



Forging pathways for **technology** careers

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Starting the technology career journey

If Australia's technology sector is to reach its full potential, there will need to be a dedicated effort to help attract and nurture the talent required for tens of thousands of new digital careers.

Australia has a vibrant and flourishing technology sector, generating around A\$167 billion annually, and employing approximately 861,000 people. But it has achieved this without any clear approach to the 'pathways' that enable people to start or advance their digital careers.

In the future, this ad hoc approach will not suffice. There are critical digital skills shortages. Australia needs an estimated additional 286,000 technology workers by 2025.

One of the key challenges lies in better defining the pathways that will enable people to commence and progress their technology careers.

For most careers – say, teaching, law, nursing, building – it's possible to map out a typical pathway that an entrant would take, starting with the appropriate qualifications and entry level jobs. But that's not the case with digital careers.

For instance, where is the best place to start or change to a technology career? Is there an optimum route? What are the best skills to obtain? What is the best approach – university, vocational education, short courses or a combination? How does someone at mid-career reach the next level?

Even the language used to describe technology roles can be confusing.

The answers to these questions are important for employees, employers and training providers, and especially for the next generation of school leavers, as well as their parents and careers advisers.

Understanding digital skills pathways enables informed decisions to be made as people prepare for employment or self-employment, acquire digital skills, and for those who need to design education or training strategies. Defined pathways help employers identify what is needed and align training providers on training priorities.

The Digital Skills Organisation (DSO) commissioned the National Centre for Vocational Education Research (NCVER) to explore what has been done both in Australia and internationally.

This landmark work has identified some real opportunities, but also some glaring gaps. For instance, there is currently no framework, either in Australia or elsewhere, that fully supports a comprehensive digital skills pathway model.

While many worthwhile digital skills initiatives have been undertaken, none meet Australia's current needs.

The DSO is seeking to develop and trial a world-first approach that will clearly identify pathways into digital roles, while further developing existing pathways so they can be adapted to changing technologies and applied to individuals at different stages of their careers.

This new approach will need to be in a form and a language that can be readily understood. It should be as accessible to a school leaver as it is to a seasoned professional.

And, it will need to be broadly accepted and able to be adopted across the sector in a timely way, as Australia develops the next generation of digital skills specialists.

Digital skills pathways:

A signposted journey that leads an individual or organisation to understand the skills needed for occupations.

Each pathway is shaped by industry demand and described in a unifying language and taxonomy recognised by all, to help align employers, learners and training providers.



Where does Australia stand in the race to develop digital skills?

There is a global race to develop the digital skills that will propel industries and national economies.

The Technology Council of Australia believes Australia's tech sector can match the contribution of global peers such as Canada, and has set a target of reaching \$250 billion in value by 2030. Under this scenario, technology jobs in the tech sector could grow from the current 861,000 to 1 million by 2025, requiring an additional 286,000 workers to join the sector.

One of the key tasks of the DSO is to lay the foundations for workforce strategies that will help prepare people with employer sought skills to enter a range of industries and fulfil critical skills needs. One of the challenges is that, unlike in some industries, there are many different pathways to a tech career. There are hundreds of thousands of people employed in technology firms, both directly in established technology businesses, and indirectly in firms, where they are performing technology roles.

Approximately 98 percent of the 861,000-strong technology workforce is employed in SMEs. There is an extraordinary dispersion of tech expertise across industries, enterprises and geography. It's a career pathway that provides varied opportunities across socioeconomic groups, skills and educational backgrounds.



Forty-two percent of those in the tech sector don't have a university degree. Those with a VET background experience only a 3 per cent pay gap relative to university graduates, compared to a 17 per cent pay gap in other comparable high-paying industries. Almost a third of workers speak a language other than English.

It's an industry that opens its doors wide and gives everyone a go.

The numbers required will place extraordinary demands on the training system. Many will need to be trained, re-trained or upskilled. Many will need to transition from other sectors or new entrants.

