DISCUSSION PAPER

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Identifying work skills: international approaches

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INFORMING POLICY AND PRACTICE
IN AUSTRALIA'S TRAINING SYSTEM

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About the research

Identifying work skills: international approaches

Gitta Siekmann and Craig Fowler, National Centre for Vocational Education Research

The digital revolution and automation are accelerating changes in the labour market and in workplace skills, changes that are further affected by fluctuations in international and regional economic cycles and employment opportunity. These factors pose a universal policy challenge for all advanced economies and governments. In the workplace, people seek to acquire contemporary and relevant skills to gain employment and retain transferable skills to maintain employment.

The central purpose of this paper is to investigate how other nations or regions are dealing with these issues. What approaches are they taking to understanding the mix and dynamics of the skills attained by individuals and, more broadly, the totality of skills that in aggregate constitute a highly capable and adaptable labour force, one that supports firm viability and greater national productivity.

This research has examined a range of initiatives and approaches being developed or in use in selected countries, including the United States, Singapore and New Zealand, and agencies/organisations; for example, the European Commission and the Skills for the Information Age Foundation. In doing so, it showcases the good practices used to ensure that occupational-level skills information remains current and widely accessible.

Key messages

- International practice is moving to establish and maintain a more dynamic inventory of job-specific skills, with these organised, classified and interrelated by means of a practical skills taxonomy, and set within a coherent skills information framework. Such a categorisation is more detailed than qualifications and occupational titles; these are poor proxies and become outdated by comparison with the real-time skills needed and performed in workplaces. Well-integrated and well-organised skills intelligence is becoming increasingly useful to multiple end-users for many different purposes.
- Policies to reduce skills imbalances and prepare for future skills in demand can be more successful if they are underpinned by accurate and timely information about skills needs. A good practice approach to this issue is a comprehensive skills framework, into which a variety of data are integrated, including up-to-date information directly sourced from workers and employers, complemented by, for example, online job-vacancy data analyses.

This paper, as well as the companion case studies of both international best practice and evolving practice (available at <https://www.ncver.edu.au), provides content upon which to reflect on current Australian approaches. These issues appear to deserve separate and wider public discussion. As a preliminary and debatable observation, Australia has multiple and valuable skills information resources and existing repositories, although their full potential remains unrealised, given the lack of an integrating skills framework of the ambition, scope and complexity of other nations.

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Managing Director, NCVER

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Contents

Tables, figures and boxes

Tables

Figures

Boxes

Executive summary

The world of work is changing in ways that make it increasingly difficult for a large proportion of the workforce to gain and maintain consistent employment. More than ever, existing and future workers need to prepare for the changing skills requirements of jobs. With advancements in technology, the skills profiles within jobs, and the jobs themselves, are rapidly evolving, a situation that places huge expectations on national vocational education and training (VET) systems in servicing and responding to the rapidly changing needs of employers, as well as the job aspirations of students.

This is a multifaceted public policy issue: workers need contemporary and relevant skills to gain employment and transferable skills to traverse the labour market and so maintain their employment; employers need a highly capable and adaptable workforce; and governments seek to ensure, by means of coherent public policy and efficient investment, effective relationships between students, training providers and employers.

So how are other nations addressing the issue of ensuring their workforces possess the skills required for the future? What are other countries or regions doing about skills descriptions, analyses and frameworks to accommodate these skills: how are they approaching the challenge of identifying discrete job skills; of building and maintaining a dynamic inventory of such skills; and of assembling these into a well-organised and practical skills taxonomy, one where interrelated skills are classified and integrated? And, practically how is all of this information collated for the betterment of training? Further, how are skills at different levels to be recognised within such skills frameworks, how do clusters or aggregates of such skills relate to any named occupations, and how can training content and qualifications be responsively adjusted to drive a dynamic training system.

In Australia, standardised occupational skills data for informing training is mainly found in training packages, foundation skills frameworks and in occupational standards in classification systems such as ANZSCO (Australian and New Zealand Standard Classification of Occupations). These repositories, particularly the latter, have potentially slower information-update cycles and risk being unable to keep abreast of the rapidly changing employment and occupational requirements.

Approach

This report provides a summary overview of occupational skills information practices in selected countries and organisations, with the aim of highlighting the approaches adopted by each to the design, content, update and provision of skills information. In addition, it showcases good practice in ensuring such information is current and accessible.

We conducted a desktop analysis of the skills information frameworks and systems that were readily available on public websites, along with the associated documentation on these sites. The frameworks and systems identified were mainly government or intergovernmental agency websites (for example, OECD, European Commission). The search particularly focused on the level of detail of skills information within occupations, its currency and accuracy in regard to describing 'on-job workplace reality', and evidence of this skilling intelligence being used to update vocational training in a timely manner.

Thirteen cases were studied in detail. These came from the following countries, agencies and organisations: United States, United Kingdom, New Zealand, Canada, Finland, Switzerland, Singapore, Organisation for Economic Co-operation and Development (OECD), European Commission, Cedefop (European Centre for the Development of Vocational Training), Skills for the Information Age (SFIA) Foundation, and Burning Glass Technologies. This report summarises the major themes to emerge, with greater detail provided in the support document accompanying this report.

Key findings

Of the organisations and countries, four cases stood out. These were the Occupational Information Network Program, O*NET, from the United States; Singapore's Skills Framework; the classification of European Skills, Competences, Qualifications and Occupations (ESCO); and an information technology (IT) framework developed by an industry body (SFIA Foundation). Other approaches of merit came from the United Kingdom, New Zealand and Canada. The main features of the identified exemplar organisations are summarised below, while an overview on each follows.

- *Characteristics of successful skills information initiatives*

  A number of features were common to the successful skills information initiatives, including strong governance structures, processes to ensure timely and up-to-date data acquisition, logical structures and taxonomies of skills descriptions, and public access to such skills information.

  In the good practice skills information systems, the government took the lead, but with stakeholder collaboration and buy-in. Often a dedicated skills agency, the skills information body is linked with an industry organisation or sector-specific councils and has regional representation. Such agencies support skills information initiatives, systems and programs.

- *Identification and sourcing of data*

  Every data source has inherent strengths and weaknesses, meaning that drawing from a variety of sources is desirable. These sources include worker, employer and industry surveys, job vacancy and labour market information (LMI), and econometric exercises.

  The O*NET system provided a good practice example of how to link detailed skills information to the nation's standard occupation classification system. To ensure currency, new or 'modified' occupations are added in an expanded O*NET version of the classification system.

- *Access to and utility of skills information*

  Several skills information initiatives aim to act as 'first stop or one stop websites', that is, information portals catering for a range of stakeholders. For example, Cedefop envisions skills information access as comprising an interactive platform, supporting data and features that respond to the needs of different types of users — policy-makers, training or career practitioners or experts in skills needs anticipation.

- *Usefulness of skills information for curriculum developers and trainers*

  While many skills information models and frameworks aim to address this issue, this study was less successful in identifying clear examples of organisations where such skills information rapidly informs training, thus leading to modifications and updating. Worth mentioning here is the Ofsted[1] process in the UK whereby a training provider is assessed on how well the leadership and management team successfully incorporate labour market information into the planning, establishment and management of curriculum and learning programs.

Identified exemplar bodies

As flagged above, the desktop research singled out four international organisations whose approaches to the provision of skills information in meeting the needs and interests of learners, employers, and the local and national community were considered to represent best practice.

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1 UK Office for Standards in Education, Children's Services and Skills.

*United States: O*NET*

With a particular focus on providing occupational profile information to students and job seekers, O*NET is the primary source of skills information in the United States. Readily accessible to a range of stakeholders, it uses a common language for defining and describing occupations, while its flexible design can capture changing job requirements.

Central to the program is the O*NET database, containing information on hundreds of standardised and occupation-specific descriptors. The model is based on the rationale that every occupation requires a different mix of knowledge, skills and abilities and is performed using a variety of activities and tasks.

The model embodies the character of both occupations (via job-oriented descriptors) and people (via worker-oriented descriptors). It also allows occupational information to be applied across jobs, sectors or industries (cross-occupational descriptors) and within occupations (occupational-specific descriptors).

O*NET's main feature is the use of standardised surveys of job incumbents, which request information on the level of skills performed and their perceived importance in the job.

Singapore: Skills Frameworks

Launched in 2016, Singapore's skills strategy (Skills Futures), aims to make every student and worker responsible for their own learning path. Every Singaporean over the age of 25 years is provided with a lifelong $500 credit to use towards a range of government-supported training and education courses.

This strategy makes use of the skills information program — Skills Frameworks — to enable informed decision-making by students, employees, employers and educators. The Skills Frameworks program is being rolled out sector by sector and currently includes hotel and accommodation services, early childhood care and education, precision engineering and sea transport.

The Skills Frameworks website aims to provide up-to-date information on employment, career pathways, occupations, job roles and existing and emerging skills, as well as relevant education and training programs. A list of training programs that address skills gaps in each sector is included on the framework website.

European Commission: ESCO

In July 2017, ESCO, the classification of European Skills, Competences, Qualifications and Occupations, an integrated skills, occupations and qualifications platform was launched, the objective being to aid labour mobility in Europe.

ESCO, a multilingual platform, assembles disparate skills information via website-tagging technology (semantic web[2]), identifying and categorising skills, competences, qualifications and occupations relevant to the European Union (EU) labour market and education and training, and systematically shows the relationships between the various elements.

ESCO provides information about the skills required when working in a specific occupation or gained as a result of a specific qualification; it also displays the qualifications required or often requested when seeking work in a specific occupation.

It is envisaged that, by 2018, the system will possess the capacity to translate across the occupational or skills classifications and similar de facto standards of member nations, helping to strengthen the interconnectivity of national systems and enabling cooperation between member state authorities.

2 Semantic web, whereby web pages are structured and tagged in such a way that it can be read directly by computers.

IT community: Skills Framework for the Information Age (SFIA)

SFIA is a globally accepted common language for the skills and competencies required in the digital world. Begun as an initiative in the UK in 2000, this IT skills framework describes itself as the de facto global IT skills framework, now being used in nearly 200 countries by organisations and individuals to characterise and manage skills. SFIA does not define occupational roles or jobs; rather, it delivers flexible building blocks of skills descriptions at various levels of competence.

SFIA is a model suited to those fast-changing workplaces that are transitioning static job roles to more flexible project-aligned team-building IT skills. Individuals working in these organisations are described as 'distributed IT professionals' and are placed and used as needed throughout organisations.

Observations and learnings

The findings from the desktop survey highlighted the following significant issues:

- The examples of good practice frameworks demonstrate that occupational skills analyses encapsulate more than merely an analysis of qualifications and occupational titles, given that these can represent poor proxies for the actual discrete skills required and performed in diverse workplaces.
- Policies to reduce skills imbalances and prepare for future in-demand skills can only be successful if they are underpinned by accurate and timely information about skills needs, which in turn is supported by a comprehensive content model, established from a diversity of data sources, including sourcing information directly from workers and employers via regular and frequent surveys, as well as from online-vacancy data analyses.
- International best practice typically includes a dedicated skills agency, under the auspices of a national government, whose role is to coordinate skills information services. An important element of the design and construction of a skills information framework is consultation and cooperation with multiple stakeholders.
- Rethinking how occupational skills information could be analysed, stored and made accessible could provide an opportunity to simplify the structure and update of training products.

While this paper did not set out to make comparative analyses between Australia's situation and international examples and case studies, the findings from the 13 selected examples of international practices (see support document) do prompt reflection on Australia's present arrangements and offer an evidence base from which future discussion and debate could be initiated.

Australia already supports multiple information resources and repositories for existing skills, occupations and qualifications, for example, JobOutlook, managed by the Department of Employment; ANZSCO; training.gov.au; MySkills.gov.au, the Australian Core Skills Framework (ACSF), the Core Skills for Work Development Framework (CSWDF) and the Australian Qualifications Framework (AQF). International evidence and comparisons suggest that the full potential of these various resources may be unrealised, given the lack of an up-to-date and widely accessible integrated skills information framework.

From a narrow VET perspective, failing to address the issue of the lack of such a framework may risk the currency of training package information, while standard occupational information is likely to become increasingly disconnected from job reality. The lack of an accessible, comprehensive and up-to-date skills information framework means that individuals may fail to develop the appropriate set of skills for work and employers may have trouble finding people with the right skills sets.

The evidence indicates that other nations are making concerted efforts to create such frameworks, populated with contemporary and cross-referenced skills intelligence and maintained close to real time, the aim being to steer policy and inform training practices, which begs the question: what might be adapted from these various examples to benefit Australia?

Introduction

Skills are a key enabler to the prosperity of nations and to better lives for individuals in the twenty-first century. Skills contribute to economic growth both directly, through increased productivity, and indirectly, by creating a greater capacity in workers and firms to adopt new technologies and ways of working (OECD 2011, Productivity Commission 2017). The future risk of a widening mismatch between skills in demand and those in supply is largely the result of rapid advancements in technology. Moreover, the world of work is changing in ways that could make it more difficult for people to gain and maintain the skills needed for ongoing, consistent employment (Hajkowicz et al. 2016).

To navigate this environment, VET students and graduates, particularly at the low and middle skills level, need access to sound career advice and training based on up-to-date skills information. Young job seekers in particular face significant challenges, with up to 30% of young Australians aged 15—24 years now unemployed or underemployed (Foundation for Young Australians 2017). Not only is accurate and timely information needed on how skills are changing within occupations, but also which skills are transferrable across occupations (Cunningham & Villasenor 2014; Department of Employment 2017; European Political Strategy Centre 2016; Foundation for Young Australians 2017; Productivity Commission 2017, Snell et al. 2016, World Economic Forum 2016). Estimates suggest that on average when a person trains for or works in one job, they acquire skills for 13 others (Foundation for Young Australians 2017).

Australians entering the workforce today might have as many as five different careers and make 17 changes in employers over their working lives (McCrindle Research 2014). On average, by 2020, more than a third of the desired core skills sets of most occupations may be comprised of skills that today are not considered crucial to the job (World Economic Forum 2016). In many industries and countries, the most in-demand occupations or special skills sets did not exist 10 or even five years ago, and the pace of change is set to accelerate. The World Economic Forum (2016) estimates that 65% of children entering primary school today will ultimately end up working in completely new job types — jobs that do not yet exist.

To keep up with changes in the workplace, up-to-date occupational skills profiles need to be maintained and contain comprehensive descriptions of different skills types, including technical and non-technical or enabling skills; employers are increasingly placing a greater emphasis on non-technical and social skills or attitudes such as adaptability, resilience, team-working and communication (Cunningham & Villasenor 2014).

These discrete occupational skills are hard to track reliably for the purposes of analysis and statistics and therefore most commonly estimated by: the qualifications that individuals have previously acquired; or the occupational classification of the jobs they do (Dickerson et al 2012). Both of these approaches have the significant advantage of being relatively simple to measure, although they are poor proxies for the actual skills required by employers and used by individuals in the workplace (Beblavý et al. 2016, Dickerson et al. 2012, Lowry, Molloy & McGlennon 2008, National Research Council 2010). This predicament in terms of occupational titles and in this case, underpinning technical skills is illustrated by the following quote:

> The federal [US] government might have data on the demand for 'computer programmers', but you might know from your friends in IT that 'computer programmer' is not a very helpful term, says Matthew Sigelman, chief executive of Burning Glass Technologies. Are employers looking for programmers in Java or .NET or C#? That's what we're looking for. (Martinez 2016, p.1)

Future of work

Some commentators claim that the impact of technology and changing employment models (for example, length of contracts, location of work) are causing 'tectonic shifts [that] are re-shaping the ways that work is performed' (European Political Strategy Centre 2016, p.1). While substantial occupational disruption is expected, the relationship between technological innovation and employment is much more complex than is commonly understood (Spoehr et al. 2017). In relation to automation, routine tasks and capabilities rather than occupations themselves need to be the focus of assessments of the likely impacts of automation on employment. Such routine tasks are generally associated with jobs that require low and mid-range skills. The impact of automation on job skills can be estimated by the time that different tasks in a job take and which tasks are replaced or augmented by technology (AlphaBeta 2017). In the extreme case, this could mean that complete jobs are replaced, but it is more likely that workers spend more time on other tasks that cannot be automated. By way of example, retail workers may be spending less time at the register and more time helping customers, while factory workers may spend less time on the assembly line and more time optimising production and training other workers (AlphaBeta 2017).

In this new world of work, qualifications based on technical skills and technical knowledge are unlikely to be sufficient (Business Council of Australia 2017). Creativity, emotional intelligence and transferrable or transversal[3] skills will be in higher demand in the future (Business Council of Australia 2017; Cunningham & Villasenor 2014; Department of Employment 2017; European Political Strategy Centre 2016; Foundation for Young Australians 2017; World Economic Forum 2016). Research by the Department of Employment (2017) has found that more than two-thirds of Australian employers place at least as much emphasis if not more on employability skills than they do on technical skills, a finding reflected in a global survey of employers and human resources managers conducted by the World Economic Forum (2016). Occupations requiring strong social and non-routine analytical skills have grown dynamically in line with consistent growth in wages since the 1980s (Cunningham & Villasenor 2014; European Political Strategy Centre 2016), while interaction with digital technology will continue to rise (Committee for Economic Development of Australia 2016; Reeson et al. 2016; World Economic Forum 2016).

Training systems and skills information

An effective training system must therefore build people's capabilities to find work and to move between jobs and have a particular focus on ensuring that students and graduates, and specifically those who are disadvantaged in the changing labour market, continue to have opportunities to learn new skills (Beddie, Hargreaves & Atkinson 2016). Research by Snell, Gekara and Gatt (2016) found that due to a lack of advice workers focus on their technical skills when applying for jobs and do not consider other skills they may have developed, such as communication and knowledge of workplace health and safety.

Data modelling by the CSIRO (Reeson et. al 2015) for TAFE Queensland determined which skills and abilities are becoming more and less important in the workplace. Their modelling indicated that technology-design skills were represented in the jobs with the greatest employment growth, followed by mathematics, computer use and critical thinking skills. In the non-technical skills set the top three skills were service orientation, negotiation and active listening. Entrepreneurship and lifelong learning should also be added to the core skills (Payton 2017).

3 Transversal skills: transversal knowledge, skills and competences are relevant to a broad range of occupations and sectors. They are often referred to as core skills, basic skills or soft skills, the cornerstone for the personal development of a person.

The CSIRO (Reeson et. al 2015) report notes a troubling gap between the skills profile of the current workforce and the growing demand for more highly skilled workers. Given that VET providers train a large segment of the Australian workforce, the nation's competitiveness depends on VET providers training larger and more diverse student populations at higher skills levels (Reeson et al. 2015). Rapid change in work skills requires complementary well-managed and swift responses in the adjustment of training products, that is, training packages and accredited courses (Productivity Commission 2017). Relevant and timely information on skills needs is therefore key to updating vocational education curricula. Moreover, in line with maintaining currency in content, and doing it quickly, workplace training of the future may look very different (box 1).

Box 1 Will the future of ongoing upskilling in the workplace look like this?

The following example stretches the boundaries of traditional work-based learning methods. Augmented reality uses sensors and a network connection to display relevant information on a screen when and where it is needed, serving as an example of innovative combinations of human labour and computers. 'In a factory setting, workers could wear adapted glasses, combining a camera and photo-recognition software, to identify objects and display relevant information on a tiny screen mounted to the frame. The worker is free to manipulate a tool or machine as they read the instructions for the task.' Just as new technology forces workers to learn new skills, employers could also use it to train workers in those skills. 'By delivering information in the physical environment where it is used, augmented reality can condense the amount of time spent in classroom instruction and on-the-job training'.

(Adapted from Karsten & West 2017)

As expressed during a symposium on training product reform[4] in 2016, what is required is a system in which the skills described in training products are aligned to the needs of the modern and changing labour market, with these skills not only leading to employment but also being transferable (Beddie, Hargreaves & Atkinson 2016). In considering contemporary work patterns, participants at the symposium agreed that training products must capture the entire range: from a requirement to do a specific task, to a worker's capacity for holistic workplace awareness and social interaction beyond a particular job. The importance of an evidence base to underpin reform was raised, including information about possible future demand for skills and the likely types of skills, good data and research about the current system, and pilots to test new approaches (Beddie, Hargreaves & Atkinson 2016).

Information about foundation skills as described in two separate frameworks (Australian Core Skills Framework and Core Skills for Work Developmental Framework, Department of Industry, Innovation, Science, Research and Tertiary Education 2012, 2013) are of particular relevance as employers place increasing importance on skills like numeracy, literacy and employability skills. The Core Skills for Work Developmental Framework was recently used as a tool to investigate whether vocational training in the early childhood and aged care sectors focusses on the skills employers value most (Perkins 2017).

More comprehensively, some high-level information about the types and levels of occupational skills is found in national occupational classification systems (for example, ANZSCO in Australia). However, common to all standard classifications is a relatively slow update cycle, which may miss crucial changes

4 At the request of the Council of Australian Governments (COAG) Industry Skills Council (ISC) and the Skills Senior Officials Network (SSON), a National Training Product Reform Group, comprising representatives from all of the jurisdictions, considered the longer-term reform of training products at a symposium in 2016.

in some areas of skills, for example, digital and communication skills or traits like adaptability and resilience. The relatively static nature[5] of skills descriptions in occupational categories in ANZSCO can be problematic as it simply classifies occupations on the basis of entry-level skills, and thus fails to register increasing levels of proficiency within a job (Fraser, Junor & Hampson 2011).

The call to transition from occupations to occupational skills is echoed in migration policy, which highlights the usefulness of current skills descriptions by comparison with occupational titles. In an inquiry into migrant intake, the Productivity Commission (2016) noted that ANZSCO was found to be problematic because it is out of date for many occupations, or even missing relevant occupations; other inadequacies include brevity and 'static' skills descriptions in occupational classifications. Also not taken into account in ANZSCO is that occupation-specific skills can change by industry context: the same occupational title can encompass different skills profiles. For example, mechanical engineers in the transport industry have a different skills profile from those who work in the healthcare industry or infrastructure sectors (State & Rodriguez, cited in World Economic Forum 2016).

About the study

The objectives of this research are to:

- explore and document international best (and evolving) practices in the development and use of skills information frameworks and systems
- understand the policy context, governance arrangements and intended benefits arising from the establishment and maintenance of such frameworks and systems
- identify common practices in the management of data including the capture, structure and update of skills data within skills repositories
- investigate how the management of skills information could be integrated with skills and occupational standards (the equivalent of training packages and ANZSCO in Australia)
- examine evidence of the usefulness of and access to skills information resources, including how such resources link with and inform adjustments to skills training content.

Detailed information on 13 international skills information frameworks is provided in the support document. In the remainder of this report, important key principles and highlights are derived from these international case studies in order to identify the common features across current or evolving international best practice. This research examines these practices and identifies reasons for building and maintaining skills frameworks and investigates how skills information is captured, organised and classified within practical skills taxonomies.

This paper does not explore or compare current Australian arrangements with these international examples. The objective of this paper is to provide a comprehensive international review that offers an evidenced-based platform to inform local debate, including the merits or otherwise of adapting such approaches to Australian practice.

5 Revisions occurred in 2006, 2009 and then 2013.

Selection of international approaches

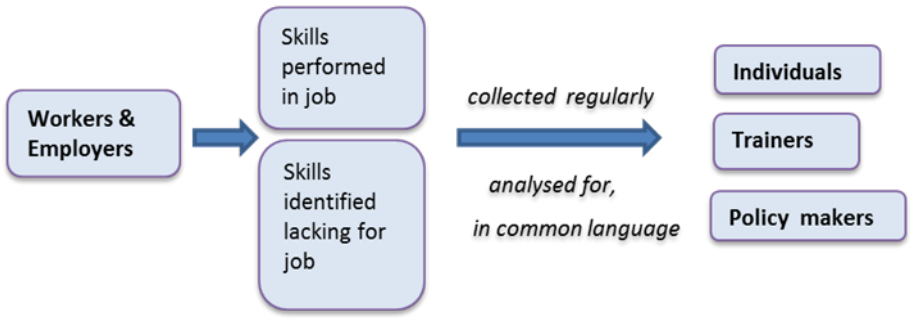
We conducted a desktop analysis of the frameworks, systems and tools readily available on public websites, and consulted the documentation associated with these sites in search of good practice examples of skills information initiatives in other countries, regions or industry bodies. These were mainly government or intergovernmental agency websites (for example, OECD, European Commission).

Selection process

To this end, the general suitability of skills information approaches was based on the notion of sourcing occupational skills information where it originates, that is in the workplace, flowing through to where the demand is for skills information (Figure 1). This information is of use for a range of stakeholders:

- Individuals such as students, employers and career advisors looking for training advice
- Developers of training content and trainers wanting to update their content
- Governments adjusting their workforce policies.

Figure 1 Flow of skills information



With this approach in mind, the search criteria for the desktop analysis included keywords and synonyms in the English and German languages, based on the objectives of this study (table 1). The education research database, VOCEDplus, Google and Google Scholar served as search engines. The year range was limited to January 2010 to March 2017.

Table 1 Desktop analysis: search criteria

Objective	Examples of search terms
Selection of international practices in development of skills information frameworks/systems	skill* system, model, framework, database, classification taxonomy, strategy, competency*, capability, vocational education, VET, TVET,
Management of skills data	data/information sourc*, collect*, survey
Integration with national standards	standard classifications, skill/competency standards
Evidence of utility	curriculum develop*, train*, educat*, learn*, policy

* Asterisks in search terms denote wildcard characters.

This search led to a 'long' list of 17 cases, which fully or partially addressed our search criteria (appendix A). This list was further refined on the basis of similarity of economies among countries, shared history of or highly regarded tertiary education systems, or prominence in the broader skills information literature. The final list (table 2) contained 13 cases that either addressed all or at least one of the four key objectives and those that, despite their not fully fulfilling the criteria, presented a new idea or concept of interest, for further investigation. The case studies (presented in the support document) in turn

informed the key findings and conclusions in this report. Each skills case provides an overview, purpose, operation, highlights and examples of application.

Table 2 Selected skills information approaches

Case	Country/organisation	Title or description	Type of initiative
1	OECD	Skills strategy	Skills strategy framework
2	CEDEFOP	Skills anticipation	Skills information guidelines
3	USA	O*NET	Skills information framework
4	Singapore	Skills Frameworks	Skills information framework
5	UK	Futures Programme	Project-based industry program
6	Canada	FutureSkills Lab	Skills funding proposal
7	Switzerland	Skilling overview	Skills information overview in TVET
8	New Zealand	1) Skills strategy proposal 2) Vocational Pathways	1) Skills strategy proposal 2) VET learning to earning initiative
9	Finland	Skills anticipation activities	Skills anticipation model
10	European Commission	ESCO	Occupation and Skills Classification Database
11	IT industry community	SFIA	IT industry skills information framework
12	Burning Glass Technologies	Real-time job data analysis	Internet vacancy data analysis
13*	NSW BVET /Researchers Wheelahan & Moodie	Capability framework	Normative capability framework

* The theoretical capability framework developed by researchers Wheelahan and Moodie (2011) was included in the selection as it provides a broader background to training and skilling by focusing on the capability of learners.

Defining occupational skills

The notion of 'skill' can be an elusive and difficult concept to define (Lowry, Molloy & McGlennon 2008). A number of different definitions for skills are used, mainly to distinguish them from similar or related concepts such as knowledge, competencies, tasks and jobs.

These approaches to skills definitions are more of academic interest and are not immediately useful in the realm of policy-making. Alongside the challenge of defining and measuring skills, personal characteristics such as motivation, empathy, inquisitiveness, a sense of humour etc. need to be considered. For the purpose of this report we adopted the definitions given in box 2.

Box 2 Defining skills, jobs and occupations

Skill and Competency: for practical purposes no distinction is made between competency and skill. A skill is the ability or capacity of an individual to act appropriately in a given situation. It involves the application of knowledge (explicit and/or tacit), the use of tools, cognitive and practical strategies and routines, and implies beliefs, dispositions and values (for example, attitudes) (OECD 2016a).

Job: a job is defined as an explicit or implicit contract (relating to the provision of labour input, not to supplying output of a good or service) between a person and a resident institutional unit to perform work (activities which contribute to the production of goods or services within the production boundary) in return for compensation (including mixed income of self-employed persons) for a defined period or until further notice (OECD 2002).

Occupation: a set of jobs whose main tasks and duties are characterised by a high degree of similarity constitutes an occupation. Persons are classified by occupation through their relationship to a past, present or future job (OECD 2001).

For the purpose of comparing and referencing skills, it is practical to provide skills categories or types. A useful categorisation of skills types in a skills policy context is provided by Cunningham and Villasenor (2014), whose framework — comprising four categories of skills type — is based on a meta-analysis of employer surveys. Cunningham and Villasenor's categorisation (table 3) enables tailored approaches to skills development in training and assessment. For example, technical skills can be taught and assessed by a work supervisor, but attitudes and social skills are better observed by skilled pedagogues and counsellors. A comprehensive list of individual skills, by category, is found in appendix B. Skills from all four categories are usually present in all jobs but to varying degrees.

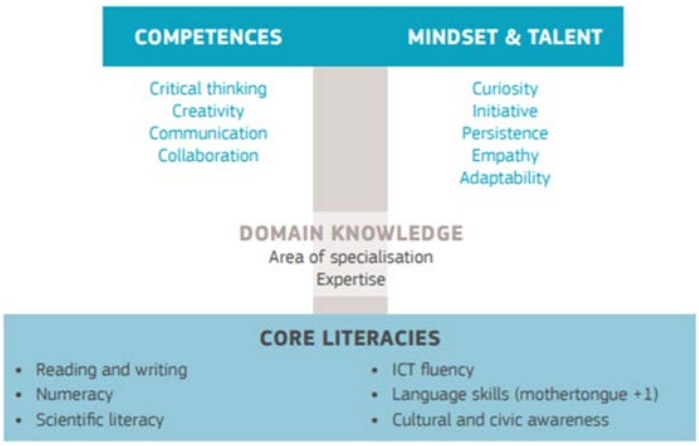
Table 3 Skills categorisation

Skill category	Definition	Example
Technical	Technical skills can be defined as those abilities that are associated with the specific knowledge required by an individual to carry a task.	This may be the ability to repair a car's muffler, the knowledge to identify specific bacteria under a microscope, or the know-how to sew a dozen shirts per hour.
Lower-order cognitive	Ability to capture basic academic knowledge.	Literacy and numeracy.
Higher-order cognitive	Ability and capacity to deal with complex information processing in a professional environment.	Critical thinking, time management.
Socio-emotional	Referred to by economists as non-cognitive skills, these are behaviours, attitudes and personality traits that determine how we do things.	Teamwork, customer awareness, honesty.

Source: adapted from Cunningham and Villasenor (2014).

A useful depiction of the composition of skills types and how they make up the skills profile of an occupation is the T-shaped skills model (European Political Strategy Centre 2016). The vertical line in the 'T' represents the depth of an expertise in a single field (domain knowledge), while the top horizontal bar is the ability to collaborate across disciplines (figure 2). These skills are founded on a base of core literacies common to all jobs.

Figure 2 Core skills for resilience for a changing world of work



Source: European Political Strategy Centre (2016).

Presentation of key findings

As flagged earlier, the findings of this study are based on 13 skills cases (referenced in the text by their case numbers), identified from a desktop audit and complemented by insights from a country comparison conducted by the OECD (2017b). In this report the observations and findings from the case studies are presented according to the themes of:

- the rationale for skills frameworks
- their governance arrangements and the benefits flowing from them
- the collection and assembly of skills data
- access to and the usefulness of information on skills.

