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A Partnership of the ILO and the Russian Federation” (2nd Phase)*

**DEVELOPMENT OF OCCUPATIONAL STANDARDS, QUALIFICATIONS AND SKILLS ASSESSMENT
INSTRUMENTS
(Stock-taking technical report)**

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Responsibility for the content and views expressed in the Report are those of the author and do not necessarily reflect the official opinion of the ILO

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INTRODUCTION

The purpose of this report is to describe: a) the concepts and practices of developing occupational standards, b) the application of occupational standards for designing vocational education and training (VET) qualifications, and c) the principles and techniques for assessment of qualifications.¹ This area of theory and practice attracts lots of interest in all countries. However, not many countries, in particular, the developing nations, have achieved a demonstrable success in these areas. Development of quality standards and qualifications requires considerable technical and organizational expertise, while their utilization in vocational training and assessment needs adequate levels of funding of providers which are required to perform in line with certain performance standards. For this reason, the further growth of interest in the development and application of occupational standards and standards-based qualifications has been muted.

The need for the product and process-related standards has been felt in the economically advanced economies for hundreds of years because of the increasing competition and technological progress, and lately, due to the regulations on the protection of environment and health. *Occupational standards* describe the standards of competent and safe behaviour of labour force in the workplaces, rather than the requirements directly applicable to products. Nevertheless, occupational standards may also involve requirements for compliance with the regulations imposed on products and processes. Being regulations of the competent behaviour in the workplace, occupational standards can serve various purposes, from selection and recruitment of staff to being a basis for developing vocational qualifications. Occupational standards and qualifications contain requirements for producing the instruments for assessing candidates seeking formal recognition of their competent workplace behaviour (certification). Many countries are involved in the development of occupational standards and qualifications for the same occupations because there are differences in concepts of qualifications, and in templates applied to occupational standards. Some countries opted for producing relatively simple occupational standards and qualifications which mostly include the range of functions which persons are supposed to carry out. Some other countries include in standards detailed descriptions of the knowledge and skills and the workplace environment in which those should be demonstrated with certain, well-defined, results and critical elements of competent performance.

Vocational qualifications have emerged years back caused by the need to recognise professionalism in trades. In modern labour markets, the workers who do not carry formal qualifications may have a limited employability, an inferior recognition and a lower pay. Share of certified workers in working age population (WAP) (aged 20-65) has become *one of the indicators of quality* of the national workforce. For instance, in Australia (2014), 20% of the national workforce held the trade worker Certificates of IV and III levels, 11% of workforce held Diplomas and Advanced Diplomas of technicians. It is planned by 2020: a) to halve the share of high-skilled workers without formal qualifications (Certificate III and above) from 47.1% to 23.6%, and b) to double the number of graduates with qualifications of Diplomas and advanced Diplomas (technicians).²

Qualification is also a basis for *professional identification of workers* in the skilled labour market. In some industrialized countries, a considerable share of jobs require that workers need to be accredited, or registered with professional organizations or certified in order to perform their duties. Some coun-

¹ This Report has been produced under the Project Activity 2.2.1 To produce a stock-taking report for developing a knowledge base on concepts, templates and quality requirements for producing occupational standards, qualifications and skills assessment instruments.

² National Agreement for Skills and Workforce Development, Productivity Commission, Canberra. Commonwealth of Australia 2012; National Agreement Performance Information 2011: National Agreement for Skills and Workforce Development, Productivity Commission, Canberra. Commonwealth of Australia 2012 (For a comparison, the baseline data for Russian Federation (2013) for the WAP aged 25-65 who carried formal qualifications, was estimated as 5.0%. see: Strategy for development of vocational training 2013-2020. Ministry of Education and Science. Russian Federation)

tries apply occupational names as qualifications (carpenter, fitter), while other countries distinguish between several levels of workplace competencies and develop the corresponding occupational standards for workers (3-6 levels) and technicians (1-2 levels).

The *qualifications assessment instruments* should be linked to the occupational standards and related qualifications since those are the outcomes of training. Development of the assessment instruments has been much more (then it was for standards and qualifications) delegated to the awarding bodies and assessment centres who produce a broad range of assessment methods. Some of the above differences in concepts, templates and assessment instruments and procedures are described in this report.

I. OCCUPATIONAL STANDARDS

I.1. The concept of occupational standard

The purpose of standard

There is commonly a need to describe requirements for the productive, effective, and safe (broadly *competent*) performance in a specific workplace. These requirements or standards are called *occupational or professional only* because they describe the *occupational, professional or job-related* behaviour. The term “occupational” should not be interpreted as if it refers solely to an “occupation”³. Compliance with the “occupational standards” may be a condition for being employed in a particular job/industry or for being awarded a qualification or a licence for practicing an occupation. For defining requirements for competent workplace behaviour, some countries use the term “occupational standards”, some other countries use the term “competency standards”. Some countries use both terms. In this paper, “occupational standards” and “competency standards” carry the same meaning.

Occupational standards may be developed by enterprises for meeting their own needs. In some countries, where national qualifications are recognized as a matter of national importance, there are processes for the development, quality assurance and recognition of occupational standards as of “national occupational standards”. In these countries (such as Australia, UK), occupational standards are registered in national databases and are subject to regular review as well as to formal procedures of their application in producing qualifications and in their assessment.

There are various *benefits* of developing occupational standards because they may have many uses. Some of the ways of utilizing standards involve:

- Identification of competency gaps⁴ with employees and developing in-company upgrading programmes to improve competitiveness and productivity
- Producing job descriptions for staff recruitment and career planning
- Recognition of competencies acquired on-job and of qualifications acquired abroad
- Transferring technologies requiring complex competencies of workers which need to be described and applied in details
- Organizational review of work processes to reduce overlap of functions, etc.⁵

Occupational standards are also utilized in VET, notably, for the development of: standard-based curriculum, and skills assessment instruments for completers of training modules, etc. The terminology in this field distinguish between “occupational standards” and the “standards-based products”.

³ The International Standard Classification of Occupations (ISCO-08) defines a “job” as ‘a set of tasks and duties performed by one person’. An “occupation” is defined as a ‘set of jobs whose main tasks and duties are characterised by a high degree of similarity’. ILO. Geneva 2008

⁴ “Competency gap is “a difference between the competencies required for effective job performance and the competencies which employees actually possess.

⁵ 115 uses of occupational standards. Caple Melbourne Limited 2001, with acknowledgements to B. Mansfield & L. Mitchell. Towards a Competent Workforce. Gower 1997

Definitions of occupational standards

An occupational standard may be defined as a *statement of the standards of performance* the individuals must achieve when carrying out functions in the workplace, together with specifications of the underpinning knowledge and understanding. Occupational standards are therefore the “*evidence-based benchmarks of competent performance* in the workplace which have been agreed by a representative sample of employers and other key stakeholders”.⁶ Based on the above definition, a person working in compliance with such standards of performance may be called “a competent” person.

Content of occupational standards commonly involves several components⁷:

- a) *Performance criteria* which is a statement of performance outcomes (which may involve “critical elements of performance”). Statement of performance outcome and specific critical elements of performance commonly relate to each individual function to allow for distinguishing thereby between “performance” and “competent performance”. Critical elements of performance can take various forms depending on the type of technology, characteristics of the workplace, etc.⁸;
- b) *Knowledge and skills* required for the competent implementation of job-related functions enabling to demonstrate performance criteria
- c) Important details of the specific workplace where the job functions should be implemented (the so-called “defined contexts”). This means that if the workplace context has changed, the occupational standard may no longer be valid.

