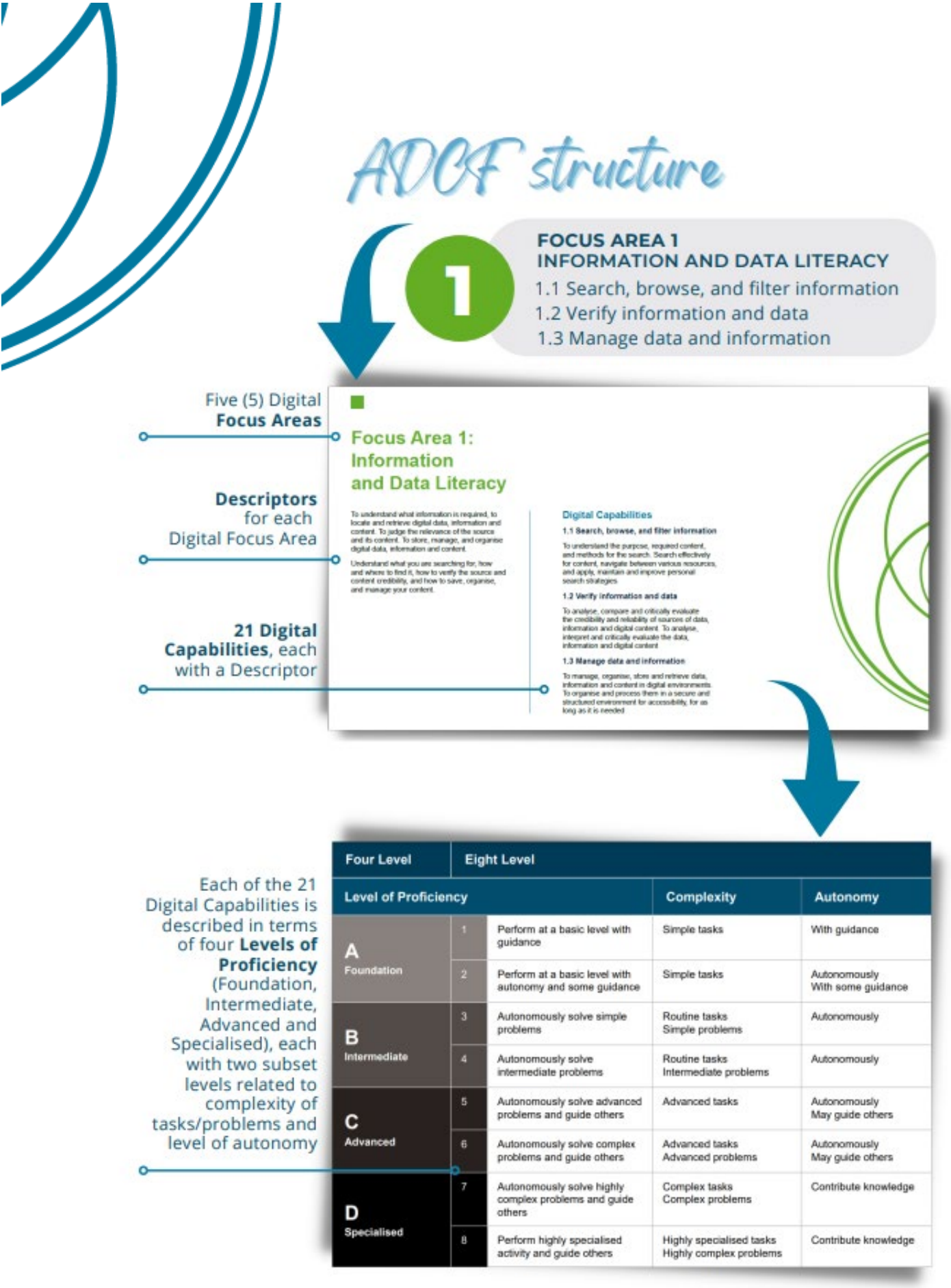
The Framework was developed through:

- A review of existing digital capability frameworks in relation to the Australian workplace context and alignment with the identified Design Principles
- Selection of the European DigComp 2.1 framework as the basis for an Australian framework
- A sophisticated, multi-stage analysis of the DigComp 2.1 framework against performance criteria from Australian training package qualifications using machine learning algorithms (referred to as Natural Language Processing – NLP)
- Adaptation of DigComp 2.1 to create a draft Australian Digital Capability Framework, which then underwent a comprehensive feedback and validation process.

There is significant potential for further applications of the processes used to develop the Framework, beyond the realm of digital capabilities.

The Australian Digital Capability Framework





The Framework has been designed to align with or complement other frameworks and taxonomies in use in Australia, including the Skills Framework for the Information Age (SFIA), Digital Literacy Skills Framework, the Australian Skills Classification, Core Skills for Work Developmental Framework and the Australian Curriculum. This alignment and complementarity

will support the creation of more seamless pathways between education and training sectors (a long-standing policy aspiration) and help to focus and amplify efforts to build digital capability across the workforce.

The alignment of the Framework with DigComp also opens up possibilities for accessing and adapting a range tools and resources.

The Framework is intended as a 'living resource' that will continue to evolve in line with the evolution of digital technology into the future. The supporting tools developed by the project will assist with this process of evolution and help to speed up the process of identifying and responding to digital skill needs as they emerge.

Applications of the Framework

The Framework lends itself to a wide range of uses by a diverse range of users. For example: support for workforce development, skills assessments, career development, labour mobility, analysis of training package content and development of new training products and pathways, labour market analysis and benchmarking, as well as a potential reference point for the digital literacy skills to be included in the new Australian Qualifications Framework architecture.

The other tools developed by the project have helped to validate the Framework and will support its application in a range of settings.

The **Prototype Companion Volume** has been designed to help trainers and training organisations keep up to date with digital technology and the applications of this technology for their industries. It has been designed as an online document that supports the development of digital skills and capabilities under each training package[8]. It provides information about the digital capabilities delivered by qualifications related to occupations, the digital skills commonly requested in job advertisements for those occupations and information about digital technology and skill trends affecting the industry. The prototype also contains a knowledge sharing component that allows users to provide feedback on any additional digital capabilities and skills required for occupations.

The **Digital Occupational Profile template** can be used by industry to identify which of the capabilities from the Framework are needed for specific occupations, and at what level they are needed. They can be used to describe occupation-specific skills related to the required capabilities and provide other occupation-specific information related to digital technology and equipment, the labour market and training opportunities. **Digital Occupational Profiles** developed using the template can then be used for a range of purposes, such as career development activities, skills assessments and training needs analysis.

Maintenance of the Framework

Significant effort will be required to maintain the various components of the Framework, the Digital Occupational Profiles and Companion Volumes (modelled on the Prototype), to ensure they keep pace with digital transformation. Many of these maintenance activities are complex, requiring technical and subject matter expertise.

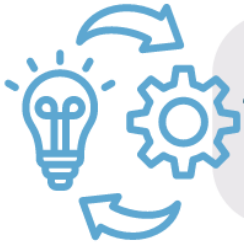
[8] A set of nationally endorsed standards and qualifications for recognising and assessing people's skills in a specific industry, industry sector or enterprise

Next steps for success and evolution

To capitalise on the significant collaboration, agreement and outcomes achieved through this initiative and to maximise the use of the new products and processes generated by the project, the following steps for success for adoption and evolution are:

1. SUPPORT ADOPTION AND USE OF THE FRAMEWORK AND ASSOCIATED TOOLS

- Seek adoption of the Framework and associated tools by Australian, state and territory governments
- Support the adoption of the Framework amongst potential users including employers & industry bodies, Australian workers, job seekers & students, VET professionals, schools & higher education institutions, and training product developers
- Conduct a review of training products and pathways through the lens of digital transformation
- Adopt the Digital Occupational Profile (DOP) template
- Adopt the prototype Companion Volume
- Adapt the self-assessment tool aligned to DigComp 2.1

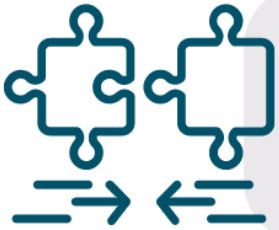


2. ADOPT AND IMPLEMENT MAINTENANCE ACTIVITIES

- Maintain the currency and quality of the Framework and associated tools in accordance with the specified methodology and schedule, and with the same level of rigour applied throughout the development process

3. DEVELOP AND FUND A PROMOTION AND AWARENESS STRATEGY

- Conduct a series of workshops, webinars and presentations on the Framework and its applications
- Establish communities of practice
- Develop a communication pack to explain and promote the benefits of the Framework
- Develop exemplars and case studies of the Framework's use by the full range of stakeholders



4. EXPLORE FURTHER APPLICATIONS AND EXTENSIONS OF THE FRAMEWORK

- Identify opportunities to develop additional applications of the Framework and its development process, and to adapt a range of existing resources, including those that underpin the DigComp Framework

Contents

About the project

The context of digital transformation

It is now widely acknowledged that digital transformation has changed, and will continue to change, the ways in which we work. The rapid and continuing evolution of digital technology and the increasing automation of routine work tasks and occupations is transforming the work landscape. In Australia, 2.7 million jobs are predicted to become automated by the year 2034, and almost twice as many new jobs created. These predictions include 1.2 million new technology-related jobs and a massive 4.1 million new non-technology-related jobs. At the same time, the work of 4.5 million Australians is likely to be augmented by technology, offering businesses opportunities for increased productivity.[9]

Since the time when these predictions were made, the Covid-19 pandemic has not only accelerated the pace of automation and adoption of new technology, but also highlighted what is possible and achievable with the use of digital technology.

In the midst of the pandemic, the Digital Transformation Expert Panel came together to develop a *Digital Transformation Skills Strategy*, designed to provide advice on how Australia's VET system can most effectively respond to digital change underway across industry and its impact on the nation's workforce. The Panel acknowledged the significant opportunities presented by digital transformation, but also expressed caution about the negative impacts of failure to equip Australia's workforce with the necessary skills to navigate the change.

> *History has taught us that with great economic disruption comes the risk of great inequality if we fail to simultaneously upskill and reskill the working population. When disruption occurs at speed, as is currently the case, it significantly amplifies that risk and means that the widespread adoption of technology can come at the expense of an inclusive society. This is why our strategy has as its guiding principle that we "leave no worker behind".* [10]

The *Digital Transformation Skills Strategy* lays out a series of actions under five interrelated focus areas:

1. System settings
2. Industry leadership
3. Learner support services
4. Teaching and learning
5. Training products.

[9] Australian Computer Society and Faethm (2020) *Technology impacts on the Australian workforce*. ACS, Sydney

[10] Digital Transformation Expert Panel (2021) *The Learning Country: Digital Transformation Skill Strategy*. Australian Industry Standards, Melbourne

The Strategy was considered by the Australian Industry and Skills Committee (AISC) in early 2021. Australian Industry Standards (AIS) was subsequently commissioned to implement a series of actions from the fifth focus area, the goal of which is that "*Future-focussed, national endorsed training products build existing workers' agility in response to the impact of digital transformation*". The actions include to:

- Develop a population inclusive, sector neutral digital capability framework, which establishes a common language between the range of stakeholders, informs training product design and supports a systematic approach to digital skills supply and demand.
- Ensure the design and content of nationally endorsed training products supports existing workers to continuously upskill and reskill by:
    - strategically reviewing training packages through the lens of digital transformation
    - developing a prototype of the non-endorsed training package Companion Volume technologies.

Aims of the project

At a practical level, the Digital Capability for Workforce Skills project set out to create an **Australian Digital Capability Framework** Version 1.0 (also referred to in this report as **"the Framework"** or the **"ADCF"**) along with supporting resources that could be used by the Australian VET sector to review training products and inform training product design. At a deeper level, however, the project brought together different stakeholder groups and areas of national policy to create a platform and a common language that will focus and magnify efforts to build the digital capability of the Australian workforce.

The Project comprised of several components:

- Development of an occupational and industry sector neutral **Australian Digital Capability Framework** for use by employers, employees, training product developers, Vocational Education and Training professionals and policymakers
- **Analysis of existing training package content** to confirm coverage and suitability of the draft Framework
- Development of a **Digital Occupational Profile Template** and sample **Digital Occupational Profiles**, to illustrate use of the Framework
- Coordination of a **high-level review of training packages** in relation to the Framework, to recognise the presence of digital skills within qualifications and assess the impact of digital transformation on related occupations
- Development of a validated model and prototype of a **dynamic online Companion Volume** to support VET practitioner's knowledge of digital technologies and their implications for training.

This report describes each of these components, identifies key learnings from the work and presents recommendations for furthering the outcomes of the project.

Project methodology

The work to develop the Digital Capability Framework and its associated components was conducted by AIS, in partnership with CSIRO's Data 61, and with the assistance of Industry Reference Committees (the groups of industry experts responsible for oversight of training package development) and their supporting Skills Service Organisations.

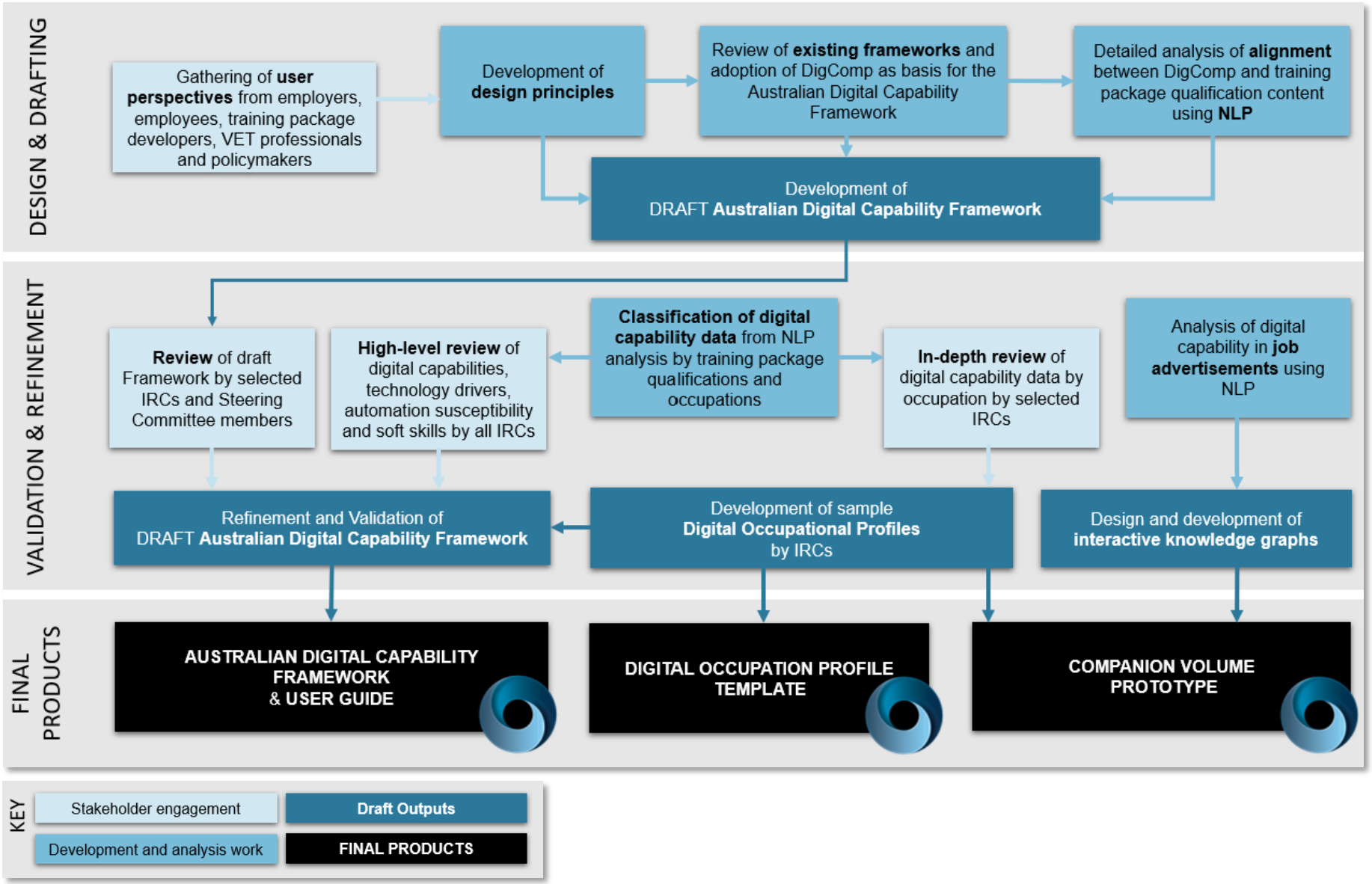
Figure 1 illustrates the main processes used to design, draft, validate and refine the Framework (shaded in mid and dark blue), as well as the key points of consultation and validation with stakeholders (shaded in light blue) and the major products developed by the project (shaded in black).