Skills frameworks, governance and benefits

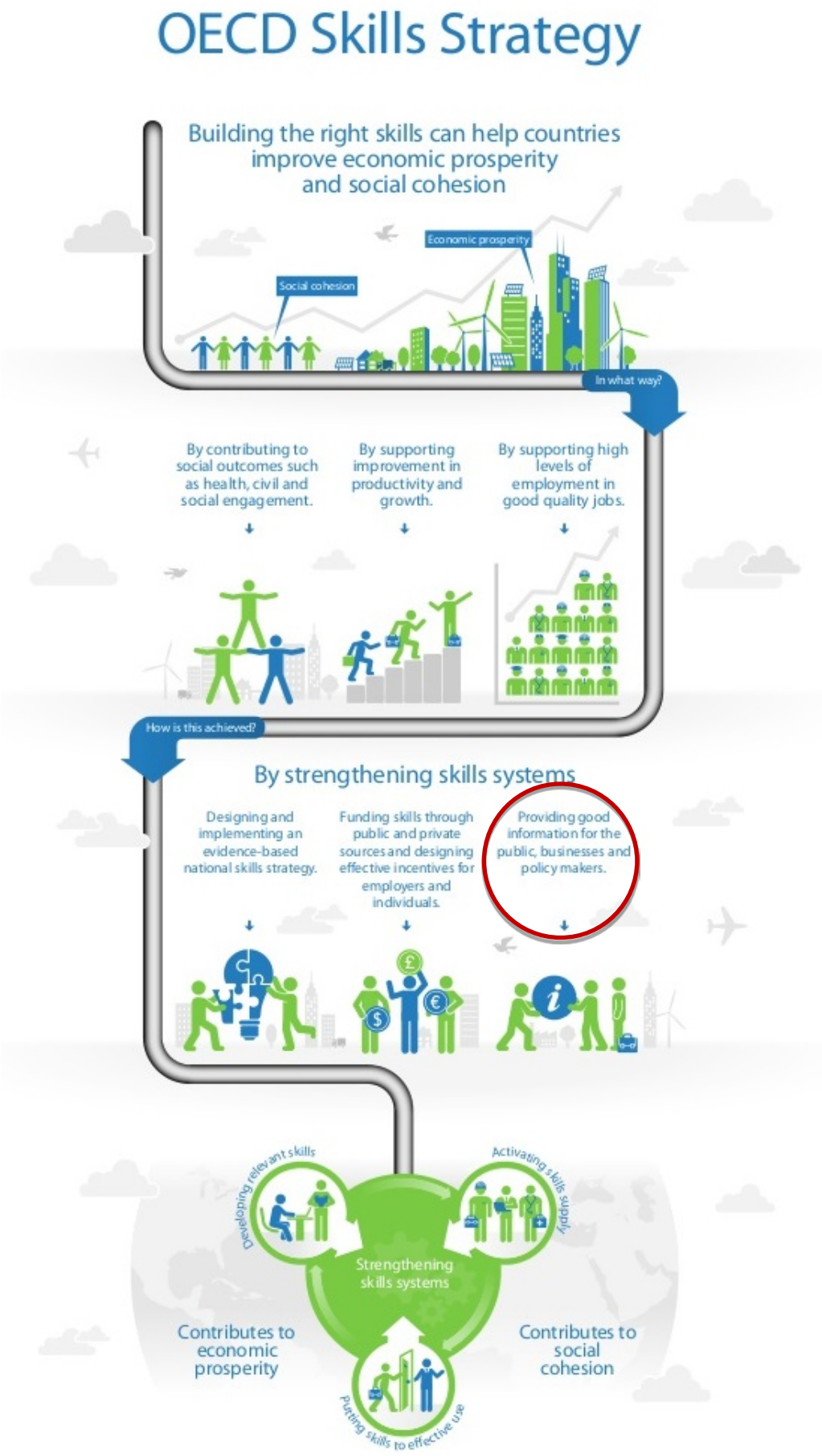
The supply of and demand for skills is shaped by both structural and cyclical factors, each of which affects countries in different ways. For instance, economic growth, changes in the composition of economic output over time and the so-called megatrends are all important macroeconomic factors influencing the demand for skills (Case 1, OECD 2017a). On the other hand, labour market trends, migration, and training and education outcomes play an important role in defining the supply of skills.

Many countries have developed skills strategies to address some or all of these issues from national perspectives (Case 1, OECD 2017a). To facilitate a cross-government approach and learning on effective skills policies and to address the global dimensions of the supply of and demand for skills, the OECD suggests that a successful skills strategy will result if the following steps are taken in its development:

- Establish a common language to describe skills
- Improve the measurement of skills
- Identify essential skills for the future
- Understand skills mismatch
- Improve skills training for the unemployed
- Develop sound strategies for skills financing
- Provide guidance for national policy development and implementation (Case 1, OECD 2017a).

Further, during the process collaboration must occur across ministerial portfolios and levels of government, while engaging all relevant stakeholders — employers, trade unions, and education and career organisations. Integral to a skills strategy is the provision of good information for the public, businesses and policy-makers (figure 3, emphasis added). To tackle skills imbalances, it is essential that countries develop effective skills policies, based on reliable information relating to skills needs (Case 2, Cedefop 2016; Case 1, OECD 2017a). This includes setting up systems for the assessment and anticipation of skills needs and ensuring that this information feeds into education, training and labour market policy (Case 2, Cedefop 2016).

Figure 3 OECD skills strategy



Source: OECD (2014; our emphasis added).

Stakeholder consultations

A review by the OECD (2017b) found that, in some countries, the key stakeholder ministries such the departments of education and employment, public employment services or education providers are not sufficiently engaged in the collection and use of information on current and future skills needs. As skills imbalances affect a number of different actors, it is critical to involve a representative group of stakeholders. In the majority of the countries involved in the OECD review (2017b), the government plays a key role in collecting information on skills needs, although in some, special bodies are tasked to carry out the assessment. Methods for assessing current and future skills needs range from econometric models and composite indices, to recruitment difficulties surveys.

Coordinated mechanisms need to be in place to ensure that stakeholders work effectively together to assess and use skills needs information (OECD 2017b). Several examples of good practice are available, the best being the UK Commission for Employment and Skills (UKCES), an agency comparable with Australia's (now-defunct) Skills Australia/Australian Workforce and Productivity Agency. The UK Commission for Employment and Skills (abolished in 2017) played a key coordination role in the production of skills intelligence and in encouraging responses at the sectoral and regional level through industry skills bodies (UK Case 5). Industry councils also play a key coordination role in Canada and Singapore (Cases 6 and 4), while independent bodies such as national skills advisory groups help improve coordination in Finland (Case 9).

Engagement mechanisms

A variety of mechanisms have proved successful in helping stakeholders to reach consensus, including working groups (for example, the inter-ministerial skills working groups in the United States) or roundtables with specific objectives and timelines (for example, in the Netherlands, where they are used to enhance collaboration across regional/sub-regional administrative levels) (OECD 2017b).

In the majority of the countries surveyed by the OECD a variety of ministries, government agencies, bodies at regional and sub-regional administrative levels, and the social partners are involved in discussions on future skills needs and in the subsequent development of appropriate policy responses. The number of actors, as well as the diversity of interests and institutional objectives, may make it difficult to reach consensus when deciding, first, what the skills needs are and, second, the most appropriate policy response (OECD 2017b).

Being realistic

Encouraging dialogue between stakeholders is an obvious first step, but it pays to be realistic, by entering the process with 'open eyes' and recognising that agencies and stakeholders have limited time for debate and discussion (OECD 2017b). Several mechanisms exist across the countries to facilitate consensus-building and to overcome potential conflict among the stakeholders involved in skills needs assessment. These mechanisms include inviting stakeholders to participate in the advisory boards of key agencies or actively involving them through thematic workshops: Singapore, UK and the IT body SFIA (Cases 4, 5 and 11 respectively) provide examples how this can be achieved. Other consensus-reaching mechanisms include developing a legal framework that requires the engagement of different stakeholders in the process; involving high-level political representatives; and framing the discussions around very concrete and short-term objectives (OECD 2017b).

Collection and assembly of skills data

Policies to reduce skills imbalances can only be successful if they are underpinned by accurate and timely information on skills needs. An effective skills information framework demands the inclusion of high-quality — timely and relevant — skills information, achieved through a variety of data-collection exercises. Most countries conduct some form of skills needs assessment, including future skills needs, but there are important differences in the quality of these data and the way they are used (OECD 2017b).

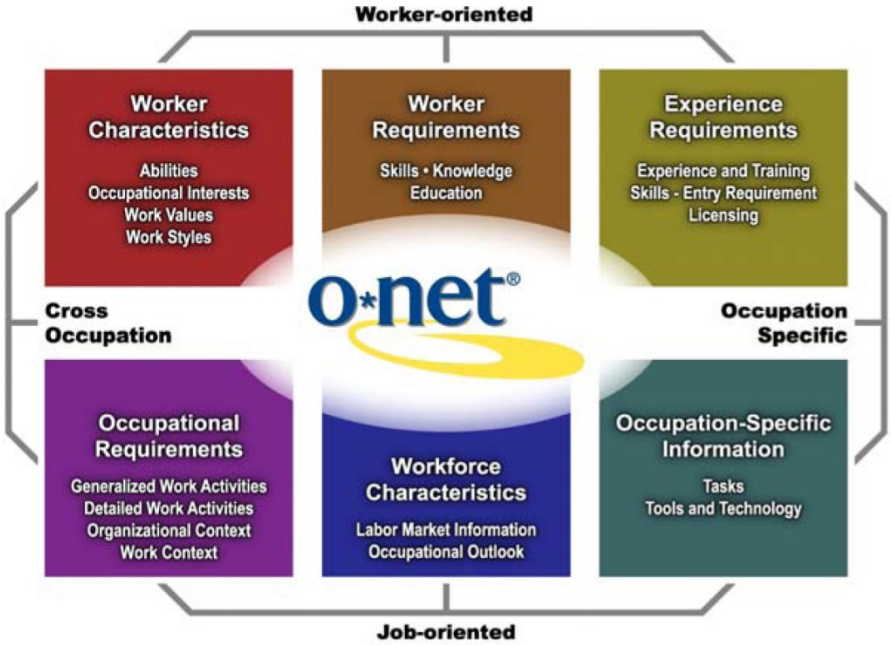
The OECD review (2017b) confirms that the level of stakeholder involvement in skills-assessment activities varies widely across countries, with several types conducted in each of the countries examined. For instance, many initiatives rely on a mix of information from econometric analyses, job-vacancy information, employer and industry surveys, wage and employment pressures, and forecasting exercises (OECD 2017b). The mechanisms designed to enhance collaboration and coordination among the relevant parties also differ significantly.

Looking at the skills cases in this report: at one end of the scale is a system such as that operating in Switzerland, where skills information processes are integrated in the creation and update of training curricula (Case 7). The VET system in that country has a long tradition of industry-led workplace training, whereby skills in demand are closely monitored by the training system. In other countries, more responsibility for identifying relevant skills for work is placed on individuals such as training providers and students. This is the case in countries like the United Kingdom, Canada and the United States, where the link between vocational training qualifications and occupations, apart from apprenticeships and 'registered' occupations, is less direct (Wheelahan & Moodie 2017). Identifying skills within occupations, via their occupational information network, O*NET, has been a long established exercise in the United States (Case 3).

Content model of occupational features

A comprehensive skills information framework addresses the labour market and workplace factors that affect how an occupation is shaped (figure 4). The content model of O*NET (Case 3), which was developed using research on job and organisational analyses, strives to reflect the character of occupations (via job-oriented descriptors) and people (via worker-oriented descriptors). The content model also allows occupational information to be applied across jobs, sectors or industries (cross-occupational descriptors) and within occupations (occupational-specific descriptors). These descriptors are organised into six major domains, enabling the user to focus on the areas of information that specify the key attributes and characteristics of workers and of occupations.

Figure 4 O*NET® content model: anatomy of an occupation



Source: US Department of Labor, Employment and Training Administration (2017).

Drawing from a variety of data sources

Given the inherent strengths and weaknesses of the various types of skills data source, drawing from a variety of sources is desirable. For instance, the Migration Advisory Committee in the UK relies upon both quantitative information (for example, vacancy, wage and employment data) and qualitative stakeholder reports to assemble its shortage occupation list for migration policy (OECD 2017b).

In the US, the O*NET skills information system conducts regular surveys of workers and job experts for skills, and accesses online vacancy data for technical or tool-related skills (for example, IT software skills) (Case 3). A number of other countries, among them Australia, and organisations, such as Cedefop, are using O*NET's data as a readily available occupational skills repository because a good correlation between occupations and the working environment exists. However, some limitations, and even problems, can arise when countries other than the US rely only on O*NET content; this occurs when skills profiles are not mapped correctly to other countries' occupations or if occupations exist in one country but not on O*NET (Dickersen et al 2012).

Europe's ESCO platform (Case 10), an integrated classification system of skills, occupations and qualifications, has been developed as part of an emerging semantic web for use in the labour market and the education and training sector. The semantic web aims to transform the internet from a collection of documents, such as job vacancies, CVs and training courses, into a web of interlinked, standardised and reusable data.

In New Zealand (Case 8), the Spotlight Skills Recognition Tool, a skills taxonomy, was developed initially for the purpose of validating underspecified and, consequently, under-recognised, interpersonal and work-organisation skills in the public administration, health and education sectors (Hampson, Junor & Smith 2008; NZ Ministry of Business, Employment and Innovation 2017). It has since been applied to jobs in the non-government social and community services sector in both New Zealand and Australia. For example, it was used to provide evidence of unrecognised skills in a recent successful application by the Australian Services Union for an equal remuneration order; affirming occupational descriptions were not in line with actual skills required and thus jobs were undervalued in this sector (Fair Work Australia 2012).

Classification systems

Standard skills classification systems function as a complementary rather than a primary source of occupational skills information. Occupational categories do not facilitate comparisons of job skills requirements across jobs (National Research Council 2010), requiring instead a common metric or taxonomy, one where skills within occupations are classified. Such a taxonomy should be based on sound social science, and grounded empirically in direct measurements of the job tasks, aptitudes and duties of the incumbents of each occupation (National Research Council 2010). Skills classifications have become more prominent as it has become clear that the traditional occupational classifications have failed to reflect labour market transformation and the interdependencies between occupations (Markowitsch & Plaimauer 2009). Further, as Beblavy et al. (2016) note, new and emerging occupations are not being reflected in classification systems. Skills classifications such as facilitated by the European ESCO and US O*NET databases have now become a key concept in the debate on new and emerging occupations (Beblavy et al. 2016).

The most prominent of classification systems is the O*NET database, which contains hundreds of standardised and occupation-specific descriptors on occupations across the entire US economy. While O*NET's content model defines the information structure for a single occupation, the O*NET-SOC taxonomy defines the set of occupations across the world of work (US Department of Labor, Employment and Training Administration 2017). Based on the Standard Occupational Classification external site, the O*NET-SOC taxonomy currently covers almost 1000 occupations, all of which are updated constantly according to a specific schedule.

Labour market intelligence

Labour market intelligence is a vital ingredient in a skills information framework. It includes occupational and skills analyses and forecasts, which enable understanding of skills gaps and therefore a better alignment between the supply of and demand for occupations and skills in the labour market. A number of countries and organisations place a strong emphasis on linking labour market intelligence to training information (Case 1, OECD 2017a; Case 5, UK Futures Programme).

Labour market intelligence and skills anticipation

Cedefop's skills anticipation and matching resources (Case 2; Cedefop 2017) include guides and benchmarking tools on how to use labour market information effectively. The labour market information guide describes the relevant methods, approaches and components for the interpretation of labour market intelligence, as well as the conditions and operation of the labour market. It includes various measures, recent and projected trends, and restrictions and challenges to be considered in analysing labour market intelligence (Cedefop 2016).This guide provides advice and recommendations for policy- and decision-makers on how to respond to market signals and how to react to early warning messages driven by labour market intelligence. Technical analysts and professionals can use this information as a means for identifying how labour market intelligence systems can be further developed and used for policy analyses and interventions.

SkillsDMC, a former industry skills council for the Resources and Infrastructure Training Package acknowledged the usefulness of the labour market guides developed by Cedefop and its partners and offered an example in its comprehensive *Resources and infrastructure: industry workforce analysis and forecast* (SkillsDMC 2017). Developed in 2016, the forecast aims to provide 'information and reasoned forecasts on the Australian resources and infrastructure industry's skilling needs, challenges and

opportunities' (p.3). In effect, this report serves as a long-term planning document for the rapidly transitioning resources and infrastructure industry, and for preparing industry participants for both the challenges and opportunities ahead.

Surveys and other 'traditional' skills data sources

National, regular and standardised surveys of the workforce, employers and job experts are the backbone of first-class skills information systems and initiatives such as O*NET (Case 3), Cedefop's skills surveys (Case 2) and the OECD's skills information instruments such as PIACC.

The Survey of Adult Skills, a product of the OECD Programme for the International Assessment of Adult Competencies (PIAAC), measures adults' proficiency in several key information processing skills, namely, literacy, numeracy and problem-solving in technology-rich environments (OECD 2016b). Similar to the O*NET survey approach, PIACC uses a 'job-requirements approach' to ask employed adults about a number of generic skills, including how intensively and how frequently they use these skills at work. Information is also collected on four broad categories of generic work skills: cognitive skills, interaction and social skills, physical skills, and learning skills.

*O*NET surveys are exemplary*

The O*NET model is exemplary in the scale, coordination and depth of its survey, by occupation, of the skills, abilities and knowledge of workers (Case 3). O*NET re-surveys occupations on an ongoing basis and a completely new set of ratings becomes available about every five years. This has great potential use in capturing within-occupation skills change (Handel 2016), a situation which cannot be achieved by standard occupational classification systems. O*NET's Knowledge, Skills, Abilities, and Work Activities questionnaires ask two-part questions on both the importance and levels of a given skill or characteristic.

UK Employer Survey captures skills difficult to recruit

The UK undertakes employer surveys to gauge the country's current level of skills demand and the extent to which they are experiencing skills shortages (Case 5). The most important one is the Employers Skills Survey (ESS, United Kingdom) which provides comprehensive insight into skills needs, vacancies, skills shortages and skills gaps (Cedefop 2017, Skill Panorama website). The survey, which is conducted every two years, collects data from businesses with one or more employees across sectors and the UK, and covers employers' recruitment activities, the occupations for which they have been recruiting, and whether they have experienced difficulties recruiting people with the desired skills. This provides an indication of skills mismatch at the occupational level. The strength of the survey is that it provides information about those skills employers find difficult to recruit. However, it is not always clear whether difficulties recruiting staff are due to, for instance, relatively poor working conditions or a genuine shortage of skills in the external labour market, although advances have been made over the years in addressing this issue (UK Commission for Employment and Skills 2016).

The employers skills survey feeds into a UK online portal (LMI for All). Now a repository of a vast range of skills data, LMI for All provides national-level data on labour market information for IT developers and others to produce a range of website tools to help inform career choices and decisions. The aim of LMI for All is to make skills and other labour market data available to a wide range of stakeholders (UK Commission for Employment and Skills 2016).

Canada's FutureSkills Lab taps into employer's own data

Canada's FutureSkills Lab program (Case 6) recognised that corporations have a significant role in the generation and collection of labour market information and that this employer data is a critical resource

for forecasting skills needs. For example, while employers may not know exactly how many engineers they will need in five to 10 years, they can, in all probability articulate the types of foundational skills (for example, technical literacy) needed. Given that some employers keep high-quality data, the FutureSkills Lab program would consider ways to unlock this valuable proprietary data, perhaps, it is suggested, by engaging employers on an annual skills and competency survey and offering a report of trends and findings in exchange.

Real-time, online skills demand and supply data

Gaining access to traditional labour market information can pose several challenges; for example: the high cost of data collection; the data lag behind real-time developments in the labour market; and, occasionally, insufficiently detailed information to understand skills gaps. Real-time labour market information uses big-data analyses to overcome these shortcomings, utilising 'big data' information sources such as online job and resumé advertisements, which that can be exploited instantly.

Traditional labour market data are structured around broad job categories, and all jobs within those categories are presumed to be identical in terms of the skills, experience and education they require (Case 12, Burning Glass Technologies 2017). By contrast, real-time job-market data can be much more specific, reflecting how jobs differ within and across sectors and geographies.

Online job vacancy 'mining'

In recent years online job advertisements have proliferated, and government agencies and the research community are increasingly experimenting with online job data, in particular breaking it down in order to study skills in demand and labour market dynamics more generally. Online job-advertisement data show great promise, especially in combination with other educational and labour market data. Used carefully, these data offer insight and suggest rich new areas for the development of employment and educational services (Case 12; Carnevale, Jayasundera & Repnikov 2014).

Compared with the point-in-time snapshots provided by survey-based labour market data, which rely on random sampling, online data are cost-effective and have the capacity to improve the accuracy of labour market forecasts. They are able to produce supplementary estimates of demand within detailed occupations, industries and geographies (Case 12; Carnevale, Jayasundera & Repnikov 2014), and also provide the relative demand for different types of skills and levels of education.

The real-time nature of job-vacancy data also allows for the early detection of labour demand trends, which gives job seekers, employers and policy-makers a forward-looking analytical tool. Real-time labour market indicators can be particularly useful in aligning education and training curricula with workforce needs in emerging or rapidly changing industries, such as healthcare and information technology (Carnevale, Jayasundera T & Repnikov 2014).

Online job-vacancy analyses demonstrate that the precise skills an employer expects from an occupational title can vary according to geography. Using the example of a marketing manager in the United States, in Chicago employers appear to emphasise project management skills, whereas in San Jose, the heart of Silicon Valley, it is product development skills, and in the 'casino capital', Las Vegas, employers request customer service skills above other skills (Case 12, Burning Glass Technologies 2017).

Tapping into individual online data on jobs and people thus provides new opportunities for better tracking and anticipating gaps in skills, mapping mismatches and marrying employers' needs with employees' capabilities. This approach also offers transparency, enabling individuals to understand potential career options and education and training requirements, and how these are remunerated in the

labour market (World Economic Forum 2016). Interestingly, the O*NET system (Case 3) uses online vacancy data only in the area of tools and technologies.

Online job-vacancy data analyses revealed that lower-skill jobs seem to face the widest gaps in foundational skills (Burning Glass Technologies 2016). In the online postings a number of foundational skills are emphasised out of proportion to what traditional job definitions would appear to require, suggesting that employers struggle to find people with these skills. Employers in fields such as hospitality, food and tourism, and personal care and services, expressed a particularly strong requirement for skills such as basic maths (Case 12, Burning Glass Technologies 2016).

Despite increased usage, there has been only limited research assessing the usefulness of this data source. In the US, and possibly in the Australian labour market, it is estimated that between 60 and 85% of job openings are now posted on the Internet, but these job ads are biased toward industries and occupations that seek high-skilled white-collar workers (Carnevale, Jayasundera & Repnikov 2014; Case 12, Burning Glass Technologies 2017).

Job-vacancy data are subject to systematic errors, introduced by how employers utilise the Internet for their talent search; the vendor data-collection processes; and the effectiveness of the artificial intelligence used to collect and single out the information from the advertisements. If ignored, systematic errors can undermine the predictive power of the data and distort public policy decisions. Currently, online job-vacancy data may not meet the traditional standards of labour market information or government statistics, but there is merit in carefully implementing this tool in conjunction with traditional data, particularly as it becomes more robust and viable (Carnevale, Jayasundera & Repnikov 2014). As Johnson (2016, p.1) notes:

> Given significant limitations to real-time LMI itself, including examples where real-time LMI leads to suspect policy action, some experts see it as a useful supplement — or an additional labor market 'lubricant' — but not as a replacement for or savior of traditional systems.

Online resumé 'mining'

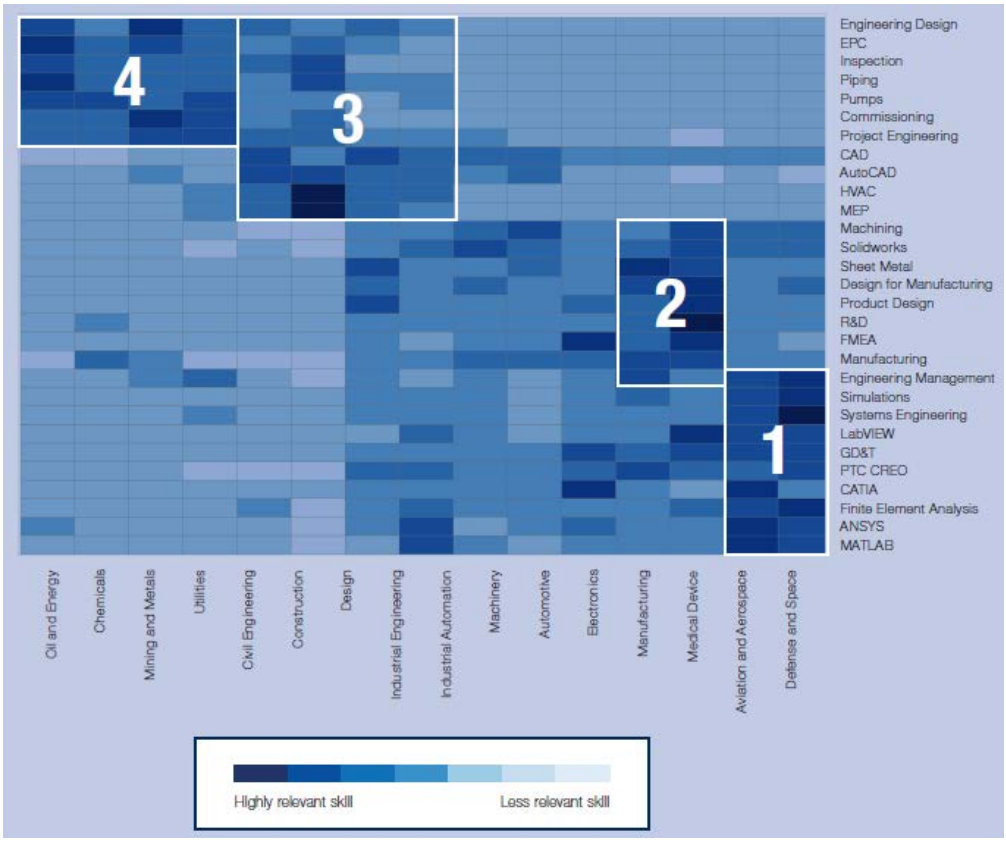
As online resumé mining is an emerging data source, less information was found on this aspect in any of the skills cases. In New Zealand (Case 8) VET students are encouraged to build skills portfolios that demonstrate which units of their program relate to the various industry areas and their pathways. These portfolios are accessible to potential employers, who are able to gain insight into the applicability of the training undertaken by the student to the employer's skills interests (see a portfolio illustration on page 36 in this report and NZ Case 8 in support document).

By way of an example of how to exploit online data on the skills supply side (job seeker data) and to map labour market changes, the analytics employed by the professional profile platform, LinkedIn, describe each job function as an agglomeration of skills (State & Rodriguez, cited in World Economic Forum 2016). This enables the platform to track changes in the skills landscape as members update their professional information, which in turn allows the platform to identify the clusters of skills associated with the profiles of members with common job functions and titles, and to map how these change over time. It also allows the identification of nuances and differences between the skills sets of common job functions in different industries or geographies.

For example, a skills heat map, a representation of data in the form of a map or diagram in which the intensity of data values are represented as colour intensity as shown in figure 5, can highlight that the most common skills reported by mechanical engineers vary across different industries (State & Rodriguez, cited in World Economic Forum 2016). Mechanical engineers working in various sectors of the

mobility/transport industry have similar skills but their skills differ from the skills of those who work in the healthcare industry or the energy and infrastructure sectors.

Figure 5 Common skills reported by mechanical engineers across different industries (LinkedIn Analytics)



Source: State & Rodriguez, cited in World Economic Forum (2016, p.17).

By calculating the skills recently added to members' profiles as a percentage of those who had already reported that skill, it becomes possible to identify the skills whose supply is on the rise in particular industries or geographies (State & Rodriguez, cited in World Economic Forum 2016). This supply-side analysis can be complemented by an analysis of skills demand — whether based on job listings, within job-hiring rates, government forecasts, or employer surveys — to identify emerging skills gaps and to inform training and skills programs, with the aim of preparing the workforce for future requirements.

Similar limitations to those of online job-vacancy data hold true for resumé data, specifically that the online professional profile is self-compiled and may be skewed towards industries with highly skilled professionals.

Data update cycle

Skills information for occupations needs to be continually updated through regular surveys and online job data. Ideally, skills descriptions should keep pace with movement in the labour market. The frequency of updates can differ according to the type of occupation and skill. It makes sense for IT programmers to update information on programming skills annually (Case 11, SFIA), whereas in more traditional occupations, such as teachers, the principal pedagogical skills can be retained for a much longer period, with no need for annual updates.

The O*NET system (Case 3) demonstrates that the frequency of updates is different for skills based on tools and technology, where online vacancy data are used. More enduring categories such as values and interest may be over five years old, whereas work activities or tools and technology may be updated every one to two years. The Singapore Skills Framework updates its information about every two years (Case 4).

Access and utility

This section summarises the findings from the 13 skills initiatives on the output from skill information systems and the usefulness of skills information for various stakeholders.

Making the best use of the information relating to the assessment of current and future skills is a crucial challenge for many OECD countries (OECD 2017b). Governments usually use information about skills to:

- update occupational standards
- design or revise training policies for workers or the unemployed
- design, revise or decide on the allocation of courses in formal education.

This information is used in many countries to inform the development of vocational education and training programs or apprenticeships, while some governments may use the information to guide migration policy, as well as their transition to a digital or green economy (OECD 2017b). Career services use skills information to inform workers and students about trends in skill demand and supply.

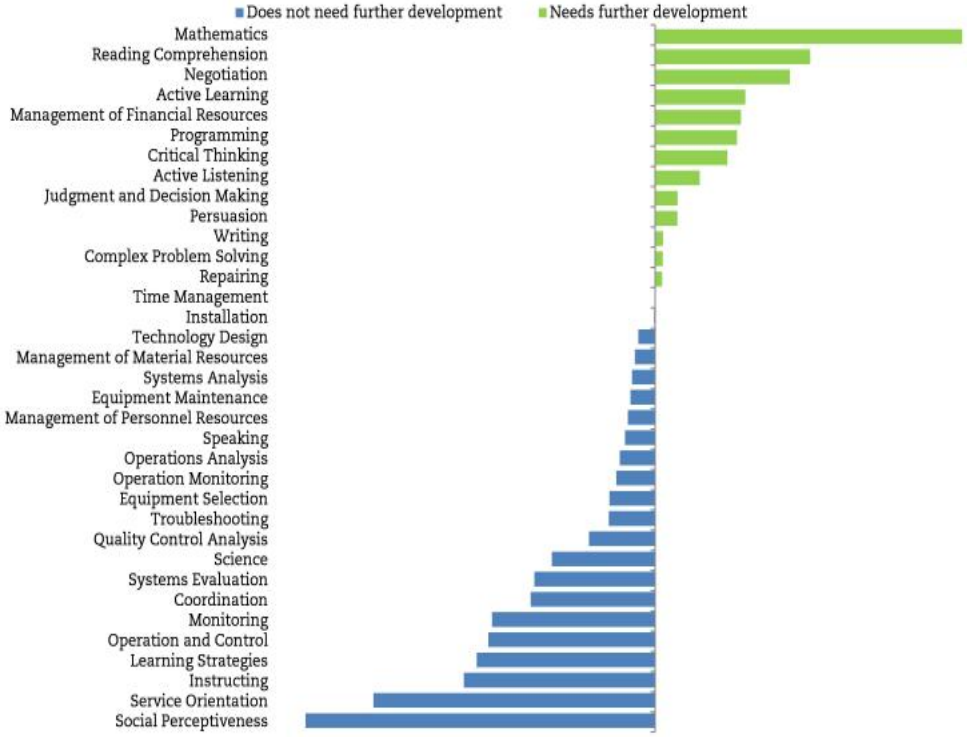
Access to skills information

Several skills information initiatives aspire to function as an information portal catering for a range of stakeholders, that is, 'first stop' or 'one stop websites'. For example, Cedefop (Case 2) envisions its skills information output as a lively interactive platform with data and features responding to the needs of different types of users, irrespective of whether they are policy-makers, practitioners working in employment agencies and guidance services, or experts in skills needs anticipation. O*NET (Case 3) leads the way, with information from the O*NET database forming the heart of O*NET OnLine, an interactive application for exploring and searching occupations.