The issue of attracting, recruiting and mentoring talent in the tech sector takes on a new level of urgency if these workforce targets are to be realised.



Digital literacy at the core

Anyone considering a career in the tech sector has numerous choices – occupations, courses, qualifications and industries. Will it be web development, systems admin, data analytics, networking, cyber security or one of the many other tech choices?

Do they follow a prescribed route, or just follow their passions? Do they go to university, TAFE, or study an online course? Do they need work experience? What about apprenticeships and traineeships? What about their own start-up?

One of the key findings of the NCVET mapping of digital skills initiatives is that there is no compelling theme that unifies existing initiatives. There is overlap and duplication. There is even a lack of a common language.

The international experience provides some guidance but no straightforward solutions. Accordingly, Australia needs a home-grown approach to address the lack of suitable digital skills pathways.

One of the priorities of the DSO has been to focus on an individual's foundation for digital skills, or what is known as digital literacy.

A central element of the proposed DSO Pathways Model entails digital proficiency – the ability to live and work in a digital world, with skills ranging from the foundation to the advanced level.

Digital literacy embodies the foundation skills and knowledge needed to use digital tools and devices. At the organisational level and particularly among tech firms, there will be progressively higher levels of digital skills proficiency required. The embedding of different levels of digital skills as part of a pathways model is critical because each pathway will have a different starting point, and will need to meet varying needs, from novice to specialist.

Just as literacy in language, science or health is encouraged, developed and assessed, digital literacy becomes a national goal, and a fundamental pillar of a digitally-enabled economy.



Building the pathways model

Currently, there is a lack of clarity around the optimum pathway to a digital career. We have come to accept this ambiguity as part of the tech career journey. But, is there a more coherent narrative that explains at least some of the pathways? Is there a common thread? Do some have a greater chance of success?

Rather than focus on specific occupations or job roles, the proposed DSO Pathways Model seeks to define the central purpose behind virtually all technology careers. These seven functions have been defined as: Adapt, Analyse, Build, Design, Innovate, Protect, and Transform.



From these core functions, the DSO Pathways Model extends to a series of seven roadmaps or 'domains' that define certain characteristics of the most typical technology career pathways:

- **Digital Fluency** – Digital readiness, resiliency, and leadership – an overarching pathway across all other pathways
- **Digital Design** – Content, experience, and product design
- **Digital Intelligence** – Data, information, systems and intelligence analysis
- **Digital Innovation** – New and improved products, processes, and services
- **Digital Security** – Safety and security of data, systems, networks and identity
- **Digital Technology** – Infrastructure, software development and operations and support
- **Digital Transformation** – Strategy, integration and management of technological change

The approach taken in the DSO Pathways Model seeks to distill a sometimes confusing array of career paths into a more manageable set of choices, framed around overall purpose, not specific job descriptions.

The model accommodates skill levels from basic digital literacy to advanced professional skills. It is flexible, so that skills obtained from different pathways and at varying skill levels can be blended or stacked.