The project adopted a design thinking approach, whereby the needs and wants of likely users and beneficiaries of the Framework were identified and then used in combination with feasibility and viability considerations to inform development of the Framework and its related resources. Design thinking ensures that outputs and outcomes genuinely meet the needs of end users – in this case, Australia's VET sector and industry sectors.

In line with this design thinking approach, each component of the project was informed by extensive research, consultation and validation with key stakeholder groups. This included:

- Surveying and interviewing stakeholders from potential user groups, including employers, employees and students, training product developers, VET professionals and policymakers. The results informed development of a set of Design Principles that guided development of the scope, structure and functionality of the Framework
- Undertaking a review and comparative analysis of existing digital capability frameworks and taxonomies, their applicability to an Australian workplace context and alignment with the identified Design Principles. This was used to identify the foundation upon which the Framework would be developed
- Completing a sophisticated, multi-stage analysis of the European DigComp framework and the associated European Skills, Competences, Qualifications and Occupations (ESCO) taxonomy, using machine learning algorithms. This analysis identified alignment of DigComp's key digital competences with performance criteria from Australian training package qualifications, and confirmed the suitability of DigComp as the basis for a framework
- Development of a draft Framework, based upon the results of the analysis phase, which was validated through targeted consultation with five Industry Reference Committees (IRCs) and further refined in response to feedback from the project Steering Committee
- Validation of the Framework by the wider group of IRCs via a high-level review of the digital capabilities identified in training packages, as well as exploration of technology drivers and automation susceptibilities that underpin the need for digital capabilities
- Further testing of the validity and applications of the Framework by working with selected IRCs and with Steering Committee members to develop a Digital Occupational Profile template, sample Digital Occupational Profiles and a prototype online Companion Volume.

Figure 1: Key components of the Digital Capability for Workforce Skills Project



The project was guided by a Steering Committee comprised of representatives from different policy areas that have a connection with Vocational Education and Training. This included representatives of:

- Branches of the former Department of Education, Skills and Employment:
  - Industry Advice
  - Foundation Skills
  - Qualifications Reform
  - Skills Organisation
- Department of Prime Minister and Cabinet (PM&C)
- Jobs and Skills Australia (JSA) formerly National Skills Commission (NSC)
- Australian Public Service Commission (APSC)
- Digital Skills Organisation (DSO)
- Training.gov.au (TGA).

The Steering Committee provided strategic guidance, facilitated engagement with key stakeholders and reviewed the key project outputs. They also provided advice to ensure the structure and content of the Framework was consistent with related projects underway in other areas of government. This maximised opportunities for alignment between the Framework and other national initiatives.

Next steps for success and evolution

To capitalise on the significant collaboration, agreement and outcomes achieved through this initiative and to maximise the use of the new products and processes generated by the project, the following steps for success for adoption and evolution are:

1. SUPPORT ADOPTION AND USE OF THE FRAMEWORK AND ASSOCIATED TOOLS

The Framework's industry-neutral common language for identifying digital capabilities for occupations, as well as more broadly an individual's digital capability, provides opportunity for unification and coherence across the nation's population, and by doing so, systematically lifting productivity right across the economy and uplifting societal engagement.

The generic nature of the Framework supports alignment with other existing frameworks and can be used under the Industry Cluster arrangements to inform training product design and support a systematic approach to identifying skills supply and demand. The following activities can be considered to support the adoption of the Framework:

a. **Conducting a review of training products and pathways through the lens of digital transformation -** Industries undertake a review once the Industry Clusters are established. VET professionals and other users could also review accredited courses and community programs against the Framework.
b. **Adopting the Digital Occupational Profile template** - this template developed from the Framework provides the basis for adoption of a common language to describe digital skills across all industry sectors, which could assist with transferability of skills and job mobility into the future. Its adoption by Industry Clusters and others could also provide a common and simple mechanism for highlighting digital skills required for occupations (as opposed to needing to read and interpret large amounts of training package content) and provide a structured source of intelligence for training product development. The template could also be adapted to suit societal contexts.

c. **Adopting the Prototype Companion Volume** - there is widespread agreement that digital capabilities need to be more explicitly addressed by training, but this is dependent on the clear identification of necessary digital capabilities and skills in training package products and the up-to-date knowledge and understanding of trainers and training organisations to interpret and train for them. Through consultation with industry, digital skills should be detailed and made explicit where possible and appropriate in training packages, in instances where digital skills are implicit then the Companion Volume Implementation Guide (CVIG) can capture the detail on the digital skills. The Prototype developed by the project could be adopted by Industry Clusters as a means of better supporting the development of digital capability through the training packages they will be responsible for developing and implementing. The Prototype has also demonstrated the value of utilising NLP to support forward development of training products. This extends beyond identifying digital capabilities to identifying industry trends. There is also significant potential to adapt and apply the NLP and validation processes developed and used through this project to other endeavours to support training and development, including to the identification and development of 'soft skills', which are essential companions to digital capabilities.

d. **Adapting the self-assessment tool aligned to DigComp 2.1**[11] to align with the Framework. This could be promoted to individuals as a quick and easy way of assessing their current digital capabilities and identifying where further development might be needed. In doing so, it can raise awareness of the Framework and understanding of digital capability amongst the broader population.

2. ADOPT AND IMPLEMENT THE MAINTENANCE ACTIVITIES HIGHLIGHTED IN THIS REPORT

The continuing process of digital transformation is a given. If the Framework and other tools are to continue to support development of the necessary digital capability across the workforce into the future, then they will need to be maintained – and maintained with the same level of rigour used to develop them. Details of what is required to maintain the suite of tools can be found in the section on Maintenance of the Framework and related components.

[11] See https://digital-skills-jobs.europa.eu/en/inspiration/resources/test-your-digital-skills-tool

3. DEVELOP AND FUND A PROMOTION AND AWARENESS STRATEGY FOR THE AUSTRALIAN DIGITAL CAPABILITY FRAMEWORK (ADCF)

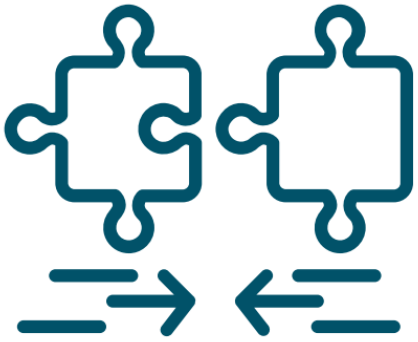
The Framework's intrinsic potential to unite and amplify efforts to build Australia's digital capability will only be realised if people know about and understand the Framework and its applications. A strategic approach is needed to build awareness and understanding of the Framework amongst potential users, including employers and industry bodies, employees, job seekers and students, VET providers and professionals, schools and higher education institutions, career development and employment services, training product developers and VET-related policymakers at both the national and jurisdictional levels.

To avoid duplication and fragmentation of effort across the nation, awareness and understanding also needs to be built amongst non-VET-related government departments and agencies involved in employment, workforce development and digital transformation.

Activities incorporated into an implementation strategy would include:

a. **Conducting a series of workshops and webinars** for various potential user groups across the country
b. **Conducting presentations on the Framework and its applications** to policy and decision-makers from relevant government departments and agencies outside of the VET system
c. **Establishing communities of practice,** or similar, that can champion the Framework, explore its applications and provide feedback as part of the ongoing maintenance of the suite of digital capability tools
d. **Developing a communication pack** that provides a simple overview of the Framework and its benefits (see Attachment D for example) and can be disseminated widely
e. **Developing further exemplars and case studies** that illustrate how the Framework and supporting tools can be used by a range of user groups, including workers, employers, training product developers and VET professionals

4. EXPLORE FURTHER APPLICATIONS AND EXTENSIONS OF THE AUSTRALIAN DIGITAL CAPABILITY FRAMEWORK (ADCF)



One of the unanticipated outcomes of this project is the recognition that the Framework and supporting resources that have been developed are just the starting point for building Australia's digital capability. The potential for further applications of the Framework and the processes used to develop it, is extensive. The alignment of the Framework with DigComp 2.1 and its complementarity with other existing frameworks and taxonomies, provide the basis for exploring and adapting a range of other existing resources to support development of digital capability. This includes the DigCompEdu, DigCompOrg and Transformational Thinking frameworks described in the Extensions of the Framework section of this report, and the potential adoption of the ADCF as the basis for describing digital literacy under the revised AQF architecture.

Overview of the Australian Digital Capability Framework

Key points

- The Framework describes generic digital capabilities required across the Australian workforce
- It is based on the European DigComp framework
- It provides a common language for describing, identifying and developing digital capabilities across industries and education and training sectors
- The Framework comprises five digital focus areas and descriptors, 21 digital capabilities and descriptors, and four proficiency levels, each with two subset levels describing examples related to complexity of tasks/problems and level of autonomy.

The Framework describes generic digital capabilities required in occupations related to Australian VET qualifications. The Framework provides a common language that can be used by employers, employees and students, training product developers, VET professionals and policymakers to describe these generic digital skills, to identify where they are needed in different occupations (and the associated VET qualifications) and where there are commonalities across occupations.

Digital Capability is the potential ability to perform a broad set of tasks related to digital technology.

This can be broken down into particular types of **digital capabilities** needed for a broad set of tasks (e.g., search, browse and filter information) and then into **digital skills**, used for specific tasks (e.g., Use enterprise planning software to reconcile stock/deliveries/outgoings against data and records).

The Framework has been designed to complement other Australian frameworks and taxonomies in both its language and structure (see details in the section Applications of the Framework). This design, together with the generic descriptions of digital capabilities, enables the Framework to be applied across different industries, and to align and reduce duplication of efforts to build digital capability across different education, training and workplace contexts.

In addition, the Framework is intended as a 'living resource' that will continue to evolve in line with the evolution of digital technology into the future. The supporting resources will assist with this process of evolution. For example, Online Companion Volumes will provide a means of gathering up-to-date intelligence on new and emerging digital technologies and skills in demand, while Digital Occupational Profiles will highlight the changing digital requirements of occupations. Together, these resources will help to speed up the process of identifying and responding to digital skill needs and support the development of digital capability across the Australian workforce. The Framework has been adapted and modified from the European Commission's Digital Competence Framework for Citizens Version 2.1 (DigComp 2.1) to reflect the Australian workplace context (see discussion in the section, Development of the Framework).

The Framework is comprised of:

- Five digital focus areas and descriptors
- 21 digital capabilities and descriptors
- Four proficiency levels, each with two subset levels and descriptors that act as a guide for determining a person's proficiency level. These are related to complexity of tasks/problems and level of autonomy.

Figure 2 provides an overview of the Framework's focus areas and digital capabilities.

Figure 2: Overview of the Focus Areas and Digital Capabilities

The Framework contains four levels of proficiency – Foundation, Intermediate, Advanced and Specialised. Each of these levels contain two subsets related to the complexity of the tasks and/or problems in which the capability is being used, and the level of autonomy with which a person uses the capability (see Figure 3). The subset levels provide additional detail to assist with assessing and developing digital capabilities in a range of contexts for individual, workplace and educational purposes. The use of proficiency levels organised around autonomy and complexity is a feature common to all of the frameworks analysed during the project.

Figure 3: Overview of Proficiency Levels

Four Level	Eight Level			
Level of Proficiency			Complexity	Autonomy
A Foundation	1	Perform at a basic level with guidance	Simple tasks	With guidance
	2	Perform at a basic level with autonomy and some guidance	Simple tasks	Autonomously With some guidance
B Intermediate	3	Autonomously solve simple problems	Routine tasks Simple problems	Autonomously
	4	Autonomously solve intermediate problems	Routine tasks Intermediate problems	Autonomously
C Advanced	5	Autonomously solve advanced problems and guide others	Advanced tasks	Autonomously May guide others
	6	Autonomously solve complex problems and guide others	Advanced tasks Advanced problems	Autonomously May guide others
D Specialised	7	Autonomously solve highly complex problems and guide others	Complex tasks Complex problems	Contribute knowledge
	8	Perform highly specialised activity and guide others	Highly specialised tasks Highly complex problems	Contribute knowledge

For each of the subset levels under each digital capability, the Framework provides proficiency descriptors that illustrate what the capability might look like in practice (see Figure 4 for an example).

The proficiency descriptors have been designed to be applicable to multiple occupations and contexts and are described using action verbs - similar to the way that performance criteria in training package units of competency are written. However, the descriptors are intended only as guides and should be used with discretion by users of the Framework for assessment and capability development purposes.

The complete set of descriptors for focus areas, digital capabilities and proficiency levels can be found in the Framework included at Attachment A - Australian Digital Capability Framework.

Figure 4: Intermediate Proficiency Level examples for Focus Area 2 - Communication and Collaboration

Focus Area 2: Communication and Collaboration

Level of Proficiency			2.1 Digital communication	2.2 Digital sharing	2.3 Digital engagement	2.4 Digital collaboration	2.5 Digital conduct	2.6 Digital identity
Intermediate	3	Autonomously solve simple problems	• Perform specific, routine interactions using a selected digital communication platform • Perform specific, routine communication using the selected method from the platform	• Select and use a digital information platform for sharing of information • Select and use content referencing and attribution practices for sharing of information • Identify and use best practice for acting as an intermediary for sharing of information	• Identify and select a specific digital service to routinely participate in education, workplace or society • Routinely use a specific digital service for self-empowerment and engagement with education, workplace or society	• Select and use specific digital technologies to collaborate with others	• Identify and routinely engage in specific behaviour appropriate for digital audiences • Identify communication practices to routinely apply to specific digital audiences • Identify specific cultural, generational and societal differences to routinely consider for diverse digital audiences	• Identify routinely used or created digital identities • Identify routine ways to protect digital identity and reputation • Identify personal information routinely produced and stored in a digital environment
	4	Autonomously solve intermediate problems	• Select and use a variety of digital communication platforms • Select and use a variety of communication methods from the platforms	• Use multiple features of a digital information platform for routine sharing of information • Guide others in content referencing and attribution practices for routine sharing of information • Guide others to use best practice for acting as an intermediary for routine sharing of information	• Identify and select a specific digital service to routinely participate in education, workplace or society • Guide others to routinely use digital services for self-empowerment and engagement with education, workplace or society	• Select and use specific digital technologies to routinely collaborate with others	• Discuss appropriate behaviour while using digital technologies • Discuss appropriate communication practice for a specific digital audience • Discuss cultural, generational and societal differences that impact digital behaviour	• Identify routinely used or created digital identities • Discuss routine ways to protect digital identity and reputation • Manage personal information routinely produced and stored in a digital environment

Applications of the Framework

Key points

- The Framework complements a wide range of other frameworks and taxonomies, including the Digital Literacy Skills Framework, Skills Framework for the Information Age (SFIA), Australian Skills Classification, Australian Public Service Data Capability Framework, Core Skills for Work Developmental Framework, Australian Curriculum and the European DigComp framework
- The Framework has been designed for use by employers, employees, learners and job seekers, training product developers, VET professionals and policymakers
- Applications of the Framework are many and diverse, and include support for workforce development, skills assessments, career development, labour mobility, analysis of training package content and development of new training products and pathways, labour market analysis and benchmarking, as well as a potential reference point for the digital literacy skills to be included in the new Australian Qualifications Framework architecture.

Complementarity and alignment of the Framework

One of the significant features of the Framework is a structure that aligns with or complements a range of other Australian frameworks and taxonomies.

As illustrated in Figure 5, the structure supports movement between different frameworks related to the development of digital skills and capability:

- The **Foundation** level aligns with the skills and contexts addressed by the Digital Literacy Skills Framework, which is currently used in literacy-related programs
- The **Intermediate** and **Advanced** levels are applicable to most VET related contexts and qualifications
- The **Specialised** level relates to complex situations and complex problem solving, which are most likely to occur in specialised digital technology related occupations. At this level users may transition to using more specialised frameworks, such as Skills Framework for the Information Age (SFIA).