OECD Skills for Jobs database

Launched in July 2017, the OECD *Skills for Jobs* Database provides information for European countries and South Africa about skills shortages and surpluses, as well as data on qualification and field-of-study mismatch. Information about surplus and shortage at the occupational level is translated into skill needs by mapping the occupations to their skill requirements (Case 1, OECD 2017c). The database provides information on a wide range of skills, including cognitive skill, social skills, physical skills and a set of knowledge types which it sources from the O*NET database. In the *Skill for Jobs* web tool the skill requirements of occupations can be compared to see which skills need to be further developed through training. These training profiles allow individuals to see which skill investments would be required to move from one occupation to another, and ideally from a surplus occupation to a shortage occupation (see example in figure 6, Vandeweyer 2017).

Figure 6 Training profile for 'Legal, social and cultural associate professionals' wanting to switch to 'Business and administration associate professionals' jobs (Italy) (Vandewyer 2017)



Source: (OECD, Vandewyer 2017)

Career guidance counsellors can use the Skills for jobs web tool to provide advice that responds to labour market needs. Employers could use the Skills for Jobs web tool to identify occupational skill profiles that are similar to those they require in order to maximize their chances of recruiting for hard-to-fill vacancies (OECD 2017c).

Examples from Singapore and the UK

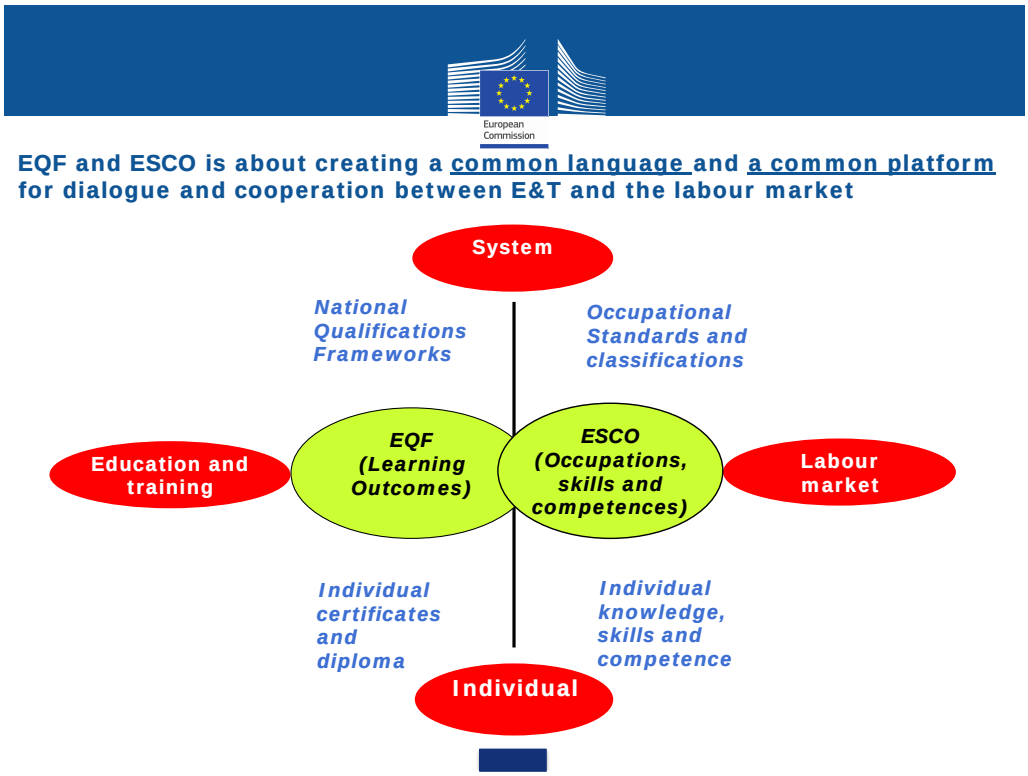
The comparatively new Singapore Skills Framework site (Case 4) provides videos, information and frequently asked questions, specifically tailored to students, employees, employers, career advisors and training providers. Beginning in 2016, information on skills has become available progressively for selected industry growth sectors. The information is organised in a structured manner, starting with background information about the sector before detailing the workplace context and covering career pathways and occupations/job roles, as well as the skills needed for these occupations/job roles. The information in the Skills Framework also includes a listing of training programs to address skills gaps and for skills advancement.

The UK labour market portal (Case 5), LMI for All, has become a repository of a vast range of skills data and provides national-level data on labour market information. As mentioned earlier in the report, the aim of LMI for All is to make skills and other labour market data available to a wide range of stakeholders. Skills data with labour market indicators are mapped to Standard Occupational Classification (SOC) categories at a detailed occupational level (4-digits, the most detailed level in the UK classification system). Data are disaggregated to occupation, region, gender, age and employment status.

Europe's ESCO skills classification

An initiative worthy of close monitoring is Europe's recently released ESCO platform — European Skills/Competences, Qualifications and Occupations (Case 10) — a classification that provides an integrated approach to information on skills, occupations and qualifications (figure 7).

Figure 7 Role of ESCO classification



Source: Nomden (2012).

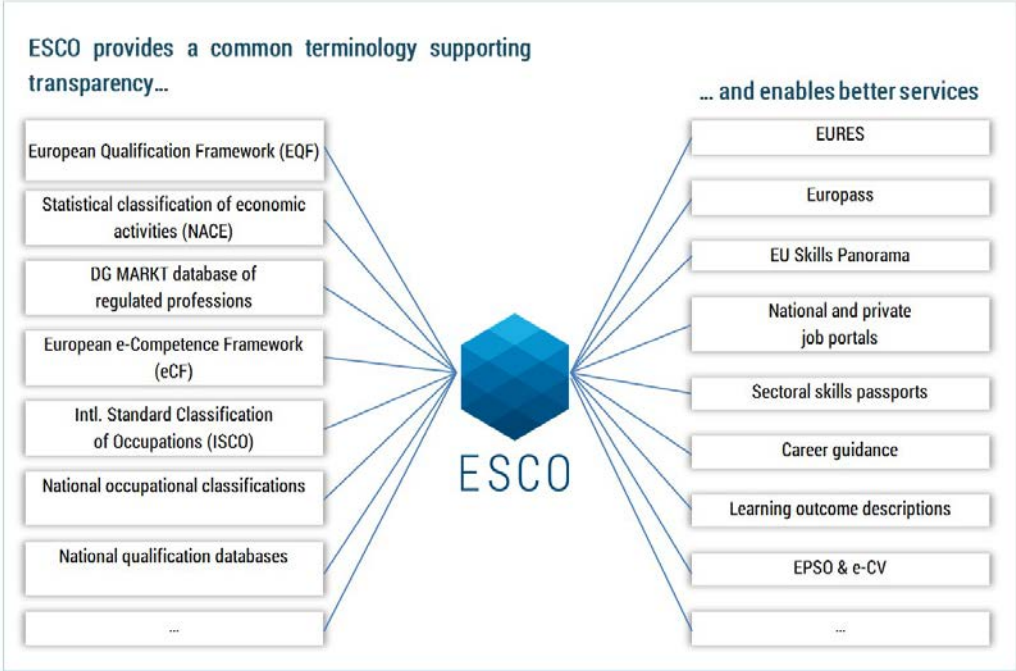
Interlinked (via semantic web technology) standardised and reusable data from different sources can then be fed into tools such as job-matching platforms, human resources systems, career guidance tools or statistical applications. As of July 2017, the platform offers three searchable data pillars: occupations, skills/competences and qualifications.

The skills pillar currently contains about 13 500 skills/competences and knowledge concepts, tagged by skill type/category. Each of these concepts comes with terms in each of the ESCO European languages and also includes an explanation of the concept, in the form of description, scope note and definition. The skills pillar is structured in four different modes:

- Through their relationship with occupations, that is, by using occupational profiles as entry point
- In collating transversal knowledge, skills and competences through a skills hierarchy
- Through relationships indicating how knowledge, skills and competences are relevant to other knowledge, skills and competences (in particular in cases of skill contextualisation)
- Through functional collections, which allow the selection of subsets of the skills pillar.

By connecting to other instruments on skills intelligence, the ESCO database aims to provide a clearer and more complete picture of labour market and education-related information. The use of a linked open-data approach ensures that the resulting product can be used by the majority of owners of practical career, training and labour market tools and labour market systems, thus enabling better services to stakeholders (see figure 8).

Figure 8 ESCO classifications supporting and integrating instruments and services of skills information



Source: European Commission (2017), p.10.

(A similar database created for Australia could conceivably interlink with comparable instruments and services, for example, ANZSCO, qualification frameworks and labour market information on the one hand and career, job and training portals and training assessment tools on the other hand.)

Usefulness of skills information

Curriculum developers and trainers

Many skills information models and frameworks address the usefulness of skills information for curriculum developers and trainers, but little is known about the actual usage and perceived benefits of these frameworks for this cohort.

Quality information on skills needs is crucial in the planning of training provision. In a limited country review, the OECD (2017b) found that at the government level this is only the case in France, where the public employment service estimates training needs according to information on expected recruitments from the national employer survey. Estimated training needs are used to decide on the amount and type of training to procure for the unemployed.

However, in other countries sectoral bodies and unions collect and/or use skills needs information to plan training provision. For instance, sector skills councils in the United Kingdom were previously instrumental in organising apprenticeships and facilitating linkages between training providers and firms (Cedefop 2017); to a large extent, this role has now been taken up by employer-led trailblazer panels (OECD 2017b).

Capability framework

The capability framework developed by Wheelahan and Moodie (2011; Case 13) proposes alternatives to the notion of competence that underpins competency-based training and aims to transform vocational education. The capability approach purports that freedom to achieve well-being is a matter of what

people are able to do and to be, and thus the kind of life they are effectively able to lead. This type of framework is normative as it refers to an evaluative standard. It presents suggestions for thinking about the particular types of skills required to achieve well-being in work. The rationale for the development of the capability framework is that VET should prepare students for a broad occupation within loosely defined vocational streams rather than for the workplace tasks and roles associated with particular jobs (Wheelahan, Buchanan & Yu 2015). The capability framework calls for moving the focus:

- from competencies ('skills') to capabilities
- from products (training packages, assessment materials etc.) to processes (brokering standards, accreditation and assessment)
- from qualifications based on workplace tasks and roles to qualifications that prepare students for broad occupations within vocational streams.

Access to skills information

In the US, O*NET (Case 3) has been endorsed by about 500 national and industry associations, for example, Bread Bakers Guild of America, International Warehouse Logistics Association, and the New York Academy of Sciences; all organisations encourage their members to contribute information to the O*NET program.

The explicit objective of the Singapore Skills Framework (Case 4) is to encourage training providers to gain insights into sector trends and skills in demand. The information presented is designed to enable providers to make innovations to training and to contextualise curricula and training programs to suit the needs of the sector. Under the tab, Skills and Competencies Descriptions, technical and generic skills and competencies are identified for each job role, meaning that training providers can use this information to plan the courseware and curricula, and conduct research on ways to embed suitable pedagogies for achieving the learning outcomes. Training providers are also encouraged to use skills descriptions to help companies to develop progressive human resources practices for skills recognition and benchmarking.

In relation to the Singaporean VET system, Peter Noonan (2017) commented in *Campus Review* that, in the 1990s, the Australian VET sector was 'the envy of the rest of the Asia-Pacific but now it might be the other way round':

> In Singapore, the formerly dilapidated Institutes of Technical Education have been entirely overhauled, materially and in spirit. Now, they emphasise future skills training, with a technology edge. Heavy government investment in both Singapore and Hong Kong has resulted in a multitude of modern campuses offering similarly innovative courses, like those with a sustainability focus, particularly in Singapore. This, in turn, has amped up the prestige of the sector, drawing in students who would have previously only considered a university education.

FutureSkills Labs

Canada's FutureSkills Labs (Case 6) aims to identify innovative ways to link degrees and credentials to skills and competencies. As one potential approach, the program suggests mapping the skills demanded by employers, as expressed through pilot proposals, to information about the credentials of the employees who have been most successful in the past. Initiatives of this nature would provide greater clarity to employers seeking to hire workers with competencies not reflected by traditional credentials. Students could also use the FutureSkills Lab information to identify the qualifications required for their desired field of work.

The FutureSkills Lab would support programs that equip students and new graduates with the skills employers need, or skills associated with successful and scalable entrepreneurship. This support might include increasing opportunities for work-integrated learning or delivering training tied directly to market-identified skills needs. Priority for co-financing support would be allocated to those pilots that build skills important for future work success and which are unlikely to be made redundant in the near term through automation or other forms of innovation.

Information for training providers in Finland, Europe, UK and the global IT community

In Finland (Case 9) the education department runs a national project whose aim is to develop and pilot a forecasting model designed to identify the skills needs of the adult population, with the aim of informing decisions on education for this cohort of all types and levels. A new skills-anticipation tool, focusing on VET, is likely to be completed in 2018, triggered by the significant reform of the VET system currently underway. In 2016, skills assessment reports were published on industries in the food chain, retailing, games and services for the elderly sectors. Results from these skills-forecasting exercises will have an impact on the curricula for VET and higher education.

Europe's skills database, ESCO (case 10), provides resources to enable education and training providers to undertake surveys and analyse data on current and future labour market needs, which can then be used as the basis for the further development of curricula.

The IT Skills Framework for the Information Age developed by the SFIA Foundation (Case 11) offers training providers the opportunity to map their courses to the framework, thus ensuring the most appropriate courses and certifications are selected for individuals. Professional bodies and membership organisations can map SFIA skills to their membership levels, certifications, professional development and mentoring programs. The framework can also be used to identify suitable mentors, supporting knowledge- and experience-sharing and coaching activities.

How labour market intelligence can be connected with training providers is demonstrated by the UK's Future Programme (Case 5). As a component of the program, the Association of Colleges (AoC) and the UK Commission for Employment and Skills (2015) have produced a guide for curriculum developers designed to assist further education colleges to maximise the use of labour market intelligence. The guide provides a broad perspective of national and local labour market information across industry sectors and is intended to support college leaders with curriculum planning (Case 5). Through a defined inspection process conducted by Ofsted, a provider will be assessed on how well leadership and management teams successfully plan, establish and manage the curriculum and learning programs to meet the needs of learners, employers and the local and national community.

Job seekers, employees and career advisors

The O*NET platform (Case 3) provides a wealth of up-to-date occupational skills information, with its database providing the basis for career-exploration tools, including assessment instruments for workers and students looking to find or change careers. These include a range of instruments and services (box 3).

Box 3 O*NETs range of instruments and services

The Interest Profiler Short Form matches a person's interests and level of work experience to identify a possible suitable career. The easy-to-read career reports include the most critical on-the-job tasks and skills. Job seekers can also find local salary information, training opportunities and job postings. Customised versions are available and provide targeted services to veterans and to Spanish-speaking career explorers/job seekers.

In O*NET OnLine Customizable Occupation Reports offer a range of information, from a broad overview to comprehensive detail on a specific subject. Occupations, or the entire O*NET-Standard Occupational Classification hierarchy, can be searched by keyword search, and users are encouraged to explore across occupations, using Content Model descriptors such as abilities and interests.

Using the O*NET Career Exploration Tools, students and workers may explore a range of career directions, based on their interests, work values and abilities. The computerised assessments and related materials are available as free downloads.

Source: National Center for O*NET Development (2017).

The aim of Singapore's Skills Frameworks (Case 4) is to assist students to make informed decisions on education and training, career development and skills upgrading, using the sector, employment, occupation/job role, skills and training information available on the framework. The Sector and Employment Information section provides a broad overview of the sector and employment prospects. A section on occupations informs users of job scope, the work context and the attributes required by employers. A map on career pathways provides a description of typical career pathways and potential development prospects. As the occupations/job roles are mapped to skills and competencies, which in turn are linked to the relevant education and training programs given in the training program list, users can determine their preferred choice of study based on their aspirations.

New Zealand's skills strategy (Case 8) emphasises the importance of informed career advice, advocating the provision of current information and lifelong learning advice for young people currently in the workforce, as well as their families. As part of this work, consideration is given to expanding and enhancing the range of information (including labour market information) and tools targeted at adults in the workplace on the nation's career services website and within their 'wrap-around' suite of services.

It was proposed that the nation's career services agency, in partnership with others, will be the lead organisation in advancing work in this area, as it has an evolving and sophisticated service delivery infrastructure, including web-based, phone-based and in-person services. It is widely recognised as the 'go to place' and has a track record of providing relevant, independent, accessible and user-friendly career information, advice and support.

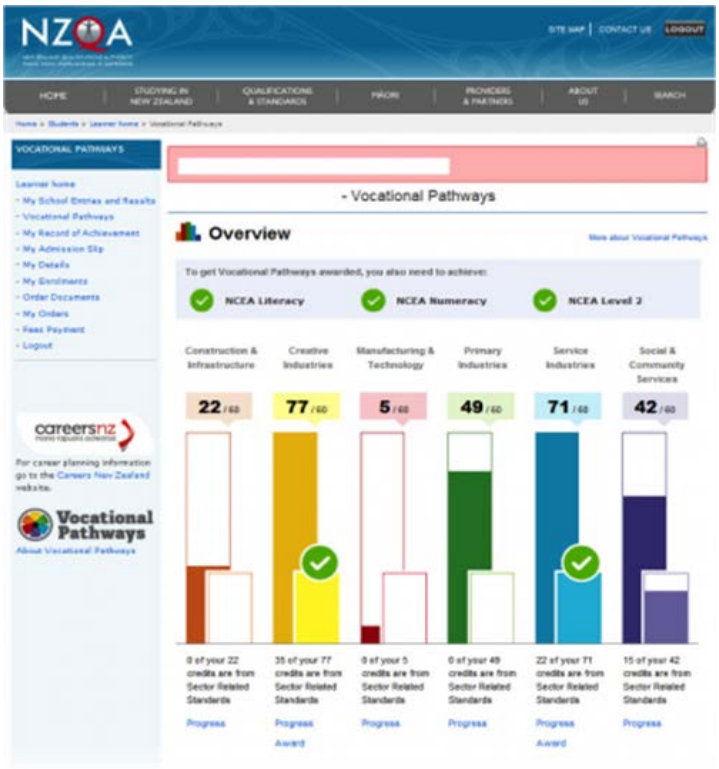
NZ's Vocational Pathways program (Case 8) provides new ways to achieve secondary vocational accreditations (NCEA[6] Levels 1, 2 and 3), by developing pathways that progress to further study, training and employment. The Vocational Pathways provide a framework whereby students are able to show how their learning and achievement is valued in the workplace by aligning learning to the skills needed for industry. The online tool, Profile Builder, helps students to explore their study options. By inputting the skills/standards, a student is able to evaluate the program they are undertaking or considering undertaking, as well as viewing the pathway along which they are heading and thinking about where they would like to go.

6 National Certificate of Educational Achievement.

Educators can also use the tool to plan programs that align to Vocational Pathways and support young people to achieve an award. Employers can view a student's vocational profile to identify the sector (pathway) their credits relate to, how many sector-related credits they have achieved, and whether they have achieved a Vocational Pathways Award. An employer can then determine whether a student's skills and interests align with those required by the selected industry.

Figure 9 provides an indication of the Vocational Pathways information relating to specific students, which employers can glean from the New Zealand Qualification Authority website. In this example, the student has gained NCEA Level 2 with two pathways: Manufacturing and Technology, and Primary Industries. The ticks of approval on these bars show the levels achieved and that the student will be awarded a Vocational Pathways Award in both pathways. Credits may appear in more than one pathway.

Figure 9 NZ Vocational Pathways Profile Builder Overview



Source: NZ Ministry of Education (2017).

Employers

Employers have the opportunity to use the resources contained in Singapore's Skills Framework (Case 4) to design progressive human resources practices for recognising skills and making informed decisions on skills investment. Employers are encouraged to use the technical and generic skills and competencies as a means for understanding the breadth and depth of the skills requirements. The available skills and competencies descriptions can also be used during appraisals of individuals and their skills profile to discuss and assess skills match and skills gaps. The list of the training programs given in the Skills Framework enables employers to be able to identify the program that would address the skills needs of employees.

As a part of the UK Futures Programme (Case 5), small-scale public co-investment was offered to employers and industry to enable them to design and test solutions to their emerging or long-standing skills and productivity challenges. The program's evaluation flagged that it was important to foresee difficult barriers in employer engagement in the program, to ensure it added value to existing initiatives.

Europe's new skills classification database, ESCO (Case 10), has been designed to support employers to understand the knowledge, skills and competences that people have obtained through education, training or 'on the job' experience. The structure of the database allows employers to articulate the knowledge, skills, competences and qualifications they expect from their employees.

Discussion

Now more than ever, existing and future workers need support to navigate an increasingly complex and uncertain world of work. The Productivity Commission (2017, p.86) warns that the current skill system across all education sectors 'has fractures that put at risk its capacity to deal with the future labour market changes'. Changes in the work environment and longer working lives, and with workers having multiple and different 'jobs', will drive the formal education sector towards a lifelong learning model, along with 'as needed' training. This is the central argument recently made by the Business Council of Australia (2017) in its *Future-proof: protecting Australians through education and skills* discussion paper. Individuals need to be prepared to not only change jobs more often but also to transition to new jobs. This places greater emphasis on deep-detail understanding of skills, rather than occupations.

This chapter offers some summary discussion points emerging from the findings of the desktop analysis, at the end of which we highlight a number of implications for the VET system, especially training packages, arising from the potential establishment of a skills information framework in Australia.

Skills, occupations and qualifications require different analyses

The good practice examples of skills frameworks described here recognise that occupational skills analyses require a far more detailed disaggregation than the equivalent for qualifications and occupational titles; these can be poor proxies for the actual skills required and performed in diverse workplaces. For many qualifications, there is a limited match between the qualifications that people have and the jobs they do (Mavromaras et al. 2013; Wheelahan & Moodie 2017). Investigating via the skills lens provides a more effective way to determine which key amalgam of skills is instrumental to students gaining a job or performing well in a job.

This issue is also relevant to job applicants: they need the capacity to recognise the distinct skills obtained from formal education, as well as those from informal learning. For managers, New Zealand offers the Spotlight Skills Recognition tool, designed to assist them to identify the employee skills that can be overlooked or taken for granted ('hidden skills'); these are especially skills used in interacting and relating, coordinating and shaping awareness (Ministry of Business, Employment and Innovation 2017).

Skills updates need to be linked to occupational classification systems

Policies to reduce skills imbalances and prepare for future skills in demand can only be successful if they are underpinned by accurate and timely information. At present, information relating to skills requirements is largely sourced from occupational classifications systems. The literature reviewed for this report is clear that the problem does not lie with the structure and content of occupational classifications but in their use as proxies for skills information. In the absence of up-to-date and forward-looking occupational skills information, this is often the next best alternative.

Rather than implementing a system of continuous update of skills information within occupational classification systems, which is not feasible in practical terms, a better solution is to keep occupational code information at a broad level and use external databases to tag skills to occupations, as done with the O*NET system. The collection and mapping of skills data to occupational classifications in this program is a leading example of good practice. It uses a variety of data sources, including information directly from workers, employers and job experts, via regular and frequent surveys, complemented by online vacancy data analyses.

Education needs to become more stackable

Both training content and its mode of delivery will continue to change. Courses and their associated qualifications are likely to become more modular to allow them to be completed progressively and flexibly alongside work. Following completion of a foundational qualification, the model of a 'stackable' VET system may be required, whereby workers' existing skills are measured and efficiently built upon with new training modules (Payton 2017). This has been demonstrated by Singapore's Skills Framework, where the training system is moving away from qualifications towards a modular system, one in which employers and learners can choose the training components.

Skills information must be accessible to all

Governments focus on the productive capacity of society; individuals focus on preparation for their working lives and progression in the labour market; and employers focus on the immediate needs of their firms. With these requirements in mind, the ideal skills information framework will accommodate these sometimes conflicting interests and provide information tailored to all interest groups.

The exploration of international skills information frameworks, systems, initiatives and services confirmed that good practice approaches involve determined government leadership and excellent stakeholder collaboration and buy-in. The framework itself requires timely inputs of coherently and comprehensively sourced, analysed and assembled data coupled with useful outputs via an accessible data portal.

The future for Australia?

Australia is also encountering an increasingly complex skills landscape, with its attendant problems of access to and availability of information relating to both current and future skills in demand. To this end, the development of an overarching skills information framework, on both the supply and demand sides, and containing relevant, timely and up-to-date data, could be investigated. In terms of the Australian VET system, such a skills framework would be particularly useful in updating skills standards in training packages and linking VET accredited units to skills identified on the demand side. The Productivity Commission (2017) noted in *Shifting the dial: 5 year productivity review* that training packages do not always serve the needs of employers and students with technical standards having proliferated over time and taking too long to update.

Recent discussions on training product reform (training packages and accredited courses) indicated that technical skills should not be compromised in training packages, but that broader capabilities and disciplinary knowledge need to be added to the training (Beddie, Hargreaves & Atkinson 2016). Snell, Gekara and Gatt (2016) argue further, that there is a need to reconceptualise how occupations are classified in Australia, such that the transfer of skills is better acknowledged and encouraged, underscoring that it is important to understand how all occupations invariably draw upon the skills inherent in other occupations. This is a similar concept to vocational streams, whereby occupations are grouped according to their shared knowledge, skills and practices, rather than according to specific workplace tasks and roles, the aim being to promote a more adaptable workforce (Wheelahan, Buchanan & Yu 2015). This is reiterated by the Productivity Commission (2017) urging to broaden the skill content of training packages to equip people with sufficient skills to adapt to changes in the workplace.

The Australian career site JobOutlook already takes advantage of the O*NET skills repository, using its descriptors for ANZSCO occupational groups (Department of Employment 2017). This information is linked to the MySkills website, a platform primarily designed to enable students to find courses and training providers. The link allows individuals and curriculum developers to link qualifications with research on

occupational labour market statistics and extensive skills descriptions (derived from US occupations through O*NET) within intended occupations.

In a next step, this information could be mapped to units of competency in training products, as stored on the repository of accredited vocational training and providers, training. gov.au. During the 2016 training products symposium, participants proposed that 'static' course and unit information (stored as pdf documents) be transferred into a relational database of units of competencies (Beddie, Hargreaves & Atkinson 2016). The VET workforce, as well as employers and, potentially, learners, could then access specific information about the training packages, qualifications, skills sets and units of competency associated with their occupation of interest (Beddie, Hargreaves & Atkinson 2016).

A web-based occupation and skills information platform in the making is the Australian Industry Skills Committee's National Industry Insights Web Platform, which, as the website explains, is being developed 'to provide an easily accessible platform for industry stakeholders and IRCs (industry reference committees) to access data and information on their sector' (Australian Industry Skills Committee 2017).

Rethinking how occupational skills information could be stored and accessed also offers a potential opportunity to simplify the structure and update of training packages. Research by Snell, Gekara and Gatt (2016), noted earlier, suggested that the Australian VET system could be improved by encouraging more transferability across occupations by means of making employability skills more applicable to all workplace contexts. Their proposal would see training packages drawn from a common language to describe competencies, skills and knowledge to make the content of training packages easier to understand.

Conclusion

In summary, the international evidence is that other nations are making concerted efforts to create and use skills information frameworks, populated with contemporary and cross-referenced skills intelligence, maintained close to real time, to steer policy and inform training practices. A resource such as this will become increasingly useful to multiple end-users for a variety and diversity of purposes. Australia has multiple skills information repositories, yet their full potential remains unrealised, as a consequence of a lack of an integrating skills framework of the scope, ambition and investment evidenced in fast evolving international practice.

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Case 9

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Case 10

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SFIA Foundation 2017, 'Skills Framework for the Digital Age', viewed 21 October 2017, <https://www.sfia-online.org/en>.

Case 12

Burning Glass Technologies, <http://burning-glass.com/>.

Case 13

NSW Board of Vocational Education and Training 2011, *Rethinking skills in vocational education and training - from competencies to capabilities*, by L Wheelahan & G Moodie, viewed 21 October 2017, <https://www.skillsboard.nsw.gov.au/bvet-projects>.

Appendix A

Initial list of skill information initiatives

United States

O*NET
<https://www.onetonline.org/>

- Identifying the most important 21st century workforce competencies: an analysis of the Occupational Information Network (O*NET)
  Burrus, Jeremy; Jackson, Teresa; Xi, Nuo; Steinberg, Jonathan
  Princeton, New Jersey: Educational Testing Service, 2013

- The O*NET content model: strengths and limitations
  Handel, Michael J.

Singapore

Skills Framework
<http://www.skillsfuture.sg/skills-framework>

- Related initiatives

  - Industry Transformation Maps
    <https://www.mti.gov.sg/MTIInsights/Pages/ITM.aspx>
    <https://www.mti.gov.sg/MTIInsights/SiteAssets/Pages/ITM/Images/Industry%20Transformation%20Maps_v13.pdf>

  - Jobs Bank
    <https://www.jobsbank.gov.sg/>

Canada/United States

- Canadian Occupational Projection System (COPS)
  <http://occupations.esdc.gc.ca/sppc-cops/w.2lc.4m.2@-eng.jsp>

- Essential skills profiles
  <https://www.canada.ca/en/employment-social-development/programs/essential-skills/profiles.html>

- e-Talent Canada
  <http://www.etalentcanada.ca/>

- Job Bank
  <https://www.jobbank.gc.ca/home-eng.do?lang=eng>

- NYC Career Pathways
  <http://www1.nyc.gov/site/careerpathways/strategy/our-strategy.page>

  Reports:

  - Career pathways: one city working together
    <http://www1.nyc.gov/assets/careerpathways/downloads/pdf/career-pathways-full-report.pdf>

  - Career pathways: progress update
    <http://www1.nyc.gov/assets/careerpathways/downloads/pdf/Career-Pathways-Progress-Update.pdf>

Europe/UK

- European Skills, Competences, Qualifications and Occupations (ESCO)
  <https://ec.europa.eu/esco/portal/home>
  <https://ec.europa.eu/esco/portal/escopedia>

  Industry application:
  'Future Skills processor': competence profiles for the media sector based on ESCO [European Broadcasting Union]
  <https://ec.europa.eu/esco/portal/news/2f975ecc-3d63-42db-9e2c-2e0fabdd65e2>

- EURES [European Job Mobility Portal]
  <https://ec.europa.eu/eures/public/en/homepage>

- UK Futures programme
  <https://www.gov.uk/government/collections/ukces-futures-programme-overview>

Scotland

- Skills Scotland example Our Skillsforce <https://www.ourskillsforce.co.uk/>

Finland

- Finnish government is reforming VET
  <http://valtioneuvosto.fi/en/article/-/asset_publisher/1410845/ammatillisen-koulutuksen-reformi-uudistaa-koulutuksen-vastaamaan-opiskelijoiden-ja-tyoelaman-tarpeita>
- Skills information flow chart
  <http://valtioneuvosto.fi/documents/1410845/4203924/OKM_uusi_ammatillinen_koulutus_Englanti_200417.pdf/8af1d772-883f-4a90-bcd6-3bbfab9a337a>

New Zealand

- Vocational Pathways
  <http://www.youthguarantee.net.nz/vocational-pathways/>
  The Vocational Pathways provide a framework for students to show how their learning and achievement is valued in the workplace by aligning learning to the skills needed for industry.