The following terms are commonly applied which are drawn from the descriptors summarised in the European Qualifications Framework (EQF):

- *Qualification* means a formal outcome of assessment process.
- *Knowledge* is what people know. Broadly, knowledge can be theoretical and/or factual.
- *Skill* is what people should be able to do. It means the ability to apply knowledge and know-how to carry out tasks.
- Competence includes responsibility and autonomy required for competent performance at workplace.⁹

People are considered as “competent” when they possess the required knowledge and skills and apply those in defined job context according to the criteria of performance. A “competency” develops with people through functional interaction of the knowledge, skills and attitudes when they perform the workplace functions.¹⁰ Performance criteria may refer to the details of complex workplace context and associated risks. Given the variety of situations occurring in different workplaces and companies, occupational standards are the *minimal requirements* of performance expected from the qualified person.

However, the way the above elements of standard are operationalized, combined and the relative weights assigned to them can vary across countries considerably. In Australia, performance criteria are stated as an *outcome*. For instance: “Towing of equipment *is carried out* safely, in accordance with the authorised equipment manual, using suitable connections, and within approved towing vehicle capabilities”.

⁶ NOS Strategy 2010-2020. UK Commission for Employment and Skills. Revised Strategy June 2011; National Occupational Standards. Quality Criteria with Explanatory Notes. UK Commission for Employment and Skills and the Alliance of Sector Skills Councils. 2011

⁷ The simplest definition of a standard applied in some developing countries involves listing of functions which a person should be able to carry out in a workplace or a certain occupation. In this sense, a person who is considered capable of carrying out all the necessary functions is considered as a competent person. See for instance: Regional model competency standard: Manufacturing industry. ILO. Bangkok 2007

⁸ Some companies include “productivity” into performance criteria.

⁹ http://ec.europa.eu/eqf/terms_en.htm

¹⁰ Some definitions of a competency also involve “attitude”. See: H. Guthrie: Competence and competency-based training: What the literature says. NCVET. 2009

ties.“ In the UK, a competency statement is requirements for the function, for instance: “*Carry out adhesive bonding activities using two of the following types of material: metallic, non-metallic, or combinations.*”¹¹

In description of competencies, performance criteria should be stated as clear, demonstrable and assessable outcomes. As far as the requirements for knowledge, and the requirements for skills¹² are concerned, they may be stated separately or combined.

Competency unit and competency elements

Jobs consist of tasks. Within individual tasks, functions can be identified requiring certain competencies. Such competencies become “competency elements”. A competency element may be described through its title, the task to be implemented, performance criteria, and underpinning knowledge and skills. However, it is a competency unit, rather than its element, which is the smallest piece of a standard which, when applied in a work situation, can logically stand alone and can be assessed, recognized and certificated. Competency elements should therefore be grouped into a “unit of competency” (UoC) required for implementing a task. A package of competency units will determine the performance requirements for carrying out a certain job. Size of a unit of competency in terms of the number and scope of competency elements must adequately reflect the content of the functions, and complexity of skills and knowledge required. It should also be suitable for skills training and assessment. A unit of competency should involve the range of functions that are normally intended for completion by one person. For some jobs and tasks, identification of detailed functions and developing competency elements is not practical. In this case, units of standard do not contain descriptions of individual functions and related requirements.

In some countries, which apply the same units of competency in several qualifications and in a range of different contexts in variety of enterprises, transferability is also a requirement in the design of units. Units of competency need to be broad enough to be used across a range of settings, but flexible enough to be useful in any specific context. In this case, competencies should not be too closely tied to the specific products and types of technologies. These particular features can be accommodated in the so-called “range statement” which is part of the unit (see **Chart 1**). Transfer of units between qualifications is also called “migration”.

I.2. Templates for unit of standard

Generic template

A generic template for a unit of competency is presented in **Chart 1**. If a unit is made up of *competency elements*, the same template will be used for describing performance criteria related to the individual tasks with the rest remaining common for the whole UoC.

Chart 1. Generic structure of a unit of competency (UoC)

1	Unit Title and Descriptor	The <i>unit title</i> is a brief statement of the outcome of the specific unit of competency. For instance, “Organise vessel transfer operations” or “The environmental impact of operations and activities is assessed and monitored”. The <i>unit descriptor</i> assists with clarifying the unit title and links with other units of competency.
2	Scope of the Unit	<i>Scope</i> describes the industry competency area to which the Unit belong, for instance, “Handling ship cargo”. Competency sub-field: “Plan and organize storage and despatch of cargo, complete all required documentation”. The

¹¹ Standards for “Fabrication and Welding Engineering” Level 3. Unit No 29: Bonding Engineering Materials using Adhesives. SEMTA. UK

¹² In some countries, for instance, UK, instead of “skills” the term “understanding” is used

		scope may also denote the industry sector (e.g. ports), specialisation, or function associated with the Unit.
3	Industry sector-specific competencies	These are the competencies required for accomplishing generic (industry-specific) functions. Industry-specific competencies may exist at different levels of generality. Such sector-based competencies will be very different between, for instance, agricultural sector and education services sector. Industry specific competencies are stated as performance criteria.
4	Job/task-related competencies	These are the competencies required for accomplishing a task in defined workplace/context. For instance, in the ports sector, such competencies may involve: "Routine inspections on the port crane are implemented in line with manufacturer's specifications". Competencies are stated as performance criteria and may involve critical elements of performance.
5	Requirements for knowledge	Underpinning knowledge may involve knowledge of theory, processes, technologies, codes of practice, legislation, etc. Requirements for knowledge may be stated separately for each performance criterion or may be combined for covering the whole unit of competency.
6	Requirements for skills/understanding	Skills involve abilities to demonstrate competent usage of know-how, operational guidelines, machines, methods of work and communication, and techniques, etc. Requirements for skills may be stated separately for each performance criterion or may belong to the whole unit of competency.
7	Employability skills	<i>Employability skills</i> enable people to work more effectively across jobs/occupations and industries irrespective of the job content. Such skills may involve core skills (basic literacy and numeracy), people skills (working with others, communication, planning and organising, and problem solving), thinking skills (learning, decision making, and computer literacy), personal skills (self-direction and acting with integrity). ¹³ The employability skills are not stated separately but they are embedded in or combined with other elements in performance criteria or knowledge and skills requirements.
8	Range statement of the workplace	The <i>range statement</i> relates to the whole unit of competency (and the whole set of performance criteria) and describes: <ul style="list-style-type: none"> - the range of contexts, work environments and situations, and operating conditions where a worker should perform the work tasks - the meaning of key terms used in the performance criteria The range statement may also describe: types of equipment, tools, materials, other inputs and processes to be dealt with at the workplace; types of clientele; uncertainties and associated risks; levels of required responsibility, accountability, and job autonomy.
9	Assessment guidelines (or Evidence guide)	Guidelines determine how the competency should be demonstrated. It must be read in conjunction with performance criteria, the range statement and the content of the unit. The evidence guide may describe: <ul style="list-style-type: none"> - the range of evidence to be collected - conditions under which competency must be assessed including the assessment environment and equipment - the knowledge and skills that must be demonstrated - methods of assessment (direct observation of working processes and results, samples or work accomplished, questioning; assessment on the job, use of simulators, etc.) - ways of linking assessment to the performance criteria (used as "critical elements of assessment")

¹³ This set of employability skills is adopted in Australia. In the UK, a set of employability skills encompasses: literacy, numeracy, ICT, self-management, thinking through and solving problems, working with others, communicating effectively and understanding the business.

		<ul style="list-style-type: none"> - assessment of consistency of performance (competency may need to be demonstrated in different contexts) - relationships with the assessment of any other unit of competency
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Chart 2 shows an example of the unit of standard involving metalworking tasks which format is completely in line with the above standard template. The example shows the listing of performance criteria, very detailed specifications for knowledge and understanding and the very extensive details of the range statement describing all the tools, materials and other requirements which should be mastered by the unit completers. Such a template of the unit assumes that the requirements for knowledge and skills acquisition belong solely to the performance criteria stated in this unit.