The Framework aligns with the Australian Skills Classification (ASC) – a taxonomy developed by the former National Skills Commission, which sets out the key core competencies, specialist tasks and technology tools required for more than 1,000 occupations in Australia.

The ASC identifies ten core competencies common to every occupation in Australia and uses a 10-point scale to describe the complexity of the core competency. For each core competency, the points on the scale have corresponding descriptions that illustrate what this might look like in practice. However, these descriptors are generic and not related to specific occupations.

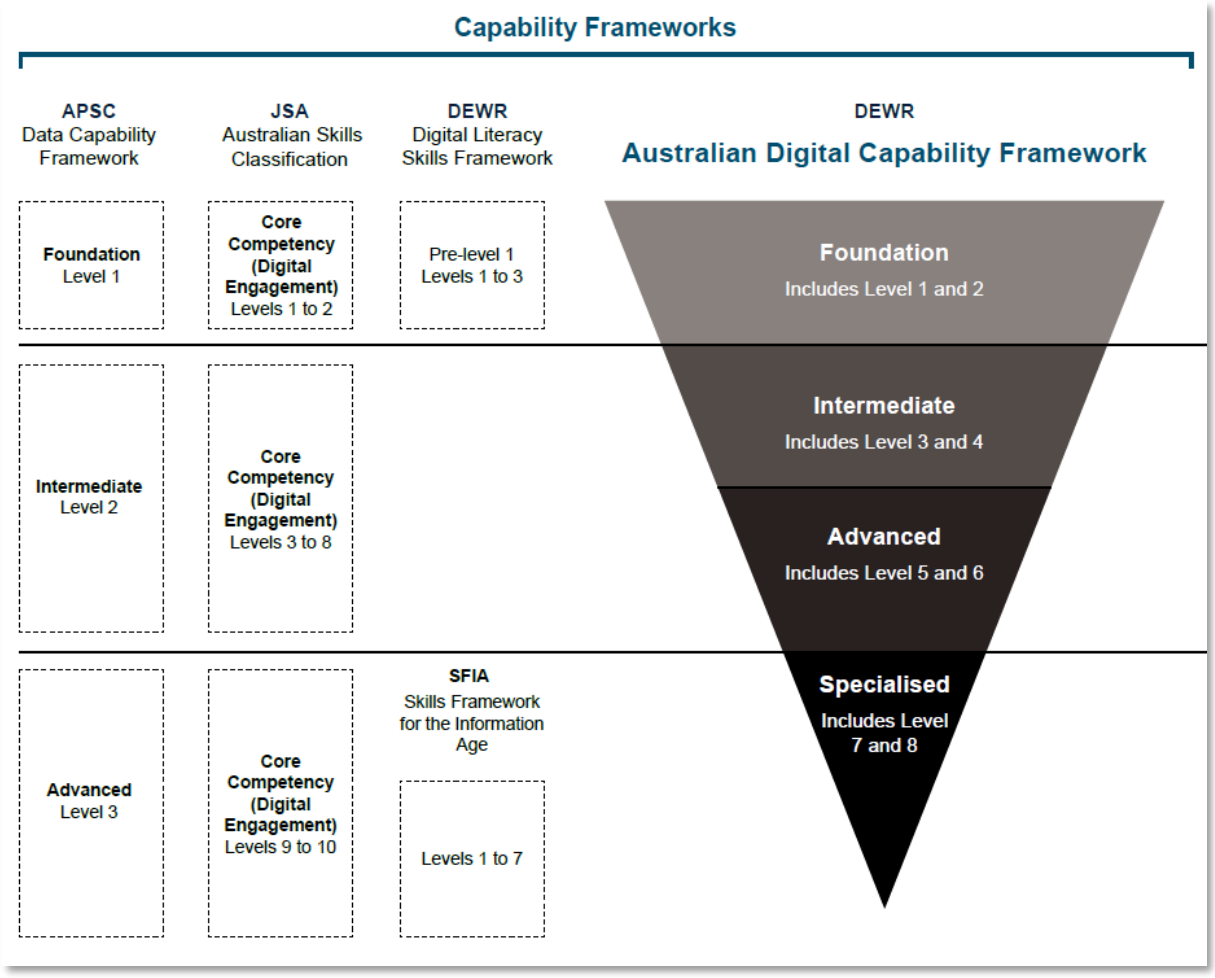
The Framework aligns to many areas of the core competencies within the ASC but has particular alignment with the core competency of 'digital engagement' and its corresponding ten levels.

As illustrated in Figure 5, the ten levels of 'digital engagement' can be aligned with the proficiency levels of the Framework.

The Australian Public Service (APS) Data Capability Framework is a beta version of a framework for defining the data specific knowledge, skills and behaviours required when working with data in the APS that spans across three proficiency levels. As illustrated in Figure 5 these three levels can be aligned with the proficiency levels of the Digital Capability Framework.

Application of the Framework's alignment to the DSO's draft digital skill model was assessed by the Steering Group and it was found that the levels generally relate to the four proficiency levels with the specialist ICT skills at the higher end of the framework.

Figure 5: Alignment of the Australian Digital Capability Framework



The Framework also complements other frameworks and concepts that have been developed or are in use in Australia, including the Core Skills for Work Developmental Framework used in VET and the Australian Curriculum used in schools (Figure 6).

The Framework would also lend itself to being applied to the revised Australian Qualifications Framework (AQF), providing a basis against which to reference the digital literacy skills that are proposed for inclusion in the revised architecture.

The alignment of the Framework with the European DigComp also opens up possibilities for accessing and adapting a range tools and resources developed from DigComp, such as the **European Framework for the Digital Competence of Educators (DigCompEdu)**[12] and the **European Framework for Digitally-Competent Educational Organisations (DigCompOrg)**[13] (see further discussions in the section on Extensions of the Digital Capability Framework). The alignment will also enable ongoing benchmarking of the Framework against DigComp as both frameworks evolve over time.

[12] https://op.europa.eu/en/publication-detail/-/publication/fcc33b68-d581-11e7-a5b9-01aa75ed71a1/language-en
[13] https://joint-research-centre.ec.europa.eu/european-framework-digitally-competent-educational-organisations-digcomporg_en

Figure 6: Complementarity of the Digital Capability Framework with other frameworks and concepts

		COMPLEMENTARITY WITH OTHER FRAMEWORKS AND CONCEPTS						
DIGITAL CAPABILITY FRAMEWORK		**European Digital Competence Framework 2.1 (DigComp)**	**Digital Literacy Skills Framework**	**Core Skills for Work Developmental Framework**	**The Modern Worker: A guide to what employers want (BCA)**	**Australian Workforce Digital Skills Framework (NCVER report)**	**Australian Curriculum**	**Digital Dexterity Framework (Council of Aus. University Librarians)**
FOCUS AREAS	**1 INFORMATION & DATA LITERACY**	Information and data literacy	Access, organise, present and problem solve	Access, organise, and present information	Digital information and analysis	Digital ways of working	Investigating with ICT element	Information, media & data literacy
	2 COMMUNICATION & COLLABORATION	Communication and collaboration	Connect, communicate and collaborate	Connect with others	Digital communication	Digital ways of working	Communicating with ICT element	Collaboration, communication and participation
	3 DIGITAL CONTENT CREATION	Digital content creation			Digital innovation and creation	Digital ways of thinking	Creating with ICT element	Digital creation, problem solving and innovation
	4 PROTECTION & SAFETY	Safety	Digital identity and safety	Manage risk	Digital identity and development	Living in the digital age	Applying social and ethical protocols and practices when using ICT element	Digital identity and wellbeing
	5 TECHNICAL PROFICIENCY & PROBLEM SOLVING	Problem solving	Digital technologies and systems	Use digitally based technologies and systems	Digital operation	Digital tools for working	Managing and operating ICT element	ICT proficiency and productivity Digital learning and development

Uses of the Framework

The Framework provides a structure and language that can unite a wide variety of users in their efforts towards building the digital capability of the Australian workforce.

It's simple and intuitive structure utilises many features that will be familiar to VET professionals and training product developers, such as the use of focus areas and proficiency levels (similar to those used in the Australian Core Skills Framework) and proficiency level descriptors that are structured in a similar way to performance criteria in a unit of competency.

The high-level descriptors of digital capabilities support meta-level analysis and comparison of capabilities required across the Australian labour market, while the detailed proficiency level descriptors enable individual assessment of digital skills for learning and workforce development purposes.

The Framework's sector-neutral language and use of straightforward descriptors derived from Australian work contexts ensure its relevance to users in both workplace, education and training contexts. It also provides a common language to translate differing approaches to development of digital skills and capabilities across different sectors (such as between schools and VET, and between VET and higher education). This will help to support the creation of more seamless pathways between education and training sectors (a long-standing policy aspiration of the Australian Government).

Figure 7 describes some of the many applications of the Framework available to different user groups.

Figure 7: Examples of application of the Digital Capability Framework

User group	Potential applications
Employers 	• Information that can guide workforce development activities, including upskilling of existing workers • Skills assessments that can help to identify existing capabilities and capability gaps across the workforce or for individual employees • A focus on capabilities, rather than specific pieces of technology, which can be used in job advertisements to attract a wider pool of potential candidates • Guidance on emerging digital technology trends and their likely impact on workforce capability • A common language to use when talking to employees and training providers
Employees, Learners and Job Seekers 	• A basis for skills assessments (including self-assessments) that can help individuals to identify the capabilities they possess and those they may need to develop • Information that supports career development in terms of: ▪ understanding digital capabilities required for particular occupations and for career progression ▪ identifying possible career pathways supported by digital capabilities that are transferrable across occupations

User group	Potential applications
Training Product Developers 	• A common language to use when talking to employers and training providers • Analysis of existing training package content to identify digital skills and possible gaps • Identification of emerging digital technology trends and their likely impact on skills demand, skills availability and skill proficiency levels • Identification of existing upskilling and reskilling pathways • Identification of the need and opportunity for new upskilling and reskilling pathways • Identification of the need and opportunity for new training products, including qualifications, skill sets and units of competency • Identification of digital capabilities that are common to occupations, which can support labour mobility • A common language to use when consulting with employers and training providers on training needs
VET professionals 	• Detailed information that makes the digital capabilities embedded in training products more explicit • Up-to-date information on digital technology and its application, which supports current and consistent delivery of training against training product Performance Criteria • The basis for developing and implementing skills assessments
Policy Makers 	• Labour market analysis, to identify trends and patterns and assist with workforce development initiatives • Identification of digital capabilities and capability gaps within the workforce • Identification of common capabilities between industries and occupations, to assist with labour mobility • Benchmarking of required digital capabilities across geographic regions and industry sectors, to assist in identifying whether educational offerings are aligned with national or global standards and inform training investment decisions • A common language to use across government departments and agencies, to assist with maximising the impact of initiatives to build Australia's digital capability.

The Framework and its associated resources will be valuable tools for the soon-to-be established **Industry Clusters**. Industry Clusters will take over responsibility for training package development from the current Industry Reference Committees. However, the Framework will assist not only with the development of training products, but with all four core functions of these new bodies. For example:

1. **Workforce Planning** – the Framework and proposed Companion Volumes can assist with identifying digital technology and digital skills patterns and trends across the workforce to inform workforce development initiatives
2. **Training Product Development** – the Framework, in combination with NLP analysis, can help to identify existing digital skills, digital skill gaps, and the need for new training products and pathways
3. **Implementation, Promotion and Monitoring** – the Framework and Digital Occupational Profiles can assist with identification and promotion of career pathways, while the proposed Companion Volumes can be used to support training providers in terms of currency and consistency of training delivery
4. **Industry Stewardship** – the Framework provides a common language for discussing digital capability trends and needs with stakeholders, while the proposed Companion Volumes provide a vehicle for consolidating industry intelligence on digital technology and digital skill trends and issues.

Digital Occupational Profiles

Key points

- The project developed a Digital Occupational Profile template, which can be used by industry to identify which of the capabilities from the Framework are needed for specific occupations, and at what level they are needed
- The profiles also describe occupation-specific skills related to the required capabilities and provide other occupation-specific information related to digital technology and equipment, the labour market and training opportunities.

One of the valuable uses of the Framework is the development of Digital Occupational Profiles, which essentially translate the Framework's generic digital capabilities into occupation-specific information.

Drawing upon European examples related to DigComp, the project developed a template for a Digital Occupational Profile suitable for the Australian context.

The Digital Occupational Profile has been designed to document the knowledge, skills and proficiency levels that an individual will need to adequately perform tasks requiring digital capability in a particular occupation.

The Digital Occupational Profile template includes:

- Links to labour market information and training opportunities relevant to the occupation
- Details of digital equipment used in the occupation and information about emerging digital technology and related skills
- A description of key tasks of the occupation, including both digital and non-digital tasks
- Description of the digital skills required for the occupation, mapped to the digital capabilities and proficiency levels of the Framework.

Digital Occupational Profiles categorise each of the identified digital capabilities into one of three categories of usage:

- **Essential digital capabilities** - which are essential and specific to the occupation described in the profile
- **Transferrable digital capabilities** - which are essential to the occupation described in the profile, but may also be used across multiple occupations
- **Complementary digital capabilities** - which are useful and improve job performance but are not strictly necessary.

The Digital Occupational Profile template was tested with five selected Industry Reference Committees (IRCs), each using the template to review the digital capabilities required for a single occupation within their industry and completing an example profile for the occupation. This resulted in further refinements of the template.

The development of the example profiles was used not only to pilot the template, but also as another means of validating the Framework. Later in the project, another four IRCs developed Digital Occupational Profiles as part of the validation phase.

The Digital Occupational Profiles can be used as the basis for development of assessment tools, or to support training needs analysis and development of training and professional development plans.

They also offer significant potential to support the new Industry Clusters in their workforce planning and workforce development functions, outside of the confines of training package policy which can constrict the ways in which existing, new and emerging digital capabilities are identified and described.

A selection of **sample Digital Occupational Profiles** for different occupations are included at Attachment B.

Prototype Companion Volume

Key points

- To help trainers and training organisations to keep up to date with digital technology and the applications of this technology in the industries and occupations they are delivering training for, the project has developed a Prototype Companion Volume (Prototype)
- The Prototype has been designed as a 'live', online document that supports the development of digital skills and capabilities under each training package. It provides information about the digital capabilities delivered by qualifications related to particular occupations, the digital skills commonly requested in job advertisements for those occupations and information about digital technology and skill trends affecting the industry
- The Prototype also contains a knowledge sharing component that will allow users to provide feedback on any additional digital capabilities and skills required for particular occupations. This will assist with keeping the information up to date.

The need for 'live' resources to support the Framework

One of the issues highlighted in the *Digital Transformation Skill Strategy*[14], was the need for VET training products to stay up to date with rapidly evolving technology, but without creating a need for equally rapid and frequent updating of qualifications and units of competency.

Under current training package design processes, digital skills are typically embedded in units of competency using broad terminology that can be applied to a range of relevant technologies, a range of workplace contexts, and in some cases, different industry contexts. This same principle underpins the Framework in terms of its broad and sector-neutral descriptions of digital capabilities. Neither training packages, nor the Framework, refer to specific digital technologies.

This approach places the responsibility for keeping up to date with new and emerging digital technology and applications of that technology, on the shoulders of trainers and training organisations.

The Expert Panel recognised the need to support RTOs (Registered Training Organisation) and VET professionals in this task, to ensure currency and consistency of their interpretation of unit of

[14] Digital Transformation Expert Panel (2021) *The Learning Country: Digital Transformation Skill Strategy*. Australian Industry Standards, Melbourne

competency requirements, and in turn, the currency and consistency of skills of the workers they train. They recommended that this support be provided in the form of 'live' Companion Volumes.

> *"Stakeholders involved in the Expert Panel consultation processes were supportive of the idea of 'live' resources that are regularly updated and include the detail of how relevant technologies are applied in the industry domain. Training Package Companion Volumes are ideally suited to this purpose. This could help relieve pressure from the 'endorsed' components of Training Packages and at the same time, help VET practitioners keep up to date with the technologies relevant to their industry area."*[15]

Every VET training package includes a Companion Volume, which provides guidance to RTOs and VET professionals on how to deliver and assess training related to that training package. Unlike the qualification and units of competency contained in the training package, which need to go through an extensive process of consultation and endorsement to be changed, Companion Volumes can be updated relatively easily and are an established part of the training system architecture.