Middle East

- National Occupational Skills Standards (NOSS), United Arab Emirates
  <https://www.nqa.gov.ae/EN/Pages/VET/NOSS.aspx>

Burning Glass Technologies

<http://burning-glass.com/>

- Example
  Labor Insight™
  <http://burning-glass.com/labor-insight/>

Appendix B

Categorisation of skills by Cunningham & Villasenor 2011

Table 4: Classification of Skills Reported in the Sample

Socio-emotional	Higher-order cog	Basic cog	Technical
Adaptability	Analysis Skills	Basic literacy	Advanced IT
Collaboration	Critical Thinking	Numeracy	Advanced vocational
Commitment	Decision-making		Basic vocational
Control emotions	Entrepreneurship		Computer Literacy
Conscientiousness	Foreign language		Degree level
Cooperation	Intellect		Degree subject
Creativity	Language		Experience
Conflict aversion	Learning Processes		Grades
Cultural diversity	Listening skills		Hands-on training
Customer Awareness	Manage risk		Industry-based skills
Customer Handling	Oral communication		IT knowledge
Dependability	Organization		Job-specific skills
Efficiency	Planning		Office administration
Emotional Stability	Problem-solving		Practical knowledge
Extraversion	Strategic management		Professional skills
Flexibility	Time management		Score on employer test
Hard worker	Thinking skills		Statistical analysis
Honesty	Written-communications		STEM
Initiative			Technical skills
Independence			Theoretical training
Integrity			University attended
Leadership			Work experience
Modesty			
Motivation			
Negotiating			
Negotiate conflict			
Networking			
Open to new ideas			
Personal appearance			
Positive attitude			
Proactive			
Punctuality			
Professionalism			
Responsibility			
Self-confidence			
Self-management			
Social values			
Stress-management			
Teamwork			
Work ethic			

*the skills in the list were condensed from 140 different skills names in the 28 studies reviewed in this paper. The author's used the definition of each skill category to assign each skill to a category. One could argue that some skills better fit in another, or multiple, skill categories. The table is organized such that the skills categories that are most similar are next to each other.

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SUPPORT DOCUMENT

NCVER

Identifying work skills — international case summaries

Gitta Siekmann
NCVER

This document was produced by the author(s) based on their research for the report *Identifying work skills — international approaches*, and is an added resource for further information. The report is available on NCVER's Portal: <http://www.ncver.edu.au>.

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Contents

Tables and figures

Tables

Figures

Case 1 – OECD's skills strategy rationale

Source

http://www.oecd.org/skills/

Type

Skills strategy framework

About

The Organisation for Economic Cooperation and Development (OECD) works with countries to develop skills strategies tailored to specific needs and contexts. The Organisation prepared a global skills strategy outline over the period 2011 to 2013. In its paper "Towards an OECD Skills Strategy" (OECD 2013), the OECD sets out the main issues which must be addressed by efficient and effective policies for skills formation and skills use.

Purpose

To facilitate a cross-government approach and peer-learning on effective skills policies, and to address the global dimensions of the supply and demand for skills. The strategy focuses on:

- Establishing a common language to describe skills.
- Improving the measurement of skills.
- Identifying essential skills for the future.
- Understanding skills mismatch.
- Improving skills training for the unemployed.
- Developing sound strategies for skills financing.
- Guidance for national policy development and implementation.

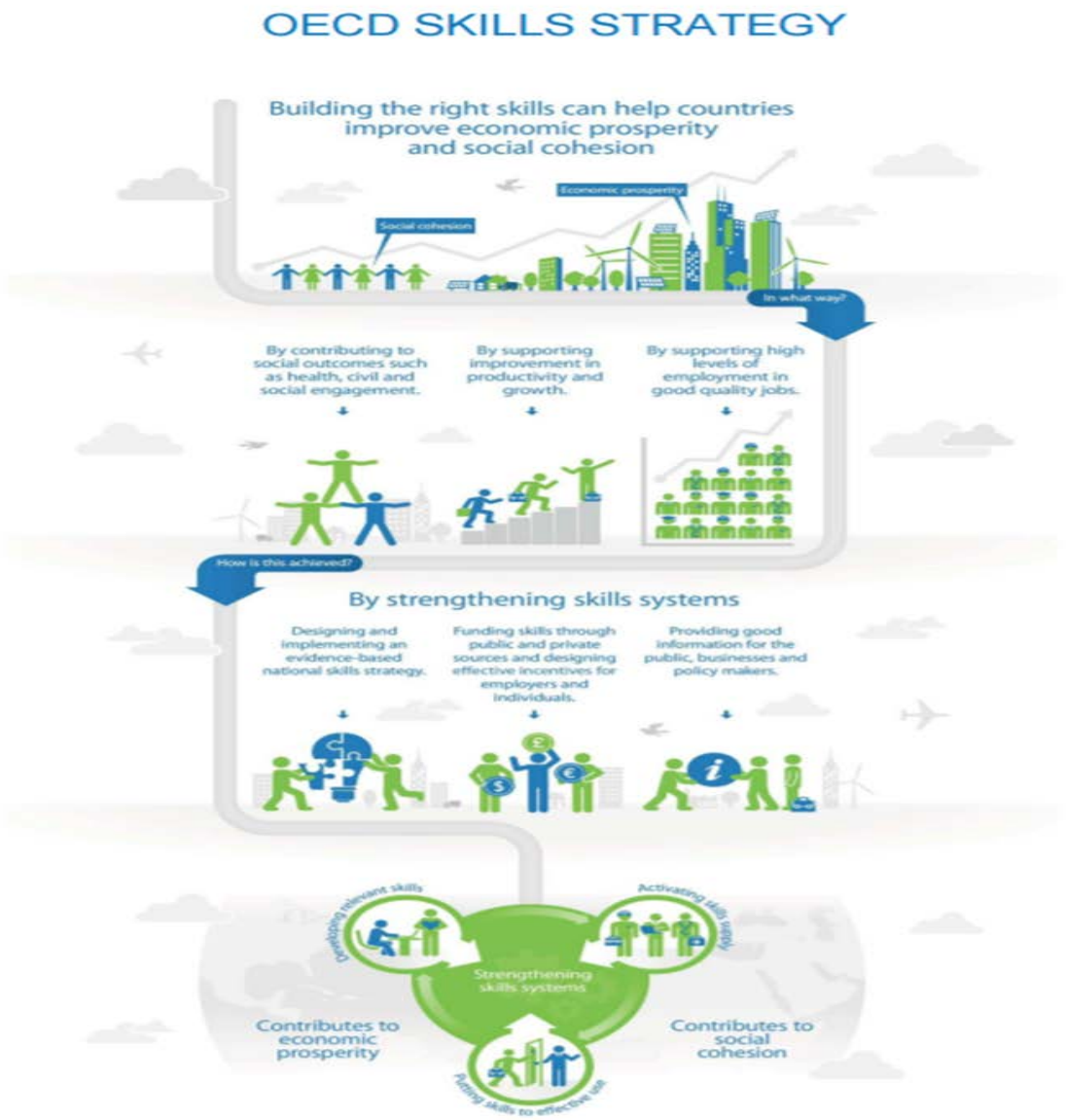
Operation

The strategy framework is being used to support countries in building more effective national skills strategies by:

- Working closely with inter-ministerial teams in capitals whose members include government officials from education, employment, economic development and innovation, among others.
- Engaging a broad range of stakeholders through interactive workshops to build a deep, shared understanding of the skills challenges facing their country.
- Identifying the country's key skills challenges and designing concrete actions to improve the country's skills system.

Each national skills strategy country project offers a tailored approach to focus on the unique skills challenges, context and objectives of each country. Each project leverages OECD comparative data and policy analysis, fosters collaboration across ministerial portfolios and levels of government while engaging all relevant stakeholders – employers, trade unions, and civil society organisations.

Figure 1 OECD skills strategy flow chart



Highlights

Ownership, coordination and stakeholder involvement

The OECD is a unique forum where governments work together to address the economic, social and environmental challenges of globalisation. The OECD is also committed to understand and to help governments respond to new developments and concerns, such as corporate governance, the information economy and the challenges of an ageing population. The Organisation provides a setting where governments can compare policy experiences, seek answers to common problems, identify good practice and work to co-ordinate domestic and international policies.

Identification, collection and update of skill descriptions

A key element of successful reform is building a deep, shared understanding of the challenges facing the country. This phase would typically involve several diagnostic workshops that would involve all relevant ministries and national and/or regional stakeholders. Workshops use techniques designed by the OECD and adapted to the country's context, in close consultation with the national project team. They are designed to facilitate dialogue among the stakeholders and highlight relevant international evidence. The main skills challenges identified are set out in a short OECD Skills Strategy Diagnostic Report and presented publicly.

Practical outcomes

The action phase involves several stakeholder workshops that focus on tackling the skills challenges identified in the diagnostic phase and building agreement on what actions need to be taken and by whom. Project activities are designed to support, and contribute to, advancing the country's own skills policy agenda.

A full National Skills Strategy country project, comprising a Diagnostic Phase and an Action Phase, would typically be carried out over a period of 18-24 months, in order to allow time for reflection and further discussion at the national level between workshops.

Illustration – Norway's skill strategy action Plan

What should the government do?

- Provide relevant information and guidance to individuals, stakeholders and policy makers
- Strengthen the evidence-base on current and projected skills imbalances across occupations and regions.
- Make sure that this information is used by policy makers, public officials and heads of agencies and institutes at different administrative levels.
- Establish a high-quality lifelong career guidance system to provide youth and adults with personalised advice on labour market opportunities and education and training options. including a central national online platform for career guidance and information.
- Ensure high quality standards within the lifelong career guidance system. Make sure counsellors have relevant skills and tools to provide user-friendly up-to-date information on realistic job profiles, regional and national employment opportunities, including current and expected skills shortages, and skills development pathways.
- Pay stronger attention to the needs of the target groups described in here. Consider encouraging education institutions to publish information on employment outcomes of graduates by field of study to improve market signalling on the performance of institutions.

What should stakeholders do?

- Make better use of information on skills imbalances Individual employers, social partners and Statistics Norway can take steps to:

- Collaborate on effective ways to provide information on occupational and sectoral skills imbalances to government and social partners. Particular emphasis should be placed on collecting information on skills imbalances that are not easily measured using standard labour market indicators, such as skill shortages in specific regions or with regard to specific skills sets.
- Education for career guidance
- Develop a common career guidance system
- Skill scenarios/foresights
- Collaboration between federal and local ministries

Related systems and tools

OECD Skills for Jobs database

Source

http://www.oecd.org/els/emp/skills-for-jobs-dataviz.htm

About the database

Recently launched in July 2017, the *OECD Skills for Jobs Database* provides information for European countries and South Africa about skills shortages and surpluses, as well as data on qualification and field-of-study mismatch. The database provides information on a wide range of skills, including cognitive skill, social skills, physical skills and a set of knowledge types.

The goal of the database is to fill the knowledge gap about skill imbalances within and across countries. It is doing so by providing regularly-updated international evidence on skill shortages, surpluses and mismatch. Information about surplus and shortage at the occupational level is translated into skill needs by mapping the occupations to their skill requirements.

The aim of the OECD Skills for Jobs indicators is to monitor the evolution of skill mismatch and skill shortages in a way that:

- is comparable across countries
- can be regularly updated
- is available at a sufficient level of skill-disaggregation to be useful to policy makers
- allows mapping occupational shortages into skill needs.

Rather than using qualifications or occupations to describe skill needs, the OECD Skills for Jobs indicators use the occupational skills classification database, O*NET, to translate occupations in shortage into a measure of skills in shortage. Three domains of competence are measured and presented – *skills, knowledge and abilities* – (based on the occupational information from the O*NET database). Furthermore, circumventing the often subjective information on skill needs available from employer surveys, the OECD Skills for Jobs indicators are based on quantitative data from large-scale household surveys (OECD 2017).

While the approach is not widespread, some countries do have comprehensive occupational standards or descriptions of what skills are required by each occupation. Some examples according to the OECD (2017) are:

- Canada's National Occupational Classification
- The United States' O*NET database
- Italy's Occupations, Employment and Needs survey
- France's Operational Repository of Occupations and Jobs (Répertoire Opérationnel des Métiers et des Emplois)
- Germany's BIBB-IAB-Qualification and Occupational fields.

These exercises are run at country level and have not been used jointly, if not in ad-hoc empirical studies. At the European level, the European Skills, Competences, Qualifications and Occupations framework (ESCO) links occupations to the knowledge, skills and competences that are essential or optional when working in a specific occupation.

*Classifications & O*NET data mapping*

O*NET detailed occupational features are available for each US standard occupation. The mapping takes advantage of official crosswalks that had been developed between the US occupational codes (SOC) and International Standard Classification of Occupations (ISCO). The problem when recoding 6-digit SOC into 4-digit ISCO is that many SOC occupations are split over different ISCO occupations. Ideally one would know which share of a SOC occupation is attributed to an ISCO occupation (OECD 2017). However, this information is not (readily) available. As an approximation, it is assumed that employment from one SOC occupation is spread equally over the related ISCO occupations. Employment per SOC occupation is taken from the US Bureau of Labor Statistics Occupational Employment data. The O*NET information is further aggregated the 2-digit ISCO level by taking employment weighted averages.

Application

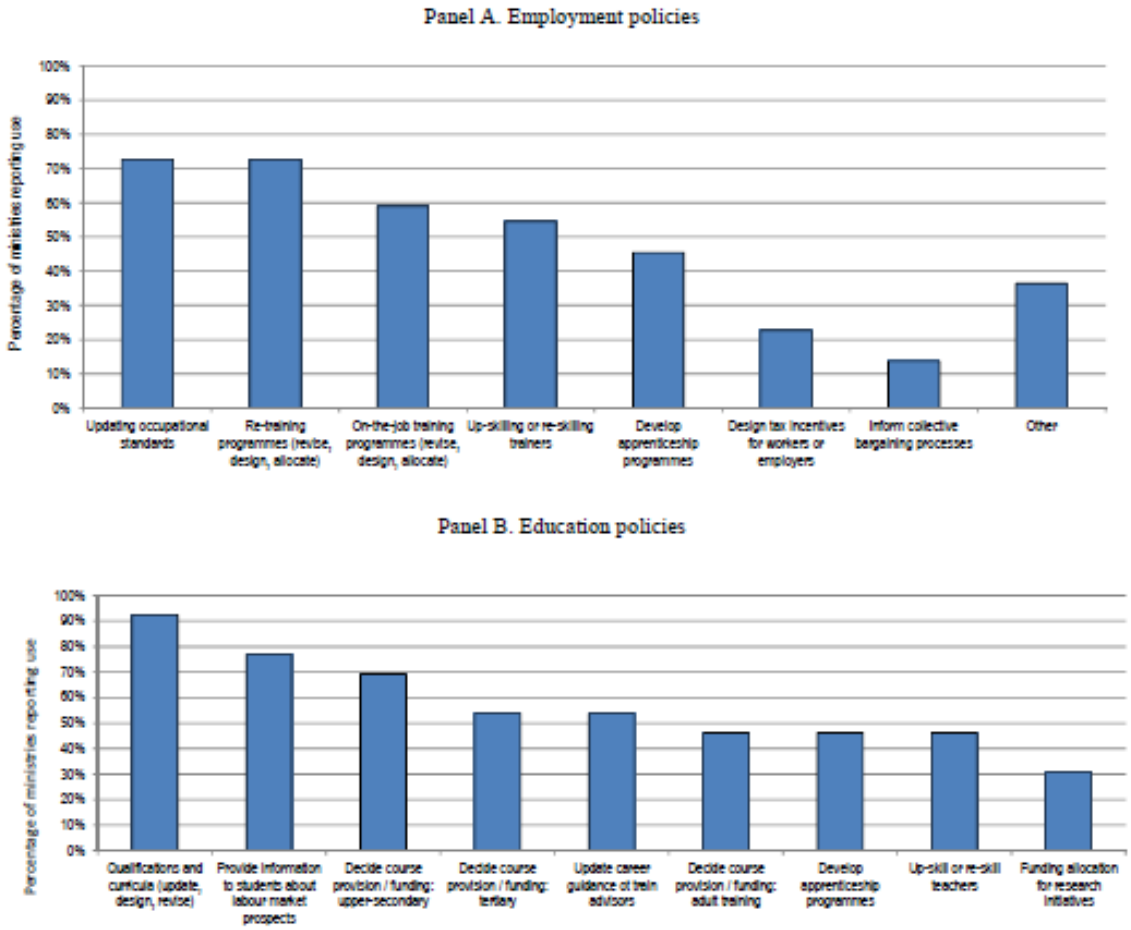
In addition to identifying the type of skills that are in shortage or surplus in a economy, the OECD Skills for Jobs Database can be used to analyse how economies and jobs use and combine these skills. The results of this occupational analysis can be used to identify training priorities and key skills that would be needed for workers employed in occupations in surplus (whose employment prospects are poor) to move to occupations that are in high demand (or shortage), thus improving their labour market outcomes.

Career guidance counsellors can use the web tool to provide advice that responds to labour market needs. Employers could use the Skills for Jobs web tool to identify occupational skill profiles that are similar to those they require in order to maximize their chances of recruiting for hard-to-fill vacancies.

Information about discrete skills serves different analytical purposes and is designed to provide trends on what skills are (or will be) needed in the labour market so as to inform a wide array of different policies (OECD 2016). Figure 2 shows that skills information are used for a range of employment policies, such as updating occupational standards and designing and revising re-training programmes, as well as for multiple education policies (e.g. design and update of qualifications and curricula, and provision of information about labour market prospects to students). In addition, the skill information is used in several countries to inform migration policies. This information is useful for policy makers and other stakeholders in each individual country and, if anything, it is often underused to inform

employment, education and migration policies in view of achieving a better use of existing skills (OECD 2017).

Figure 2 The use of information about skills in employment and education policy (OECD 2016)



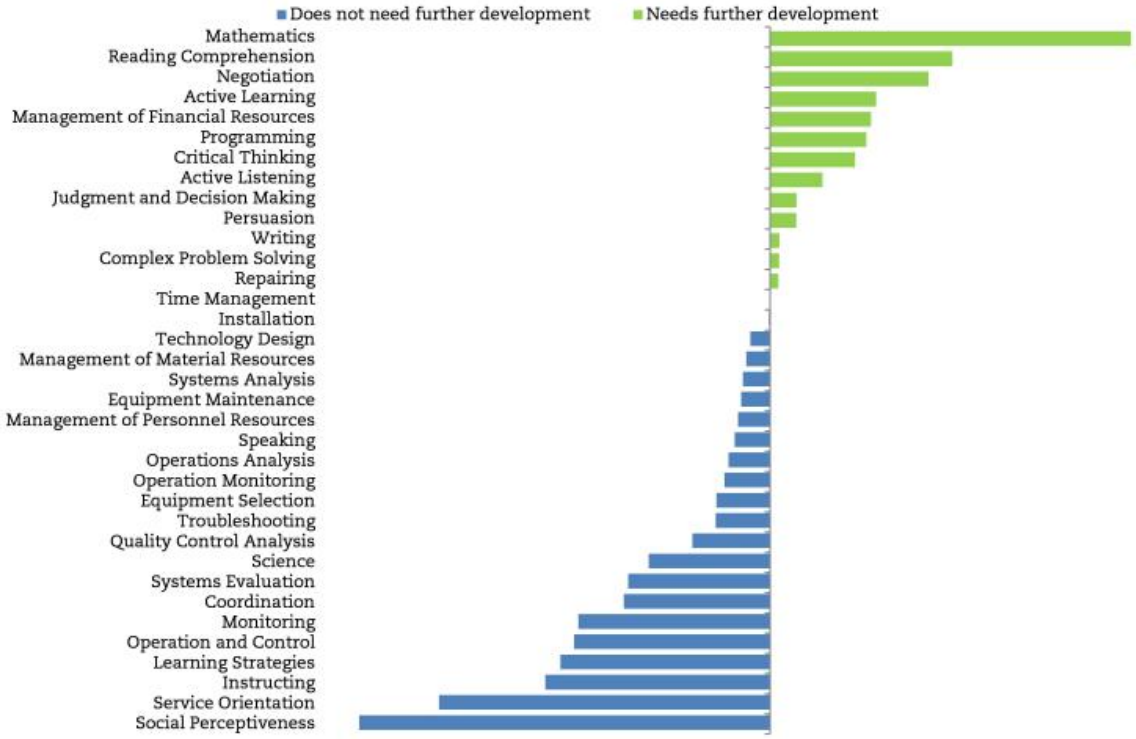
Note: Percentages based on information provided by 21 OECD countries for Panel A, 13 countries for Panel B.

Source: OECD (2016), *Getting Skills Right: Assessing and Anticipating Changing Skill Needs*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264252073-en.

Illustration

The example below show that in Italy "Legal, social and cultural associate professionals", which are in surplus, would need to invest in the development of skills such as mathematics, reading comprehension and negotiation, if they would like to move into "business and administration associate professionals" jobs, for which there is a shortage (Figure 3).

Figure 3 Training profile for 'Legal, social and cultural associate professionals' wanting to switch to 'Business and administration associate professionals' jobs (Italy) (Vandewyer 2017)



Source: (OECD, Vandewyer 2017)

Case 2 – Cedefop's skill anticipation framework

Source

http://www.cedefop.europa.eu/en/themes/identifying-skills-needs

http://www.cedefop.europa.eu/en/events-and-projects/projects/assisting-eu-countries-skills-matching

Type

Guidelines to establish a skills information infrastructure

About

The guidelines were developed by the European Centre for the Development of Vocational Training (Cedefop), in cooperation with the ILO (UN International Labour Organization) and ETF (European Training Foundation). It focuses on high quality evidence on trends in the labour market and skill needs by producing regular skill supply and demand forecasts for Europe. Cedefop also investigates skill and competence needs in selected sectors, has collected its own European data on skills and jobs and is currently working on collecting and analysing data on skill demand using online job postings. All data and intelligence is delivered it to end-users via the European online source *Skills Panorama* (REF).

Purpose

Better matching a country's skill supply to the needs of its economy is a dynamic process that requires policies to increase education and training responsiveness to labour market needs. To inform the design of vocational or technical training and employment policies the framework provides guidance on how to identify and anticipates future skill needs and potential skill mismatches. It provides assistance and support to develop a skills anticipation infrastructure in countries and an integrative approach to skills governance.

Operation

Mitigating skill mismatch due to technological obsolescence requires an integrative approach to skills governance among stakeholders, which can ensure a virtuous feedback loop between labour market and education and training actors. In 2017 Cedefop began to provide technical advice to countries asking for its support to improve their 'governance of skills anticipation and matching'. In doing so, Cedefop works to identify country-specific challenges, bottlenecks and policy solutions for achieving effective skills governance. It employs the following tools:

- Big data analysis from online vacancies: Cedefop is joining forces with Eurostat and DG EMPL to develop a fully -fledged EU-wide system to collect and analyse data on skill demand using online job postings.

- European Company Survey: Cedefop and Eurofound are sharing expertise and resources to carry out the next European Company Survey. The survey will explore the strategies deployed by companies to meet their skill needs, through recruitment, HR development practices and work organisation. In this context, special emphasis will be put on the impact of digitalisation.
- European skills and jobs (ESJ) survey: is the first survey on skill mismatch carried out in the EU28 Member States, examines drivers of skill development and the dynamic evolution of skill mismatch in relation to the changing complexity of the tasks and skills required in people's jobs.
- Forecasting skill demand and supply: Cedefop produces regular skill supply and demand forecasts for Europe and analyses the potential labour market imbalances.
- Skills Panorama: Cedefop manages a unique central access point for data information and intelligence on skill needs in occupations and sectors across Europe.

Highlights

Identification, collection and update of skill descriptions

The country support that Cedefop provides aims at improving methodological instruments that collect labour market and skills intelligence and seeks to facilitate effective dissemination and use of results in several policy spheres (e.g. education and training, employment, active labour market policies etc.), in collaboration with key national stakeholders. Using a common analytical framework and various methodological tools (e.g. stakeholder interviews, focus groups, Delphi methods).

Cedefop works closely together with governments in EU countries and appointed bodies of national stakeholders to collect information and facilitate policy consensus. In 2016 Cedefop, in collaboration with the ILO and ETF, published five methodological guides to anticipating and matching skills and jobs, targeted at EU policymakers and decision-makers.

Guide 1 – Using labour market information

This is an introductory tool for everyone who wants to understand how labour market intelligence can be used for better anticipation and matching of skills demand and supply. Technical analysts and professionals can use this guide as a source of inspiration on how LMI systems can be further developed and used for policy analyses and interventions.

Guide 2 – Developing skills foresights, scenarios and forecasts

This volume covers the development of skills foresights, scenarios and skills forecasts, and aims to support setting up skills forecasting systems at national level by means of quantitative and/or qualitative approaches. The guide is built on a number of experiences and case studies in both developed and developing countries. It proposes a set of instruments devised to help guide new initiatives in this area. Adapted to specific objectives and country contexts, elements of the methods described can be combined.

Guide 3 – Working at sectoral level

A sectoral focus and perspective are seen as essential in anticipating changing skills needs. The guide examines sectors as the key points where changes in skills demand occurs, the term sector being used to define specific areas of economic activity. By providing the reader with concrete examples and case studies, this publication is a tool for employment policy- and decision-makers to understand

whether a sectoral approach is appropriate, as well as for technical analysts and professionals who want to know how it should be implemented.

Guide 4 – The role of employment service providers

This volume covers the role of employment service providers in skills anticipation and matching and aims to support transition and developing countries in establishing and strengthening the role of these providers. It identifies outstanding initiatives and good practices from around the world, and gives insights into strategic choices and experimental practices that different countries have undertaken in their attempts to match skills supply with labour market demands. The examples provided can be used by training providers, guidance and counselling officers, administrators and researchers.

Guide 5 – Developing and running an establishment skills survey

This volume covers the development and carrying out of establishment skills surveys. Such surveys are designed to generate data on employers' skills needs and their human capital development strategies. If done regularly, the surveys help to analyse the trend in skills needs and identify potential skills bottlenecks. The audience for this guide is mainly those who make decisions about undertaking surveys and oversee their implementation (in ministries, human resource development agencies and other relevant bodies) and those directly involved in survey design and implementation, such as survey managers, data collectors and analysts.

Guide 6 – Carrying out tracer studies

This volume covers the development and carrying out of tracer studies and aims to contribute to the improvement of education in TVET and higher education through high-quality graduate surveys or tracer studies. The key objective of such studies is to identify the relevance of education/training for transition to a job and further vocational career in the first years after graduating.

Big data analysis from online vacancies

Cedefop works with Eurostat and other agencies to develop a EU-wide system to collect and analyse data on skill demand using online job postings. Cedefop has already developed a prototype multilingual system, tested it in five countries (UK, DE, CZ, IT, IRL) and is now refining the tool. First data will be released in 2018 and the EU system will be fully operational end 2020.

Presentation of skill intelligence

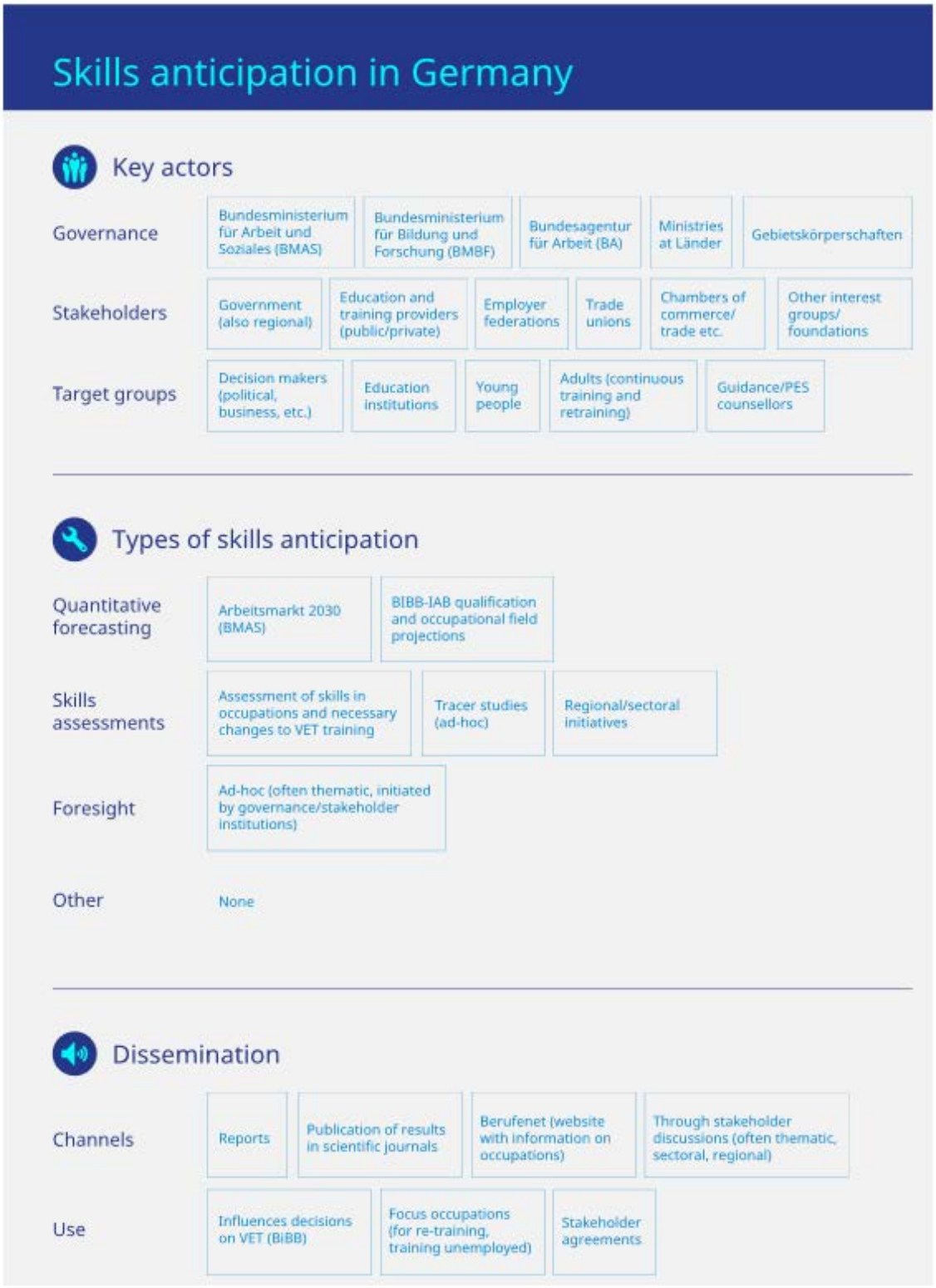
Skill information is envisioned as a lively interactive platform with data and features responding to the needs of different types of users, whether they are policy-makers, practitioners working in employment agencies and guidance services or experts in skill needs anticipation.

Illustration – Skill anticipation country profiles

Skills anticipation in Germany

04/2017

Overview of the German approach



Case 3 – USA's O*NET

Source

https://www.onetcenter.org/aboutOnet.html

Type

Established operational occupational skills framework. The O*NET system will be dealt with more comprehensively than other cases described here as this framework is the most advanced form found in this study to date

About

O*NET program stands for occupational information network and is the US primary source of skill information. The program is based on a long history of measuring job skill requirements and related job characteristics which were first published in 1939 to assist the Employment Service in matching job-seekers to vacant positions during the Depression (Handel 2016). In 1990 alternatives were considered by an advisory panel in response to methodological criticism which gave rise to O*NET in 2001. It would use standardised surveys of a representative sample of job incumbents instead of only job analysts conducting workplace interviews and observations (Handel 2016). The first complete version of O*NET became available in 2008.

The online site O*NET Resource Center serves as a central point of information about the O*NET program and is the main source for O*NET products, such as the:

- O*NET database
- O*NET OnLine with occupational information and career exploration tools.

Central to the program is the O*NET database, containing information on hundreds of standardized and occupation-specific descriptors.