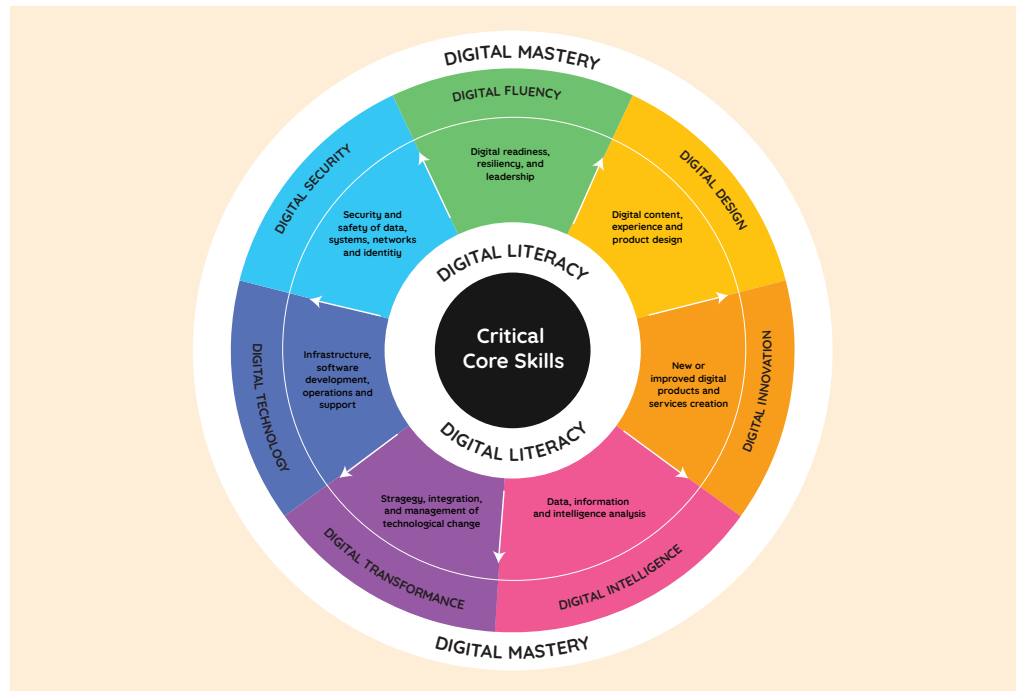
And, since it does not revolve around fixed occupations or job roles, it can readily adapt to changes in technology.



How would this look in practice?

The DSO Pathways Model must accommodate people at various career phases and across a range of skills and abilities. To meet this wide variety of needs, the model includes seven levels of proficiency along a continuum from Digital Novice to Digital lead.

Sitting in the background are a series of critical core skills that apply across the spectrum. These non-technical skills are central to building digital capability – problem solving, creative thinking, collaboration, communication, leadership and adaptability.



In the real world, a digital skills pathway may follow one of the seven digital domains or, more likely, include elements from several.

For example, the pathway for Cybersecurity might include Digital Security, Digital Transformation and Digital Intelligence.

The career pathway for Cloud Computing might entail Digital Transformation, Digital Security, Digital Fluency and Digital Technology.

The Data Analyst pathway is likely to include elements from all seven domains, in addition to the core skills of critical thinking and problem solving.

Robotics is likely to include Digital Fluency, Digital Technology and Digital Design while the Artificial Intelligence pathway may predominantly derive from Digital Fluency and Digital Technology.

There will be many possible variations, dictated by changing technologies and evolving skills needs.

These pathways are intended as a starting point, arguably the first of its kind, to erect the building blocks of a digital careers model – something to be used by employees, employers, learners and training providers.



What we will do next

The role of the DSO is to advance new and emerging ways of developing skills to meet industry and employer needs for an Australian economy already significantly digitised.

In this regard, the DSO is undertaking a number of pilots, including the Train 100 Data Analyst pilot, the Qualification Design Trial and the DSO Innovation Hubs to test the delivery of digital skills needed by local employers. The DSO Pathways Model adds to this approach.

The DSO Pathways Model addresses the needs of key users; individuals who want to start on a pathway for a technology career or upgrade their skills to further their technology careers; employers who need to develop career pathways and reskill existing workers; and training providers who need to design and deliver education and training programs.



The DSO will consult with industry and stakeholders on the shape of the pathways model to confirm the critical building blocks needed to move forward.

As the NCVET notes, key priorities in forging pathways for technology careers include developing the skill sets that will sit below each of the broad skill domains, with a focus on areas of immediate skills need, most notably in Cybersecurity, Data Analytics, software development, Artificial Intelligence/Machine Learning and Cloud Pathways.

The immediate priority of DSO will be to liaise widely with industry and employers and to commence work on the vital next elements that will help to power the Australian economy.