The Prototype Companion Volume

The Digital Capability for Workforce Skills project has designed a Prototype for a Companion Volume that can be kept up to date with digital technology as it emerges and changes the way that work is done. The Prototype has been designed to:

- Provide a 'living' document that contains kept up-to-date guidance on technology and skills trends
- Link technology and skills trends to the broad capabilities described in the Framework and the specific occupations and qualifications covered by each training package
- Provide a vehicle for crowd sourcing feedback from users of the Companion Volume regarding specific skills and proficiency levels required by workers in particular occupations.

The Prototype includes:

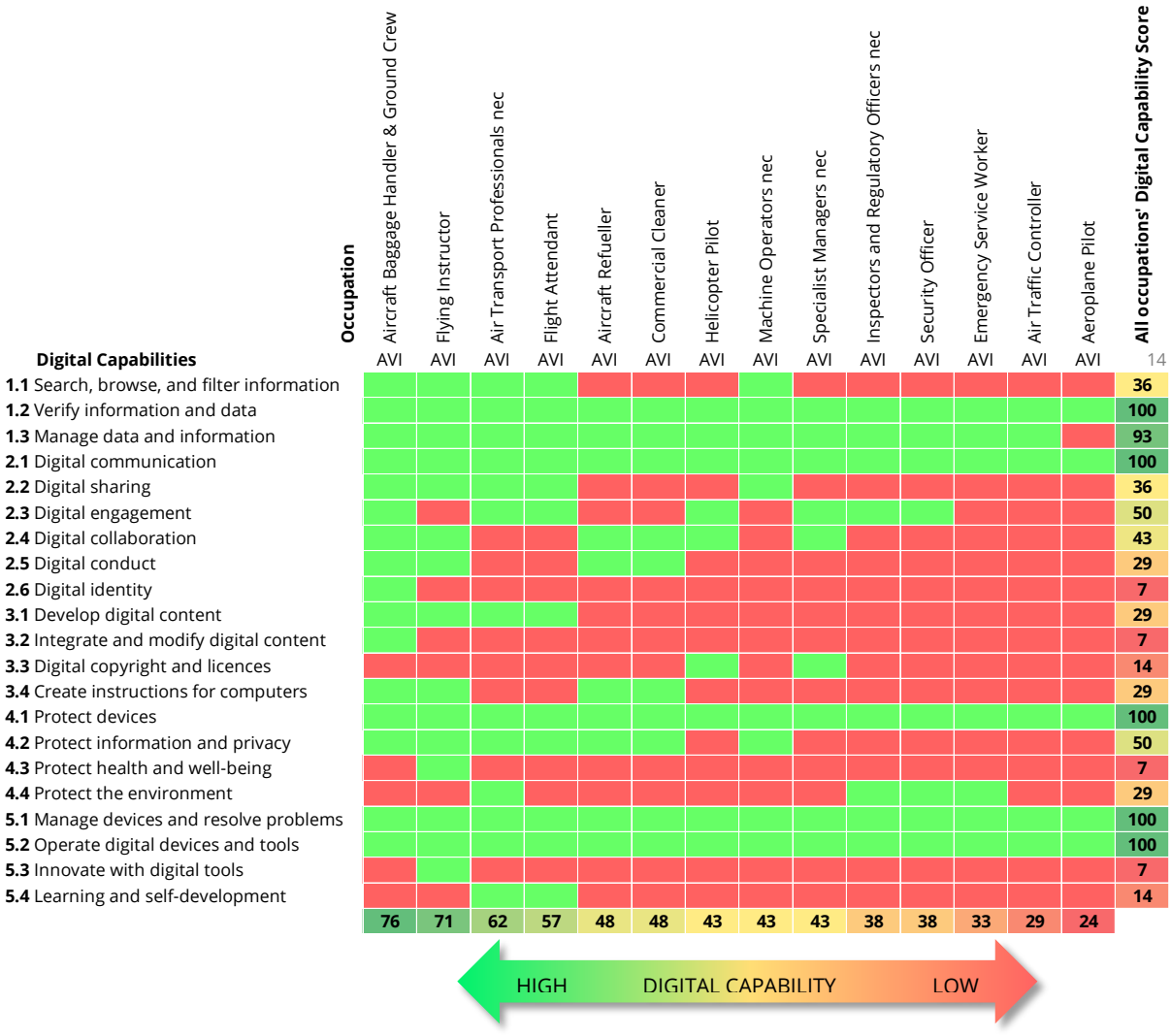
- An **overview of the Australian Digital Capability Framework**
- A high-level, visual representation of **digital capabilities delivered by qualifications** in the particular training package (Figure 8). This is derived from NLP analysis of training package content (see discussion in the section Development of the Framework)
- A **Knowledge Graph**, which allows users to select an occupation, see what digital capabilities are currently included in the qualifications for that occupation and explore the digital skills most commonly identified in job advertisements for the occupation (Figure 9)
- **Insight into technology and skill trends** affecting the delivery of products and services in the relevant industry. This is drawn from analysis of relevant scientific literature

[15] Digital Transformation Expert Panel (2021) *The Learning Country: Digital Transformation Skill Strategy*. Australian Industry Standards, Melbourne p71

(identified via the ProQuest database) and analysis of online job advertisements (identified from a national dataset of online job ads provided by Adzuna Australia), to identify demand for specific technologies and associated skills over time

- **Digital Occupational Profiles** for each occupation (see discussion in the section on Digital Occupational Profiles)
- a **Knowledge Sharing** component that supplements the findings of the NLP analysis by enabling users to suggest additional digital capabilities and skills required by workers for a particular occupation and to provide feedback on the level of proficiency required.

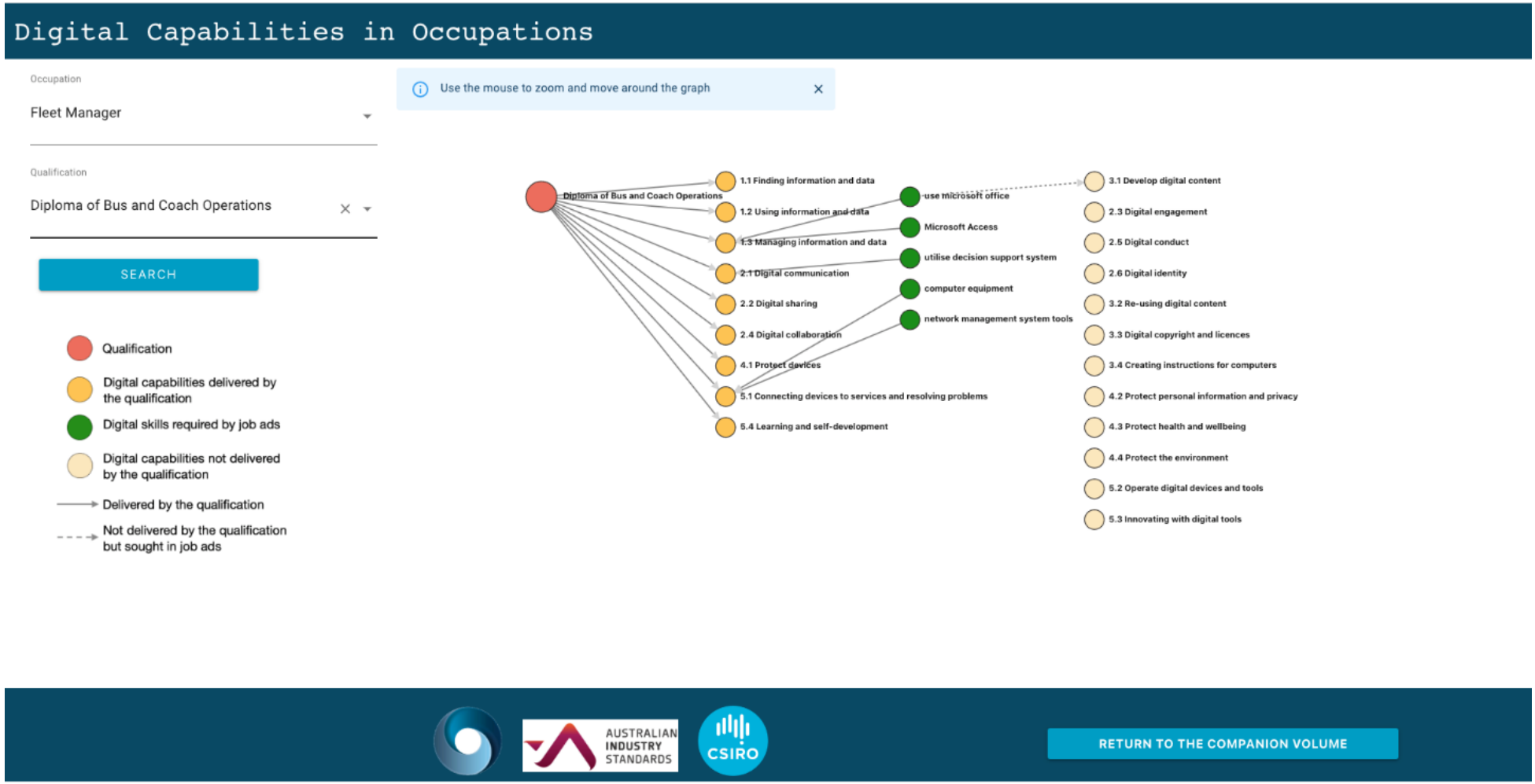
Figure 8: Example of a digital capability summary for the Aviation (AVI) training package



The Prototype presents the relevant information in the form of an interactive, online resource. For example, the **Knowledge Graph** component allows users to search by occupation and identify the relevant qualification(s) for that occupation, the digital capabilities covered by that qualification, the digital skills being sought in job advertisements for the occupation and any skills that are being sought in job ads, but not covered by the qualification (see illustration in Figure 9).

The Knowledge Sharing component enables users to directly submit suggestions for additional digital capabilities and skills to the developers of the relevant training package. The training package developers can review these suggestions and then update the Companion Volume if ratified.

Figure 9: Representation of searchable 'Knowledge Graphs'



Further consultation with VET stakeholders will be needed to validate the usefulness and feasibility of the Prototype. If adopted, changes will also need to be made to the template for Companion Volumes that forms part of the current *Standards for Training Packages*. The highlighted sections in Figure 10 suggest additional content to be included.

Figure 10: Proposed changes to the Policy Template from the Standards for Training Packages

COMPANION VOLUME FOR *[insert Training Package Code and Title]* *MANDATORY FIELD*

OVERVIEW INFORMATION
MANDATORY FIELD

- Version control and modification history
- List of AQF qualifications, Skill Sets and units of competency in the Training Package
- Unit mapping information, including equivalence table linking old to new units of competency
- Qualification mapping information, including equivalence table linking old to new qualification
- List of imported and prerequisite units in the Training Package
- Key work and training requirements in the industry
- Regulation and licensing implications for implementation

IMPLEMENTATION INFORMATION
MANDATORY FIELD

- Information on the key features of the Training Package and the industry that will impact on the selection of training pathways.
- **Digital Skills including:**
  - **Link to the Australian Digital Capability Framework**
  - **Identifying digital capabilities delivered by qualifications**
  - **Digital Occupational Profiles (DOPs)**
  - **Feedback tool**
- Industry sectors and occupational outcomes of qualifications **including:**
  - **Link to Digital Capability Knowledge Graph**
- Explanation of any mandatory entry requirements for qualifications
- Pathways advice, particularly in line with requirements of the AQF Pathways Policy
- Access and equity considerations
- Foundation Skills
- Advice on any health and safety implications in the industry
- Resource and equipment lists relevant to the Training Package
- **Technology Trends**
- Legal considerations for learners in the workplace/on placements
- Other information relevant to implementation of the Training Package

LINKS
OPTIONAL FIELD

Resources supporting the companion volume implementation guide.

- Other companion volumes as required including:
  - Learning strategies guidance, describing the diversity of learners and learning strategies
  - Knowledge guidance, identifying contextual information such as knowledge requirements and resources
  - Assessment strategies, providing guidance on implementation of assessment requirements
- Training Package developer's quality assurance process for companion volumes

Companion Volumes would also need to be updated on a regular basis. Table 1 below outlines what would be involved in incorporating the prototype components into current Companion Volumes for each training package and maintaining the currency of information for each component.

Not all sections of the Prototype need be incorporated into every Companion Volume. Given the level of effort required to implement and tailor some of the prototype components for different training packages, some flexibility in implementation of the Prototype would be beneficial.

Table 1: Implementation and maintenance requirements for the components of the Prototype

Components		Implementation Requirements for each Component		
Section	*Description*	*Companion Volume Developer*	*Maintenance*	*Level of difficulty*
Australian Digital Capability Framework (ADCF)	The Framework is a tool to improve and identify generic digital capability requirements in different occupations	Inclusion of the ADCF via a direct link to the framework or by incorporating key information into the Companion Volume. This section should be included if any other sections of the Prototype are used as it provides important background information	Check links and content are current every six months	1 Low
Identifying digital capabilities delivered by qualifications	Identifies the digital capabilities delivered (by qualifications) to workers in each occupation covered by the training package	Figure X needs to be tailored for the training package.	Run checks on data sets	1 Low
Technology trends captured from scientific literature and job ads	To stay abreast of technology developments an analysis of scientific research should be undertaken, tailoring to each training package	Access to ProQuest (or other research database with broad coverage), the ability to differentiate subject tags relating to technologies (from subject tags that do not relate to technologies), and some data analysis capability is required to deliver this section	Update technology trends every 12 months	3 High
Knowledge Graph of the Australian VET sector	The interactive Knowledge Graph allows selection of an occupation and the digital capabilities delivered in related qualifications. It also shows the digital skills (reflecting the digital capability) that are mentioned in job ads for the occupation	Insert a direct link to the webpage where the Knowledge Graph of the Australian VET sector is hosted	Check links and content are current every six months	1 Low
Digital Occupational Profiles (DOPs)	DOPs allow users to analyse the digital capability and skills requirements for an occupation in more detail	Completed DOPs can be embedded into the Companion Volume or, if the Companion Volume is not offered online, they can be provided as hard copy attachments to the Companion Volume	Update DOPS with new content information	2 Medium
Knowledge sharing	The feedback tool works best when the DOPs are made available online	The feedback tool uses Microsoft Forms. The survey form will need to be updated to reflect changes in the ADCF. Microsoft Forms automatically connects back to a databank, with responses stored against the internal database to be accessed by the owner of the survey and can be forwarded for review	Moderate feedback and update DOPS when changes are approved	2 Medium

Development of the Framework

Key points

- Design of the Framework was informed by surveys of potential users and interviews with other stakeholders, the results of which were used to develop a set of design principles
- Based on these design principles and a review of existing digital frameworks, DigComp 2.1 was selected as the basis for developing a draft Framework
- A comprehensive and sophisticated process, using computer-based Natural Language Processing and expert human input, was used to analyse, modify and validate the DigComp framework to create a Framework that reflects the digital capability needs of Australian vocational-related occupations.

Creation of design principles

In accordance with the project's design thinking approach, the development of the Framework commenced with a survey of key user groups. A group of 28 potential users were selected from across employers, employees/students, training product developers (including Industry Reference Committee members), VET professionals and policymakers, with initial contact made by telephone before completion of the survey. Some respondents played multiple roles (e.g., policymaker and employer, or training product developer and employee) and therefore provided responses to the specific questions for more than one user group.

The survey provided potential users with a list of functions that the Framework might fulfil and asked them to rate each function as 'must have,' 'desirable', 'not required', or 'no opinion'. The survey also provided potential users with the opportunity to make further comments on what the Framework should enable or should look like.

The survey responses reflected the differing priorities of different user groups. For example:

- **Employers and Employees** were most interested in a framework that can help them to **identify the digital skills needed for recognised job roles in their industry** (with between 80% and 90% of each group rating this as a 'must have' and the remainder rating this as 'desirable'). The ability to **identify digital skills that are common between job roles** was also rated highly by both groups
- **Training Package Developers** were most interested in being able to use the framework for **mapping existing training products to identify missing or outdated digital skills** (rated as 'must have' by 80% of respondents and 'desirable' by the remainder)

- **VET Professionals** were most interested in using the framework to **create assessment tools to establish a learner's digital proficiency and identify gaps** (rated as 'must have' by 75% of this group and 'desirable' by the remainder).
- **Employees** were also very interested in being able to **self-assess their current digital skills capabilities and identify gaps** (with almost 80% rating it as 'must have' and the remainder as 'desirable).
- **Policymakers** were most interested in the framework being able to **leverage and complement other skills trends frameworks and taxonomies where appropriate** (with 85% rating this as a 'must have' and the remainder having 'no opinion').