Purpose

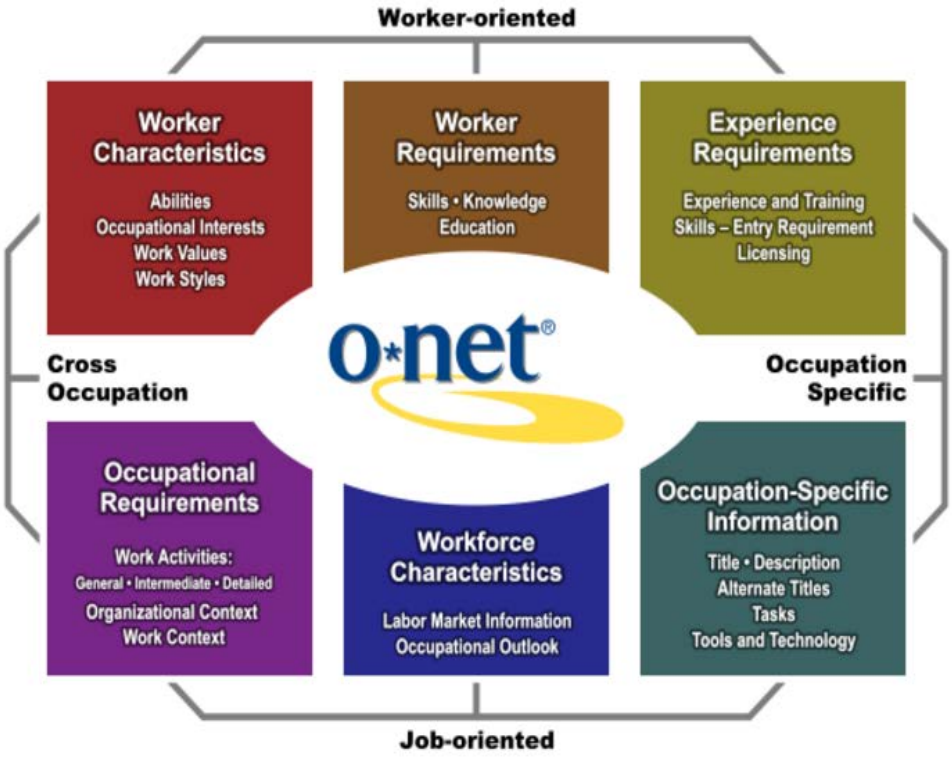
The O*NET program is an openly accessible source of occupational information for a range of stakeholders with a particular focus on providing occupational profile information to students and job seekers. O*NET aims to operates as a timely, easy-to-use resource that supports employers, educators and job seekers to identify and develop the skills of the nation's workforce. It provides a common language for defining and describing occupations. Its flexible design can capture changing job requirements.

Operation

Every occupation requires a different mix of knowledge, skills, and abilities, and is performed using a variety of activities and tasks. These distinguishing characteristics of an occupation are described by the O*NET Content Model, which defines the key features of an occupation as a standardized, measurable set of variables (descriptors, Figure 4). This hierarchical model starts with six domains, describing the day-to-day aspects of the job and the qualifications and interests of the typical worker.

The model expands to 277 descriptors predominantly collected by the O*NET program, with more collected by other federal agencies such as the Bureau of Labor Statistics.

Figure 4 O* NET content model - Anatomy of an occupation



The Content Model was developed using research on job and organizational analysis. It embodies a view that reflects the character of occupations (via job-oriented descriptors) and people (via worker-oriented descriptors). The Content Model also allows occupational information to be applied across jobs, sectors, or industries (cross-occupational descriptors) and within occupations (occupational-specific descriptors). These descriptors are organized into six major domains, which enable the user to focus on areas of information that specify the key attributes and characteristics of workers and occupations.

Information is collected using a two-stage design in which:

- a statistically random sample of businesses expected to employ workers in the targeted occupations will be identified and
- a random sample of workers in those occupations within those businesses will be selected. New data will be collected by surveying job incumbents using standardised questionnaires.

The O*NET Data Collection Program provides several hundred ratings, based on responses by the sampled workers to the O*NET questionnaires. All respondents are also asked to complete a task questionnaire and provide some general demographic information.

Abilities and Skills information is developed by occupational analysts using the updated information from incumbent workers. On average, 614 O*NET occupations were updated yearly between 2003—

2016. By comparison the O*NET occupational classification (O*NET — SOC 2010) includes 1110 occupations.

Table 1 O*NET surveys & content (Handel 2016)

Table 1 O*NET surveys and principal content

Survey	Main content
Education/ training	Required education, related work experience, training
Knowledge	Various specific functional and academic areas (e.g., physics, marketing, design, clerical, food production, construction)
Skills	Reading, writing, math, science, critical thinking, learning, resource management, communication, social relations, technology
Abilities	Writing, math, general cognitive abilities, perceptual, sensory-motor, dexterity, physical coordination, speed, strength
Work activities	Various activities (e.g., information processing, making decisions, thinking creatively, inspecting equipment, scheduling work)
Work context	Working conditions (e.g., public speaking, teamwork, conflict resolution, working outdoors, physical strains, exposure to heat, noise, and chemicals, job autonomy)
Work style	Personal characteristics (e.g., leadership, persistence, cooperation, adaptability)

Source: Handel 2016

Highlights

Ownership, coordination and stakeholder involvement

The Occupational Information Network (O*NET) has been developed under the sponsorship of the US Department of Labor/Employment and Training Administration (USDOL/ETA). O*NET partners and contributors are numerous, from different sectors, with well defined roles.

*The National Center for O*NET Development* (Center) provides core staff with acknowledged expertise in the areas of occupational analysis and assessment research and development. Under the direction of government, the Center manages projects and contracts and provides technical support and customer service to O*NET users. The Center leads a partnership of public and private-sector organizations that carry out the work of the O*NET project.

In addition to the Center, the partnership currently includes the *Research Triangle Institute* (RTI), the *Human Resources Research Organization* (HumRRO*), North Carolina State University* (NCSU), technical *support* (MCNC), and a consultancy firm (Maher & Maher).

- RTI International (RTI) is a research organization that conducts applied and theoretical research for national and international governmental, industrial, and public service organizations. RTI designs, implements, and supervises the survey data collection designed to populate the O*NET database and provides guidance on continuous improvement efforts.

- The Human Resources Research Organization (HumRRO) is a non-profit research and development organization that applies the latest advances in science and technology to the human performance needs of public and private organizations. HumRRO provides technical expertise on the O*NET Content Model and in the areas of data collection, job analysis, assessment, and training.
- North Carolina State University (NCSU) is a nationally recognized leader in science and technology. The Industrial/Organizational psychology program invokes the scientist-practitioner model by conducting applied and theoretical research to study the world of work. It conducts research to support O*NET initiatives, such as development of New and Emerging Occupations (N&E) and Tools and Technology (T2s).
- MCNC promotes technological development and enterprise in North Carolina through the technical use of electronic and information technologies in government and industry. MCNC houses the O*NET database and provides Internet access and dissemination and strategic advice on technology.
- Maher & Maher is a specialized management and workforce development consulting firm. It provides web-based training services and products through the O*NET Academy to promote and support the integration of O*NET information throughout the workforce investment community.

Identification, collection and update of skill descriptions

O*NET resurveys occupations on a continuous basis in a 5-year cycle with the latest completely new set of ratings made available in 2013. This has great potential utility for researchers interested in capturing within-occupation skill change (Handel 2016).

Updates include a range of data categories — which can be updated in different years and in different schedules. More enduring categories such as values and interest may be over 5 years old whereas work activities or tools and technology may be updated every 2 years. The data categories are:

- Abilities, Alternate Titles, Detailed Work Activities, Education , Interests , Job Zone, Knowledge, Sample of Reported Titles , Skills, Tasks, Tools & Technology, Work Activities, Work Context, Work Styles, Work Values.

Sources for updates can include (in order of contribution):

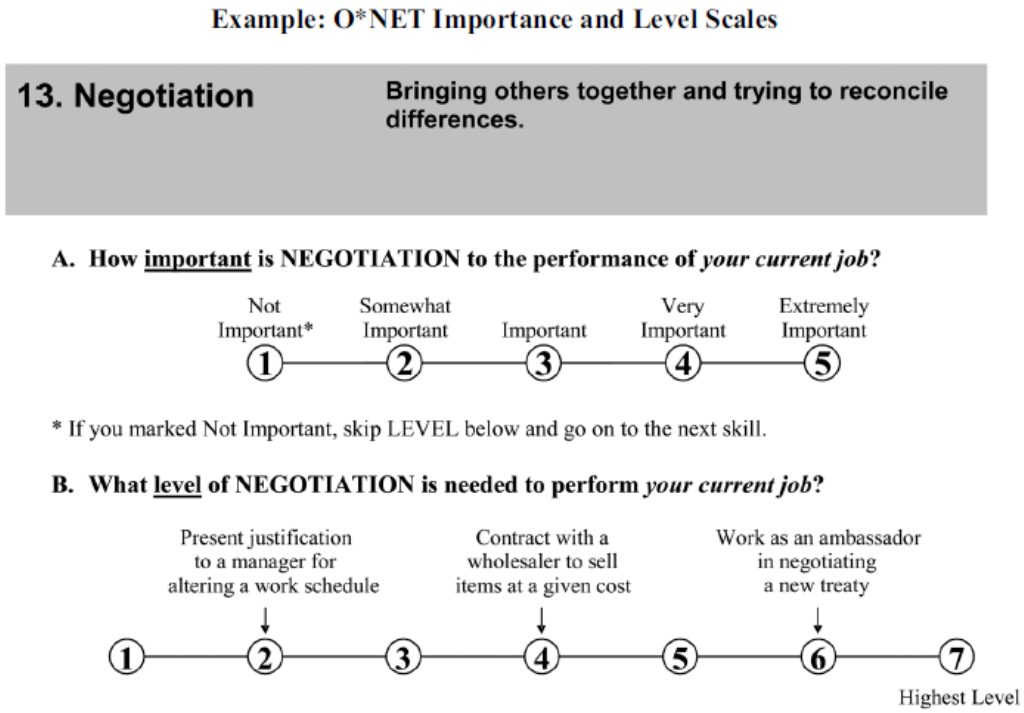
- Job Incumbents, Occupational Experts, Analyst Ratings, Customer & Professional Association Input, Employer Job Postings, Government Programs, Transactional Data, Web Research.

Information is collected using a two-stage design in which:

- a statistically random sample of businesses expected to employ workers in the targeted occupations will be identified
- a random sample of workers in those occupations within those businesses will be selected. New data will be collected by surveying job incumbents using standardized questionnaires.

The O*NET Data Collection Program provides several hundred ratings, based on responses by the sampled workers to the O*NET questionnaires. It is not feasible to ask each respondent to provide information for all data elements. To reduce the burden on respondents, the questions have been organized into three questionnaires, each containing a different set of questions. The sampled job incumbents for each occupation are randomly assigned one of the three questionnaires. All respondents are also asked to complete a task questionnaire and provide some general demographic information.

Figure 5 Importance and Level of skill characteristic



Individuals require about a half-hour to complete an allocated subset of questionnaires. Respondents receive a prepaid $10 incentive for completing the survey (Handel 2016).

Table 2 Example of O*NET Occupation occupational data update

Category	**Source**	Occupation1 **Baker**	Occupation 2 **Computer Network Support Specialist**
Abilities	Analyst	2015	2014
Alternate Titles	Multiple source	2017	2017
Detailed Work Activities	Analyst	2015	2014
Education	Incumbent	2015	2014
Interests	Analyst	2008	2013
Job Zone	Analyst	2015	2014
Knowledge	Incumbent	2015	2014
Sample of Reported Titles	Incumbent	2015	2014
Skills	Analyst	2015	2014
Tasks	Incumbent	2015	2014
Tools & Technology	Employer Job Postings	2016	2017
Work Activities	Incumbent	2015	2014
Work Context	Incumbent	2015	2014
Work Styles	Incumbent	2015	2014
Work Values	Analyst	2008	2012

Presentation of skill intelligence

Central to the project is the O*NET database and information from this database forms the heart of **O*NET OnLine**, an interactive application for exploring and searching occupations.

Complementing occupational classification systems

While the Content Model defines the information structure for a single occupation, the O*NET-SOC taxonomy defines the set of occupations across the world of work. Based on the nation's Standard Occupational Classification (SOC), the O*NET-SOC taxonomy currently includes 974 SOC occupations which currently have, or are scheduled to have, data collected from job incumbents or occupation experts. To keep up with the changing occupational landscape, the taxonomy is periodically revised; the last revision was in 2010.

O-NET complements the Standard Occupational Classification (SOC) system with about 100 additional occupations. O*Net functions as information reservoir for occupations in classification system. One can look up occupational codes and titles and a vast amount of job and worker characteristics and indicators are returned.

New and emerging occupations

In O*NET, the identification of new and emerging occupations is based on two criteria that have to be met simultaneously (Beblavy 2016):

The occupation

(1) involves significantly different work than other occupations in the database and

(2) is not adequately reflected by the existing structure.

The O*NET programme assembles 'background' information on these occupations, such as their development, employment numbers, education requirements, licensing and associations.

O*NET focuses on the identification of new and emerging occupations in high-growth industries. Potential candidates are found by using a web-search methodology (i.e. searching the websites of sector associations and job portals, finding associations and educational programs) and by following leads from the US Department of Labor and the Employment and Training Administration.

A selection of new and emerging occupations is then made, for which occupational profiles are constructed (classified as 'bright outlook' occupations). Examples of such occupations are baristas, industrial ecologists and video game designers.

Usage by stakeholders

O*NET has been endorsed by about 500 national and industry associations such as Bread Bakers Guild of America, International Warehouse Logistics Association or New York Academy of Sciences which encourage their members to contribute information to the O*NET program.

Job seekers and students

The O*NET database provides the basis for *Career Exploration Tools*, a set of assessment instruments for workers and students looking to find or change careers. These include the following:

My Next Move
My Next Move assists new job seekers, students, and other career explorers investigate occupations. The interactive web-based tool has numerous ways to search careers. The *O*NET Interest Profiler Short Form* suggests careers matching a person's interests and level of work experience. Easy to read career reports include the most critical on-the-job tasks and skills. Job seekers can also find local salary information, training opportunities, and job posting. Specialised versions of *My Next Move* are available that provide targeted services to Veterans (*My Next Move for Veterans*) and to Spanish speaking career explorers/job seekers (Mi Próximo Paso).

O*NET OnLine
O*NET OnLine is a comprehensive web application for exploring the O*NET database. Customizable occupation reports offer a range of information, from a broad overview to comprehensive detail on a specific subject. Occupations or entire O*NET-Standard Occupational Classification hierarchy the can be searched by keyword search; users are encouraged to explore across occupations, using Content Model descriptors like abilities and interests. OnLine also offers tools like the *Skills Search for job seekers*, and the *Crosswalk* to convert other classifications to the O*NET-SOC taxonomy.

Career Exploration Tools Professional assessment instruments
Using the O*NET Career Exploration Tools, students and workers may explore a range of career directions, based on their interests, work values, and abilities. The computerized assessments and related materials are available as free downloads. In addition, workforce development professionals may be interested in the paper and pencil versions. These can be ordered, or print shop files for these tools can be downloaded and taken to a professional for printing.

Code Connector – O*NET-SOC classification made easy
Designed specifically for job coding professionals, O*NET Code Connector makes it easy to match job orders to an occupation in the O*NET-SOC system.

Illustration - Personal Care Aide profile

Occupational skill report for can be viewed as summary, detail or custom report. The following example looks at the summary report with an example for each occupational skill item.

Personal Care Aide	**Example** (not complete, for illustration only)
Tasks	Administer bedside or personal care, such as ambulation or personal hygiene assistance.
Technology Skills	Electronic mail software
Tools Used	Patient lifts or accessories
Knowledge	Customer and Personal Service
Skills	Service Orientation — Actively looking for ways to help people
Abilities	Oral Comprehension
Work Activities	Providing personal assistance, medical attention, emotional support, or other personal care to others such as coworkers, customers, or patients.
Detailed Work Activities	Administer basic health care or medical treatments.
Work Context	Contact With Others
Job Zone	[2] - an occupation that needs some preparation in terms of education, experience or on the job training
Education	High school diploma or equivalent (54%), less than high school diploma (34%)
Credentials with links to training, certifications, licenses	Career One Stop website: Pop up box for state; list of colleges & programs
Interests	Social
Work Styles	Dependability
Work Values	Relationships
Related Occupations	Home Health attendants, childcare workers
Wages & Employment	Median wage, state wage, employment, growth, openings, state trends, top industries
Job Openings	Career One Stop website - > vacancies by postcode
Additional Information	Bureau of Labor statistics , occupational outlook handbook by occupation

Challenges

Demographic representation

The representativeness of the worker sample with respect to basic demographic information, such as education, gender, race, and ethnicity, is unknown even though O*NET collects this information on its Background survey. It is possible that over-representation of more educated workers because of the survey's cognitive burden biases estimates of skill demands upward, but this remains a hypothesis in the absence of the necessary data and analysis (Handel 2016).

Uneven coverage

O*NET's coverage of certain content areas, such as technology and employee involvement practices, is too sparse, while other content is redundant. This redundancy does not seem to reflect design but rather a lack of coordination in the construction of a very long battery of items across multiple instruments (Handel 2016).

Complexity

Many of the items themselves are vague, overly complex, and jargon-laden. O*NET has recognized this fact implicitly in transferring responsibility for completing the Abilities and Skills questionnaires from incumbents to job analysts, who receive written information on the occupations they rate but do not make workplace site visits.

Despite these concerns, in the aggregate, 40 % of O*NET's 239 items correlate moderately or moderately strongly with wages and the figure is 48 % for the items from the four surveys using the Importance and Level format, suggesting reasonable criterion validity, though individual correlations often have unexpected absolute and relative magnitudes (Handel 2016).

Case 4 – Singapore's Skills Frameworks

Source

http://www.skillsfuture.sg/

http://www.skillsfuture.sg/skills-framework

Type

Newly developed operational skill information framework for selected industry sectors

About

Launched in 2016, Singapore's SkillsFuture initiative aims to invest in human capital through education and training. The training system moving away from qualifications towards a modular system in which people could choose the training components. A SkillsFuture credit provides every Singaporean over the age of 25 with a $500 credit to use towards a range of government supported training and education courses. The credit never expires and is topped up periodically over the individual's career. The program's intent is to make every student and worker the leader of their own learning path, where they are free to choose the type of training they need to reach their own career goals, whether that means pivoting to a new industry or gaining specific hard or soft skills. Alternatively employers are provided the skills modules and they choose the units of training they want their staff to receive and then they approach a training provider who then draws up learning plans based on those units.

SkillsFuture leverages a Skills Frameworks programme to enable informed decision-making by students, employees, employers and educators. This is gradually rolled out sector-by-sector. It provides up-to-date information on employment, career pathways, occupations, job roles, existing and emerging skills, as well as relevant education and training programmes. A list of training programs that address skills gaps in each sector and role are included on the framework website.

Purpose

The Skills Framework has been primarily developed for the Singaporean workforce with the objectives to build deep skills in the workforce, enhance business competitiveness and support employment and employability. It is designed to support individuals make well-informed choices in education, training and careers. At the same time it aids the development of an integrated high-quality system of education and training that responds to constantly evolving needs. The Framework aims to create a common skills language for individuals, employers and training providers. This further helps to facilitate skills recognition and support the design of training programmes for skills and career development.

Operation

The Skills Framework:

(i) Spells out the skills and competencies needed for mastery and mobility. It identifies technical and generic skills and competencies that are needed to perform the work requirements of a job.

(ii) Provides up-to-date information about the sector and jobs to inform career and skills development. The Skills Framework covers the sector and employment information, including career pathways which are useful to inform career development and skills upgrading. The Skills Framework also captures emerging skills which are important to inform skills development for competitiveness.

(iii) Provides information on training programmes for skills acquisition. The training programmes listed in the Skills Framework are aligned with industry-validated skills and competencies captured in the Skills Framework. The training providers are responsible for the quality and rigour of their training programmes.

The training programmes listed in the Skills Framework are listed based on alignment to the knowledge and abilities underpinning the skills and competencies required for the job roles. As the knowledge, abilities, skills and competencies are validated with employers and key stakeholders, programmes that are aligned to the Framework will be of relevance to meet industry's needs.

Highlights

Ownership, coordination and stakeholder involvement

The Skills Framework is co-created by the government and the industry with key stakeholders such as, employers, industry associations, unions, professional bodies, education and training providers. The Skills Framework provides key information collated by a range of stakeholders on sector and employment, career pathways, occupations/job roles, as well as existing and emerging skills required for the occupations/job roles.

Identification, collection and update of skill descriptions

Special care was taken to describe skills within occupations. Each skill is carefully analysed and written to capture both occupational/job and personal domains of the skill for holistic development. Similar to occupations or job role description, skill descriptions provides overall introduction to the skills by summarising the performance expectations of the skills. The Framework site also provides a list of training programmes for skills upgrading and mastery.

Presentation of skill intelligence

Information is shared via an interactive and colourful website with structured information for students, employees, employers, training providers, lifelong learners. A main feature is introductive videos for each group. Skill information will be launched progressively starting from 2016 and have been launched for the following sectors:

- Hotel and Accommodation Services
- Early Childhood Care and Education
- Precision Engineering
- Sea Transport.

The information is organised in a structured manner, starting with background information about the sector before detailing the workplace context covering career pathways, occupations/job roles, as well as the skills needed for these occupations/job roles. The information in the Skills Framework is completed with a listing of training programmes to address skills gaps and for skills advancement. In detail, information is set up via the following five components:

(i) Sector and Employment Information - This component describes the sector and employment landscapes and it includes useful statistics on the sector's manpower and occupational/job requirements, in line with the Singapore's industry support program (Industry Transformation Maps).

(ii) Career Pathways - This component shows how the occupations/job roles in the sector are structured progressively based on sector norm. From the Career Pathways, users can identify vertical and lateral advancement opportunities.

(iii) Occupations/Job Roles Description - This component describes the skills requirement, work context and expected profile of the worker performing the occupational/job role. It provides an overall introduction to the occupation/job role.

(iv) Skill Description - Every occupation/job role in the Skills Framework contains a set of skills. Each skill is carefully analysed and written to capture both occupational/job and personal domains of the skill for holistic development. Similar to Occupation/Job Role Description, Skill Description provides overall introduction to the skills by summarising the performance expectations of the skills.

(v) Training Programmes — Training Programmes link the skills in the occupations/job roles to programmes that are available in the market. The list of programmes is not limited to academic qualifications, and continuing education and training programmes. It will also list apprenticeships, recognition of prior learning and any other skills-based programmes and manpower initiatives such as SkillsFuture Earn and Learn Programme that are available in the sector.

Usage by stakeholders

Students

The above components provide the following benefits from a student's perspective. They can use the Skills Framework to make informed decisions on education and training, career development and skills upgrading based on the sector, employment, occupation/job role, skills and training information in the framework. The Sector and Employment Information provides a broad understanding of the sector and employment prospects. The Occupation/Job Role Descriptions informs about the job scope, the work context and the attributes which are required by employers. The Career Map will provide an understanding of typical career pathways and potential development prospects. As the occupations/ job roles are mapped to skills and competencies that are linked to relevant education and training

programmes under the Training Programmes Listing, one can determine their preferred choice of study based on aspirations.

Employers

Employers can use the Skills Framework to design progressive human resource practices to recognise skills and make informed decisions on skills investment. Employers can use the technical and generic skills and competencies under the Skills and Competencies Descriptions to explain the breadth and depth of the skills requirements. The Skills and Competencies Descriptions can also be used during appraisals to discuss and assess skills match and skills gaps. Through the Training Programmes Listing, employers can immediately identify the programmes that aim to address the skills needs of employees.

Individuals in their early and/or mid-career

Workers can use the Skills Framework to make informed decisions on education and training, career development and skills upgrading based on the sector, employment, occupation/job role, skills and training information in the framework. Based on the skills identified for the occupations/job roles, one can do a simple self-assessment to assess a skills match or skills gap. The government is working with the relevant parties to put in place occupation profiling tools to further enhance the skills assessment experience. More information will be provided when the service is ready.

Training providers

Training providers can use the Skills Framework to gain insights into sector trends and skills in demand, which allow them to innovate and contextualise their curricula design and training programmes to suit the needs of the sector. Under the Skills and Competencies Descriptions, there are technical and generic skills and competencies drawn up for each job role. Training providers can use this information to plan the courseware and curricula, and research on ways to embed suitable pedagogies to achieve the learning outcomes. Training providers are also encouraged to use the Skills and Competencies Descriptions, to help companies develop progressive HR practices for skills recognition and benchmarking.

Parents, teachers and career counsellors

People in advisory roles can use the Skills Framework to understand the sector and employment prospects and learn about the occupational/job scope, the work context and the work attributes which are demanded by the employers in the sectors. The framework provides informed advice to children and students as they choose their desired pre-employment training programme. The Career Map provides an understanding of typical career pathways and potential development prospects.

Illustrations

Retail Sector framework

For industries facing challenges in restructuring, such as those such which are domestically-focused and require a large pool of low-skilled workers, the specifically-tailored Industry Transformation Map encourages productivity growth through the use of technology and innovative business strategies. The report identified the retail industry as an example (Figure 6).

Figure 6 Future of retail - SkillsFuture retail sectoral manpower plan

Source: https://www.spring.gov.sg/DevelopingIndustries/RT/Documents/Retail_Sectoral_Manpower_Plan_Publication.pdf

Early Childhood Care and Education information structure

1. Sector and Employment Information click leads to a guide/brochure on occupations and skills in the sector.
2. Career pathways leads to a one page diagram on career pathways
3. Skills Maps and Standards (including occupational and skill descriptions) leads to two pages with four high level skill categories and paragraphs of occupational descriptions per each of the 13 occupations. Separate tracks per three career groups can be downloaded. Skill standards articulate the content of all skills required for each occupation. Skill categories across all occupations are:

    - Developing the Child Holistically

    This category focuses on the holistic development of children through programme development. This would include having a sound understanding of child development theories, pedagogy, the learning environment, interactions and relationships, as well as health, safety and nutrition.

    - Collaborating with Families and the Community

    This category focuses on establishing and sustaining strong partnerships with families and community stakeholders.

    - Building Professional Capacity

    This category focuses on the importance of life-long learning and taking ownership of one's professional growth and development for the purpose of strengthening children's learning and development.

- Building Organisational Capacity

This category focuses on enhancing capabilities, as well as aligning systems and structures within centres to realise centres' goals and vision.

Occupational categories

Educarer 1 (44 pages!): Occupation description; about 20 specific skills resembling the Australian units of competency style under each skill category and sub-categories (hierarchical). Each skills is categorised as follows:

Skills code, skill category, sub-skill category, skill name, skill descriptions, knowledge and analysis, application and adaptation, Innovation and value creation (n/a in this case); Social intelligence and ethics (n/a in this case), Learning to learn (n/a in this case), Range of application.

4. Training programmes (still under development)

The Training Programmes provide information on courses that are available for aspiring and in-service educators to acquire or deepen skills relevant to the various occupations in the ECCE sector. Rather than full occupational qualifications, there are modular programs and providers mapped against single skill/skill categories to support skill deepening (Figure 7).

Figure 7 Training programs for skill and knowledge deepening

Skills Framework for Early Childhood Care and Education

Programmes that broaden or deepen specific skills and knowledge for the various occupations in the sector

Educarer

Occupation: Educarer 1

Full Qualification Programme	Provider
N/A	

Skill Category	Modular Programme	Provider
Developing the Child Holistically	(WSQ) Teacher-Child Interaction and Classroom Management	SEED INSTITUTE PTE. LTD
	(WSQ) Apply Emotional Competence to Manage Self at the Workplace	Eagle Infotech Consultants Pte Ltd
Collaborating with Families and Community	Relevant programmes will be updated at a later date	
Building Profesisonal Capacity	Relevant programmes will be updated at a later date	
Building Organisational Capacity	(WSQ) Apply Emotional Competence to Manage Self at the Workplace	Eagle Infotech Consultants Pte Ltd

Case 5 – UK's Futures Programme

Source

http://skillspanorama.cedefop.europa.eu/en/analytical_highligths/skills-anticipation-uk

https://www.gov.uk/government/collections/ukces-futures-programme-overview

Type

Temporary project based industry program

About

Starting in 2014, the UK Future's Programme trialled innovative approaches to workforce development through co-investments with employers and industry to test solutions to long-standing or emerging workforce development issues. Between 2014 and 2016 UK Commission for Employment and Skills (UKCES, abolished in March 2017) worked with industry to test 'what works' in addressing current or anticipated workforce development problems, e.g. – productivity, low skills, and mobility, that are restraining business performance. Essentially, the UK Futures Programme encourages a Research & Development approach to skills development and application in the workplace. The UK Futures Programme issued targeted competitions for grant receiverships with employers in selected industries aiming to achieve sustained economic recovery for the long term, driven by skills and talents of people.

Purpose

To address emerging or long-standing skills and productivity challenges in close cooperation with industry. The Programme's key objectives were to:

- Support collaborative approaches to workforce development issues amongst employers and, where applicable, wider social partners
- Encourage innovative approaches to addressing workforce development issues
- Identify ways to address new or persistent market or system failures which act as a brake on UK workforce competitiveness
- Identify 'what works' when addressing market failures in relation to workforce development, for adoption in policy development and wider business practice.

Operation

The Programme offered small scale public co-investment to employers and industry, to design and test their own solutions to emerging or long-standing skills and productivity challenges. The programme was designed on the basis of learning from previous UKCES investments and from the

'Innovation Lab'[1] approaches being adopted in policy development. Key features included highly specified and targeted challenges , employer leadership and engagement, collaborative solutions, a strong emphasis on testing new (and ideally innovative) approaches with an appetite for risk and co-creation between public and private investors.

Targeted competitions were issued in response to selected areas to create impact through this Programme. The competitions were identified through the insights of UKCES Commissioners and from their research base. Collaborative employer-led projects were encouraged, as were proposals which also include wider social partners, such as trade unions and membership bodies. Single employer proposals were supported as well where there is potential for impact/learning to be applied in wider contexts.

Highlights

Ownership, coordination and stakeholder involvement

The Programme saw UKCES and industry co-creating projects to research, develop, pilot and / or scale innovative solutions to identified current and emerging workforce development issues that restrain business performance. Lessons learnt in employer and end-user engagement were:

- Utilising existing networks and relationships, usually through face-to-face conversations, is a more efficient and effective means of engaging employers and wider stakeholders than 'cold' approaches
- Intermediaries and sector bodies can facilitate access to networks. Their non-commercial status can be useful for engaging employers as they are viewed as independent, non-competitive and operating on behalf of the sector or for social good
- Small firms face significant information and resource barriers to engagement. For practical reasons, sector initiatives also tended to be geographically focussed
- It is easier to engage employers and stakeholders, especially those with whom there is little previous relationship, with a product or solution that is tangible (e.g. a demo or prototype), rather than an idea
- The employers targeted by the UKFP are often not sure of their needs or the benefits to be gained from training, due to their lack of previous engagement. Therefore, they are more likely to engage if the initial offer is at low or no cost to employers, to enable them to participate with minimal risk or commitment
- Senior teams within employer organisations need to be engaged to ensure organisational buy-in and commitment to change, and middle managers need to be on board for effective implementation.

1 For each competition there least two workshops (innovation labs) where project teams share lessons learned and work together to address common problems. The workshop crucially depends upon a commitment from projects to engage fully with the day. There is an expectation to have at least two senior individuals from each project to attend the labs, and there will often be activities to complete in advance.

Identification, collection and update of skill descriptions

The Productivity Challenges

The *Future Programmes* funded five Productivity Challenges. Each Challenge was focused around specific skills for a sector/industry and workplace productivity challenge. Each Challenge comprised a number of distinct projects (between 5 and 7), most of which were employer led and based on partnerships between different organisations or companies.

Challenge 1 — focused on designing solutions to the workforce challenges in the **offsite construction** industry

Challenge 2 — focused on improving leadership and **management** through supply chains and networked organisations

Challenge 3 — focused on improving progression pathways in the **retail and hospitality industries**

Challenge 4 — focused on enhancing skills for innovation management and commercialisation in the manufacturing sector

Challenge 5 — focused on developing leadership and entrepreneurship skills in **small firms** and the role of anchor institutes in supporting the development of small firms.