Chart 2. Unit of occupational standard. “Carrying out sheet metal cutting, forming and assembly activities” SEMTA. UK¹⁴

Performance criteria	Additional requirements related to performance criteria	Requirements to knowledge and understanding
<p>You must be able to:</p> <p>P1. Work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines</p> <p>P2. Obtain the appropriate tools and equipment for the sheet metalworking operations, and check that they are in a safe and usable condition</p> <p>P3. Mark out the components for the required operations, using appropriate tools and techniques</p> <p>P4. Cut and shape the materials to the required specification, using appropriate tools and techniques</p> <p>P5. Use the appropriate methods and techniques to assemble and secure the components in their correct positions</p> <p>P6. Check that the finished components meet the standard required</p> <p>P7. Report any difficulties or problems that may arise with the sheet metal activities, and carry out any agreed actions</p> <p>P8. Leave the work area in a safe and tidy condition on completion of the sheet metal activities</p>	<p>You must be able to:</p> <p>1. Carry out all of the following during the sheet metalworking activities:</p> <p>1.1 Adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment (PPE) and other relevant safety regulations</p> <p>1.2 Ensure that all power tool cables, extension leads or air supply hoses are in a tested and serviceable condition</p> <p>1.3 Apply safe and appropriate sheet metal cutting and forming techniques and procedures at all times</p> <p>1.4 Return all tools and equipment to the correct location on completion of the sheet metalworking activities</p> <p>2. Use marking-out methods and techniques, including one of the following:</p> <p>2.1 Direct marking using instruments</p> <p>2.2 Use of templates</p> <p>2.3 Tracing/transfer methods</p> <p>12. Produce sheet metal components with all the dimensions within +/- 3.0mm or +/- 0.125” (overall 90 requirements)</p>	<p>You need to know and understand:</p> <p>K1. The health and safety requirements, and safe working practices and procedures required for the sheet metalworking activities undertaken</p> <p>K2. The personal protective clothing and equipment (PPE) to be worn when carrying out the sheet metal activities (such as leather gloves, eye protection, ear protection), and the importance of keeping the work area safe and tidy</p> <p>K3. How to handle sheet materials safely and correctly and the need to wear gloves and other related safety equipment</p> <p>K4. Safe working practices and procedures to be observed when using manual and power operated tools</p> <p>K5. The hazards associated with carrying out sheet metalworking activities (such as handling sheet materials, using dangerous or badly maintained tools and equipment, operating guillotines and bending machines, and when using hand and bench shears), and how they can be minimised</p> <p>K6. The procedure for obtaining the required drawings, job instructions and other related specifications</p> <p>K7. How to use and extract information from engineering drawings and related specifications including BS or ISO standard symbols and abbreviations, imperial and metric systems of measurement, workpiece reference points and system of tolerancing (overall 22 requirements)</p>

¹⁴ Unit Code H029 04. (<https://www.sqa.org.uk/files/aq/H02904.pdf>) (accessed 16.10.2018)

Separate units of standard for knowledge or performance

Occupational standards do not necessarily involve requirements for simultaneous acquisition of the knowledge, skills and a demonstration of performance. Some units of standard may focus only on acquisition of knowledge, some - on acquisition and demonstration of skills, and some units may involve requirements for combined performance. For instance, to achieve the NQF Level 3 Diploma in Heating and Ventilating Industrial and Commercial Installation in UK, the learners must demonstrate competent implementation of 14 units of standard, 9 of which are “knowledge units”, 4 are “performance units”, and one is a “combination unit”. Example of the outcome statement for the “knowledge unit” is “Understand industrial and commercial cold -water system installation techniques”. The outcome of a “performance unit” is “Perform industrial and commercial oxy-acetylene pipe jointing”. The outcome of the “combination unit” of standard reads as follows “Understand and carry out electrical work on industrial and commercial heating and ventilating systems and components”.¹⁵ **Chart 3** shows an extract from the two such different units. The interpretation of such a template is that the standard for knowledge acquisition will be applicable to all the performance units belonging to the qualification. The same is equally true for the separate “performance unit”.

Chart 3. Separate “knowledge unit” and “performance unit” of standard in the qualification, UK¹⁶

“Knowledge unit”: “Understand industrial and commercial cold-water system installation techniques” (involves overall 9 outcomes)	
Outcomes/Elements of competency	Performance criteria: The learner should be able to:
Outcome 1. Understand the working principles and layouts of industrial and commercial cold-water systems	1.1. Specify the operating and working principles of boosted high rise cold water systems including: <ul style="list-style-type: none"> - connections from mains to premises - cold water storage cisterns - factors to determine system selection - key regulations relevant to installation 1.2 Define the operating principles of different appliance types that are connected to cold water systems, including: <ul style="list-style-type: none"> - sanitary appliances - industrial and commercial appliances - appliances specific to industrial and commercial premises - compliance with building and water regulations, etc.
“Performance unit”: “Maintain industrial and commercial heating and ventilating systems” (involves 2 outcomes)	
Outcomes/Elements of competency	Performance criteria: The learner should be able to:
Outcome 1. Be able to complete preparation work for industrial and commercial H&V system maintenance activities	1.1 Check the work location and report factors that will impact on the work to the supervisor or line manager 1.2 Source appropriate job information and documentation for heating and ventilation system service and maintenance requirements including any two from the following:

¹⁵ Level 3 Diploma in Heating and Ventilating Industrial and Commercial Installation. www.cityandguilds.com UK. 2017

https://cdn.cityandguilds.com/ProductDocuments/Building_Services_Industry/Heating_and_Ventilation/6188/6188_Level_3/Centre_documents/6188_30_L3_Diploma_Qualification_logbook_v1-1.pdf (Accessed 14.08.2018)

¹⁶ Level 3 Diploma in Heating and Ventilating Industrial and Commercial Installation. 2017. www.cityandguilds.com UK

	systems: cold water: <ul style="list-style-type: none"> - storage (indirect) - non- storage (direct) hot water: <ul style="list-style-type: none"> - open vented - storage (indirect), etc.
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I.3. Analysis applied in the development of standards

I.3.1. Functional analysis of a sector¹⁷

It needs to be clear on what will be boundaries of the sector for which occupational standards to be developed. For instance, a sector may be a particular industry (e.g., printing, or meat industry), a discipline/occupational family (e.g., veterinary service occupations) or a certain work function (e.g., safety at ports, or, broadly, safety at work).¹⁸

A generic functional analysis of an industry sector (or a company) aims to identify a set of functions a specific industry sector is supposed to carry out in order to achieve its *key purposes*. Functional analysis begins with defining the key purposes of the sector - a statement of what everyone in the sector is ultimately trying to achieve. Much is dependent on the formulation of the key purposes of a sector. If sector's key purposes change (through, for instance, placing a significant focus on environmental protection) the sector job-related functions and occupational requirements will change inevitably resulting in changes of occupational standards. Key purposes of a sector may be one or several. For instance, "Keep the environment clean, safe and well maintained to help people enjoy where they live, work or visit" is the key purpose of the Local Environmental Management sector in UK. This key purpose applies to managers, engineering and operational staff at all levels.

All the *functions* which need to be carried out to achieve the "key purposes" should be identified and sequentially disaggregated into the discrete functions which can be carried out by an *individual*. In order to identify the *key functional areas*, the analysis asks the question: "what has to happen to achieve each key purpose?" The analysis then asks the question: "what has to happen to achieve outcomes envisaged in each key area?" The methodology continues to ask the question: "what has to happen to achieve each outcome?" until disaggregation reaches the point when functions which can be carried out by an *individual* have been identified.