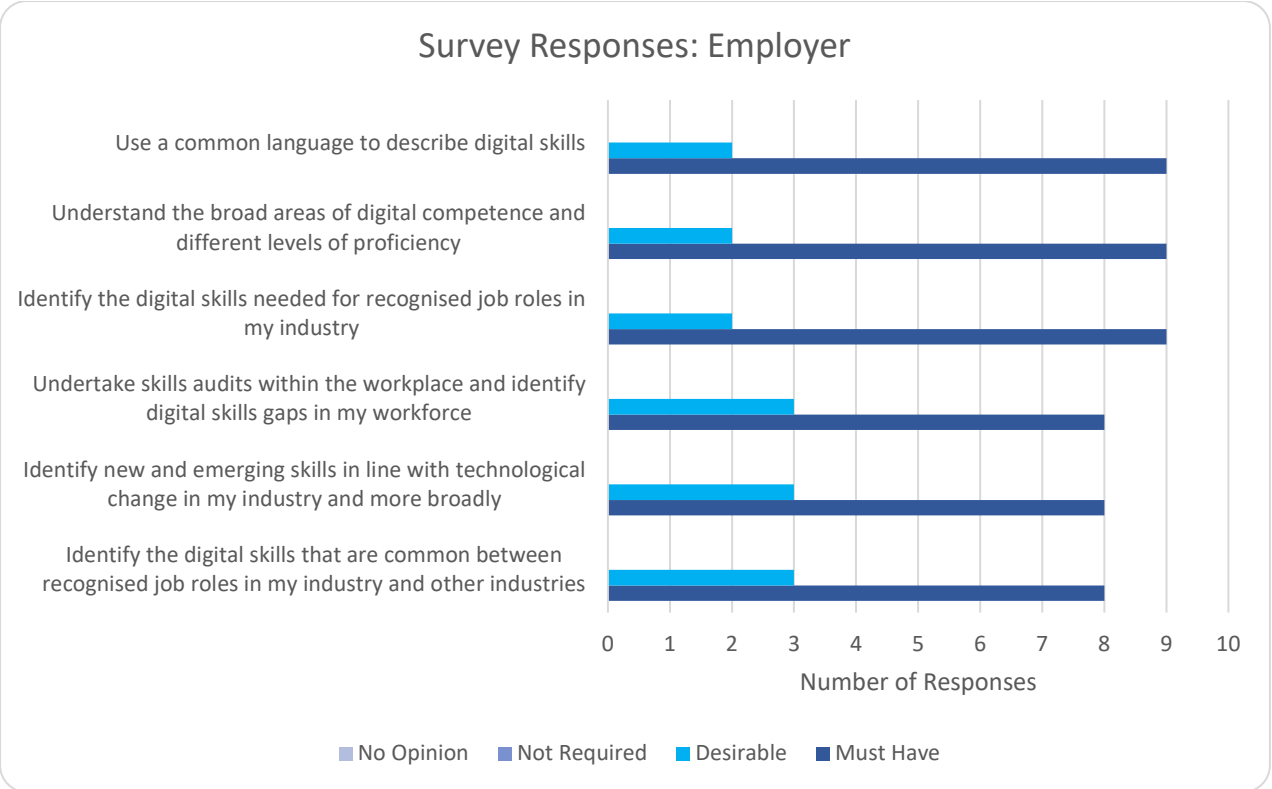
Across all user groups (except for employees/students, who were not given this function in their list), **having a common language to describe digital skills** was rated as very important (75-85% of each group rated this function as a 'must have').

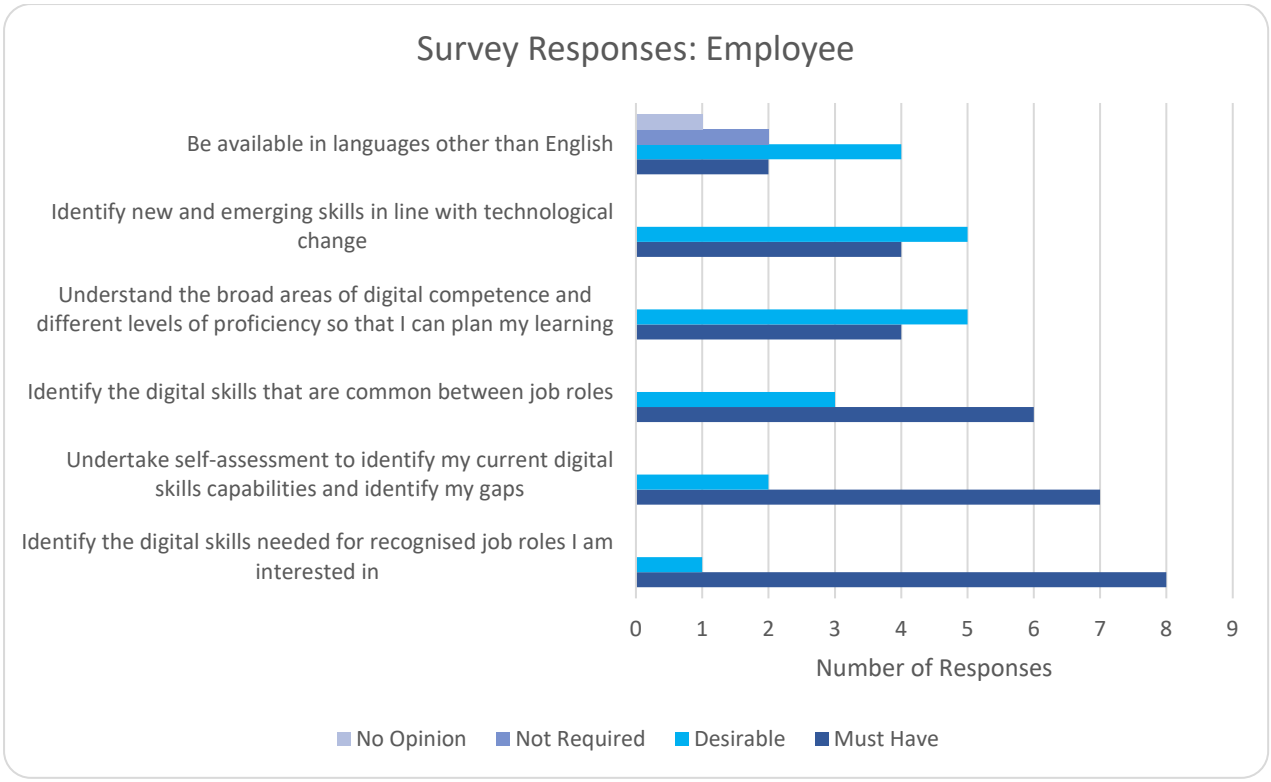
Comments in the free response questions further elaborated that the Framework should provide a clear and concise description of digital skills, be broad enough to support a wide variety of users, encompass a range of proficiency levels. Respondents also stressed that the Framework should complement, but not duplicate existing frameworks.

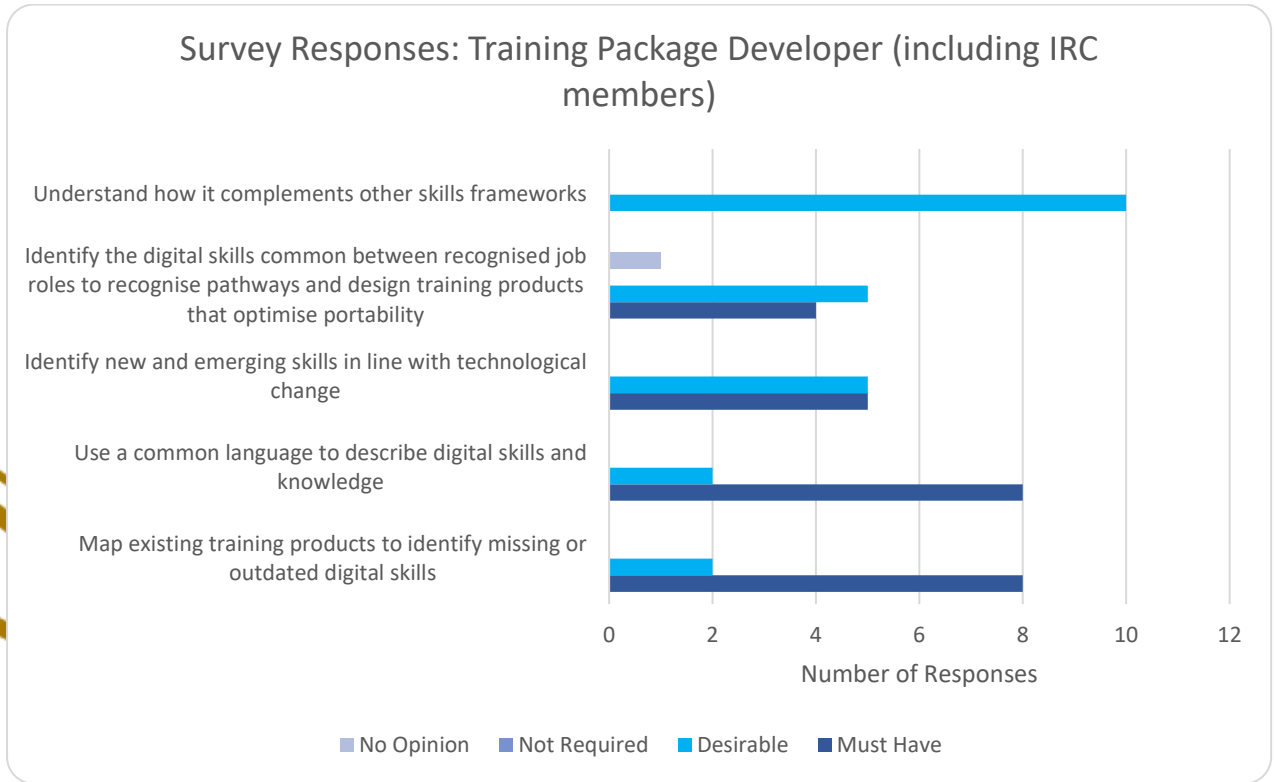
Additional survey comments highlighted the value of using the Framework to support lifelong learning, workforce planning and development, which implies the importance of the Framework remaining up to date.

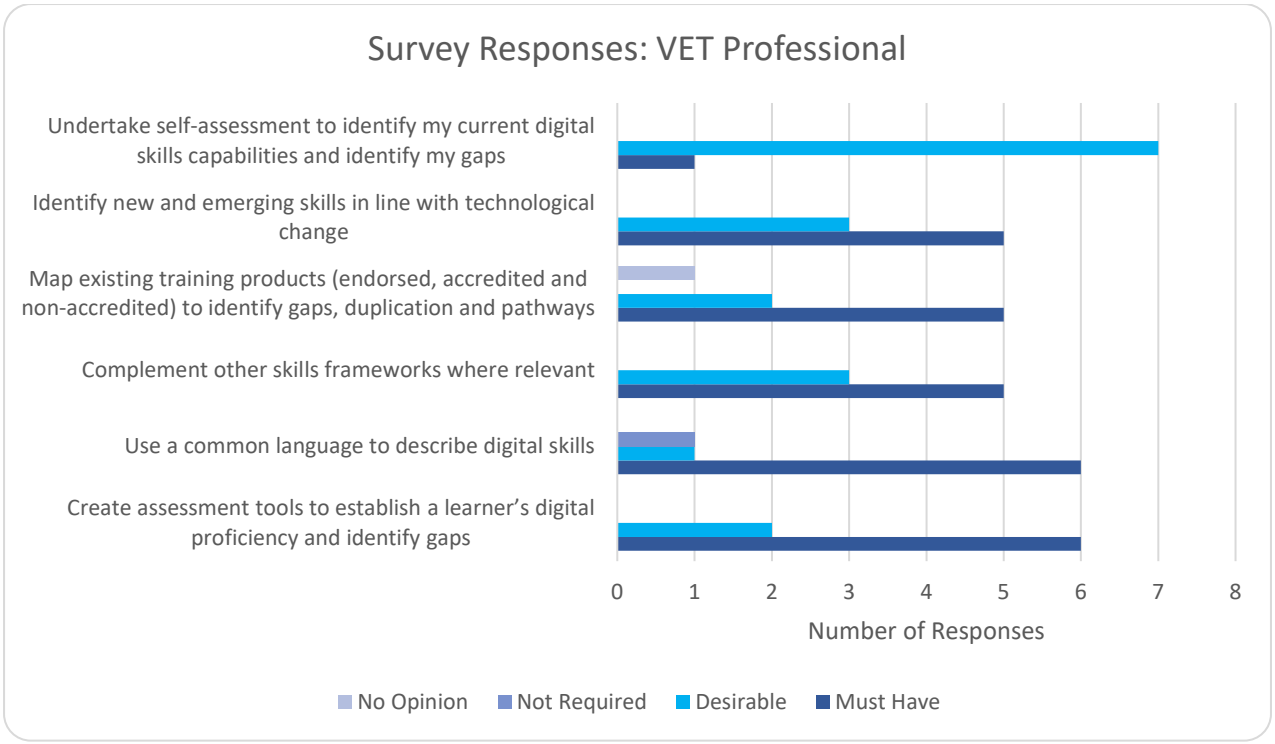
Figure 11 illustrates further the differences in responses across user groups.

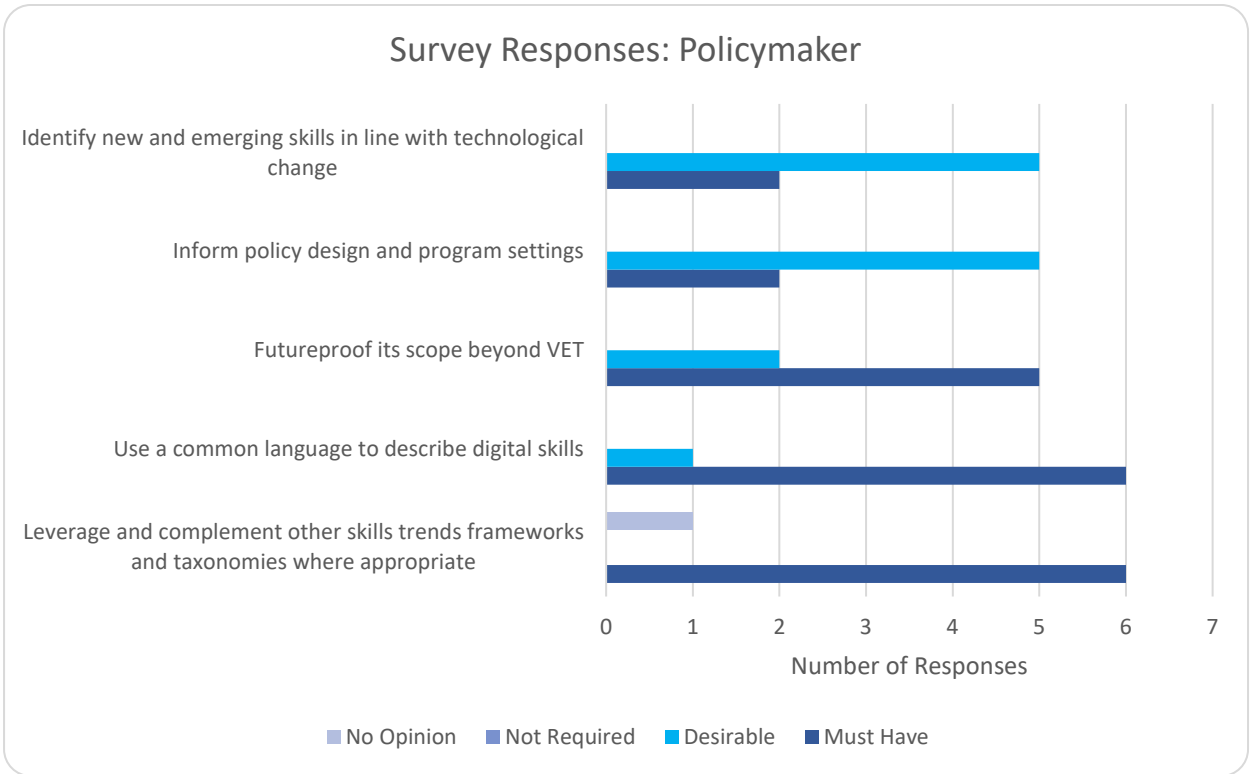
Figure 11: Survey responses from the five potential user groups




Survey Responses: Employee
Be available in languages other than English
Identify new and emerging skills in line with technological change
Understand the broad areas of digital competence and different levels of proficiency so that I can plan my learning
Identify the digital skills that are common between job roles
Undertake self-assessment to identify my current digital skills capabilities and identify my gaps
Identify the digital skills needed for recognised job roles I am interested in
0 1 2 3 4 5 6 7 8 9
Number of Responses
No Opinion
Not Required
Desirable
Must Have


Survey Responses: Training Package Developer (including IRC members)
Understand how it complements other skills frameworks
Identify the digital skills common between recognised job roles to recognise pathways and design training products that optimise portability
Identify new and emerging skills in line with technological change
Use a common language to describe digital skills and knowledge
Map existing training products to identify missing or outdated digital skills
0 2 4 6 8 10 12
Number of Responses
No Opinion
Not Required
Desirable
Must Have





To inform the Framework's design, further stakeholders with a particular interest in digital capability were interviewed. This included representatives of the Australian Digital Inclusion Alliance (ADIA), Tech Council of Australia, Australian Council of Trade Unions, University of Melbourne (in relation to the AQF reform), the Australian Government department managing the reform of www.training.gov.au and former members of the Digital Transformation Expert Panel.