Presentation of skill intelligence

UKCES placed strong emphasis on sharing what works to influence policy and wider practice. The success of the Programme is deemed crucially dependent on actively communicating findings and sharing good practice to influence employer practices and future public policy debates. There are a number of areas that were not supported through the Programme although deemed important. These included large scale delivery of training ('participation'); projects that could be supported through already existing routes ('mainstream'); and costs not directly linked to delivery of projects.

Enhancing skills and capabilities program evaluation

This section considers evidence from the UKFP evaluation in relation to what works well and what was difficult to enhance skills and capabilities within sectors and businesses.

What works?

What works	Why or How does it work
Engaging industry in discussions about what the skills gaps related issues are /	This is essential for tailoring provision to meet business needs and getting them to think about the importance of skills
Developing tangible tools and solutions, demonstrating to industry what good looks like. /	This enables business to understand what good practice looks like in action, rather than just being told the theory. Businesses gain significant value from approaches where they work with other businesses on practical solutions, through approaches like peer learning and mentoring
Baseline existing capabilities, to evidence gaps in knowledge / skills. / across a sector	This helps to communicate the need to upskill to businesses and identifies which skills need attention. Baselining can be effective both on an individual business level or

Targeting the right senior managers and leaders ./	These employees are able to put learning into practice, through implementing action plans to support change. They are also able to cascade learning to junior managers to widen the reach of solutions
Testing new ideas and learning from mistakes./	There are benefits in being open to try new ideas when it is not clear whether they will work and accepting that while some things may produce large gains, this cannot always be known in advance
Use of training methods that are tailored to the needs of end-users ./	There are a wide range of training methods available, and different employee roles require a different mixture of methods. Identifying the correct methods is crucial for delivering the most effective training
Focussing on practical learning Employers were seeking support around very particular issues./	They therefore wanted interventions which addressed these issues, and did so directly to minimise the time that they had to engage
Developing relationships between companies around finding solutions to issues relating to skills./	There are many ways that companies can learn from each other and develop joint solutions to issues around skills. This can take the form of peer-to-peer learning, or the delivery of joint projects
High quality sessions tailored to need./	Employers are attracted by sessions that are targeted to meet their specific issues, and that clearly add value beyond generic training provision

What didn't work

What didn't work	**Why it didn't work**
Enhancing skills in the wider sector, reach beyond the engaged companies./	It is difficult to engage businesses or other stakeholders beyond those that are already known to project leads or have existing relationships with partners.
Creating new linkages remains time consuming and challenging./	Short lifetime of the projects: Projects that seek to have a significant impact on skills within a business or the wider sector require time to develop, select the right partners and embed changes. Without enough time, impacts tend to be limited

Usage by stakeholders

UKCES' ambition is for a sustained economic recovery for the long term, driven by the skills and talents of people. Their vision was articulated in their 'Growth through People' report. The report outlines 5 priorities for action if this ambition is to be realised:

- Employers should lead on skills and government should support them
- Improving workplace productivity should be recognised as the key route to increasing pay and prosperity
- 'Earning and learning' should be the gold standard in vocational qualifications
- Education and employers should be better connected to prepare people for work
- Success should be measured by a wider set of outcomes not just educational attainment

Overall programme evaluation

The evaluator (SQW Group) states that the programme has shown that a relatively small amount of public cash investment can stimulate private investment and changed behaviour when supported by strong employer leadership and co-creation support from public sector project managers.

Across the Challenges, the Programme focussed on difficult barriers, to ensure it added value to existing initiatives. In so doing, it highlighted the important role Governments can play in supporting businesses to address these barriers, through information exchange and risk-sharing. This is particularly the case for addressing the long-term issue of management and leadership development in the UK and the management of UK workplaces.

Illustration

Addressing skills deficiencies in the offsite construction sector

This Productivity Challenge focused on addressing skills deficiencies associated with technological developments in the offsite construction sector.

UKCES' own research found that the sector faces a number of skills barriers to realising its growth. These include the fragmentation of the sector, with a qualifications offered considered inadequate by employers, and specific skills problems including:

- Little collaboration between professions in offsite construction
- Marketing and business development: combining technical knowledge with strong customer-facing skills
- Project management, particularly the interface between offsite and onsite activities
- Design and IT skills, covering the design, construct and operation of buildings.

Selected project in the sector were:

Skanska — Offsite Management School: This project created an employer-led Offsite Management School with over 200 unique member companies and almost 300 individual learners.

Laing O'Rourke - Addressing Skills Deficiencies in the Offsite Construction Sector: They developed a live site scenario for training solutions allowing changes to be implemented in real time, cutting delays, improving ways of working and reducing waste.

Steel Construction Institute (SCI) - Best Practice Guidance and Management Training for Light Steel and Modular Construction: SCI consulted with over 75 companies to develop and test online learning and training resources, with over 1000 requests for best practice tools from the sector.

Edinburgh Napier University - Offsite Construction Hub: This project created an 'Offsite Construction Hub' to define and Case skill requirements and encourage collaboration between professions, engaging with over 200 employers to gather a broader sector understanding.

Buildoffsite — Comparator project: Buildoffsite expanded its online 'comparison tool' to evaluate onsite and offsite solutions at the early development stage; encouraging employers, surveyors, architects and engineers to consider offsite alternatives before committing to design solutions.

Learning

- Clear industry leadership is important and can galvanise competitors to become collaborators where there is a commonly experienced challenge.
- The breadth and depth of skill gaps were sometimes greater than projects first realised, but in recognising the gaps, corrective action could be taken – in fact it is crucial for employers in the sector to take responsibility and recognise these gaps otherwise they risk being left behind.
- Educators and businesses must work more closely together to ensure educational institutions and professionals keep up with technological advancements and ensure innovation can be capitalised upon.

Other UK skill initiatives

Working Futures

Not to be confused with the Futures Program is the Working Futures series of occupational projections, a skills forecasting initiative. The Working Futures series have been undertaken for many years, building upon similar projections also funded by the UK government. The projections of future skills demand by occupation have perhaps the most influence on policy. Initially they were used for planning purposes, i.e. when the government was involved directly in determining the courses and number of places to be funded in post-compulsory education. Now that there is less emphasis on planning as a result of the move to an increasingly market-like system, the projections have been used as an important source of information in helping people to decide which skills/qualifications to pursue.

Working Futures are aimed at policymakers and labour market intermediaries such as training providers. The Working Futures employment results are a key cornerstone of the *LMI for All* portal. The primary dissemination route seems likely to increasingly become LMI for All, and this is aimed at the widest possible number of users. Other skills anticipation activities (such as the skills foresight activities and skills surveys) are aimed more at intermediaries and policymakers.

More recently, *LMI for All*, an online portal providing national-level data on LMI for use in application and websites, has become a repository of a vast range of skills data. The aim of LMI for All is to make skills and other labour market data available to a wide range of stakeholders. Developed by UKCES, *LMI for All* draws information and data from national sources on skills assessments (both national and sectoral), occupational and skills forecasts, and regular surveys of employers. Skills data with labour market indicators are mapped to Standard Occupational Classification (SOC) categories at a detailed 4 digit level (the most detailed level in UK classification system).Data are disaggregated to occupation, region, gender, age and employment status.

Using labour market intelligence in a college context

Identifying and using labour market intelligence (LMI) to inform the curriculum offer is a useful way for colleges to build credibility with the employers in the labour market(s) they serve. The Association of Colleges (AoC) and the UK Commission for Employment and Skills (UKCES 2015) have produced a guide for curriculum developers to help further education (FE) colleges maximise the use of Labour Market Intelligence (UKCES 2015). It provides a broad perspective of national and local LMI across industry sectors and is intended to support college leaders with curriculum planning.

Through a defined inspection process, a college will be assessed on how well the leadership and management team successfully plan, establish and manage the curriculum and learning programmes to meet the needs and interests of learners, employers and the local and national community.

Ofsted inspection process (Learning and Skills Improvement Service 2013): This process places emphasis on enabling learners to progress into "jobs that meet local and national needs".

- Career development activities need to be informed by up to date LMI and employer information that is accessible and, as necessary, selected and interpreted for learners by staff who feel confident in using it.
- In many organisations, LMI is collected and stored by a wide range of staff working in different departments, including those working on business development and with Jobcentres as well as tutors on vocational programmes and in work-based learning, producing a valuable local resource and offering insights into employers' recruitment needs and practices, job profiles, expectations of applicants etc.
- Across the sector, Ofsted inspectors will consider:
  - 'Learners' acquisition of qualifications and the skills and knowledge that will enable them to progress to their chosen career, employment and/or further education and training.'
- Provider weaknesses identified recently by Ofsted included:
  - insufficient initial assessment of participants' employability skills and barriers to employment
  - failing to tackle participants' barriers to employment
  - insufficient priority being given to progression into work
  - in adequate recordings of job outcomes.

Case 6 – Canada's FutureSkills Lab

Source

http://www.budget.gc.ca/aceg-ccce/pdf/skills-competences-eng.pdf - Advisory Council on Economic Growth - BUILDING A HIGHLY SKILLED AND RESILIENT CANADIAN WORKFORCE THROUGH THE FUTURESKILLS LAB

https://www.canada.ca/en/employment-social-development/programs/sectoral-initiatives-program.html

Type

Future Skills Lab is a proposed initiative to inform skill funding decisions.

About

Canada is looking for an overarching strategy to deal with the increased probability and scale of job dislocation, and to help prepare Canadian workers for the skill demands of the future economy. It took guidance by reports from the Unites States and Australia on the impact of automation. Within this environment, the Canadian Council of Economic Growth proposed in 2017 the formation of a national non-governmental organization to operate as a laboratory for skills development and measurement in Canada. Led by an executive team drawn from the private, non-profit, and education sectors, the ambitious *FutureSkills Lab* would invite all levels of government, private sector organizations, labour unions, not-for-profits, and other interested parties to partner on an opt-in basis. Through project partnerships and co-financing opportunities, new and innovative approaches to skills development and outcome measurement will be explored.

Purpose

The FutureSkills Lab intends to inform skills and training program funding decisions of multiple players, including government ministries, researchers, employers, and organizations dealing with labour market information. The initiative would catalyse and enable forward-looking approaches to preparing Canadians for the workforce. To accomplish its mission, the FutureSkills Lab has three core functions.

1. Support innovative approaches to skills development: Solicit, select, and co-finance innovative pilot programs in skills and competency development that address identified gaps among workers, postsecondary students, and youth

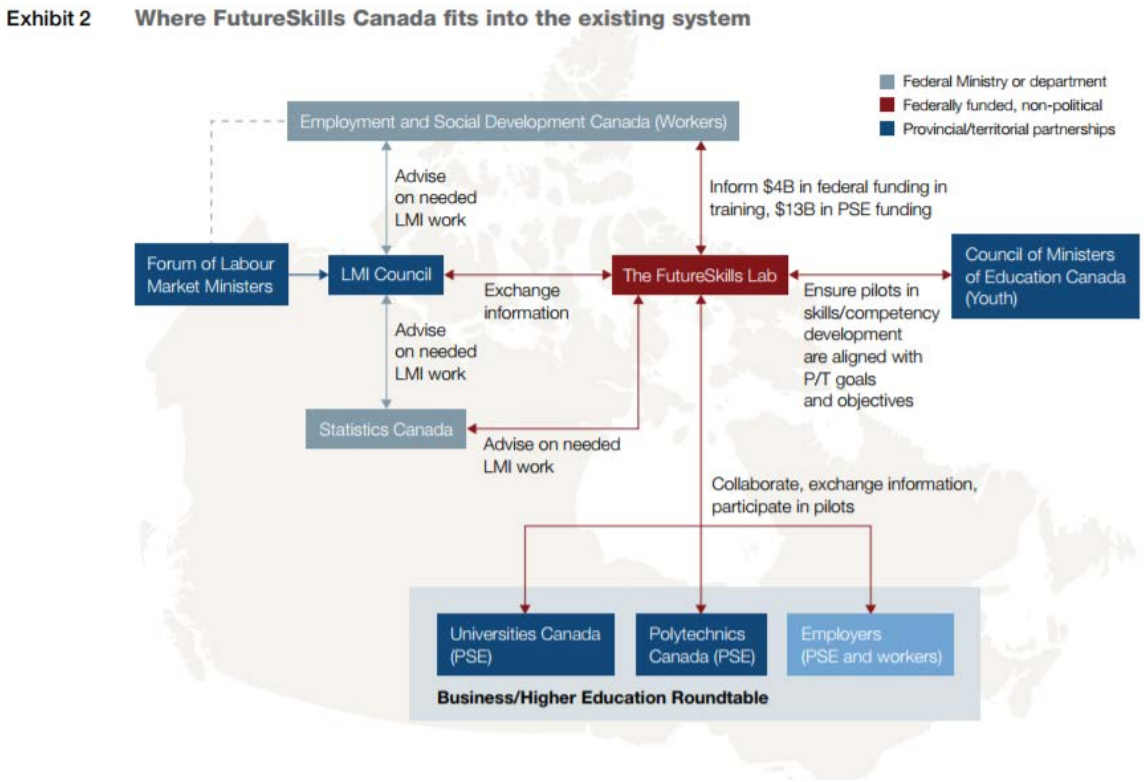
2. Identify and suggest new sources of skills information: Gather labour market signals of skill needs by building a portfolio of pilot proposals, support innovative labour market information initiatives focused on employer expectations, use web-based sources to extract and synthesize emerging labour market trends, and draw links between credentials and skills

3. Define skills objectives and inform governments on skills programming: Rigorously measure outcomes of forward-looking and targeted training programs and skills information initiatives, identify and disseminate best practices broadly to education and training stakeholders across

Operation

The initiative is still at proposal stage. Its envisioned operation draws from the above listed core functions. Operational independence and freedom from political influence are seen to be critical to the FutureSkills Lab's success. It must be nimble and entrepreneurial in order to respond to a rapidly changing work landscape. Much as the Canadian Institute for Health Information (CIHI) is accountable to Health Canada and the provincial and territorial Ministries of Health which fund it, the FutureSkills Lab would be fiscally accountable to a government department as well as to the Canadian public. The specifics of the accountability and reporting structure will need to be considered in the design and implementation of the FutureSkills Lab.

Figure 8 Where FutureSkills programme fits into the existing governance system



Highlights

Identification, collection and update of skill descriptions

While the forthcoming LMI Council has signalled intent to explore digital signals, development of the required expertise is likely beyond the LMI Council's immediate scope. The FutureSkills Lab would fill this gap by employing specialized data scientists to forecast market competency requirements from job listing sites (e.g., LinkedIn, Crunchbase, AngelList, and Talent Egg), and cull useful insights from other sources (e.g., conference topics from groups like NextGen, and research priorities of academic

institutions). More broadly, the FutureSkills Lab should regularly scan the global landscape for innovative, forward-thinking and comprehensive approaches to competencies development.

Employer data

Corporations have a significant role in the generation and collection of labour market information; such employer data is a critical resource for forecasting needed competencies. An employer may not know exactly how many engineers it will need in five to ten years, but can more likely articulate the types of foundational competencies (e.g., technical literacy) it will need. Some employers keep high-quality data, though less than before as occupational forecasting has become more difficult. The FutureSkills Lab would consider ways to unlock this valuable proprietary data, perhaps by engaging employers on an annual skills and competency survey and offering a report of trends and findings in exchange.

Training data

Rigorously measure outcomes of forward-looking and targeted training programs and skills information initiatives, identify and disseminate best practices broadly to education and training stakeholders across Canada, and determine a set of skills objectives for the future.

Should stakeholders choose to opt in, these objectives can then help inform the more than $17 billion in annual public spending on skills and training programs, the work of organizations that generate and analyse Canadian labour market information, and researchers and practitioners directly involved with training and education programs

Government agencies

The FutureSkills Lab would need to work closely with Statistics Canada and the Forum of Labour Market Ministers' forthcoming Labour Market Information Council (LMI Council) to exchange information and prioritize areas for collection and analysis of labour market information. Open communication with the Council of Ministers of Education Canada will be critical to ensure that training pilots supported by the FutureSkills Lab are aligned with provincial and territorial goals and objectives in education policy. Regular sharing of information, results, and best practices with Employment and Social Development Canada and the Forum of Labour Market Ministers would help build the FutureSkills Lab into a trusted advisor on skills development 4 Building a highly skilled and resilient Canadian workforce through the FutureSkills lab throughout the workers' life cycle. Further, collaboration and information sharing with other pan-Canadian organizations in this space – the Business / Higher Education Roundtable (BHER), Universities Canada, Polytechnics Canada to name just a few – will ensure complementary efforts.

Presentation of skill intelligence

The FutureSkills Lab would identify gaps in the measurement, data collection, and analysis of skills and competencies in Canada. Improved information would help all concerned— workers, employers, students, parents, policy makers, and training and education providers—make better informed decisions.

If it is to be valuable in this regard, the FutureSkills Lab must make all its knowledge, data, and outcomes widely accessible and visually comprehensible to Canadian workers, job seekers and employers. In areas where organizations such as Statistics Canada or the LMI Council have a clear mandate for data collection and analysis, the FutureSkills Lab would assume an advisory role by

proposing areas for data analysis. In other areas where information exists but is not used, the FutureSkills Lab would support innovative approaches to data collection and analysis, for example by leveraging data from its portfolio of pilot proposals. This includes areas like employer expectations of future skills and competency needs, digital signals from job posting websites and other online sources, and links between credentials and skills.

Usage by stakeholders

Workforce planning

The portfolio of pilots gathered from private-sector employers, educational institutions, and not-for-profits would inform policy-makers and educational providers about where they should focus their investments and efforts. Currently, governments receive a considerable number of unsolicited proposals for funding of training programs each year, but they are not aggregated and analysed for trends. The FutureSkills Lab would manage the solicitation, review, aggregation, and analysis of such proposals, and would share widely the trends it observes in competency requirements.

Training planning

The FutureSkills Lab could use the information collected to identify innovative ways of linking degrees and credentials to skills and competencies. This is a complex challenge and one that will need to be addressed with a coherent national approach. As one potential tactic, the FutureSkills Lab might map the skills demanded by employers, as expressed through pilot proposals, with information about the credentials of the employees who have been most successful in the past. Progress on this front would provide greater transparency to employees looking to hire workers with competencies not reflected by traditional credentials, and to students looking to obtain the qualifications they need to succeed in their desired field of work. Working towards national accreditation standards would also create a more mobile workforce, to the benefit of employers who hire nationally, and workers who would qualify for a larger pool of jobs.

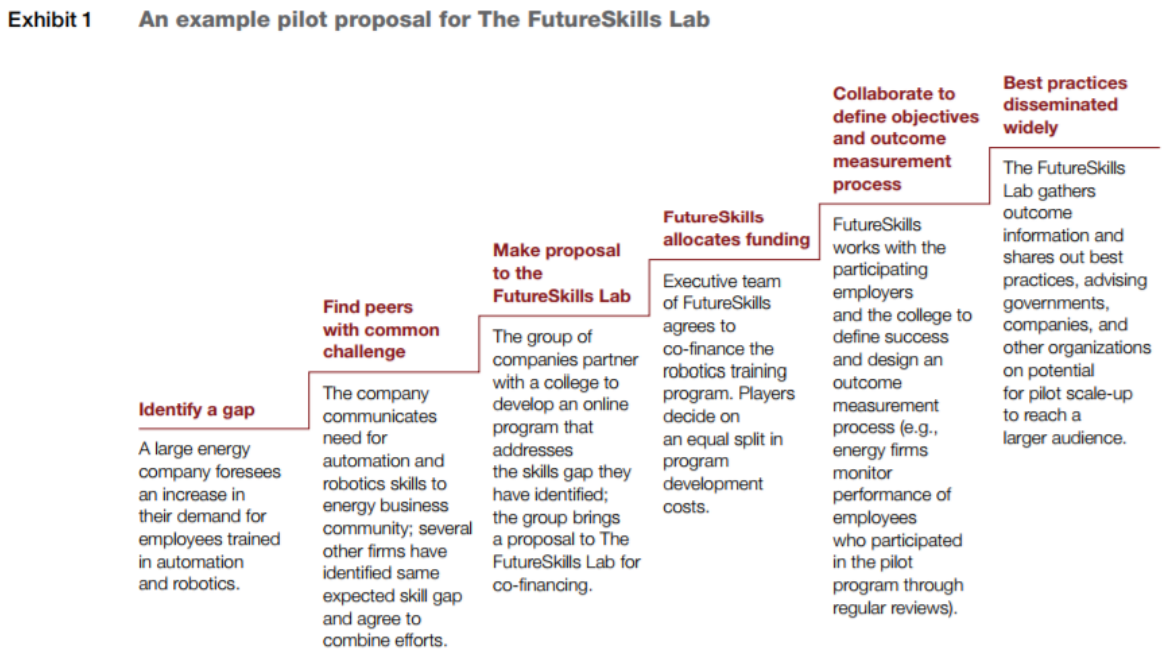
The FutureSkills Lab would support programs that can equip students and new graduates with the skills employers need, or skills associated with successful and scalable entrepreneurship. This support might include increasing opportunities for work-integrated learning, or delivering training tied directly to market-identified skills needs. Increased collaboration between employers and educational institutions is the first step in bridging the gap between employer expectations and graduate competencies. While many employers collaborate with post-secondary institutions, these arrangements mostly involve Canada's largest employers. Approximately 70 percent of large Canadian businesses partner with postsecondary institutions to support internships or cooperative learning programs. This proportion is considerably smaller among small and medium-sized companies. The FutureSkills Lab should work with organizations such as BHER, Universities Canada, and Polytechnics Canada to increase collaboration, communication and experiential learning opportunities between employers and post-secondary institutions. The Lab could act as a conduit by, for example, co-financing innovative co-op programs or experimenting with cross-disciplinary programs.

The FutureSkills Lab would focus on identifying innovative approaches to skills development within both trade industries and knowledge-related disciplines, so collaboration with both colleges and universities will be important. Priority for co-financing support would go to those pilots that build skills important for future work success and are not being made redundant in the near term via automation or other forms of innovation.

Illustration – Training pilots

Open communication with the Council of Ministers of Education Canada is seen as critical to ensure that training pilots supported by the FutureSkills Lab are aligned with provincial and territorial goals and objectives in education policy.

Figure 9 Example pilot proposal energy sector proposal



Other initiatives, systems or tools in Canada

Sectoral initiatives

https://www.canada.ca/en/employment-social-development/programs/sectoral-initiatives-program.html Sectoral initiatives program: Federal Department of Employment and Social Development Canada (2015)

The Sectoral Initiatives Program (SIP) is a grants-and-contributions program with the objective of addressing current and future skills shortages by supporting the development and distribution of sector-specific labour market intelligence, national occupational standards, and skills certification and accreditation systems. The program's mandate is to help industries identify, forecast, and address their human resources and skills issues. The SIP funds partnership-based projects for key sectors of the Canadian economy. These projects are developed and implemented by such industry partners as: workplace organizations, employer associations, education and training bodies, professional associations, unions, and Aboriginal organizations.

The objectives of the new programme are to:

- support a better match between skills and job market demands
- support more informed labour market decisions for job seekers, employers and students through the creation and dissemination of labour market intelligence

- support skills development to facilitate labour mobility.

Essential skills profiles

https://www.canada.ca/en/employment-social-development/programs/essential-skills/profiles.html

Through research, the Government of Canada, along with other national and international agencies, has identified and validated key literacy and essential skills. These skills are used in nearly every job and throughout daily life in different ways and at varying levels of complexity. Literacy and essential skills are skills needed for work, learning and life; are the foundation for learning all other skills; and help people evolve with their jobs and adapt to workplace change. These correspond somewhat with Australian foundations skills and are reading, document use, writing, numeracy, oral communication, thinking, digital technology (originally, computer use), working with others and continuous learning.

Essential skills profiles describe how workers in various occupations use each of the key essential skills. They include:

- a brief description of the occupation
- examples of tasks that illustrate how each essential skill is applied
- complexity ratings that indicate the level of difficulty of the example tasks.

Over 350 profiles are organized by national occupational classification codes.

Exploration of careers by essential skills profiles opens up a list of occupations and an associated profile a list of example tasks that illustrate how each of the 9 essential skill is generally performed by the majority of workers in an occupation. The estimated complexity levels for each task, between 1 (basic) and 5 (advanced), may vary based on the requirements of the workplace.

Each skill group opens up to subset of specific examples for each occupation, e.g. for Accounting & Clerks the Thinking skill category would list the following for as a problem solving skill:

- Encounter delays due to equipment faults, e.g. discover that they cannot access accounting software because of faulty intranet systems. They contact supervisors and technology support staff to inform them of the glitches. They perform other work until the necessary applications are usable. (Skill Level 1)
- Discover that financial records are inaccurate, incomplete and missing, e.g. discover that they are missing invoices to match expenditures shown on bank statements. They speak with suppliers and co-workers to identify purchases made and seek assistance in obtaining copies of missing invoices. (Skill level 2)

Guide to essential skills profiles (for users) All essential skills profiles are developed based on the approach described in the essential Skills Research Project (ESRP). The Employment and Skills Development Canada (ESDC) database currently houses more than 350 essential skills profiles, some of which were developed in the mid- 1990 s. In order to provide clear, up-to-date information on the skills required of workers in different occupations, ESDC may review and update essential skills profiles. Titles are generally linked to an occupation or occupational group in the National Occupational Classification (NOC) and the corresponding NOC number (e.g. NOC 7611).

In situations where the NOC numbers or titles have been revised, NOC information included in the profiles is updated to reflect the changes.

How are essential skills profiles used?

Essential skills profiles are an important source of information in building a workforce that includes all kinds of skilled workers. The profiles have many purposes and can influence workers and learners in different ways, while helping prepare them for success at work. They can be used directly with individuals, and can also help build research, standards and curriculum. For example:

- Course, training and curriculum developers use the profiles to create learning programs, tools and activities to prepare people for work
- Researchers use the profiles to study work, literacy (i.e., reading, writing, document use and numeracy) and skill levels in Canada, and evaluate how teaching and learning opportunities relate to the essential skills required in the workplace
- Trainers and teachers use the profiles to help youth and adults understand how their learning applies to different occupations
- Guidance and career counsellors use the profiles to give advice on career options and learning plans
- Employers use the profiles to develop or choose the right kind of training for their employees and/or create job advertisements, interview questions and job evaluations
- Parents, mentors and advisors use the profiles to help students plan for their future
- Job-seekers, workers and learners use the profiles to understand how their own skills measure up to those needed in different occupations.

For example, the consultancy Workplace Education Development (WED) explores tailoring GED (diploma/certificate of high school equivalency) preparation courses using the Essential Skills Profiles. The project looks to generate a matrix that correlates the Essential Skills that are addressed by a generic academic accreditation such as the GED, and those used in a wide range of entry-level jobs, as described by the Essential Skills profiles. Both systems deal with the Essential Skills of reading text, using documents, writing, numeracy and problem solving. By developing curricula that integrate some of the varied work-related contexts of the Essential Skills profiles, instructors could help to make the concepts and tasks of an academic program more immediately meaningful and useful to workers.

Case 7 – Switzerland's skilling - an overview

Source

https://www.oecd.org/edu/skills-beyond-school/skills-beyond-school-Austria-Gemany-Switzerland.pdf (A SKILLS BEYOND SCHOOL BRIEF ON AUSTRIA, GERMANY AND SWITZERLAND, Fazeka & Fields 2015)

https://www.eda.admin.ch/eda/en/home/fdfa/organisation-fdfa/directorates-divisions/sdc.html

http://swisseducation.educa.ch/en (Swiss educations 2017)

https://www.oecd.org/switzerland/42578681.pdf (Learning for Jobs OECD Reviews of Vocational Education and Training Switzerland, Hoeckel, Field & Grubb 2009)

Type

High level description about skill information within the vocational training system

About

Switzerland shows persistently beyond marks in economy, including training and skill development outcomes. Switzerland has higher levels of participation in VET and in adult education and training than the EU average. Information to skills and demand and facilitation to training is achieved by close and historically and traditionally enduring industry involvement. Vocational skills development is guided by the key elements of a dual system, such as the alternation between theoretical and practical training and close cooperation between social partners. Switzerland has a small open economy strongly integrated into both European and global trade networks. It depends, to a significant extent, on a small number of high-end niche markets such as private banking and pharmaceuticals. In Switzerland two continuing parallel trends in education are important. First, the demand for most highly skilled technical professional education and training professions is forecast to be relatively stable between 2010 and 2020, so that they will decline in relative importance on the Swiss labour market; while demand for most of the managerial professions in SMEs and large enterprises is expected to expand in the coming decade.

Purpose

Building on Switzerland's Agenda 2030 and particularly the sustainable development goals on quality education and decent work in economic growth, the Swiss Agency for Development and Cooperation (SDC) focuses on creating efficient and flexible vocational skills development systems that take into account the needs of the local labour market. Its two priority action areas are:

1. Inclusive vocational skills development: Making vocational training available to as many people as possible requires a mix of both public and private training providers. The agency supports the development of national standards that facilitate the school-to-work transition and clarify the role of public and private vocational training institutions. In addition, to lower entry barriers so that the illiterate, the poor, and people from remote regions are also given the opportunity to access and attend vocational schools. Therefore, the agency promotes

innovative teaching and learning methods, adapted to the needs of rural populations and those working in the informal sector. The seamless transition from basic education to vocational training opens up new perspectives for disadvantaged young people.

2. Global mobility: The Swiss economy increasingly requires skills which reflect European and global as well as national needs. The professional education and training (PET) system therefore needs to balance local with international skills requirements when defining qualifications. This is also necessitated by the enhanced international mobility both of workers and students. Globalising influences are strongest in sectors where trade and foreign direct investment play a crucial role. For example, the content of professions tied to business accounting standards are changing fast in response to the internationalisation of these standards and the client base of such services.

Operation

In Switzerland, the content of each PET qualification, described in competency profiles and certified by Federal Office for Professional Education and Technology (OPET), is primarily determined by employers and professional associations through a certification process. Any company and professional association can contribute; but in practice companies more extensively engaged with the PET system contribute most fully. This ensures that the content of PET qualifications adequately respond to local business needs including Swiss national requirements.

Training plans (Bildungspläne) form the basis for the vocational teaching concept used for VET programmes. They are used to structure vocational education and training courses and guide vocational teachers and trainers in their work. They define not only the technical but also social and personal skills a student must acquire, the content of education (lessons at vocational schools, range of practical skills taught at the host company and content of industry courses) and specify the respective roles of vocational school, host company and industry training centre in providing these competencies. They also define the process of assessment.

Highlights

Ownership, coordination and stakeholder involvement

Close cooperation of several stakeholders: the public and private sectors steer, fund, and manage the training together. The tri-partite Swiss partnership arrangements including the Confederation, the cantons and professional organisations rely on the principles of consensus and cooperation. While this leads to a process of policy making and reform that is relatively lengthy, entailing extensive consultation and need for agreement, it should help to ensure responsiveness to stable and long term employer needs. Implementation of reform has been described as extremely smooth and quick since employer support for the reform is built-in. Close cooperation between the partners allows for adaptation to changes in the labour market

Dual-track approach: the V(P)ET system is based on the idea of learning in a real workplace and as part of a real-world working process. Training takes place at the host companies' production facilities, not in a special, segregated training context. Company customers and cooperation partners are accustomed to being served by apprentices and accept this. The principle of learning on the job is combined with targeted theoretical inputs imparted at a VET school.

VET as business case: Because trainees are fully integrated into the productive work process, investing in VPET generally also pays off for companies involved. In the first year, the wage and training costs for apprentices will naturally significantly outweigh their productive output. This changes as trainees grow more productive, so that, after three or four years, the host company often generates net income from the relationship.

Identification, collection and update of skill descriptions

Switzerland's VET/PET system is strongly employer-driven. The involvement of professional organisations in the process of VET policy making is stipulated by law. Employers have responsibility for determining the content of VET (through ordinances which describe the competencies to be taught in every programme, and training plans) and of national examinations, and have the exclusive right to initiate the design of new ordinances, or update existing ones, and prepare training plans.