Systems analysis is applied to identify any support systems that are essential to make the process work, such as communications or computer systems, etc. which otherwise may not be properly noted. This analysis will allow identifying generic competencies required for the job (e.g. IT skills and communication skills). These support systems can be drawn on top of the process flow document, with each system linked to implementation of different jobs.¹⁹

The outcome of functional analysis is a 'functional map' which must show all the functions which need to be carried out to achieve the key purposes and the relationship between these functions. The number of levels of disaggregation in the functional map will depend on the size and nature of the sector, or area of work being analysed. Also, some parts of the functional map may need to be disaggregated to more levels than others.

¹⁷ Based on: P. Turnbull. An international assessment of training in the port sector. ILO, Geneva. 2011

¹⁸ Based on: National Occupational Standards Quality Criteria with Explanatory Notes. UK Commission for Employment and Skills and the Alliance of Sector Skills Councils. Revised June 2011

¹⁹ Based on: P. Turnbull., op.cit.

Occupational standards are developed for tasks, jobs and, sometimes, for occupations. Requirements for competent performance at workplace should closely reflect the structure of functions to be implemented and the context in which the job is carried out. The types of functions which may belong to any task are described below. The higher is the level of the functional complexity of a task/job and the more demanding is the job context, the more complex should be the related standard.

Example of a segment of the functional map developed for the agricultural sector in UK is given in **Chart 4**. This example describes only two of the industry Key Purposes - “Maintain, repair and use equipment and machinery” and “Manage agricultural crops”. Some other industry’s Key Purposes involve: “Manage workforce and organization”, “Maintain health, safety, security and environment”, “Improve staff and relationships”, etc. which involve some generic functions and can apply the occupational standards developed for other sectors.

Chart 4. Segment of the functional map (agricultural sector, UK)²⁰

Industry key purposes	Industry key functions	Key specialist activities	Detailed functions (further indivisible and assigned to individuals)	Codes of related occupational standards
Maintain and operate agricultural equipment and machinery	Use of equipment and machinery	Prepare and operate equipment and machinery	Prepare and operate a tractor and attachments	LANCS7
			Prepare and operate a powered vehicle with attachments	LANCS59
			Prepare and use equipment and machinery	LANCS35
	Maintenance and repair of equipment and machinery	Carry out maintenance and repair	Carry out maintenance and repair of equipment and machinery	LANCS25
			Manage the preparation of land-based machinery and attachments	LANCS8
	Manage agricultural crops activities	Planting crops	Prepare to plant crops	Prepare and cultivate sites for planting
Prepare planting equipment and plant crops				LANAgC2
Producing novel crops		Produce novel crops	Manage the production of novel crops	LANAgC8
Growth of healthy crops		Monitor and maintain crops	Monitor and maintain the healthy growth of crops	LANAgC3
			Monitor and maintain the provision of nutrients to crops	LANAgC4
			Monitor and maintain the provision of water to crops	LANH14
Harvesting of crops		Harvest crops	Harvest crops by mechanical means	LANAgC5
			Carry out post-harvest activities	LANH52
Bio-security		Plan, implement and maintain bio-security	Maintain site hygiene and bio security	LANCS61
			Implement and monitor site hygiene and bio security	LANCS62

²⁰ <http://www.lantra.co.uk/getattachment/a82d9490-4603-4174-b0f8-334a756d46b1/Functional-Map-Agriculture-Crops2.aspx>. (Lantra is the Standards Setting Council in UK for land based and environmental industries).

	Pests and diseases	Control weeds, pests and diseases	Prepare and apply chemicals to control pests and diseases and disorders	LANCS31
	Environmental management	Maintain sites, habitats and identify species	Maintain and repair boundaries or access points	LANCS21
			Survey and report on the conditions of environment	LANEnC3
	Drainage	Maintain open and land drainage	Maintain land drainage systems	LANH32
			Maintain open drainage systems	LANTw6
	Analysis	Analyse samples	Analyse samples to identify seeds, pests, diseases and disorders	LANAgC9
			Carry out scientific or technical tests using manual equipment	SEM-PLATA2.12
			Carry out scientific or technical tests using automated equipment	SEMLA2-2-13

I.3.2. Functional analysis of tasks and jobs

Types of job functions and related competencies

It is useful to distinguish between job/task functions of different nature as a basis for identifying different competencies arising from the nature of such functions. The lack of such structuring results in missing out of various functions/competencies in favour of the task (technical) functions which dominate in many occupational standards. A variety of functions may involve:

- task (technical) functions
- task management functions
- contingency management functions;
- job role and environment-related functions²¹

Task technical functions-related competencies involve requirements for knowledge and skills for implement technical tasks, for instance, laying bricks, welding, giving a presentation. The following is an example of the performance criterion for implementation of the technical task: “The machine pre-start, start-up, park-up and shutdown procedures are carried out in accordance with manufacturer’s instructions and site safety regulations”.

Task management-related competencies involve requirements for knowledge and skills for integrating functions enabling to *produce outcomes* through managing the work process – for example, planning of work, monitoring quality of the product, finding better ways of doing things. The following is an example of the performance criterion for managing/integrating job tasks: “The product is assembled and controlled for quality through selecting appropriate metal bonding materials and using the most cost-efficient production and quality assurance techniques”. These functions are not necessarily supervisory but are the responsibility of high skilled workers.

Contingency management competencies involve requirements for knowledge and skills for identifying the anticipated or non-anticipated irregularities, breakdowns, imperfections, and the unknown events and their implications to working process and respond to such contingencies effectively²². The following is an example of the performance criterion for managing contingencies: “Sources of water contamination are identified and its implications to the health of employees and residents analysed and used to confirm hazard identification to responsible authorities”.

²¹ “Job environment” may be included in the “range statement” of the unit of standard. Training Package Development Handbook. Part 2. 2007. © Commonwealth of Australia, 2007

²² In UK, the contingency management competencies are not explicitly included in units of competency.

Competencies required for performing certain job roles in the defined environment involve knowledge and skills for functioning with certain level of autonomy and responsibility for personal work and for the work of others, and for working in teams. Performance criteria may describe requirements for maintaining effective relationships with customers and team members and for adapting to different situations and work environments, for practicing ethical behaviour and job-related health and safety functions. The following is an example of such a competency: “Notification of the worker’s non-attendance for shift is submitted to the supervisor without undue delay and according to the enterprise’ procedures”. Implementation of the job role may be strongly influenced by the job context and environment.

The above groups of job functions and related types of competencies are summarized in **Chart 5**.

Chart 5. Major groups of job functions and related competencies

	Job/task functions	Competencies
1	Implementation of <i>technical tasks</i> and duties, for instance, bricklaying, cleaning, cutting metal sheet	<i>Technical tasks-related competencies</i> : requirements for knowledge and skills and their competent application enabling to implement technical functions
2	<i>Integration of inputs, tasks and duties</i> towards delivering products and services/meeting objectives	<i>Task management competencies</i> : requirements for knowledge and skills and their competent application for producing outcomes through managing the work process, work planning, monitoring quality, solving problems, integrating functions, etc.
3	<i>Identification and management of contingencies</i> : <ul style="list-style-type: none"> - identification of the known/anticipated irregularities, breakdowns, imperfections, the unknown events - understanding implications of contingencies to work flows, self and others, and environments - preparation of effective responses to contingencies 	<i>Contingency management competencies</i> : requirements for knowledge and skills and their competent application enabling to: <ul style="list-style-type: none"> - identify the anticipated or non-anticipated irregularities, breakdowns, imperfections, - understand their implications, and - respond to such contingencies effectively
4.	<i>Implementation of the required job role, autonomy and responsibility</i> for: <ul style="list-style-type: none"> - personal work and for the work of others - working in teams while in charge of complex assignments - interacting with others- colleagues and customers - adapting to different situations and work environments 	<i>Job role and environment-related competencies</i> : requirements for knowledge and skills and their competent application enabling to: <ul style="list-style-type: none"> - perform in conditions of required autonomy and responsibility for personal work/work of others - work in teams - maintain effective relationships with customers and team members - adapt to variety of situations and changing work environments - practice ethical considerations and health and safety rules

The process of functional analysis

Development of an occupational standard for a task/job is based on the same methodology as described above. In order to identify the key functional areas, the analysis aims to ask the question: "what

has to happen to achieve each key purpose?". If the "Key purpose" is already an *indivisible function* (which is to be implemented by one person), an answer to the question "what has to happen to achieve the key purpose?" will result in the formulation of performance criteria. If performance criteria as well as the context in which they are to be demonstrated are identified, then the requirements to the related knowledge and skills can be formulated.