Based on the interview and user survey findings, a set of design principles was established to guide the development of the Framework.

Design Principles

The Australian Digital Capability Framework should:

1. ***Provide a basis for identifying transferable (transversal) digital skills, portable across the Australian workforce represented in the national vocational training system***
   - Transversal = 'skills that are typically considered as *not* specifically related to a particular job, task, academic discipline or area of knowledge and that can be *used in a wide variety of situations and work settings*' – United Nations Educational, Scientific and Cultural Organisation (UNESCO)
2. ***Be designed and maintained as a 'living' framework to ensure it:***
   - Can be updated easily as technology drives changes to transferable skills
   - Maintains ongoing relevance and high value to employers and individuals
3. ***Ensure complementarity, where possible with:***
   - Australian Skills Classification (ASC)
   - Digital Literacy Skills Framework (DLSF)
   - Australian Curriculum
   - Digital Dexterity Framework (DDF)
   - Core Skills for Work Developmental Framework (CSWDF)
4. ***Be easy to understand, intuitive and use a common language to describe digital capability***
5. ***Establish proficiency levels of sufficient disaggregation to enable:***
   - Self-assessment and mapping that clearly identifies the skills
   - Easy and intuitive definitions of complexity, autonomy

Review of existing frameworks

Two pre-existing digital frameworks were reviewed for their potential as a starting point for the Framework. The European DigComp framework[16] and the Global SFIA[17] framework were selected for review due to their development being underpinned by extensive research and consultation.

An initial review identified that SFIA would not provide a suitable foundation as it did not meet the design principle of identifying digital skills that are transferable across the Australian workforce represented in the national vocational training system. SFIA describes the skills and competencies required by professionals working in ICT and other specialist roles and does not encompass the broader skills required across the general workforce. This also limits its ability to complement other Australian frameworks and taxonomies.

[16] European Commission, Joint Research Centre, Carretero, S., Vuorikari, R., Punie, Y., DigComp 2.1 : the digital competence framework for citizens with eight proficiency levels and examples of use, Publications Office, 2018, https://data.europa.eu/doi/10.2760/836968

[17] https://sfia-online.org/en/about-sfia/about-sfia

The continuing focus was therefore on the DigComp (version 2.1) framework Figure 12.

Figure 12: DigComp's 21 Digital Skills[18]

DigComp was developed to capture the generic digital competencies required by European citizens. It was synthesised from existing digital literacy frameworks and has involved extensive consultation and development processes prior, and subsequent, to its first iteration in 2016. Since the time of the drafting Version 1.0 of the Framework, a new version of DigComp (version 2.2) has been released.

DigComp complements other relevant Australian frameworks (Figure 5) and provides both a suitable breadth of digital competencies and a related structure of proficiency levels.

The substantial investment by the European Union in the ongoing application and development of DigComp further adds to its usefulness as a foundation for an Australian Framework, providing a touch point for the continuing evolution of the Framework. The relationship between DigComp and the Framework also enables the leveraging of a suite of resources developed from the European framework, including a framework for the digital competence of educators (DigCompEdu) and a framework for digitally competent educational organisations (DigCompOrg).

The five focus areas and 21 digital skills of DigComp 2.1 were used as the starting point for the design and drafting process.

[18] https://www.researchgate.net/figure/Five-fields-of-digital-competency-and-21-digital-competencies-according-to-the-DigComp_fig1_349157889/

Design and drafting of Digital Capability Framework

The design and drafting of the Framework involved a comprehensive and sophisticated process to analyse, validate and modify the DigComp framework to reflect the range of digital capabilities required across Australian VET-related occupations.

Although DigComp provided a useful starting point, it was designed to describe the broad digital competencies required of citizens for work, learning, leisure, inclusion and participation in a digital society, rather than a specific focus on digital capabilities required for the workplace. Therefore, the project augmented the analysis of the digital competencies contained in the DigComp framework by matching them with digital skill descriptions from the ESCO taxonomy, which describes the skills and competences required for occupations across the European labour market.

These expanded descriptors of digital competencies were then analysed against the unit of competency descriptions, performance criteria, knowledge evidence and performance evidence of VET qualifications using NLP algorithms. At the time of the project there were 1,229 qualifications listed on www.training.gov.au, the national register for Vocational Education and Training.

The use of Natural Language Processing to analyse alignment between DigComp and training package content

What is NLP?

NLP enables the comparison of two or more samples of text to identify where they have similar meanings; similar to the way in which a language translator can match words in different languages that have the same meaning or that spell-check can identify the correctly spelt word to be used.

Through the use of algorithms, the computer is trained to recognise and understand words and phrases in context and can compare large amounts of data through this automated process. The accuracy of the process is improved by continuing to re-train the computer with additional data and adjusting the threshold at which the algorithm determines the text samples to be a match.

How was NLP used in the project?

In this project, the 568 digital skills contained within the ESCO categories of "working with computers' and 'information and communications technology' were matched with one or more of the 21 digital competences of the DigComp framework. Knowledge, skills and attitudes statements from the draft DigComp 2.2 were also used to reword the labels and descriptions of the 21 digital competences.

This enabled the creation of detailed text descriptions for 21 categories aligned to the DigComp framework. These 21 categories were then compared with the unit of competency descriptions, performance criteria, knowledge evidence and performance evidence of 1,229 qualifications listed on www.training.gov.au to identify where there were matches.

Human experts were also used to judge whether or not a performance criterion did reflect one of the digital capabilities. These judgements were used to set appropriate benchmarks for the algorithm.

There are many decisions and steps involved in training an algorithm to perform this type of analysis and many iterations required to reach a satisfactory level of matching. For example, including the name of the unit of competency along with the performance criteria obtained a better result than simply using the performance criteria alone. The decision was also made that 'data' and 'digital technology' had to be explicitly mentioned in the performance criteria for it to be counted. If a performance criterion mentioned "communicate with others," it was not assumed that this would include the ability to communicate using digital channels.

The natural language processing analysis identified which of the more than 753,000 performance criterion represented digital skills and then assigned them to the relevant digital capabilities. This resulted in a detailed table that shows which digital capabilities are delivered in particular qualifications and units of competency, and for what occupations.

Outcomes and accuracy of the NLP process

The outcomes of the natural language processing are not intended to be used as a stand-alone or definitive analysis of the digital capabilities delivered in VET qualifications.

Determining whether or not a performance criterion relates to a digital capability can be challenging. Even two human experts will not always agree whether a performance criterion represents a digital skill and if so, which digital capability that skill represents. Humans only agree on a classification 67% of the time and a machine only achieves the same ratings as a human 59% of the time.

Instead, the outcomes are intended to help training package developers focus on where there may be gaps in the delivery of digital capabilities, and then to use their subject-matter expertise to determine whether this is the case. Feedback from IRC members who reviewed the results of the analysis identified that in some cases the digital capability is being delivered through the unit of competency, but it was not described explicitly enough for the natural language processing algorithm to identify it.

The outcomes of this complex process confirmed that the DigComp framework does provide sufficient coverage of the digital capabilities needed in the Australian labour market. This guided the drafting of the Framework, which is based on DigComp, but with some modifications to better reflect the way digital capabilities are applied in an Australian work environment and the existing policy framework.

Due to the fact that each VET qualification listed on www.training.gov.au is associated with a particular occupation from the Australian and New Zealand Standard Classification of Occupations (ANZSCO) taxonomy, the analysis process was able to identify which digital capabilities are required for particular occupations. This provides a basis for the development of Digital Occupational Profiles for VET-related occupations (see further discussion in the section on Digital Occupational Profiles).

The relevant ANZSCO 6-digit level occupations were also mapped to occupations in the ESCO taxonomy. This enabled comparison of digital capabilities identified as required for Australian occupations with those identified as necessary by ESCO.

Insights from the NLP analysis process

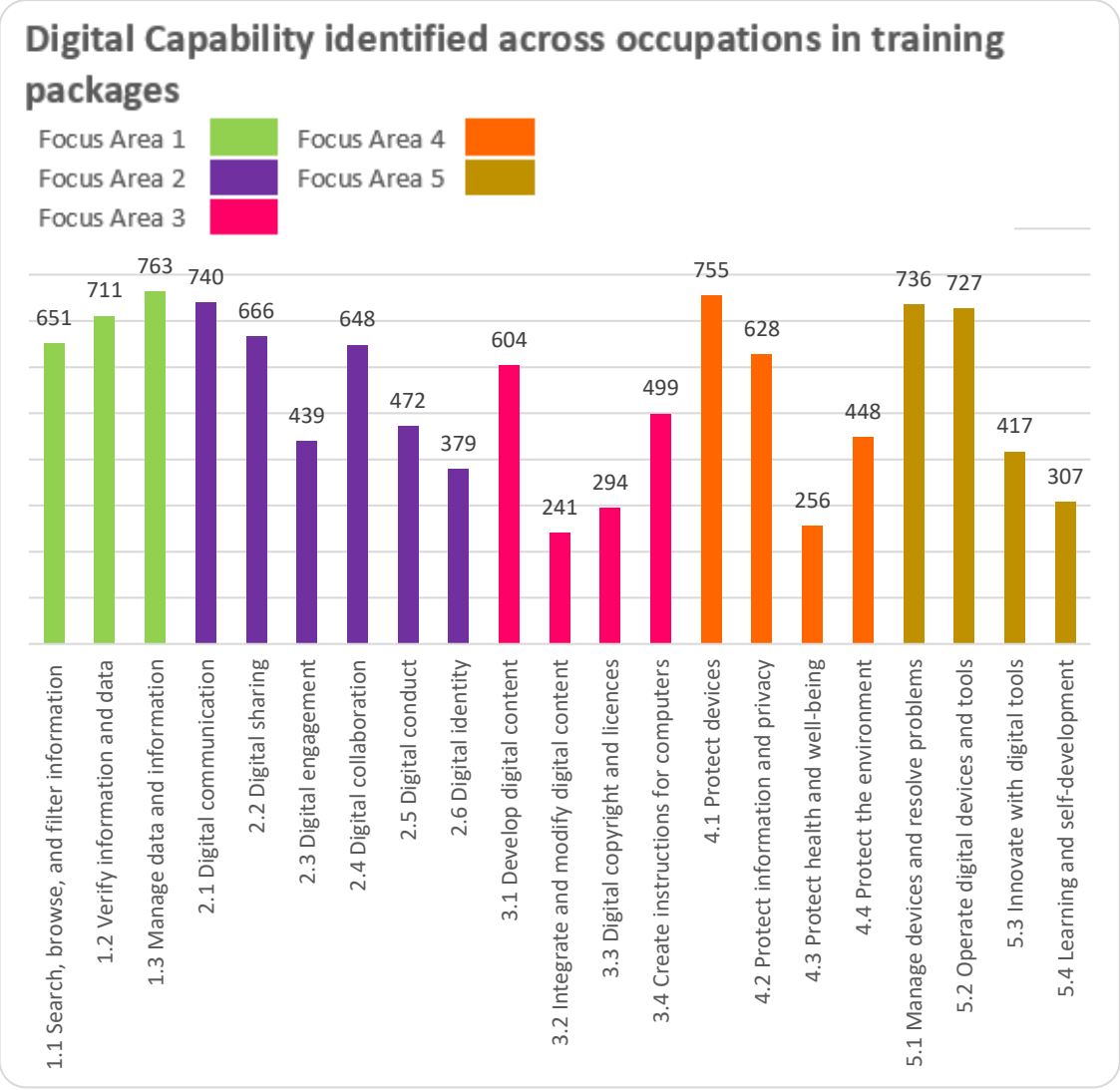
Due to the large volume of data analysed, the process produced a detailed picture of the coverage of digital capabilities across current VET qualifications. The analysis showed that current qualifications most commonly deliver digital capabilities for:

- Managing information and data
- Protecting digital devices and digital content from security risks
- Using digital technology to communicate with others (and knowing which technology to use in what context)
- Solving technical problems
- Operating digital devices and tools.

However, relatively few qualifications deliver digital capabilities for:

- Integrating and modifying digital content
- Protecting health and wellbeing (by avoiding health-risks and threats to physical and psychological well-being such as cyberbullying, and using digital technology to support well-being and social inclusion
- Understanding digital copyright and licenses
- Identifying digital competence gaps
- Creating and managing digital identities.

Figure 13: Digital Capability identified across occupations in training packages



These insights provide an indication of the way in which the Framework and NLP analysis can be used to guide VET outcomes through training product development in the future.

Review and refinement

The draft Framework was reviewed by five IRCs covering agriculture, manufacturing, transport and logistics, information and telecommunications and business services, as well as by the project Steering Committee.

This initial review resulted in refinement of the draft Framework, including:

- Further modification of labels and descriptors
- Replacement of the DigComp term 'competence' with 'capability,' due to the potential for the original term to be confused with the concept of 'competency-based training' used by the VET sector
- Removal of the variable 'cognitive domain' from the proficiency level descriptions to reduce the complexity of the Framework.

The refined Framework was then subjected to a series of industry validation activities, which are described in the following section.

Validation by industry

Key points

- IRCs used data provided by the project to analyse the presence of digital capabilities in training packages and the adequacy of training packages in addressing automation susceptibility and the need for higher level soft skills
- The validation processes highlighted the margin of error inherent in NLP analysis and the importance of expert validation. However, it also indicated that digital capabilities may not be sufficiently explicit it some in some training package content
- Cloud computing, data analytics and mobile solutions were identified as the most common technologies transforming industry sectors into the future.

As industry experts responsible for guiding the development of training products for their industry, IRC members and their supporting SSOs played a vital role in the validation of the Framework. Validation took place in two different ways:

- A high-level review of digital capability data and other factors impacting on the demand for, and development, of digital capabilities, in which all IRCs were invited to participate
- An in-depth review of digital capability data at the occupation level, which was conducted by selected IRCs during the design and drafting stage and again in the validation and refinement stage.

High-level review of digital capability and impacting factors

All 67 current IRCs, spanning the Australian VET ecosystem, were invited to participate in the high-level review. Each IRC was provided with data related to the training packages (and related occupations) for which they are responsible, and asked to answer a series of questions about:

- The presence of **digital capabilities** in training packages
- **Technology drivers** for their industry sector(s)
- **Automation susceptibility** of occupations related to their training packages
- **Soft skills** in training packages.

IRCs were invited to provide a response for each training package within their remit. Given that some IRCs are responsible for multiple training packages and some training packages are overseen by more than one IRCs, the potential number of responses was 78. A total of 47 responses were received. This 60% response rate provides a valid basis upon which to draw some conclusions about digital capabilities in training packages and the factors impacting upon the demand for, and development of, digital capability. However, it cannot be taken as a complete, system wide view[19].

[19] Note: Some training packages include material that is 'Not for Public Access' and could not be included in the review.