Labour market relevance: as occupations are defined and regularly reviewed by the professional associations, and training takes place largely in the workplace, the training received matches the needs of the labour market.

Occupational skill profiles

Occupational skills profiles are written into so called VET ordinances (Berufsbildungsverordnungen). VET ordinances are issued at the request of professional organisations or, if necessary, at the cantons' or the national secretariat for education and, research and innovation (SERI) own initiative. SERI issues education ordinances for each VET programme.

VET ordinances cover the legally relevant aspects applying to a given occupation: they define the occupational profile, the content of training, the criteria that qualified workers in the occupation must meet, the maximum number of students, and qualification procedures. Content has been carefully chosen and prepared and kept up to date by VET governance. Training providers just need to adopt the programs and student can be confident that the programs on offer lead to jobs.

Routes of progression

Many countries have tried to emulate the dual apprenticeship systems of Austria, Germany, and Switzerland that alternate on-the-job training with school-based education. Such attempts have sometimes failed because of insufficient attention to the institutional context – including the range of further routes of progression. In Austria, Germany and Switzerland, the upper secondary vocational tracks are reinforced by labour-market relevant post-secondary options for their graduates. These career and learning routes help to professionalise the initial occupation by establishing a career structure and routes of progression.

To ensure that students enrolled in vocational education and training ultimately find employment, the government's programmes aim to bring such training more into line with the needs of the labour market. This is achieved by getting the local private sector involved in developing occupational profiles and delivering training. Cooperation with the private sector is deemed important because it ensures that vocational skills development programmes actually meet the demand for specific qualifications in the labour market and improves the quality and relevance of the training itself.

Vocational education and training is a valued choice of young people in Switzerland because VET leads to a career. The system operates on the principle of 'no dead-end qualifications' and enables VPET

graduates to follow practically any career pathway. At the same time and under certain circumstances, graduates who qualify under the general education system (baccalaureate) can switch to VPET options.

Major reform activities in the past years represent an investment in vocational education and training, to respond more flexibly and swiftly to radical economic and technical changes. Since 2005, an average of 20 new or reformed training programs (educational ordinances) are entering the training market each year. Interestingly the majority of these are at the diploma level.

Case 8 – New Zealand's skills strategy proposal

Source

https://www.beehive.govt.nz/sites/all/files/NZ-Skills-Strategy-Action-Plan-2008.pdf (New Zealand Skills Strategy Action Plan, New Zealand Skills Strategy,2008)

http://www.mbie.govt.nz/publications-research/research/construction-sector-productivity/ruma-karaitiana-skills-implementation-summary.pdf (Moving from skills strategy development to implementation and managing change, Karaitiana 2012

Type

Skill strategy proposal

About

In 2008 the Skill New Zealand Tripartite Forum, a partnership of Government, Business NZ, Trade Unions, and the Industry Training Federation (ITF), released a skills strategy discussion paper. The proposed Skills Strategy and suggested actions aim to promote discussion, understanding and agreement about the fundamental importance of skills to New Zealand's prosperity. The authors emphasised the need for an education system responding to the needs of employers and proposed actions relating to strengthening and building networks and gathering information on skills. The skills strategy is to a large part designed to lift labour productivity rather than labour utilisation. More people had been working and longer hours (against a low unemployment rate) with a moderate productive output – comparing an hour worked in NZ producing approx. 30 percent less than an hour worked in Australia (New Zealand Skills Forum 2008).

Purpose

The Skills Strategy aims to a large part, to make better use of the current workforce by raising people's skills and increasing the value of the work that they do (Figure 10).

Figure 10 Purpose and Goals of NZ skills strategy

Operation

The Skills Strategy emphasises the development of management and leadership capability within firms, as well as ways to support workers to better influence skills development within their workplaces.

This Skills Strategy aims to provide a shared understanding of the challenges New Zealand businesses, government and individuals face in meeting the demands of a growing economy. It was set up to agree on solutions and priorities for action that will result in continued economic growth.

The Skills Strategy is designed to putting actions into practice by:

- establishing a mechanism for debating and reaching agreement on the required skills and systems to drive productivity
- better co-ordinating and communicating work across government and New Zealand organisations and individuals
- identifying duplication or where there is a need to do more.

The development of the Skills Strategy was based on an understanding that the significant improvements in skills development and use needed to drive labour productivity and economic growth are going to require co-ordinated action and commitment from all stakeholders.

Aspects relating to occupational skill information models or frameworks are bedded down in the following actions under **Priority 3 Supply and demand of skills, and measurement of skill acquisition and retention:**

- Improve access to careers and labour market information and advice for adults in the workforce

- Undertake a targeted review of the qualifications system, focusing on diploma and certificate levels
- Develop and disseminate integrated skills information and create a shared language on skills
- Improve the provision of information, access to careers advice, and life-long learning advice for young people currently in the workforce, and their parents.

Highlights

Develop easily accessible information

Develop easily accessible information about skills that meets the needs of individuals, employers, industries and regions

The forum shared the insight that New Zealand has not had a strong tradition of bringing relevant and timely labour market information together to inform decision makers at all levels. A potential vehicle for doing this is therefore to bring together a comprehensive skills knowledge base to better inform decision making, particularly around the supply of skills and their utilisation in the workforce.

There is a lot of information relating to skills held by government departments, employers, education and training providers and individuals. We need to bring it all together in a coherent database in order for it to be useful to us in planning for our skill needs, including obtaining timely information on skills shortages to support decision making by a wide range of stakeholders.

The Department of Labour has begun work to develop an integrated database by bringing together existing data that it produces, e.g. information, relating to occupational trends and projections, wages, and vacancy rates. The Department wishes to expand this to include more sources of information. The data is intended to cover key areas of supply, demand and matching with the intention of making this available online and updated over time. In addition to bringing together labour market and skills information, we need to make sure that those who need it to support this work know about the database and have access to it.

The Department of Labour brings together key information for decision makers in the form of an integrated skills database which pools existing labour market information sources as well as several new areas such as occupational forecasts. The aim of the integrated skills database is to obtain current and future labour market information that improves our understanding of the supply of labour (by workers), the demand for labour (by employers), and how well we are able to match workers to suitable jobs. In addition to information on skills shortages brought together by the Department of Labour, we intend to supplement this with other information and insights from those working closely on the development and use of skills.

Improve the provision of information

Improve the provision of information, access to careers advice, and life-long learning advice for young people currently in the workforce and their families

As part of this work, consideration will be given to expanding and enhancing the range of information (including labour market information) and tools targeted at adults in the workplace on Career Services website and within their wrap-around suite of services. It was proposed that Career Services, in partnership with others, will be the lead agency to take forward work in this area as it has an evolving

and sophisticated service delivery infrastructure, (including web-based, phone-based and in person services), is widely recognised as the 'go to place' and has a track record of providing relevant, independent, accessible and user-friendly career information, advice and support.

User research commissioned by Career Services found that: key gaps in information identified by recent tertiary students looking back over their career pathway include the breadth of job options related to a subject/course and the realities (pros and cons) of courses and occupations parents' degree of involvement in career decision-making with their child was dependent on their child's drive and pro-activity the views expressed (overtly or inadvertently) by parents heavily influence their children's decision-making options.

Improve access to careers and labour market information

Improve access to careers and labour market information and advice for adults in the workforce

NZ Career Services are undertaking work to increase awareness of current government provision of career and labour market information relevant to adults in the workforce. This will involve expanding and enhancing the range of information (including labour market information) and tools targeted at adults in the workplace on the Career Services website and within their wrap-around suite of services. It will also include enhancing job vacancy links, updating salary and wage information, and updating the courses and qualifications information. They will investigate the best way of providing personal career management support to people in targeted industries and/or workplaces to build on this approach. Career Services, in partnership with others, will be the lead agency to take forward work in this area as it has an evolving and sophisticated service delivery infrastructure, (including web-based, phone-based and in-person services), is widely recognised as the 'go-to place' and has a track record of providing relevant, independent, accessible and user-friendly career information, advice and support.

Other systems & tools

Skill building and skill matching tools

Source: www.career/govt.nz

Aimed primarily at job seekers the governments career website provides career planning, job hunting tips, job data base, course information, cv tools and information for practitioners.

Skills Builder

Under the umbrella of getting career ideas the Skills Builder tool identifies exiting skills and further action like finding the right course or program.

The Skills Builder tool requires a taxonomy of skills matched to jobs. Instead of building and maintaining a database from scratch, Careers New Zealand identified and tested three different sources of skill-to-occupation matches. O*Net produced the best results in terms of relevance to the New Zealand context and generation of suggested jobs based on existing skills. The alternative titles and direct work activity titles have been amended to: change US spelling and usage to New Zealand spelling and usage reduce length where necessary to work better for mobile users remove alternative titles not relevant in the New Zealand context remove duplicate alternative titles so that each unique

alternative title now matches only one O*Net occupation add additional job titles for unpaid work and match these to O*Net direct work activities.

There are over 2000 direct work activities, each mapped to multiple jobs. It is these activities that are displayed as "skills" by the Skills Builder tool when a job is selected. They are also used when looking up an individual skill to add. Once a user's skills are identified, the O*Net jobs that use those skills, or the more generic associated indirect work activities, are identified and given a score based on the number of matched skills and whether they are direct or indirect. They are ranked in order of score and the associated Careers New Zealand jobs are identified.

Vocational Pathways

Source: www.Youthguarantee.net.nz

Vocational Pathways were developed to support young people in their transition from school to employment. The following issue gave rise to concern:

- Employers, families, and whānau have some difficulty understanding NCEA.
- Students engage more in their learning when they see its relevance to their lives.
- 70% of learners in New Zealand do not go on to university, and most curriculum choices focus on the 30% that do.
- Employers want to understand more about education, and vice versa, but the language used in both sectors does not always help the connection.

The Vocational Pathways were developed through a partnership between the Ministry of Education and the Industry Training Federation. Government agencies, the industry training sector, secondary and tertiary representatives, and industry and employer representatives worked together to develop the six Vocational Pathways. This was to create a "learning to earning map" as the foundation of the journey from education to employment. A sector consortia group was formed for each Vocational Pathway. This group, in consultation with their sectors and with broader education and employment agencies, decided which standards would be recognised as Recommended or Sector-Related. They wrote the descriptions for that sector and, in consultation with Careers NZ, decided on the jobs selected for that pathway. Information is available for students, employers and training providers.

Operation

The Vocational Pathways provide new ways to achieve the National Certificate of Educational Achievement (NCEA Levels) 1, 2 and 3 for secondary students and develop pathways that progress to further study, training and employment. Achieving NCEA Level 2 is the foundation for success in further education and the world of work. Level 3 builds upon this through shared opportunities across school, tertiary, and industry training. The Vocational Pathways provide a framework for students to show how their learning and achievement is valued in the workplace by aligning learning to the skills needed for industry. The six Vocational Pathways are:

- Primary Industries
- Services Industries
- Social & Community Services
- Manufacturing & Technology

- Construction & Infrastructure
- Creative Industries.

Profile Builder

The Profile Builder helps young people explore their study options. By inputting the standards a student may achieve from the programme they are undertaking or thinking of doing, students can see what pathway they are heading along and think about where they would like to go.

Educators can also use the tool to plan programmes that align to Vocational Pathways and support young people to achieve a Vocational Pathways Award.

Vocational Profile

Employers can view a student's Vocational Profile as part of NCEA Level 2 to see:

- which sector (pathway) their credits relate to
- how many sector-related credits they have achieved
- whether they have achieved a Vocational Pathways Award.

An employer can then determine whether a student's skills and interests align with those required by the selected industry. The screenshot below provides an employer with an indication of the Vocational Pathways information students can show from the NZ Qualification Authority (NZQA) website.

In Figure 11, The Vocational Pathways Award on this Record of Achievement shows that the learner has achieved: NCEA literacy, NCEA numeracy, NCEA Level 2 and a Vocational Pathways Award in two pathways – Creative Industries and Services Industries.

The Vocational Pathways Award is achieved by the student's having at least 60 Recommended Credits in each pathway, including a minimum of 20 Sector-Related credits in each pathway.

Figure 11 Vocational Pathway Profile

Source: (http://www.youthguarantee.net.nz/vocational-pathways/)

Updates

The Vocational Pathways are updated on a yearly basis, to show the standards and qualifications that are expiring and when they will no longer count towards a Vocational Pathways Award, and to show newly registered standards and qualifications mapped to Vocational Pathways. The annual maintenance process is described in more detail here.

Link to training

Vocational Pathways provide guidance for schools, Industry Training Organisations, and tertiary providers who wish to develop contextualised learning programmes using the Pathways. Contexts for learning are provided as examples to encourage development in the sector.

It outlines key ideas about Vocational Pathways and delivery approaches that align with a Vocational Pathway philosophy, drawing together secondary and tertiary perspectives on the competencies that are required for NCEA level 2, and exploring the connections within and across pathways. Programme design is a key feature. Assessment programmes are discussed, along with an example of an assessment programme. Questions are provided to apply the information to your programme and to share your thinking with colleagues.

VOCATIONAL PATHWAYS ENABLE EDUCATORS TO:

- know the recommended standards valued by employers in particular sectors
- develop relevant and coherent learning programmes that enable young people to achieve NCEA Level 2 with a Vocational Pathways Award, NCEA Level 3 or equivalent, and progress towards further study, training or employment
- share a student's individual vocational profile with parents and whānau so they can more engaged in and support their young person's learning.

Spotlight – Skill Identification Tool

Source: https://www.employment.govt.nz/hours-and-wages/pay/pay-equity/spotlight-skills-recognition-tool/

The Spotlight Skills Recognition Tool was designed to help managers write position descriptions, select staff, manage performance and encourage individual and career development.

The tool helps focus on the skills that job holders can build on in carrying out individual and group activities. It provides a better understanding of the skills used in service work that can be overlooked or taken for granted, especially skills used in interacting and relating, coordinating and shaping awareness.

Types of skills which are often overlooked are the skills of combining activities in work streams and those involved in the sensitive, responsive, and integrated delivery of appropriate services to people.

The classification framework consists of:

- Three sets of skills (shaping awareness, interacting/relating and coordinating)
- Five learning-based levels of each skill (from familiarisation through problem-solving, to expert system-shaping).
- A list of work activities shows the use of each skill element at each level. Selected activity examples can be used to help pinpoint the skills required in specific jobs, or be included in position descriptions.

The classification framework makes concepts such as 'problem-solving', 'communication skills' and 'time management' more precise, and provides a systematic way of naming different levels of the skills that are the basis of effective work performance.

Case 9 – Finland's skill anticipation activities

Source

http://skillspanorama.cedefop.europa.eu/en/analytical_highligths/skills-anticipation-finland

Type

Skill anticipation model

About

One of the strengths of the Finnish economy is the skills of its workforce as it is amongst the most highly educated in the EU. Finns traditionally rank high on international benchmarks for learning and skills, and the percentage of people aged 20 to 29 years participating in education is the second highest amongst OECD countries.

In Finland skills anticipation activities are well-established and linked to policymaking. Over recent years, socioeconomic factors such as the effects of the economic recession, the gradually decreasing number of people in the labour force, and the ageing population increased the need for better matching between the skills supply and demand. As a result, significant investment in skills anticipation has been undertaken. The aim is to steer the education system – both vocational education and training (VET) and higher education (HE) – to meet the needs of the labour market. This is being achieved by making skills anticipation more comprehensive, with input and feedback from the government (central, regional and local) and increasingly also from stakeholders including employers, trade unions, and labour market intermediaries as well as education institutions and their staff and students. Skills anticipation takes into account sectoral, occupational and geographical differences, and includes skills assessments, skills forecasting, skills foresight, and employer surveys.

Purpose

The main aims of the skills anticipation system are to:

- Prepare forecasts concerning economic growth and employment
- Anticipate the medium and long term demand and availability of the workforce
- Anticipate developments in the occupational structure
- Anticipate the educational needs of the workforce
- Estimate the national and regional provision of education places for young people
- Ensure that young people have access to vocationally/professionally-oriented education and training.

Operation

The core tools of skills anticipation in the country are models on quantitative forecasting of educational, the VATTAGE and MITENNA models. The VATTAGE model, the cornerstone of skills anticipation in the country, provides forecasts up to 2025 based on a model of the Finnish economy, while the MITENNA model provides the basis of anticipation of education needs and future oriented development of education. The Finnish National Agency of Education under the Ministry of Education and Culture plays a key role in anticipation activities and is supported in this role by the Skills Anticipation Forum, established in early 2017.

Highlights

Ownership, coordination and stakeholder involvement

In general, there is a high degree of stakeholder involvement in skills anticipation activities. Major trade unions, employers, regional councils, and representatives of educational institutions are involved in anticipation exercises. The responsibility of education providers for anticipating and responding to the labour market changes has increased, as operational targeting and steering powers have been devolved to universities, polytechnics, and VET providers. Providers are required to play an active role in addressing the national/regional labour market skills needs.

In addition, a wide range of national and regional EU-funded anticipation and foresight projects are carried out by organisations such as research institutes, labour market and industry organisations, VET providers, universities, and polytechnics.

Governance and funding of the relevant exercises are in the remit of four ministries (Education and Culture, Finance, Economic Affairs and Employment, and Social and Health Affairs). These ministries engage in a variety of skills anticipation exercises, taking advantage of the long term baseline forecasts of economic development.

Presentation of skill intelligence

Dissemination of the data generated by skills anticipation exercises is an important element of the overall approach. There is a drive to make the outputs from anticipation exercises accessible to a wide audience (policymakers, employers, jobseekers and young people, etc.) through a range of channels including reports, workshops and online publications. Despite the focus on dissemination of skills anticipation data, there is a need to improve the user friendliness of the existing database to better inform students, job seekers and employers.

Usage by stakeholders

Skills anticipation influences government policies on VET, higher education and adult education. Forecasts of future skills demand have an impact on decisions about education supply. The funding that higher education institutions receive from the Ministry of Education depends on the results from the long-term labour force assessments, the VATTAGE and MITENNA models. Skills anticipation results feed the so-called performance agreements that set the priorities and qualitative and quantitative targets that the institutions need to meet. Skills anticipation also has an impact on curriculum planning in VET and higher education institutions. There is, however, room for improvement, related to strengthening the links between skills anticipation results and the development of education strategies at sub-national levels; ensuring greater coherence among the various exercises taking place

across the country; and providing user-friendlier labour market information to support informed decisions of school leavers and job seekers.

Workforce planning

VATTAGE Model

Skills forecasting is well-established in Finland, with multiple institutions engaged in various exercises. The baseline forecasts are produced by the VATT Institute of Economic Research for use by government ministries and agencies. The first forecast for 2005-2025 was published in 2010. It is based on the Finnish dynamic CGE-model, the so-called VATTAGE Applied General Equilibrium (AGE) model of the Finnish economy. (12) The forecasts are updated every five years, each time looking ahead with a fifteen-year horizon.

VATTAGE first produces a long-term baseline scenario of economic development based on several macro-economic variables that are considered key long-term drivers of employment. In the second phase, 'political' scenarios (alternative scenarios using different assumptions for the variables) are calculated. The VATTAGE model is supplemented with modules relating to sectoral and occupational employment. In the future, regional analyses will be incorporated into the model. Outputs from the VATTAGE model regarding future skills needs feed into the MITENNA model, (13) developed by the EDUFI through which the Ministry of Education and Culture articulates the education and training provision necessary to meet forecast demand.

MITENNA Model

Sectoral forecasts generated by the VATTAGE model are core to the MITENNA Model. The MITENNA model anticipates long-term educational needs (approximately 15 years ahead) based on labour market needs by calculating changes in labour demand, the number of people exiting the labour market, and the demand for new labour market entrants, while taking skills supply into consideration from all levels of the education system. The anticipation results are updated as new industry forecasts are released, which allows for the development of continuous anticipation data. MITENNA connects various forecasts, expert opinions and education policy objectives in order to anticipate future educational needs. This approach ensures that the results are not based on hypotheses of economic development produced by a single research institute, but on a wider process of future-oriented stakeholder dialogue.

Training planning

The Education Department currently runs a national project, which aims at developing and piloting a forecasting model on the skills needs of the adult population to support decisions on adult education of all forms and levels. A new skills anticipation tool focusing on VET is expected to be completed in 2018, triggered by a significant reform of the VET system currently underway. The reform affects the way skills relevant to this level of education are anticipated, leading to changes in the methodology and overall approach to skills anticipation. The focus will be on better anticipating skills needs and allowing the forecasting tool to be more responsive to the fast-changing environment.

In recent years, about two to three skills anticipation exercises have taken place annually at sectoral level in areas identified by the EDUFI, taking into consideration recommendations of the Education Committees and, as of 2017, by the Skills Anticipation Forum. In contrast to the VATTAGE and

MITENNA models, these sector-based assessments take advantage of the qualitative-based anticipation model developed by the National Project on Anticipation of National Competences and Skills Needs (VOSE).

In 2016, skills assessment reports were published on the food chain, retailing, the games industry, and services for the elderly. Results from these VOSE-based skills anticipation activities have an impact on the curricula for VET and HE, particularly for polytechnics (universities of applied sciences).

EDUFI database

The governmental education regions (14 in total) produce their own forecasts on educational needs in their area based on nationwide forecasts and their own estimates for regional development. The regional forecasts aim to develop a robust evidence base for strategic development in regions, municipalities and communities. This information is used by the regions in their strategic planning and by the Ministry of Education when determining the licences to provide vocational upper secondary education and training (and their content). Information is also used in performance negotiations between the Ministry of Education and Culture, the universities and the polytechnics when agreeing on the scope of their educational provision.

Case 10 – European Commission's skill classification ESCO (European Skills, Competences, Qualifications and Occupations)

Source

https://ec.europa.eu/esco/portal/home

Type

Skill classification database

About

At the European level, two initiatives are particularly interesting: the European Skills, Competences, Qualifications and Occupations (ESCO) and the European Dictionary of Skills and Competences (DISCO) projects. DISCO is a comprehensive database of skill and competences terms (over 104,000) and sample phrases (over 36,000). In the database, skills and competences are classified, described and translated (currently 11 languages are supported). DISCO cannot only be used for the analysis of competences and skills across occupations, but it also functions as a tool for other applications such as CVs, job advertisements and matching, and the description of learning outcomes.

In contrast to DISCO, the ESCO classification goes beyond the concepts of skills and competences. In July 2017 the European Commission launched the first full version of the European classification of Skills, Competences, Occupations and Qualifications (ESCO). The classification is available in 26 languages (the 24 EU languages, Icelandic and Norwegian). The Commission developed ESCO to complement pre-existing European- and national level initiatives and instruments designed to enhance interoperability in the labour market and in education and training.

The publication of ESCO v1 is a key milestone in the achievement of objectives of the Europe 2020 strategy and the New Skills Agenda for Europe. The Commission has the ambition for ESCO to become the European classification for information exchange via the European job mobility portal (EURES). ESCO has been developed in close cooperation with CEDEFOP and a wide variety of stakeholders from the labour market and education and training sector.

Purpose

The Commission developed ESCO as a complementary tool to the European Qualification Framework (EQF). Within the framework of the EQF, Member States relate their national qualification frameworks (NQF) to the EQF to allow qualification levels to be compared more effectively in Europe.

ESCO was set up to facilitate the dialogue between labour market and the education/training sector by providing a common language that helps to overcome labour market imbalances and increase occupational and geographical mobility in the EU. Transparency and common reference points aim to

help people to exchange information with unambiguous and shared meaning, independent of the language or electronic systems used (semantic interoperability). The Commission also envisages integrating private, international and sectoral qualifications from other sources into ESCO in the near future. It is piloting this approach and discussing it with the Member States.

Operation

The ESCO classification is being set up as a comprehensive classification that comprises three pillars and accounts for the relations between them (Figure 12). These three pillars are: (1) skills and competences (of a transversal, cross-sector, sector-specific and occupation-specific nature), (2) qualifications (awarded at the (inter-)national level, linked to tasks, technologies, occupations or sectors) and (3) occupations (structured hierarchically, linked to ISCO).

Figure 12 ESCO structure

Source: http://skillman.eu/?page_id=36189

The system will progressively include:

- **Classification systems**, controlled vocabularies and frameworks such as national occupational classifications, the International Standard Classification of Occupations (ISCO), the European Qualifications Framework (EQF) and the eCompetence Framework
- **Databases** with complementary information such as national qualification databases or the Commission Database on Regulated Professions
- **Technical or syntactical standards** such as Europass10, skills passports11 HR-XML12 or schema.org
- **Legislation** such as the Directive 2005/36/EC on the recognition of professional qualifications
- **Tools and services** that help people to develop their careers, such as EURES15, national job portals and career guidance tools.

Milestones to be achieved by the end of 2017 are the establishment of a system that allows the ESCO classification to be continuously updated; supports national developments in the journey to close the

gap between the classifications of occupations, skills and qualifications; supports Member States that create machine-readable translation tables (mappings) between ESCO and their national classification, or that implement ESCO on a national level.

By 2018 the system is envisaged to translate between national occupational or skills classifications and similar de facto standards, helping to strengthen the interconnectivity of national systems and enable cooperation between Member State authorities. It will provide a common reference point to make it possible to communicate using different classifications and languages.

The first full version (ESCO v1) is available free of charge through the online ESCO service platform (https://ec.europa.eu/esco/portal/home) and covers about 3000 occupations, 13 500 knowledge, skills and competences . It will progressively display information on qualifications provided by the Member States.

Firstly, ESCO aims to support jobseekers to find the job that best matches their skills by providing a common language. As recruitment is increasingly digitised, both employers and jobseekers need to use digital tools that allow them to communicate in a meaningful manner. ESCO aims to make these digital tools work better together.

Secondly it fosters a link between employment and education, as education providers can use the database to describe the expected learning outcomes of their curricula and to understand the labour market trends and future skills needs better.

Thirdly the classification aims to connects labour markets at EU level, by acting as the digital enabler of labour market mobility. The Commission has the ambition for ESCO to become the European classification for the information exchange via EURES, the European job mobility portal.

Highlights

Ownership, coordination and stakeholder involvement

European Commission (developed with CEDEFOP) ESCO is managed and supported by several bodies:

- The ESCO Board is made up of senior representatives from the stakeholders most directly concerned and provides the project with strategic guidance.
- The ESCO Maintenance Committee consists of technical classification experts. It develops the methodology for the development of ESCO together with the ESCO Secretariat and monitors the quality of the final product.
- The Sectoral Reference Groups are composed of sectoral experts from the labour market and education and training sectors. In total, 27 Sectoral Reference Groups develop the content of ESCO by defining occupational profiles, sector specific skills and competences and qualifications for their sector of the economy.
- The Cross-Sector Reference Group consists of experts in employment and education, related standards and classifications and an up-to-date knowledge of relations between education and training and the labour market. It deals with transversal skills and competences, the consistency of the skills and competences pillar and its relation to the qualifications pillar.

Identification, collection and update of skill descriptions

In order to develop the reference terminology, ESCO was built using existing sources – in particular, results from other European projects in the field of qualifications. The ESCO terminology has been published according to linked open data standards so that interested parties can access it easily and free of charge, and can link other data sources to ESCO as a reference. ESCO also supports users by providing technical information, guidelines for the use of ESCO and training.

OUTPUT – Presentation of skill intelligence

ESCO's primary objective is to contribute to better skills-based job matching online. It does so, by:

- Offering people the possibility of compiling CVs and vacancies using ESCO's vocabulary in 25 languages, enabling them to exchange information across borders.
- Providing a tool for the automated analysis and interpretation of semi-structured and unstructured data (CVs and vacancies).
- Supporting skills-based job matching on the grounds of an individual's work experience and qualifications.
- Shows how skills and competences developed in one occupation are applicable and transferable to another, i.e. cross sectoral skills and competences.

ESCO has been developed as part of an emerging Semantic Web (in the labour market and the education and training sector. The Semantic Web aims to transform the internet from a collection of documents, such as job vacancies, CVs and training courses, into a web of interlinked, standardised and reusable data. This data can then be fed into tools such as job matching platforms, HR systems, career guidance tools or statistical applications, making ESCO a building block for practical tools, applications and services.

The platform as of August 2017 offers three searchable data pillars: Occupations, Skills/Competences and Qualifications.

The skills pillar contains currently about 13500 skills/ competences and knowledge concepts by indicating the skill type. There is however no distinction between skills and competences. Each of these concepts comes with one preferred term and any number of non-preferred terms and hidden terms in each of the ESCO languages. It also includes an explanation of the concept in the form of description, scope note and definition. The skills pillar of ESCO does not contain a full hierarchical structure but is structured in four different manners:

- Through their relationship with occupations, i.e. by using occupational profiles as entry point;
- In the part of the transversal knowledge, skills and competences through a skills hierarchy;
- Through relationships indicating how knowledge, skills and competences are relevant to other knowledge, skills and competences (in particular in cases of skill contextualisation);
- Through functional collections that allow to select subsets of the skills pillar.

Usage for stakeholders

Employers

ESCO has been designed in supporting employers to

- Understand the knowledge, skills and competences that people have obtained through education, training or "on the job" experience;
- Express which knowledge, skills, competences and qualifications they expect from their employees;
- Find the right person for a job.

Job seekers

Similarly, the data platform provides information to job seekers to

- understand what employers need
- understand how they can develop their career through lifelong learning
- to document and describe their knowledge, skills and competences in order to find the right job.

Educators and Trainers

ESCO provides resources for education and training providers to

- undertake surveys and analyse data in order to obtain information on current and future labour market needs, which can then be used as a basis for the further development of curricula
- make the contents of their education and training offers more understandable for learners
- to increase the transparency and visibility of the qualifications they award.

Service providers

The data platform can help employment services and guidance counsellors to

- provide better e-services to their customers
- serve customers in several languages
- build partnerships with other service providers and exchange data with them, in particular to strengthen cooperation between public and private employment services, as well as with education and training providers.

Illustration: Child Care Worker Profile

All components are hyperlinked to a skills and knowledge repository and provide a full description.

Essential skills and competences

- supervise children
- assist in children's development of basic personal skills
- handle chemical cleaning agents

- communicate with youth
- play with children
- attend to children's basic physical needs
- maintain relations with children's parents

Essential Knowledge

- workplace sanitation

Optional skills and competences

- prepare ready-made dishes
- support children who have experienced trauma
- support children's wellbeing
- relate empathetically
- support the positiveness of youths
- tolerate stress
- manage children's problems
- assess the development of youth
- clean rooms
- prepare sandwiches
- carry out wound care
- dispose waste
- work in a multicultural environment in health care
- assist children with homework
- provide first aid

Optional Knowledge

- common children's diseases
- baby care
- pedagogy
- babysitting
- disability care

Case 11 – SFIA's Skills Framework for the Information Age

Source

https://www.sfia-online.org/en

Type

Operational IT community skill framework

About

SFIA is a globally accepted common language for the skills and competencies required in the digital world. SFIA does not define roles or jobs – it provides flexible 'building blocks' of skill descriptions at various levels of competence. It is a model addressing changing organisational landscape as it moves from static job roles to flexible project-aligned team-building. IT skills that used to be only found in people who would identify themselves as 'IT professionals' are now more distributed throughout organisations. Organisations themselves are moving away from traditional formal structures to the use of a more flexible pool of resources that can be aligned to short-term and agile teams for specific projects or activities.

The IT skills framework began as a UK initiative in 2000. It was preceded by a number of individual skills initiatives, some dating back to around 1990, that came together and collaborated to provide a single definitive framework for the IT industry. Since 2000, SFIA has become the de facto global IT skills framework, used in nearly 200 countries by organisations and individuals to characterise and manage their skills. The SFIA Framework strives to be relevant and useful through consultation activities where its extensive global user base comes together to collaborate on initiating, drafting and reviewing updates to the Framework.