It is critical that functional analysis should be able to identify various *job functions*, where relevant, (see **Chart 5**). Those may appear in different parts of the unit of competency – in performance criteria, description of skills and knowledge, the range statement and the assessment guidelines. While not every task contains all four types of functions and, therefore, not every element of competency will contain those, these functions may be covered in a competency unit or a group of related units. Functional analysis should also enable to identify and agree on the criteria of competent performance expected in a workplace.

Functional analysis is conducted through interviews with workers, their supervisors and representatives of professional societies, through direct observation on the job, etc. and involves the following techniques:

- *job boundary analysis* based on the initial (occupational) scoping of industry /enterprise and organisational charts resulting in identification of responsible person(s) for each job/task; it also aims to identify clusters of functions and related competencies that may be grouped together as they are performed (or could be performed) by the same person. Job boundaries are drawn onto the process flow document, where each process must be linked to a job or more than one job.
- *job process flow analysis* aims to clarify inter-linkages between different jobs/occupations, frequency of performing each task, similarities between jobs to enable using of the same elements of competency in occupational standards for different jobs
- *job input- and- output analysis* enables to assess the competencies required for planning and integration of tasks for delivering job outcomes and for developing performance criteria
- analysis of the *job context* allows to identify the known and anticipated risks/contingencies and to develop effective responses to those. The known (and probable sources of unknown) contingencies, their frequency and possible implications to the job process and environment are to be identified. Job-related contingencies may be generated by inputs, technologies, clientele, as well as the environment in which tasks are implemented.
- the *job role and environment analysis* for the task/function enables to assess the need for working with others, level of autonomy and responsibility, the need for communication with others and reporting to superiors.
- analysis of *knowledge and skills requirements* which will be determined by the nature of tasks described by the performance criteria as well as by the characteristics of the workplace.

In the US, the basic five questions are commonly used for breaking down the activity-outcome components of a task into identifiable elements which are recorded on the Observation Worksheet (see **Chart 6**).²³

Chart 6. Functional analysis worksheet for the task implementation

1	Question 1. Who is doing the task?
This is always understood to be a "worker", or a particular job category, such as nurse. In a task statement you want to focus on the actions that are being done, not on the particular person who is performing the task, so that the same task statement may be assigned to more than one worker, if appropriate, without rewriting the task statement.	

²³ Fine, S.A. and Wylie, W.W. An Introduction to Functional Job Analysis, Methods for Manpower Analysis. Upjohn Institute for Employment Research. No. 4, September 1971; Fine, S.A. Functional Job Analysis Scales. A Desk Aid. S. A. Fine Associates, 1989

2	Question 2. Performs what actions?
This is the series of specific actions that describe what the worker does within the task. Specific verbs such as “asks”, “writes”, “inserts”, instead of summary verbs, such as “operates”, “handles”, etc. should be used. The more specific these action verbs are made, the less chance there is for misinterpretation of the task statement by the reader.	
3	Question 3. Using what tool, materials, or work aids?
This part should include at least the essential items that are necessary for the worker to perform the task. This would also include the people with whom the worker must interact when performing the task.	
4	Question 4. Upon what instructions?
A task statement should indicate the nature and source of instructions the worker receives: whether the worker must follow verbal instructions, written guidelines, general routine procedures established in the clinic or whether the worker is free to choose the way in which to go about the task. This indicates the amount of discretion a worker needs to use in performing the task. In many cases, however, the sequence of actions is so specific that the source of instructions is implied, rather than stated explicitly.	
5	Question 5. To accomplish what result?
Pinpoint the result of the series of actions you just described above. Again, the more specific you are in identifying the outcome of the actions, the more explicit the task statement is to the worker involved in this task.	

To summarise:

- results of functional analysis are commonly presented in the form of elements/units of competency involving (in line with the **Chart 1**)
- listing of activities to be implemented in order to achieve the key purpose; the activities need to be stated in the form of performance criteria (involving measurable criteria of competent performance)
- knowledge, skills and attitudes required to perform each task/job
- description of the context in which functions will need to be implemented: equipment, materials, processes, known contingencies, autonomy/responsibility (described by the so-called “range statement”)
- the need for generic/employability skills required in jobs/tasks in the labour market

I.4. Differences in structuring occupational standards (Australia, France, and the UK)

The generic template of the unit of standard (see **Chart 1**), which reflects the Australian requirements, is applied in many industrialized countries. However, in each country there are nuances with some additional specifics generated by the industry organizations and professional bodies responsible for developing and monitoring units of standard (and qualifications) in their sectors. Templates for units of standard and qualifications are regulated by the National Qualifications Frameworks (NQF) which in some countries are very prescriptive (Australia) or rather loose (as in UK) offering more freedom to the developers of occupational standards.

Occupational standards in UK²⁴

In the UK, the development of competency units and of qualifications is guided by the recently adopted Regulated Qualifications Framework (RQF). The Office of Qualifications and Examinations Regulation

²⁴ After the QCF: A New Qualifications Framework. Decisions on Conditions and Guidance for the Regulated Qualifications Framework (RQF). Ofqual. UK. 2015; Total qualification time criteria for all qualifications. Ofqual/15/5775. UK. 2015

(Ofqual) introduced some changes which were to be implemented until the end of 2017²⁵. Vocational qualifications continue to be based on “units of competency” (further, “units”). The unit standards are accumulated and used for developing qualifications and other standard-based products. The recent reform allowed more freedom to the developers in using various templates for units of standard.

Units of competency in UK have some specific features in that they:

- may not have detailed competency elements
- may have fewer performance criteria
- apply the term “understanding” instead of “skills”
- each performance criterion may have its own requirements for “knowledge and understanding”, while in some other countries, such requirements refer to all performance criteria stated in the Unit
- units are formulated in sufficiently generic form allowing utilizing them in various qualifications

Occupational standards in France²⁶

In France, the unit standards do not exist separately as nationally registered units on which basis the qualifications can be developed. Specifications of individual TVET and of some HE qualifications are clearly based on descriptions of workplace functions, related workplace competencies and generic employability competencies. Units of standard involve criteria of performance, the underpinning knowledge and skills, as well as descriptions of the workplace context in which functions are expected to be implemented. The French qualification specifications are very detailed including guidance for theoretical examinations and practical assessment.

In French qualifications, the formulations of performance criteria and underpinning knowledge and skills broadly refer to the same types of functions as it is in Australia and UK: task (technical) functions, task management functions, job role and environment-related functions, and contingency management functions. A focus on contingency management functions is however much stronger in France than elsewhere.