Digital Capabilities in Training Packages

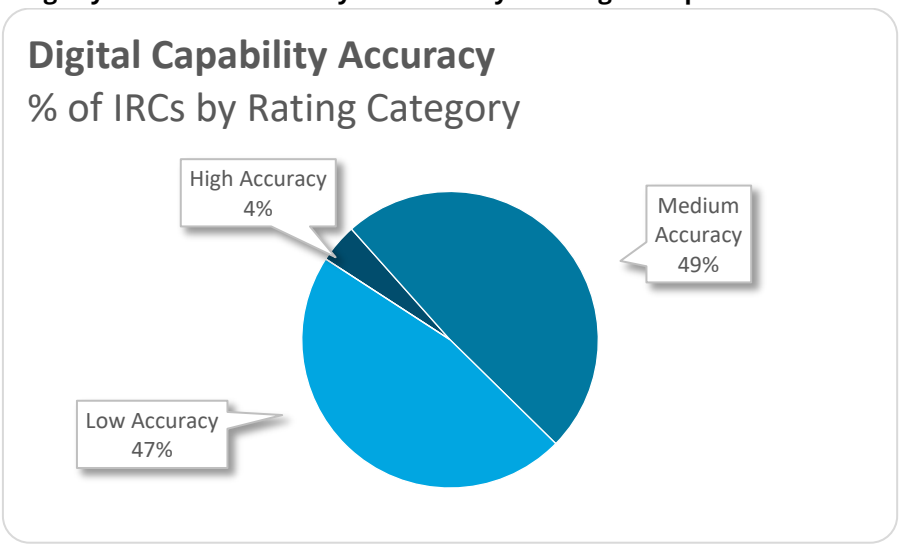
IRCs were provided with a data set and series of questions aimed at identifying the extent to which digital capabilities (in the form of digital skills and/or underpinning knowledge) are explicitly addressed in training package qualifications. The review was also designed to provide insight into the validity of the Natural Language Processes (NLP) analysis used to generate the data, as well as the usefulness of the data itself.

IRCs were provided with a table highlighting digital capabilities that had been identified by NLP analysis as contained within each of the training package qualifications they are responsible for. This data was presented under the occupations related to each training package qualification. IRCs were asked to rate the accuracy of the NLP findings for each occupation, which was then compiled to provide an average rating for each training package (Figure 14).

Figure 14: Example of Occupations by Digital Capability

As illustrated in Figure 15, just under half of the responses rated the accuracy as 'low' and just over half rated the accuracy as 'medium' or 'high'. None of the responses reported 'no accuracy.'

Figure 15: Ratings by IRCs of the accuracy of NPL analysis of digital capabilities in training packages



IRCs were also given data that identified digital capabilities that had not been associated with an occupation in the NLP training package content analysis, but were listed as requirements of the occupation in the ESCO taxonomy. On the basis of this information, 47% of IRC responses reported that at least some of the additional digital capabilities should be incorporated into the relevant training package qualification. Many IRCs suggested that further consultation with industry would be required to determine whether these additional capabilities were required in an Australian context and whether their development was within the remit of Vocational Education and Training or of Higher Education.

The final piece of data provided to IRCs in relation to digital capabilities in training packages was a ranking of training packages according to the prevalence of digital capabilities within them, as identified by the NLP analysis. IRCs were asked to consider whether the ranking of each training package they were responsible for was as expected, higher than expected, or lower than expected. In 62% of the responses, the positioning was as expected.

IRC respondents were asked to note whether a training package had been recently reviewed, was under review, or had not been reviewed, which has implications for the currency of digital capabilities contained in the training package.

Respondents also identified whether digital skills were intended to be implicit in the training package content (rather than described explicitly) or addressed elsewhere in the training process. More than half of the responses indicated that the relevant training package fell into this category.

A number of conclusions can be drawn from the IRC responses about digital capabilities in training packages:

- The gaps between the digital capabilities identified in training packages and those that IRCs say are required for an occupation highlight the margin of error inherent in NLP analysis (a topic that is also discussed in the section on Development of the Framework). However, they may also be an indicator of digital skills and capabilities not being sufficiently explicit in training package content

- The lack of explicit coverage of digital skills identified in a large proportion of training packages would help to explain the low levels of correlation between the digital capabilities expected of workers in particular occupations and what was identified in the NLP analysis of training package content for the occupation. Previous analysis of digital skills content in a 2017 project also found that "Digital training content in the training packages is expressed broadly and generically, with little reference to specific tools and systems. This is done deliberately, with the aim of making the package flexible and adaptable to the wide variety of workplace tools and systems used by different industries across the sectors"[20]. This highlights the importance of resources such as the Companion Volume and Digital Occupational Profiles to make digital capabilities more explicit
- A number of IRCs were able to make recommendations about the digital capabilities that should be recognised as associated with the occupations linked to their training package qualifications but had not been picked up by the NLP analysis. This feedback suggests that the data generated on an occupational basis by NLP analysis of digital capabilities in training packages and the ESCO taxonomy, could be useful inputs to training product review and development

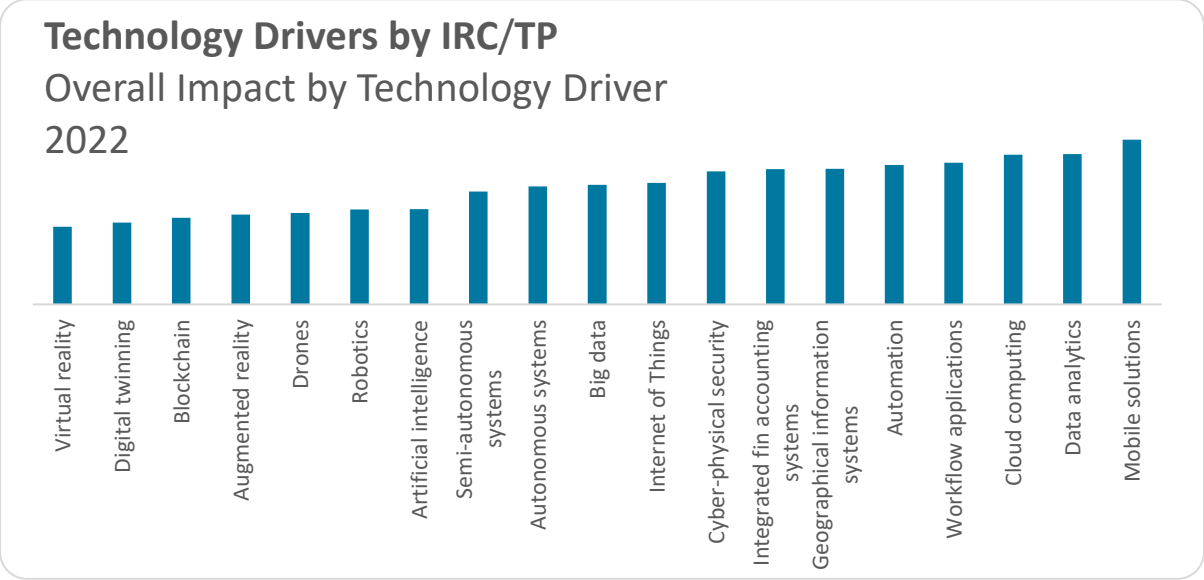
A common thread across the IRCs' responses is that digital skills do need to be considered moving forward, either as additional skills required by workers to progress or avoid being left behind, or to support businesses in the adoption of emerging technologies.

Technology Drivers

As part of the high-level review, IRCs were given a list of commonly used digital technologies and asked to rate the extent to which they are likely to drive the future of their sector and transform the industry, workplaces and individual job roles. The results of this question (Figure 16 provide an indication of where digital capabilities are most likely to be needed by workers into the future.

IRCs were also asked to identify any technology drivers having a medium to high impact on their industries that were not included in the list provided. Amongst the additional drivers identified, the most common were biotechnology, biosecurity and Building information Modelling.

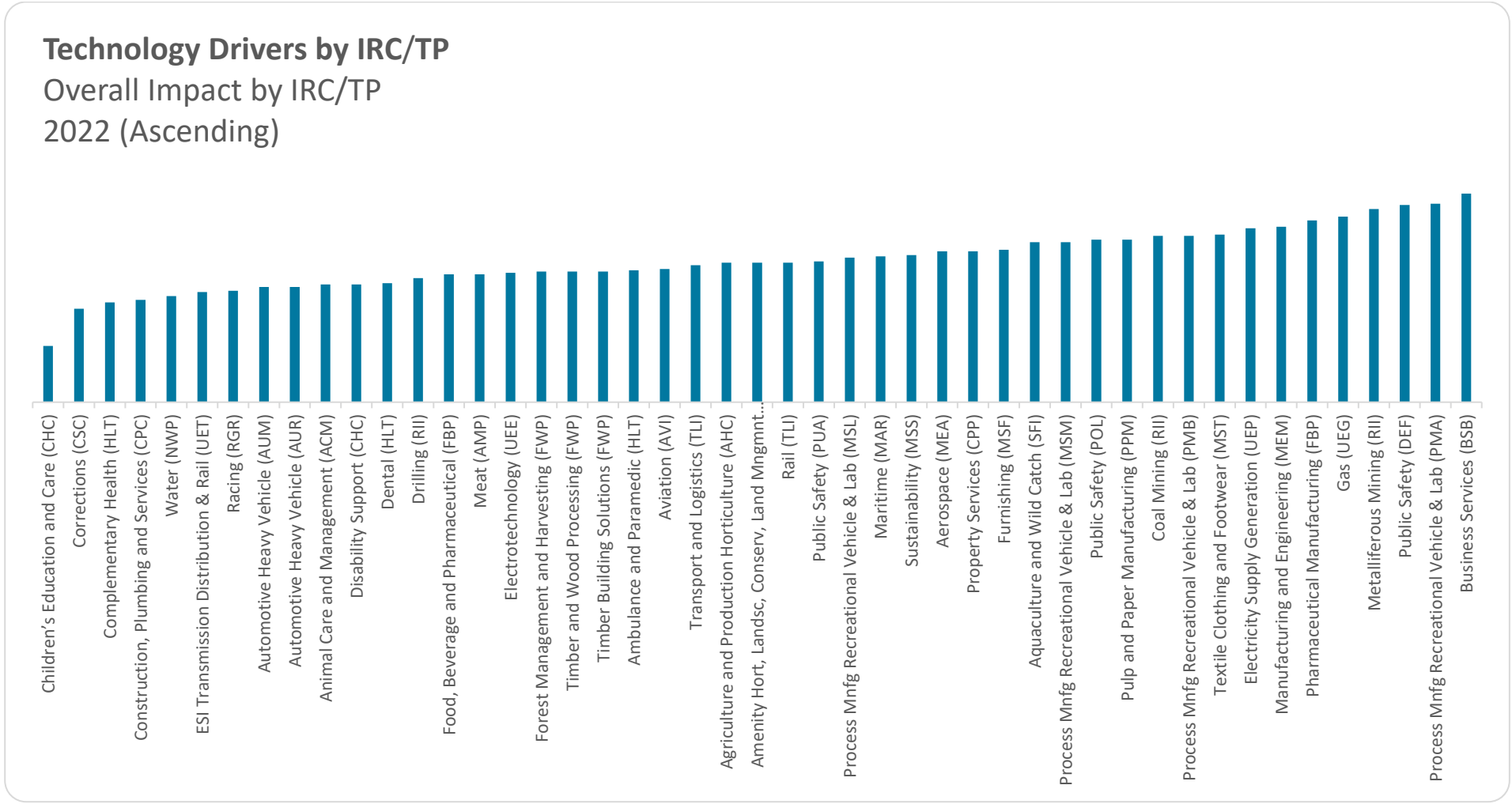
Figure 16: The extent to which particular technologies will drive the future of work



[20] Gekara, V., et al (2017, September). Developing appropriate workforce skills for Australia's emerging digital economy: working paper (NCVER).

The results also highlight the extent to which particular training packages are likely to be impacted by digital technology. As illustrated in Figure 17, the Business Services training package received the highest ranking for impact by digital technology, followed by the Public Safety and Gas training packages.

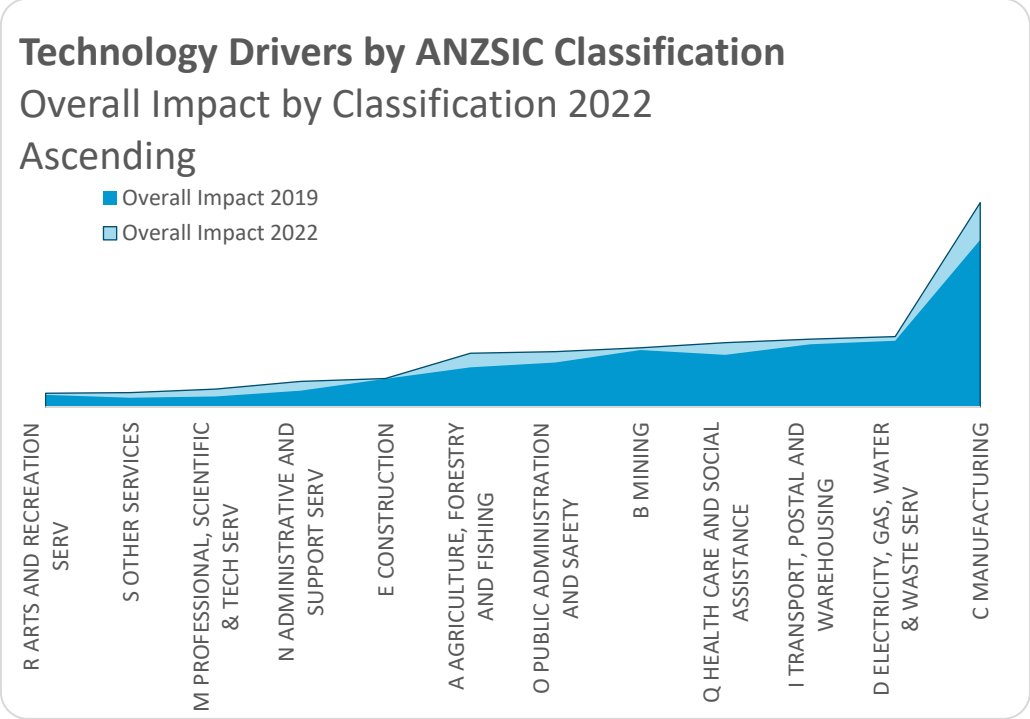
Figure 17: The extent to which digital technology is projected to impact training packages



The data gathered from responses to this question can be used to analyse the impact of digital technology of broad industries, as defined by the ANZSIC taxonomy. Manufacturing is projected to experience significantly greater impact by digital technology than any other sector (Figure 18).

The same question was asked of IRCs as part of the work of the Digital Transformation Expert Panel in 2019. As can be seen in Figure 18, this enables comparisons to be made across time.

Figure 18: Comparison of the extent to which digital technology will drive industries - 2019 and 2022



Training Pathways to Address Automation Susceptibility

IRCs were provided with an automation susceptibility table for the ANZSCO occupations covered by their training packages, which was based on an international study.[21]

The IRCs were asked to consider the occupations identified as having a high level of susceptibility to automation and report whether sufficient training pathways were available to support workers to transition to other occupations and industries through upskilling and reskilling. Where there were gaps, the IRCs were asked what priority training pathways needed to be developed.

The responses to these questions can provide a foundation for the prioritisation of new upskilling and reskilling pathways. This process of consideration of automation susceptibility may also be used to assist Industry Clusters in identifying gaps and priorities into the future.

Soft Skills in Training Packages

Soft Skills are not specific to particular jobs, tasks, academic disciplines or areas of knowledge, rather apply across a wide variety of situations and work settings. The term 'soft skills' covers a broad set of skills, behaviours, attitudes and personal qualities that people use to adapt effectively to their environment, to work well with others, to perform well, and achieve their goals. Examples include empathy, leadership, sense of responsibility, integrity, self-esteem, self-management, motivation, flexibility, sociability, time management and making decisions.[22]

[21] https://www.industry.gov.au/publications/mechanical-boon-will-automation-advance-australia

[22] Glossary of curriculum terminology; 2013 (unesco.org)

The development of higher-level, 'human' soft skills is an essential companion to the development of digital capabilities and skills. Without them, individuals and business will struggle to make the most of the technical skills they and their workers possess, or to retain the necessary agility to respond to continuing change.

> *... we want to emphasise that whilst digital transformation maybe synonymous with technology, it is those inherent human skills that cannot be replicated by an algorithm which will future-proof our workforce and are now essential to build. It is why this [digital transformation] strategy is as much about growing our cognitive skills and general capabilities as it is about digital competence.*[23]

Each IRC was asked to rate the adequacy of coverage of higher-level cognitive and 'soft' skills by their training package(s) and where there were gaps, to identify priorities for the skills needed.