Purpose

A tool to describes skills required by professionals in roles involving information and communications technology. This assists organisations to remain viable by structured assess of IT related skills to create a plan for closing gaps and supporting continual improvement and transformational change.

Operation

The framework itself does not provide instructions for improvement or the specific mix of skills that an individual or organisation should have. Context is important in the use of any framework, and it is crucial to understand the organisation's needs rather than simply use the skills in an isolated manner to form a single job description or role profile. The specific mix will be different from one organisation to another.

SFIA is a practical resource for people who manage or work in information systems-related roles of any type. It provides a common reference model in a two-dimensional framework consisting of skills

on one axis and seven levels of responsibility on the other. It describes professional skills at various levels of competence. It also describes generic levels of responsibility, in terms of Autonomy, Influence, Complexity and Business Skills. SFIA is updated frequently to remain in step with user needs and current thinking about information age capabilities. SFIA aims to give individuals and organisations a common language to define skill, abilities and expertise in a consistent way.

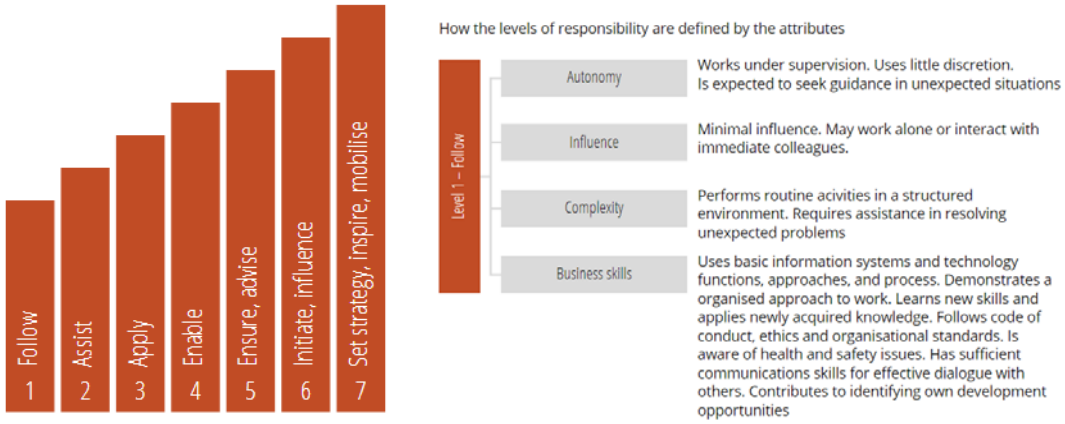
By defining core competencies as professional standards, SFIA helps organisations create roadmaps and development plans where both they and their employees can recognise a pathway to success and improvement. The skills and descriptions in the reference guide are likely to be the most used resource. The complete reference guide, which is an online and printable resource, describes the 97 skills in SFIA 6 in detail. Each skill entry comprises an overall definition and descriptions of each of up to seven levels at which the skill might be exercised. These descriptions provide a reference of how the skill and level combined produce a more detailed definition of what level of competency each skill is practiced at.

Responsibility and Skills

The seven levels in the framework are uses in two ways:

1. To provide generic levels of responsibility, with descriptions at each of the seven levels for the following attributes: AUTONOMY · INFLUENCE · COMPLEXITY · BUSINESS SKILLS
2. To reflect experience and competency levels within SFIA. The definitions describe the behaviours, values, knowledge and characteristics that an individual should have in order to be identified as competent at that level. Each level has a guiding word or phrase that acts as a brief indicator: FOLLOW · ASSIST · APPLY · ENABLE · ENSURE, ADVISE · INITIATE, INFLUENCE · SET STRATEGY, INSPIRE, MOBILISE (Figure 13)

Figure 13 SFIA experience and competency level



Highlights

Ownership, coordination and stakeholder involvement

The SFIA Foundation has five corporate members and works to maintain and distribute the framework. It encourages and supports its use within organisations using information systems. The Foundation is governed by its Board of Directors. Input to help define strategic direction is provided by the SFIA

Council and Support for users of SFIA is provided by Accredited Consultants and Accredited Partners. The SFIA council consists of about 30 people representing significant organisations in the IT industry. The general exchange of information between users of SFIA is facilitated by the SFIA User Forum.

The corporate members of the SFIA Foundation have provided funds to establish SFIA, but are not permitted to take dividends from the Foundation. Any money collected by the Foundation can only be used for the benefit of the framework and its users. SFIA is available free of charge to companies and individuals who use SFIA purely as an internal management resource; they cannot distribute SFIA information or exploit SFIA commercially.

Identification, collection and update of skill descriptions

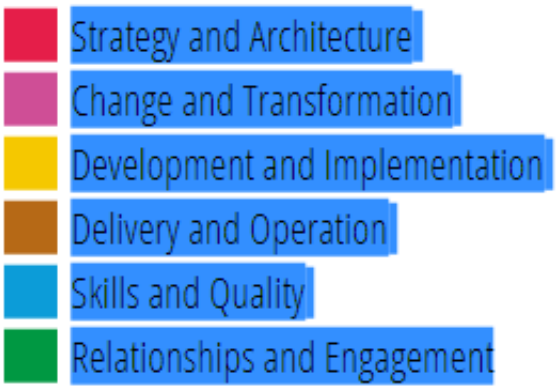
The collaborative development style involves open consultation and input from people with practical experience of skills management in corporate and educational environments. The SFIA Framework aims to relevant, useful by being simple and generic. Skills are updated through a consultation activity where a global user base comes together to collaborate on initiating, drafting and reviewing updates to the Framework. Updates appear to happen every 2—3 years.

Presentation of skill intelligence

Navigating

The skills are grouped into categories and subcategories for convenience of use (Figure 14). Like previous versions, colour codes are used to help identify the category the skill has been classified under.

Figure 14 Major SFIA skill categories



These categories and sub-categories do not equate to jobs, roles, organisational teams, or areas of personal responsibility. The grouping is intended to assist people who are incorporating SFIA skills in role profiles or job descriptions, or who are building an organisation's competency framework. The categories and sub-categories do not have definitions themselves, they are simply logical structural containers to aid navigation – it is usual for a specific job description to comprise skills taken from multiple categories and sub-categories.

SFIA skills are constructed with the following reference details:

Skill name - The name used for normal reference purposes

Skill code - A unique code used for short reference

Overall description - A broad definition of the skill, without any reference to the levels at which it might be practised

Level descriptions - Definitions of the skill for each of the levels at which it is practised. The phrasing facilitates their use as professional competencies.

Organisation and job/role design or re-design can be greatly assisted by SFIA, but common mistakes are made, including the assumption that the SFIA skills or categories are related to specific organisational units, departments, teams or jobs. SFIA does not describe roles, jobs or organisational units, but can provide building blocks to help create these. There are no organisational design templates, examples or suggestions in SFIA.

Usage for stakeholders

Individuals can map their current skills and experience, identify their goals, and plan their professional development journey. The mapping of higher-education courses, qualifications, professional memberships, and training courses helps individuals and their managers to choose the right actions and activities to support the development they need. SFIA can help in the creation of Job/Position Descriptions and in advertising vacancies, and helps individuals to identify opportunities which match their skills and experience.

Organisations use SFIA for overall resource management. It can be used to quickly provide a baseline of the capability of the organisation, specific departments, teams, professional communities or individuals, and to identify skills gaps. SFIA describes the skills and levels of competency needed to operate effectively – ensuring that individuals can do their jobs properly, supporting the achievement of business and customer outcomes. Organisation structures, salary banding and benchmarking can be aligned to SFIA, facilitating a link to the skills and experience, focusing on the required capabilities and the value delivered.

During Recruitment SFIA helps employers to more accurately describe what they need, in language that potential employees understand. It helps move away from an over-reliance on certificates and qualifications that often only confirm a theoretical understanding of the relevant areas, and towards specifying competency based on having the right skills and an appropriate level of experience and responsibility.

Training planning

Education bodies, universities, colleges and training providers map their offerings to SFIA, to ensure the most appropriate courses and certifications are selected for individuals, providing the knowledge they need, so they can apply it to help develop the skills they require at the right level.

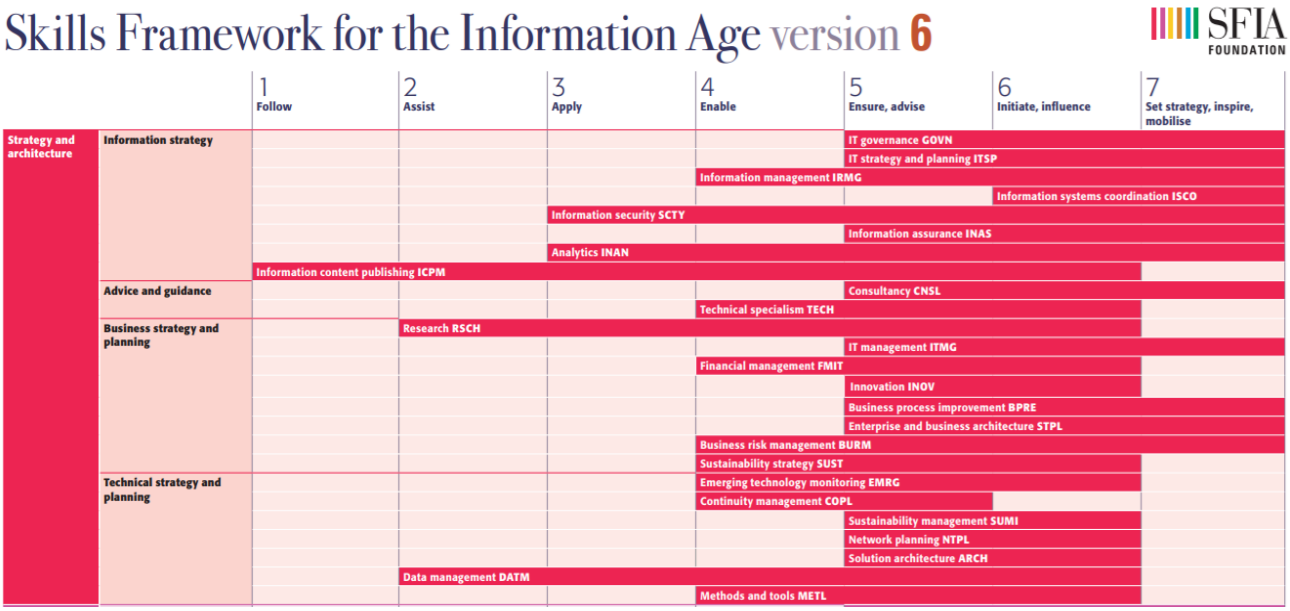
Professional bodies and membership organisations map SFIA to their membership levels, certifications, professional development and mentoring programmes. SFIA is used to identify suitable mentors, supporting knowledge and experience sharing and coaching activities.

Conference and event organisers can identify the target audience by mapping to SFIA levels of responsibility, skill categories or individual skills and levels – so individuals can select the sessions which best match their development needs.

Illustration

SFIA is used extensively in the assessment of existing capability, at both an individual and an organisational level. SFIA does not attempt to cover all of the things that an individual may be required to do, as it doesn't describe any product or technology-specific skills or knowledge, industry experience or qualifications. Figure 15 summarises the discrete skills required when operating at increasing levels of proficiency within the major skill category 'Strategy and Architecture'.

Figure 15 Summary – Example 'Strategy and Architecture'



Source: https://www.sfia-online.org/en/sfia-6/framework-summary/view

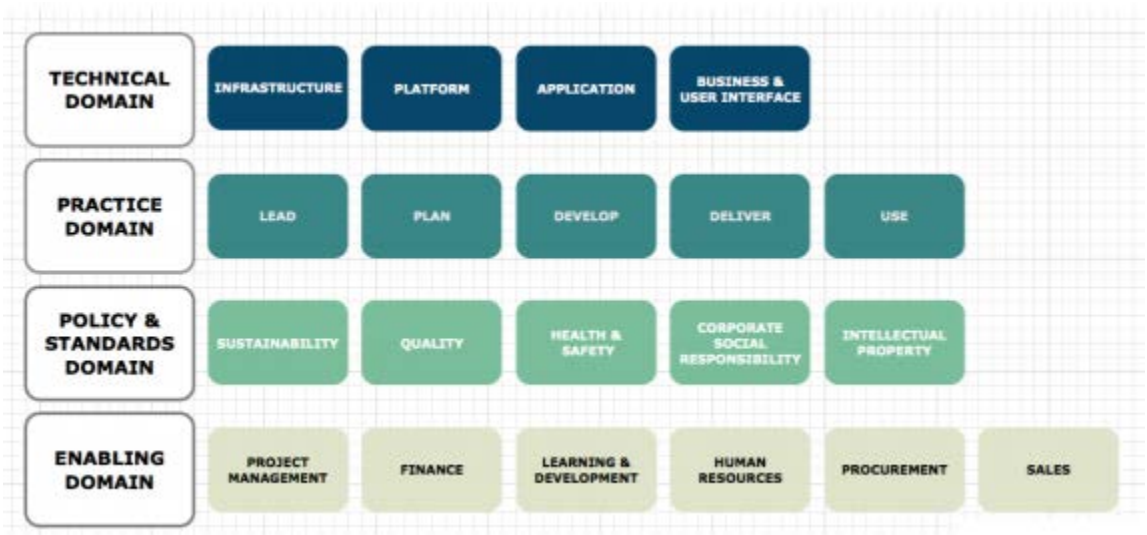
Example Service Desk Manager: one might decide that a service desk manager requires some knowledge of a particular process framework and the specific service desk tools which are used in that organisation. They may also need specific industry experience, security clearance and defined qualifications.

In this example, SFIA would be used to define the generic level of responsibility (autonomy, influence, complexity and business skills), and the identified SFIA skills, which might, as an example, include customer service support (CSMG) at level 5, business process improvement (BPRE) at level 5, relationship management (RLMT) at level 4, IT management (ITMG) at level 5, and incident management (USUP) at level 5.

SFIA – 2015 IBSA IT Framework mapping – Link to Training Packages

In late 2015 SFIA consultant Dennis Trevarthen from Ability Associates Australia worked with national skills body IBSA (Innovation and Business Skills Australia) to develop an IT Skills Framework (Figure 16). The objective was to create a framework that would guide further development of national qualifications and be capable of mapping to recognised schema like SFIA.

Figure 16 IBSA IT framework (IBSA 2015)



Source: https://store.ibsa.org.au

The framework introduced the concept of domains, placing technical skills at the centre with skills related to management practice, standards and policy supporting. Enabling domains supported the structure, but were not considered at the core.

Whilst the framework mapped to SFIA successfully, it identified some variation in emphasis with SFIA, especially regarding the relative place of enabling skills in IT. The SFIA strength in the practice domain was not found in associated national IT qualifications.

The paper presents a draft workforce skills framework and provides an explanation for the various dimensions. In addition, examples are provided on how the framework can be applied across training package, industry frameworks and workforce occupations. To be effective, the ICT workforce skills framework will be utilised to provide linkage between the Training Package, industry frameworks and the prevalent industry terminology used for various occupations.

The framework will potentially impact on these components of the ICT Training Package:

- The nomenclature, level and occupation outcomes for ICT qualifications.
- The scope and workforce focus of skill sets
- The performance focus and associated skills and knowledge required at the unit of competency level.

Guiding Principles

These principles have shaped the current approach to the framework: 1. It is possible to clearly differentiate between the types of skills applied in the ICT industry. 2. There are differences between working within the ICT industry, as opposed to using ICT skills across a range of other industries. 3. Generic business and other skills found across broad industry segments are not ICT industry skills. 4. Skills can be defined in core technical areas, organisational methods and process, compliance and enabling. 5. ICT skills can be identified across the range of AQF levels relevant to skill clusters.

6. Independence from third party frameworks is required, whilst providing for mapping and alignment where relevant.

Framework Components

The framework is made up of four domains, a number of associated skill clusters within each, and specific skills within each cluster. Domain Each domain represents a significant grouping of functions and skills that have a common role in supporting the ICT industry. Skill Cluster A skill cluster is a grouping of skills that contribute to a functional outcome within a domain. Skill A skill is an identified area of work performance that may contribute to one or more functional outcomes.

Case 12 – Burning Glass: Real-time job data analysis

Source

http://burning-glass.com/faq-on-real-time-jobs-data/

Type

Real time labour market analytics

About

Burning Glass Technologies is an analytics software company based in Boston and is playing a growing role in informing the global conversation on education and the workforce. according to the comanie's website its client base spans six continents, including education institutions, government workforce agencies, academic research centres, global recruitment and staffing agencies, major employers, and leading job boards. Since 2007, the company provides skill information services and planning tools based on a database that harbours information of job postings of a nation. This analytics offers can offer insights on which jobs are most in demand and the specific skills employers state.

Purpose

Burning Glass Technologies delivers commercially job market analytics and publishes in-house research papers. The company website states that its services are designed to empowers employers, workers, and educators to make labour market data-driven decisions. Burning Glass strives to understand and share how the labour market works, with data that identify the skill gaps and tools that enable job seekers and employers to 'bridge that gap and connect more easily'.

Operation

Real-time jobs data are compiled by scanning the internet daily using bots[2] that seek out job postings on job boards, corporate websites, and other places where job ads are posted. For example, Burning Glass technology scans more than 40,000 sources, and at any given time, tracks about 3.4 million unique, currently active openings. To ensure that real-time figures provide a 'high fidelity' picture of the current job market, removing duplicate postings is an essential part of the collection process. Overall, close to 80% of all the postings Burning Glass collects are marked as duplicates. The software extracts top-line information about each job such as title, occupation, employer, and location, and then uses natural-language technology to read each job description to identify specific occupations, skills, and qualifications that employers are seeking. Job information is broken down into distinct elements and makes comparisons among them.

2 Bots, also known as web robot, are a software applications that runs automated tasks (scripts) over the Internet.

Highlights

Identification, collection and update of skill descriptions

Real-time data represent an important complement to traditional survey-based labour market data, such as those produced by government agencies. First, job postings data provide a timely view on current market conditions. Some established labour data reports are based on observations that can be up to four years old, while the closely watched federal jobs report is released monthly. Fresh data is especially important in market areas experiencing rapid change.

In addition, real-time data can break down the job market to a precise level of detail. Traditional labour market data are structured around broad job categories, and all jobs within those categories are presumed to be identical in terms of the skills, experience, and education they require. By contrast, real-time job market data can be much more specific, reflecting how jobs differ within and across sectors and geographies.

A study published by the National Bureau of Economic Research concluded that job postings have become more specific over the last few years. The paper found that online job postings were 12% more likely to ask for specific cognitive skills, educational requirements, or experience levels in 2015 than in 2007 (Hershbein & Kahn 2016).

Usage for stakeholders

Training planning

Many community-college systems in the US are turning to job-market data that are more up to date and more precise than ever before (Martinez 2016). The Kentucky Community and Technical College system, of which Big Sandy is part, is using data gathered from online job listings to develop more programs geared toward getting students ready for the work force. The system has been working with Burning Glass for about five years, and the real-time data are more current and detailed than data offered by the federal government, according to Alicia Crouch, the system's vice chancellor for research and analysis (Martinez 2016).

> "The federal [US] government might have data on the demand for 'computer programmers,' but you might know from your friends in IT that 'computer programmer' is not a very helpful term," says Matthew Sigelman, chief executive of Burning Glass. "Are employers looking for programmers in Java or .NET or C#? That's what we're looking for."

"Kentucky's community-college system uses the job-market data to justify all new program development", says Ms Tracy. Just last week the system's Board of Regents approved new associate-degree programs in electrical technology, physical therapy, and radiography (Martinez 2016).

Illustration

The following illustration serves as an example of an informative output of an integrated occupational profile analysis using Burning Glass data.

In the US, the National Network of Business and Industry Associations (National Network) works to bridge the "skills gap" by better connecting the worlds of learning and work. The Network has partnered with a job vacancy analyst (Burning Glass Technologies) to develop occupational profiles that clearly articulate the skills and experience necessary for candidates to succeed in their job applications.

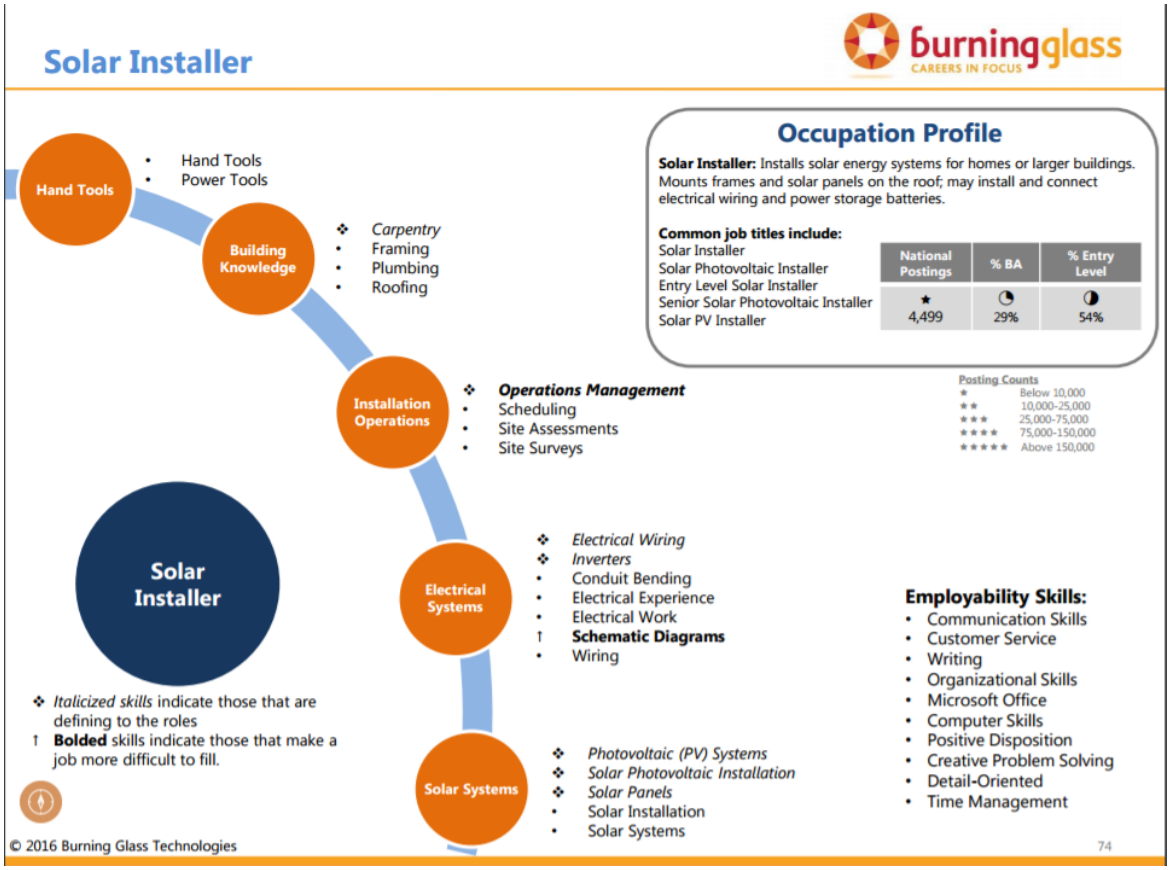
The resulting profiles reference specific data points that employers can use to build competency-based job descriptions, helping hiring managers communicate more effectively to job seekers, educational institutions, and training providers about the competencies they need to fill vacant positions.

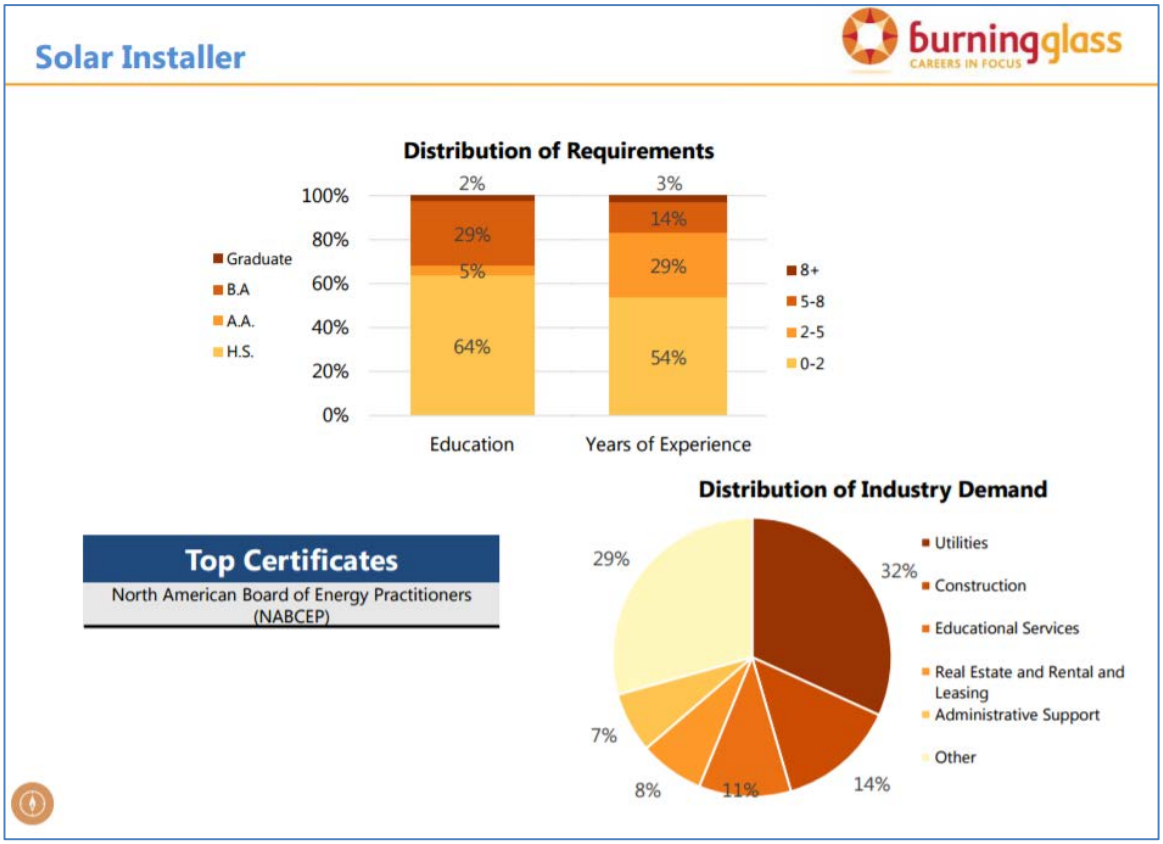
Specifically, the profiles for any given occupation help to identify:

- Skills and certifications most valued by employers of the occupation
- Skills and competencies to emphasize in job descriptions
- Education and skill requirements that increase difficulty in filling a position in the occupation
- Alternative markets for sourcing talent to find qualified candidates.

The project resulted in 52 occupational profiles of the most in-demand jobs from across 17 of the National Network's member industry associations. An example of a Solar Installer is provided in the following figure:

Figure 17 Solar Installer Occupational Profile





Case 13 – NSW BVET/Wheelahan's and Moodie's Capabilities Framework

Source

Report commissioned by NSW Board of Vocational Education and Training (now NSW Skills Board) and produced by Leesa Wheelahan and Gavin Moodie (2011)
https://www.skillsboard.nsw.gov.au/sites/default/files/rethinking_skills.pdf

Type

Discussion paper including pilot proposals. The normative framework draws from capabilities approach developed by economist Amartya Sen (1985, 1992) and philosopher Martha Nussbaum (2000).

About

The core characteristic of the capability approach is its focus on what people are effectively able to do and to be. In 2010 the New South Wales Board of Vocational Education and Training (BVET), (now NSW Skills Board) commissioned a paper to generate discussion about work, skill and qualifications. Commissioned researchers Wheelahan and Moodie (2011) based their focus on an individual's capability to deploy skills and knowledge for a successful working career. The capability approach is a broad normative framework for the evaluation and assessment of individual well-being and social arrangements, the design of policies, and proposals about social change in society. This framework emphasises the importance of theoretical vocational knowledge.

Purpose

To develop alternatives to the notion of competence underpinning competency based training and to transform vocational education further. While the paper presents suggestions for thinking about skill, it does not present a package of policy prescriptions that can be applied without problems (Wheelahan & Moodie 2011). The key rationale is that vocational education and training must prepare students for a broad occupation within loosely defined vocational streams rather than workplace tasks and roles associated with particular jobs.

Operation

A capabilities framework relates the conditions individuals need to engage in to work and to progress through a career with the requirements of broad occupations. It focuses on what people need to be able to do to exercise complex judgements at work and what they need to be able to do in the future.

This approach recognises the diffuse study and employment destinations of VET graduates, while also recognising that there is a need to reform vocational qualifications by recognising the depth and complexity of vocational knowledge, as this is a core component of capability.

Learning outcomes, curriculum and pedagogy need to be based on the notion of development so that a key outcome of learning is that students are able to progress to the next level of knowledge and complexity of practice. A crucial component of a national VET qualifications framework would be accreditation of programs against the national standards by a group of experts.

The implications for policy are that the focus would move:

- in general**, from competencies to capabilities**
- **from products** (training packages, assessment materials etc) **to processes** (brokering standards, accreditation and assessment)
- **from qualifications based on workplace tasks** and roles **to qualifications that prepare students for broad occupations** within vocational streams.

Highlights

Implications for standards and assessment

The Capabilities Framework is an alternative approach to competence-based training (CBT) with a simpler version of standards. These standards would be based on preparing individual for broadly conceived occupations that have a number of different occupational destinations within a broad vocational stream. Standards would be based on the judgement of recognised experts as representing the best understanding at present for the needs of practice now and in the future in that broad occupational field. This would include the knowledge base of practice. National consistency and confidence in VET qualifications would be further supported by a national assessment framework.

Information input

The capabilities approach starts with the person and not specific skills. An underpinning framework requires access to knowledge that underpins practice in occupations and professions, but also to industry specific knowledge and skills that transcends particular workplaces.

Inclusion of providers and teachers

Wheelahan and Moodie (2011) emphasise that providers and teachers are more likely to invest in a program when they have developed the curriculum and assessment and this is more likely to be responsive to local needs. It would require negotiation over the development of the curriculum, the knowledge base, skills, and the nature of work placements. Collaboration between training organisations, teachers, and industry experts on curriculum, teaching and learning and assessment would help to increase trust in the outcome of, and reduce the risks associated with, assessment.

A capabilities approach is also thought help provide more curricular coherence between VET and higher education, support pathways and help overcome discontinuities in flows in education particularly if both seek self-directed individuals. The authors make comparisons with the German notion of 'Beruf', supporting the development of autonomous reasoning will require access to a systematically related body of theoretical knowledge, a set of practical skills, and a social identity within an occupation or vocation.

Illustration

Options for piloting the new approaches outlined in this paper are suggested (Wheelahan & Moodie 2011, p.30-31) for Engineering, Aged care, Tourism & Hospitality.

Engineering Australia

Engineers Australia's national generic competency standards for associate engineers (which generally require an advanced diploma or associate degree) have three broad domains which are: knowledge base; engineering ability; and, professional attributes. The development of a simpler set of standards that covered the knowledge base of practice, industry specific requirements, and professional attributes would result in a better focus on the development of the individual in the context of their broad occupation. They would also underpin nationally portable qualifications.

THE ICE accrediting body

The International Centre of Excellence in Tourism and Hospitality Education is a not-for-profit international accreditation and quality assurance agency. Originally established and funded by the Australian Federal Government (2004 – 2008), THE-ICE was awarded to and managed by the Sustainable Tourism Cooperative Research Centre (STCRC), the largest tourism and hospitality scientific research centre in the world at that time. With the endorsement and support of the Australian government, THE-ICE designed, developed and implemented strategic activities to:

- recognise excellence in tourism and hospitality education in Australia
- help in furthering the development of that excellence
- aid in the promotion of that excellence to future international students.

Today THE-ICE is a global network 32 institutions comprising of public and private universities, vocational institutions and private hotel schools from 14 countries.

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