The French approach to structuring units of standard has, however, important differences in that:

- Descriptions of some of the “performance criteria” determine the *means of action*
- Performance criteria are rather simple and refer to the whole “key function” what makes them less important. However, some of job functions do have the embedded elements of performance criteria
- Requirements for knowledge and understanding are structured into “technical knowledge”, “social knowledge”, and “organizational knowledge”

Chart 7 provides a comparative summary of competency standards in Australia, UK, and France. The comparison suggests that all the countries include into competencies broadly the same types of structural elements: performance criteria (“you should be able to:”); skills; knowledge and understanding (you should know and understand in order to perform). However, the content of performance criteria may be different. In Australia and UK, “critical elements” of competent performance are part of each performance criterion, while in France the critical elements of competent performance are stated separately and do not seem to be important.

²⁵ Qualification and component Levels. Requirements and Guidance for all awarding organisations and all qualifications. Ofqual/15/5774. UK. 2015

²⁶ Le titre professionnel de Technicien(ne) de Fabrication de l’industrie chimique Niveau III (code NSF : 222s). Titre professionnel du Ministère Charge de L’Emploi, République Française.

Chart 7. Comparison of occupational standards in Australia, UK, and France

Parameters of comparison	Australia	UK	France
The term used for defining a «competency»	Competency standard/ competency unit	Occupational standard/ competency unit	Competency («compétence»)
Practical utilization	A minimal requirement for awarding a qualification	A minimal requirement for awarding a qualification	Complete set of requirements for awarding a qualification
The types of functions taken account of in the development of standards	Task (technical) functions, task-management functions, contingency management functions, and the job role functions	Unspecified, but mostly task technical functions	Unspecified, but mostly task technical functions, with emphasis on contingency management functions, and on job role functions
Links between competency units and qualifications	Qualification is a combination of competency units which are registered separately and can be used in several qualifications	Qualification is a combination of units which are registered separately and can be used in several qualifications	Qualifications are competency-based but are applied as whole (indivisible)
Content of units of standard	-performance criteria (involving critical elements of performance), -knowledge and skill/understandings, and -description of context (range statement).	- performance criteria (involving critical elements of performance), -knowledge and understanding, and -description of context (range statement). Requirements for knowledge and understanding are extensive and detailed.	- Critical elements of performance are separated from performance criteria and determine the means of job action; - knowledge and understanding, - description of context. Requirements for knowledge and understanding are extensive and detailed.
Links between performance criteria and the requirements for knowledge and understanding	Requirements for knowledge and understanding refer to the whole set of performance criteria in the unit of standard	Each performance criterion will have its own requirements for knowledge and understanding	Requirements for knowledge and understanding refer to the whole performance statement for a qualification

II. STANDARDS-BASED QUALIFICATIONS

II.1. The concept of a qualification

In the qualifications systems applying the outcome-based (result-based) concept of training and assessment, *qualification* is defined as a “formally certified statement of possession of knowledge and skills and of capability to (competently and consistently) apply them in defined work contexts in line with the qualifications requirements.”²⁷ This definition is clear that results of learning can only be recognized as a qualification against the specifications established by the National Qualifications Framework (NQF). *The outcome-based* qualifications are different from *academic* qualifications in the sense that they are based on units of occupational standards and require demonstration of competent performance in conditions equivalent to the workplace.

The *academic* (educational) qualifications are commonly *time-based and* awarded on successful completion of a training course of certain duration. Such qualifications may require acquisition of complex knowledge and application of the intermediate assessment throughout the modular programme of study. There can also be combined practices when a thorough control of student progress on the time-based programme is complimented with the structured assessment. Academic qualifications are achievements in possession of knowledge which may or may not be job specific but they are capable to underpin the competent application of skills.

For the practical and cost reasons, national occupational qualifications are commonly developed for the occupations which constitute large groups in the national economy across different sectors. The need for development of a new national qualification is identified through a research conducted by, for instance, the industry bodies concerned. National qualifications are commonly produced for *skilled occupations* because they are complex and require specifications. Such qualifications cannot be effectively taught and awarded without doing some workplace investigation resulting in development of occupational standards. Although some occupations are technically less-skilled and do not require complex technical specifications, they may involve the need for generic competencies because of the application of relatively simple technical skills in complex and high-risk workplaces. For instance, compliance with occupational safety and health-related requirements in the port sector demands that all the employees were proficient in certain sector-related and workplace competencies.²⁸

Not all the jobs require development of recognized national qualifications also because they may have a narrow basis in terms of the scope of tasks involved. Therefore, the mix of units of occupational standards required for such jobs are insufficient to be recognized as national qualifications. Such narrow job-based mixes of units of standards can be used for selection and recruitment of staff, staff training and upgrading.

II.2. NQF as a regulator of qualifications

National Qualifications Frameworks (NQFs) are sets of regulations involving the concept of qualifications and rules for their development and assessment. NQF is an instrument for the development, classification and recognition of qualifications. It is a way of structuring qualifications, which are defined by *learning outcomes*, i.e. clear statements of what the learner must know or be able to do in defined contexts. NQF helps to compare different qualifications and indicate progression routes from one level to another.²⁹ The outcome-based qualifications are viewed as independent of specific circumstances of individual providers that offer programmes leading to the same qualification. Any qualification should

²⁷ A qualification is the result of an accredited program of learning that leads to the formal certification that a graduate has achieved learning outcomes as described in the Australian Qualifications Framework (AQF). AQF Glossary of Terminology. <http://www.aqf.edu.au/aqf/about/terminology/>

²⁸ P. Turnbull. An international assessment of training in the port sector. ILO, Geneva. 2011

²⁹ R.Tuck: An introductory guide to national qualifications frameworks: Conceptual and practical issues for policy makers. ILO, 2007

have a name and a level within the National Qualifications Framework (NQF) and should be based on one of the national qualification types and related specifications.

NQFs are expected to determine the:

- qualification levels and their descriptors (commonly involving features of knowledge, skills, such as their complexity, depth, etc.)
- qualification types and their specifications (determine the purpose and NQF level of each qualification type, volume of learning required for each learning outcome)
- policies and regulations for development and registration of qualifications
- rules of progression between the VET and HE qualifications by recognising the multiple pathways and relating these qualifications to each other as well as through recognition of outcomes of learning on the job
- principles and processes for alignment of new qualifications with NQF levels and qualification types and with international frameworks

Introduction of NQFs and of standards-based qualifications has resulted in the:

- creation of the new methodology for developing qualifications of various types and levels on the basis of acquired and demonstrated knowledge, skills and competence
- reform of the national quality assurance systems, their structures and procedures
- reform of the qualification assessment and certification practices because those should be linked to the occupational standards and qualifications specifications
- change of the way the education and training institutions are registered, accredited, and deliver their programmes
- close involvement of industry bodies and the education and training providers in the development of standards and qualifications as well as of the assessment instruments and procedures,
- demand for staff who are competent in the application of new concepts and procedures, of teachers and trainers who can develop and deliver new programs, as well as of professional assessors

II.3. Major differences between national qualifications systems

For the outcome-based qualifications made up of units of occupational standard the following basic differences exist:

- The qualifications developed as packages of transferrable units of occupational standards when such units can be used in other qualifications. Such national qualifications systems maintain databases of both, units of standards and of qualifications, enabling greater flexibility in producing new qualifications or amending qualifications if need be.
- Some qualifications are “whole” since they are made of non-transferrable units of standards with each unit of standard and a qualification being unique. This means that the same qualification is applied to different mixes of job tasks in the same occupation. Such qualifications may have a lower capacity to take account of specific combinations of tasks and context existing in various workplaces. Each specific mix of job tasks may require development of new units of standard and a qualification.
- Qualifications may consist of a mix of units some of which are “mandatory” and some are “optional” enabling to produce qualification specializations on their basis through “packing” them in as many ways as the workplaces may require.
- The qualifications made up of the units of standard which are based on job-related functions only and describe requirements for the job-specific (technical) knowledge, skills and demonstration of their application in defined workplaces. The alternative option is that job-specific competencies are complemented with generic (employability) competencies what improves the application of this mix of competencies in relevant jobs in the labour market. A summary of major options applied by the national qualifications systems is presented in **Chart 8**.