The large majority of IRCs felt that the coverage of soft skills in their training package(s) was 'adequate', 'more than adequate', or 'strong'. However, 15% felt the coverage was 'less than adequate' and 2% 'inadequate'. The most common priorities identified as needed to fill these gaps were problem solving, critical and analytical thinking, decision making, time management and communication.

In-depth occupation review by selected IRCs

To refine the Framework, the five IRCs that reviewed the draft Framework also undertook a validation process using data generated by the NLP analysis. As part of the validation of the Framework, another four IRCs undertook the same process.

These IRCs reviewed data from the NLP analysis of digital capabilities found in training package content related to particular occupations. They also examined data on the digital capabilities identified as being required for particular occupations by the ESCO taxonomy (see further details on the NLP analysis in the section on Development of the Framework).

Each IRC was provided with summary tables for occupations linked to the training packages within their remit. The tables indicated where the NLP process identified:

- digital capabilities associated with training package content for that occupation and also identified as requirements for that occupation by the ESCO taxonomy
- digital capabilities associated with training package content for the occupation, but not identified by the ESCO taxonomy
- instances in which the ESCO taxonomy suggests that a digital capability is required by the occupation, but the digital capability was not identified in any of the training package content related to the occupation
- digital capabilities that were not associated with either training package content or the occupational requirements from the ESCO taxonomy

IRCS were also given detailed data on where the NLP analysis had identified a match between a digital capability and training package content for each qualification contained in their training

[23] Reference digital transformation strategy

packages. The data included the unit of competency codes and performance criteria that were identified as matches.

Whilst the selected IRCs identified mismatches in the data sets, as well as digital skills in qualifications that had not been picked up by the analysis, overall, they found that the capabilities depicted under each occupation and qualification were mostly correct. This confirmed that overall, the Framework is a valid representation of the digital capabilities needed in Australian workplaces.

The validation process helped to refine the NLP algorithm during the design and drafting stage of the project and contributed to further refinement of the draft Framework. It also provided the basis for the development of sample Digital Occupational Profiles.

The validation process provides an indication of how NLP analysis of training package content, and the creation of Digital Occupational Profiles, provides an effective means of monitoring and validating the coverage of digital capabilities in training package qualifications. The inclusion of analysis against the ESCO taxonomy also provides a means of benchmarking Australian digital occupational requirements against the European equivalents.

The validation process also lends itself to applications beyond digital capabilities and could be adapted such as other core skills, to validate and identify gaps in training products in relation to other types of skills, such as the 'soft skills' that are essential companions to digital capabilities.

Extensions of the Framework

Key points

- There is potential for using the Framework as a source document to develop an additional Transformational Thinking component for use by organisations
- The alignment of the Framework with the European DigComp framework opens up the possibilities of adopting and adapting the supporting Framework for the Digital Competence of Educators (DigCompEdu) and Framework for Digitally-Competent Educational Organisations (DigCompOrg) and the resources that accompany them
- Any extensions of the Framework in the public domain would need to be subjected to the same level of rigorous analysis, review and validation used to develop the Framework.

The Framework is a living document - intended to be revised and updated as digital technology continues to evolve. It is also the starting point for other tools and resources that can further support the development of Australia's digital capability.

At the same time as building the digital capability of individual workers, we need to be growing the capability of organisations to respond to and manage ongoing digital transformation.

Transformation Thinking Framework (Draft)

A draft **Transformational Thinking Framework** has been developed by the APSC Digital Profession agency and the Department of Employment and Workplace Relations to help governments and other organisations to respond to and thrive in a rapidly changing digital environment. This initiative is an example of using the ADCF as a source document to further extend the framework and apply it to a given context.

One of the changes in the recent DigComp 2.2 framework has been the inclusion of examples of the kinds of attitudes required to support effective application of digital competences (the term DigComp uses to describe digital capabilities). In a similar way, the Transformational Thinking Framework focuses on ways of thinking that support the effective development and application of digital capabilities.

The draft **Transformational Thinking framework** has six focus areas:

1. **Digital approach** – which is focused on awareness of the possibilities offered by digital transformation and the attitudes needed to adopt, experiment and innovate using digital tools and services
2. **People first approach** – which is focused on active engagement with the users of products, services and processes to inform design and delivery of new or improved products, services and processes
3. **Agile iterative co-design** – which is focused on the ways in which organisations can respond to rapidly changing business environments to improve approaches, products and services
4. **Applied integrity** – which is focused on working in ethical, secure, respectful, reliable and transparent ways
5. **Leveraging data** – which is focused on the changed relationship between data, and personal, social, community and business environments, and the new opportunities and risks this creates
6. **Monitoring and improvement** – which is focused on collecting and analysing data and information to increase performance and efficiency through review and the implementation of improvements.

A copy of the draft Transformational Thinking Framework can be found in Attachment C.

Other Extensions of the Framework

There is substantial potential for the VET system and VET professionals to harness the benefits of digital technology in teaching and learning.

> *"Trainers and training organisations need to not only understand and train learners in the necessary digital skills and general capabilities for their vocational area of expertise, but increasingly, to be able to design digital learning content, curate learning resources, and facilitate learning and conduct assessment using the digital technologies."*[24]

Detailed guides on possible approaches to these innovations are available through work that builds on the European Union's DigComp framework.

Alongside the DigComp framework, the European Union has developed a **Framework for the Digital Competence of Educators (DigCompEdu)** and a **Framework for Digitally-Competent Educational Organisations (DigCompOrg)**.

DigCompEdu[25] identifies six key areas of competence required by educators:

1. **Professional Engagement** - which relates to educators' use of digital technologies in professional interactions with colleagues, learners, parents and other interested parties, as well as for their own individual professional development and within the organisation
2. **Digital Resources** – which includes the competences needed to select, create, modify, manage, protect and share digital resources for learning
3. **Teaching and Learning** – which acknowledges the potential of digital technologies to shift the focus of teaching processes from teacher-led to learner-centred. It covers competences for managing and orchestrating the use of digital technologies in teaching

[24] Digital Transformation Expert Panel (2021) *The Learning Country: Digital Transformation Skill Strategy*. Australian Industry Standards, Melbourne. p59

[25] https://joint-research-centre.ec.europa.eu/digcompedu_en

and learning, including use of digital technologies to foster collaborative learning and self-regulated learning

4. **Assessment** – which addresses the use of digital strategies to enhance assessment, and recognises the potential of digital technologies to better understand learner behaviour, monitor learner progress and facilitate feedback and planning
5. **Empowering Learners** – which focuses on the potential of digital technologies to support learner-centred teaching and learning strategies. This includes improving accessibility and inclusion for all learners (including those with special needs), as well as using digital technologies to differentiate and personalise learning and foster active engagement with a subject matter, including real-world contexts
6. **Facilitating Learners' digital competence** – which includes the competences needed by educators to enable their students to develop the skills covered by the European Digital Competence Framework for Citizens (i.e., information and media literacy, digital communication and collaboration, digital content creation, response use, digital problem solving).

The DigCompEdu framework could provide a basis for professional development of VET professionals in Australia. Examples of self-assessment tools and professional development frameworks based on DigCompEdu already exist.

DigCompOrg[26] - provides guidance and descriptors of good practice across seven thematic elements covering leadership and governance practices, teaching and learning practices, professional development, assessment practices, content and curricula, collaboration and networking and infrastructure. It has been designed to:

- "Encourage self-reflection and self-assessment within educational organisations as they progressively deepen their engagement with digital learning and pedagogies;" and
- "Enable policymakers to design, implement and appraise programmes, projects and policy interventions for the integration of digital learning technologies in education and training systems."

The DigCompOrg framework could provide both policymakers and VET providers with a structured means of guiding and monitoring the integration of digital capability to enhance teaching, learning and assessment across the Australian VET system.

However, if frameworks like Transformational Thinking, DigCompEdu and DigCompOrg are to be considered as potential extensions of the Digital Capability Framework, they would need to undergo the same kind of rigorous analysis, review and validation involved in developing the Digital Capability Framework. Once validated, a suite of interrelated frameworks such as this would provide a more comprehensive foundation for the development of digital capability for individuals, for the educators, organisations and systems that train them, and for the organisations that employ them.

[26] https://joint-research-centre.ec.europa.eu/european-framework-digitally-competent-educational-organisations-digcomporg/digcomporg-framework_en

Maintenance of the Framework and related components

Key points

- There is a considerable amount of work required to maintain the various components of the Framework, the Digital Occupational Profiles and online Companion Volumes, to ensure they keep pace with digital transformation
- Many of these maintenance activities are complex, requiring technical and subject matter expertise
- Maintaining the Framework and supporting resources will require the same level of rigour that was used to develop them in order to maintain their validity
- There is significant potential for further applications of the processes used to develop and maintain the Framework and resources.

To be of continuing value to employers, employees and students, training product developers, VET professionals and policymakers, the Framework and the resources developed from it, will need to be maintained as 'living documents'.

The pace of technological change and digital transformation is not going to slow down anytime soon. The digital capability products created by this project – the Framework, the Prototype Companion Volume and the Digital Occupational Profile Template – can all assist with the development and implementation of training products and pathways that enable individuals and businesses to keep up with the pace of change. However, the information and data contained in the digital capability products need to be up to date.

Table 2 below highlights the various components of the digital capability products and describes what will be required to maintain them. As indicated, the level of difficulty of many of these maintenance activities is high, requiring both technical and subject matter expertise, including:

- Deep knowledge of VET
- Relationships across all industry sectors and stakeholder groups connected to VET
- NLP expertise
- Working knowledge of the European DigComp framework and ESCO taxonomy, the ANZSCO taxonomy, and the various frameworks complemented by the Framework.

Table 2: Maintenance requirements for digital capability products

Components		Maintenance of the Components	
Section	Description	Maintenance	Level of difficulty
Australian Digital Capability Framework (ADCF)	The Framework is a tool to improve and identify generic digital capability requirements in different occupations	Updates to the Framework through Consultation and validation	3 High
Identifying digital capabilities delivered by qualifications	Identifies the digital capabilities delivered (by qualifications) to workers in each occupation covered by the training package	Run an algorithm through all training packages and update the Framework	3 High
Knowledge Graph of the Australian VET sector	The interactive Knowledge Graph allows selection of an occupation and the digital capabilities delivered in related qualifications. It also shows the digital skills (reflecting the digital capability) that are mentioned in job ads for the occupation	The Knowledge Graph will need to be updated every few years to reflect updates to training packages and skills sought by employers. This exercise would be carried out for all training packages simultaneously. It requires specialist data mining, natural language processing and Knowledge Graph skills	3 High
Digital Occupational Profiles (DOPs)	DOPs allow users to analyse the digital capability and skills requirements for an occupation in more detail	Update template when the Framework is updated through Consultation and validation	1 Low

Triggers for Maintenance

Maintenance on the Framework and its components should be considered through two different types of updates, a minor and a major update.

A minor update would be prompted by the need to amend or fix errors only, for example spelling or page formatting. This type of maintenance may be carried out anytime without needing to undertake consultation or validation on the Framework and its components.

A major update would entail any other work on the Framework and its components, this includes changes to the focus areas, digital capabilities, descriptors, proficiency levels and the architecture.

Triggers that may instigate a major update could include:

- Changes, updates or additions to DigComp, where this change, or a variation of the changes could benefit the Framework's currency and connectivity to DigComp
- Further extensions of the Framework (see Extensions of the Framework section of the report)
- Digital Technology changes that are not covered by the current Framework where the focus areas, digital capabilities, proficiency levels and descriptors require updates and in some cases updates to terminology and language. Consideration must be taken to ensure that changes do not create barriers to the end user or the usage as a neutral sector Framework.

To maintain the validity of the Framework and supporting resources, the maintenance activities will need to involve the same level of rigour that went into their development. This will require ongoing and systematic processes for:

- research and data analysis
- consultation and validation with stakeholders across all user groups, industries, business sizes and jurisdictions at key points in the process
- collecting feedback from stakeholders as they use the products over time.

It is also vital that further iterations over time do not overcomplicate the Framework. Its effectiveness and value lie in its simplicity, its relevance across industries and its ability to unify, rather than duplicate other efforts to build digital capability across the country.

There is considerable value and potential efficiencies in adopting these maintenance activities, as they can help to speed up the process of training product development and reduce the time and effort involved in continually updating training packages.

The processes used to develop and maintain the various components described in this report also have potential applications beyond digital capabilities. For example, the processes used to identify and validate training package content could equally be applied to soft skills (also referred to as core skills for work and employability skills). The algorithm used to identify digital capabilities related to specific occupations could also be adapted to provide automated career recommendations, by allowing users to enter text from their resumes or role descriptions, matching this with relevant digital and non-digital capabilities and suggesting occupations that require similar capabilities.

Appendix 1 Glossary of Ancronyms

ADCF	Australian Digital Capability Framework
AIS	Australian Industry Standards
ASC	Australian Skills Classification
AISC	Australian Industry and Skills Committee
ANZSCO	Australian and New Zealand Standard Classification of Occupations
ANZSIC	Australian and New Zealand Standard Industrial Classification
APSC	Australian Public Service Commission
AQF	Australian Qualifications Framework
BCA	Business Council of Australia
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DESE	(former) Department of Education, Skills and Employment
DEWR	Department of Employment and Workplace Relations
DigComp	The European Digital Competence Framework
DigCompEdu	European Framework for the Digital Competence of Educators
DigCompOrg	European Framework for Digitally-Competent Educational Organisations
DOP	Digital Occupational Profile
ESCO	European Skills/Competences, qualifications and Occupations
Framework	Australian Digital Capability Framework
ICT	Information and Communication Technology
IRC	Industry Reference Committee
NCVER	National Centre for Vocational and Education Research
NLP	Natural Language Processing
NSC	National Skills Commission
RTO	Registered Training Organisation
SSO	Skills Service Organisation
SFIA	Skills Framework for the Information Age
TGA	Training.gov.au
VET	Vocational Education and Training

Appendix 2 Glossary of Terminology

ANZSCO - ANZSCO is the skill-based classification used to categorise all occupations and jobs undertaken for profit in the Australian and New Zealand labour markets. It is used in the collection and dissemination of all official statistics on occupation and is a key tenet of Australia's statistical infrastructure. ANZSCO is applied to a range of data sets, including the Census of Population and Housing, that inform and support government policy settings and programs – from vocational education and training to skilled migration programs

Companion Volume - a non-endorsed component of a training package, published by the training package developer, which provides additional information for delivery of training and assessment

Digital capability – the potential ability to perform a *broad set of tasks* related to digital technology

Digital capabilities – particular types of potential abilities to perform a *broad set of tasks* related to digital technology (e.g., search, browse and filter information)

Digital skills – skills used to perform *specific tasks* related to digital technology (e.g., Use enterprise planning software to reconcile stock/deliveries/outgoings against data and records)

Digital transformation - the strategic adoption of digital technologies to improve and transform work practices and business models

Industry Clusters – the new industry engagement and leadership bodies that will undertake a broad range of functions across the Vocational Education and Training system. They will replace IRCs

Industry Reference Committees (IRCs) - groups of industry representatives that make recommendations about what is included in training packages. They are supported by SSOs

Natural Language Processing (NLP) - a form of machine learning that uses algorithms to compare two or more samples of text to identify where they have similar meanings

Performance Criteria - part of a unit of competency, which specifies a level of performance to be demonstrated by learners to be deemed competent

Registered Training Organisation (RTO) – a training provider that has met the registration requirements to deliver nationally-recognised training and issue nationally-recognised qualifications. RTOs can include TAFEs, private training providers, schools and some industry associations and companies

Skills Service Organisation (SSO) - Skills Service Organisations (SSOs) are independent, professional service organisations that support Industry Reference Committees (IRCs) in their work developing and reviewing training packages.

Soft Skills – generic skills (such as decision-making or self-management) used to perform effectively across a wide variety of situations and work settings. The term can be used to encompass skills, behaviours, attitudes and personal qualities

Training Package – a set of nationally endorsed standards and qualifications for recognising and assessing people's skills in a specific industry, industry sector or enterprise

Taxonomy – a scheme of classification

Unit of competency - the building blocks of a qualification. Each unit of competency identifies a distinct workplace requirement or skill needed to perform the task effectively in the workplace. This can include work knowledge and skills, language, literacy and numeracy, or occupational health and safety requirements

Attachments

Attachment A - Australian Digital Capability Framework

Attachment B – Sample Digital Occupational Profiles

Attachment C – Transformational Thinking Framework

Attachment D – Sample Communication Pack