Chart 8. Summary of major options in systems of vocational qualifications

	Areas	Options and differences
1	Scope of National Qualifications Framework (NQF)	<ul style="list-style-type: none"> - Number of NQF levels - Whether secondary general education qualifications included (included in UK, excluded in Australia and France)
2	NQF level descriptors	<p>Level descriptors involve combinations of the following criteria:</p> <ul style="list-style-type: none"> - Knowledge, skills, and workplace autonomy/responsibility (Australia, France), or knowledge and skills (UK)
3	National VET qualifications types and their specifications	<ul style="list-style-type: none"> - Australia: Qualifications types specifications are described on the basis of difficulty of attainment of the learning outcome (involving its complexity, specialization, etc. - UK: Qualifications types are defined as a number of nominative hours of study expressed as credits; qualification level is defined on the basis of prevailing qualifications levels of units of standards included in the qualification - UK: Regulations on qualifications size (minimum and maximum); outside the maximum credit size it should split into 2; a set of units with the total credit size below the minimum cannot be called a full “qualification” - Number of qualifications types placed on one NQF level
4	Number of qualifications types in skilled worker and technician qualifications	<ul style="list-style-type: none"> - Number of skilled worker Certificate levels (1-in France, Germany, Korea, Switzerland) (3-4 levels of worker Certificates in Australia, UK, USA) (8 levels in UK) - Number of Diploma (Technician) levels (1 or 2) - Presence of the preliminary (entry-level) qualification types (in UK), but not in Australia, US and France
5	“Whole” qualifications and migration of units of standard. Recognition of “skills sets”/“module completions” (partial qualifications)	<ul style="list-style-type: none"> - “whole” qualifications (France, USA) versus the qualifications made up of units of standard which can be applied in other qualifications (Australia and UK) - recognition of “skills sets” (sets of units of standard combined for a particular job junction) as partial qualifications (in Australia and UK), but not in France
6	Rules of combination (packaging) of units of occupational standards into qualifications	<p>NQF determine rules of combination:</p> <ul style="list-style-type: none"> - of core units with optional units resulting in qualifications specializations (in UK and Australia) - of units with identified NQF levels and credit sizes³⁰ into qualifications; - minimum or maximum shares of units of standards at different NQF levels to be present in individual qualifications which are awarded at certain NQF levels (UK and Australia)
7	Involvement of functional ³¹ /employability skills in qualifications	<p>The countries differ by:</p> <ul style="list-style-type: none"> - range of employability and functional skills - application of same or different (by their complexity) employability skills at different qualifications levels - the way employability skills are combined with job-related competencies in qualifications and assessed

³⁰ Nominal duration of training/credits for accomplishing each unit.

³¹ In the UK, functional skills include literacy, numeracy and ICT skills. (Criteria for Functional Skills Qualifications. Ofqual. 2012. 12/5127

8	Whether qualifications system has clear rules for transition between qualifications levels and for recognition of prior learning	Availability of: - rules for transition between qualifications levels - rules for recognition of prior learning
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II.4. Australian Qualifications Framework: Levels and qualifications types³²

NQF level descriptors

The Australian Qualifications Framework *levels* are defined on the basis of descriptors expressed as learning outcomes involving knowledge, skills, and competence (defined as features of workplace). Each of those individual descriptors is operationalized further and their combinations are used as *descriptors* for each NQF level. The importance of NQF levels descriptors and related operational criteria is in that they are applied for defining the national qualifications types as shown in **Chart 9**. The acquired *knowledge* is described through its complexity, depth and breadth and kinds. The *skills* are described through their kinds - cognitive, technical, generic, etc. *Competence* is described through workplace autonomy and responsibility, workplace uncertainty, anticipated risks, etc. The application of each of the criteria assumes agreement on their interpretation. For instance, possession of “specialized knowledge” is a pre-requisite for the higher-level qualification in comparison with possession of “general knowledge”.

Chart 9. Criteria used in defining levels and national qualifications types in Australia

Required knowledge (its depth, breadth, kinds, and complexity)	Required skills (cognitive, technical, communication and interpersonal)	Competence (job autonomy, responsibility, uncertainty)
<i>Depth of knowledge:</i> general or specialized <i>Breadth of knowledge:</i> single topic-multi-disciplinary knowledge <i>Kinds of knowledge:</i> concrete-abstract/ segmented-cumulative <i>Complexity of knowledge:</i> combination of kinds, depth and breadth	<i>Cognitive and creative skills:</i> intuitive, logical and critical thinking <i>Technical skills:</i> manual dexterity, use of methods, materials, tools and instruments <i>Communication skills:</i> written, oral, numeracy, and literacy skills <i>Interpersonal skills and generic skills</i>	<i>Level of required job autonomy, responsibility, and accountability</i> <i>Level of job uncertainty:</i> predictable-unpredictable, the known-unknown <i>Level of task routine:</i> routine - nonroutine

Qualification types

The Australian *qualification types* are defined by the above descriptors (learning outcomes) what enables to place them on the NQF levels. NQF has 10 levels which accommodate 14 national qualification types covering all education and training sectors (except general education). The six TVET qualifications occupy six NQF levels and involve Certificates (I-IV), the Diploma, and Advanced Diploma.

Chart 10 shows the links between national qualification types, their NQF-defined purposes and occupational categories. Each qualification type is also characterised by the *volume of learning* which is expressed in equivalent full-time years and describes the notional duration of activities required for its

³² Australian Qualifications Framework. Second Edition. January 2013

attainment. However, the nominal duration of programs is not the major factor for determining the qualification types.

Chart 10. Links between qualification types and the NQF levels, Australia³³

National qualification type	Related occupational category	NQF level	Volume of learning (years)	Qualification type purpose ³⁴
Certificate I	<i>Entry-level worker</i>	1	0.5-1.0	The limited qualification used as a baseline entry point. It often comprises generic industry competency requirements with a limited technical range where work is routine and closely supervised.
Certificate II	<i>Semi-skilled worker</i>	2	0.5-1.0	The base qualification for implementing functions requiring fundamental operational knowledge and limited practical skills to undertake mainly <i>routine work</i> .
Certificate III	<i>Skilled worker (operator)</i>	3	1.0-2.0 (institution-based)	The skilled operator who applies a broad range of competencies within a more varied work context, possibly providing technical advice and support to a team including having team leader responsibilities.
Certificate IV	<i>High-skilled worker</i>	4	0.5-2.0	Individuals who apply a broad range of <i>specialist</i> theoretical knowledge and skills in varied contexts to undertake <i>skilled work</i> and which may involve team leadership and increased responsibility for outcomes.
Diploma	High-skilled worker or paraprofessional (technician)	5	1.0-2.0	Individuals who apply <i>integrated</i> technical and theoretical concepts in a broad range of contexts to undertake <i>advanced skilled or paraprofessional work</i> and managerial competencies to plan, carry out and evaluate work of a team.
Advanced Diploma	High-skilled worker or paraprofessional (technician)	6	1.5-2.0	Individuals who apply <i>specialized</i> knowledge in a range of contexts to undertake <i>advanced skilled or paraprofessional work</i> . It involves creative, conceptual or managerial applications for a broad or specialised work context and the organisational tasks.

Differences between qualifications types

The criteria applied in defining learning outcomes (see **Chart 9**) are combined for producing specifications for the national qualifications types. The comparison of the specifications for

³³ Based on: Australian qualifications framework. 2nd Edition 2013

³⁴ The key words in italic defining occupational categories and qualification levels are those of the report writer

qualifications “Certificate III”³⁵ and “Certificate IV”³⁶ shows that the learning outcomes for Certificate Level IV are different mostly in that:

- In the area of “knowledge” requirements, they require possession of “broad range” of “specialised knowledge” for a “specialized field of work”
- In the area of “skills”, they require capabilities to “identify, analyse, compare”, possess “broad range of specialist technical skills” applicable to “non-routine tasks and functions” and to “unpredictable problems and contingencies”
- in the area of “application of knowledge and skills”, they require “application to specialised tasks or functions in known or changing contexts” and taking “limited responsibility for organization of others and for quantity and quality of their outputs at work” (see **Chart 11**).

These differences between the skilled worker national qualifications types show directions (vectors) for distinguishing, in principle, between the two qualifications types. However, some other variables are required for greater precision in doing so.

Generic learning outcomes (competencies)

Generic learning outcomes are an additional component which is incorporated into the qualification descriptors (but this element is not part of the NQF level descriptors). The NQF recognizes four categories of *generic learning outcomes*:

- fundamental skills: literacy and numeracy
- people skills: working with others and communication skills
- thinking skills: learning, decision making, and problem solving
- personal skills: self-direction and acting with integrity

Generic learning outcomes are transferrable, non-discipline specific skills which may be acquired at work, study and life contexts. NQF determines that it is compulsory for each qualification to involve the generic competencies. It is also determined that the range and complexity of generic learning outcomes to be achieved through learning vary for the different levels of NQF qualifications and disciplines for which the qualification will be issued. The same category of generic learning outcomes for instance, the communication and thinking skills can be applied with different purposes, and to different types of information as may be required in different contexts in which these qualification types will have to be applied.

³⁵ Assumed to be used for “skilled worker”

³⁶ Assumed to be used for “high-skilled worker”

Chart 11. Specifications for the qualifications types: Certificate Level III and Certificate Level IV, Australia³⁷

The purpose of qualification types	Knowledge	Skills	Application of knowledge and skills
<p>Certificate IV qualifies individuals who apply a broad range of <i>specialised knowledge and skills</i> in <i>varied contexts</i> to undertake skilled work</p>	<p>Graduates of a Certificate IV will have <i>broad</i> factual, technical and theoretical knowledge in a <i>specialised field</i> of work</p>	<p>Graduates of a Certificate IV will have:</p> <ul style="list-style-type: none"> - cognitive skills to <i>identify, analyse, compare</i> and act on information from a range of sources - cognitive, technical and communication skills to apply and communicate technical solutions of a <i>non-routine or contingency nature</i> to predictable and <i>unpredictable</i> problems - <i>specialist technical skills</i> to complete routine and <i>non-routine</i> tasks and functions - communication skills to guide activities and provide technical advice 	<p>Graduates of a Certificate IV will demonstrate the application of knowledge and skills:</p> <ul style="list-style-type: none"> - to <i>specialised tasks</i> in known or <i>changing contexts</i> - with responsibility for own work and outputs, and may have limited <i>responsibility for organisation of others</i> - with limited responsibility for the - quantity and quality of the output of others
<p>Certificate III qualifies individuals who apply a broad range of knowledge and skills in varied contexts to undertake skilled work</p>	<p>Graduates of a Certificate III will have factual, technical, procedural and theoretical knowledge in an area of work</p>	<p>Graduates of a Certificate III will have:</p> <ul style="list-style-type: none"> - cognitive, technical and communication skills to interpret and act on available information - cognitive and communication skills to apply and communicate known solutions to predictable problems and to deal with contingencies using known solutions - technical and communication skills to provide technical information to specialist audiences - technical skills to undertake routine and some non-routine skilled tasks 	<p>Graduates of a Certificate III will demonstrate the application of knowledge and skills:</p> <ul style="list-style-type: none"> - with discretion and judgement in the selection of equipment, services or contingency measures - to adapt and transfer skills and knowledge within routines, methods, procedures and time constraints - in contexts that include taking responsibility for own outputs in work and learning including participation in teams and taking limited responsibility for the output of others

³⁷ Adapted from: Australian Qualifications Framework. 2nd Edition 2013

II.5. Developing standard-based qualifications in Australia

Template for qualifications

The Australian template for qualifications includes the qualification code, the qualification title (reflects the qualification's outcome), qualification description (a description of the qualification outcomes; any licensing, regulatory or certification considerations), any mandatory entry requirements, packaging rules (total number of units of competency required to achieve the qualification; the number of core (mandatory) and elective units of occupational standard, etc.³⁸

Transferrable units of standards

The qualification developers are encouraged to use units of competency from other qualifications in the new qualifications. This leads to portability of skills for individuals across a range of workplaces and industries. Commonly, the unit standard sourced from some other qualification should be used in the new qualification at the same qualification level. Individual units of competency can, in principle, be included in several qualifications at different qualification levels— for instance, at Certificate III and at Certificate IV.

*Packaging units of standard into qualifications*³⁹

In Australia (as well as in UK) units of occupational standard (units of competency) should be packaged into qualifications in line with workplace tasks (jobs).⁴⁰ It must be ensured that packages of units ("qualifications") reflect the essential job functions and workplace requirements in similar workplaces and can be used by a diverse range of enterprises, while still being meaningful across the industry sector or a range of sectors. This ensures national recognition and portability of such qualifications.

The common packaging model includes *combination of core (mandatory) units and elective units (of choice)* of standard. In such a packaging model, the core (mandatory units) are the standards critical for all workplaces in the occupation in question while the electives (chosen units) provide the breadth of skills necessary to meet the needs of diverse enterprises and workplaces with varying skill combinations. To ensure maximum flexibility the range of core units is commonly rather small enabling to have a meaningful range of the electives. The application of this packaging model has an implication in that the different holders of the same Certificate Level 4 in metalworking may possess different sets of competencies because they selected different combinations of electives (chosen units) with the same core units. In any case, however, there should be a set of the core competency units which all of them should attain.

The Core and Specialisation Model

The *Core and Specialisation Model* is another popular approach. This model assumes that there is a set of core units but a choice is made from defined groups of units or "specialisations" (which are usually named as group A, group B, sub-group B1, etc. This is a useful model, where particular specialisations are widely recognised in an industry in addition to a shared set of competencies covered by the core units (e.g. using fork lifts, conducting maintenance of equipment, etc.).

Application of packaging rules

Whatever packaging model is adopted, there are common rules to apply, including:

³⁸ Standards for Training Packages. Department of Industry. Australian Government. 2012

³⁹ Training Package Products Policy. National Skills Standards Council, Australia.2012 (Source: http://www.nssc.natase.gov.au/training_packages/standards_and_policies/training_package_products_policy#anchor_71610)

⁴⁰ This Section is based on: Training Package Development Handbook. Part 2. 2007. © Commonwealth of Australia, 2007

- the titles of unit-based packaged qualifications should correspond to the titles of national qualification types.
- each qualification resulting from packaging units of competency must have a distinct outcome statement which is understandable and assessable
- the qualification's levels should be determined on the basis of the NQF criteria (the qualification can be assigned higher level only due to higher job complexity, breadth of functions and increased requirements for specialist knowledge and skills, as well as for autonomy and responsibility for work of self and others)
- each qualification should have identifiable technical task-related, task management-related, and contingency management-related competencies as well as the embedded employability skills
- all units of competency in qualifications are to be described as either 'core' or 'elective.'; combinations of electives that result in particular specialisations are to be called 'Groups', etc.
- a share of elective units in all qualifications must be one third or more of the total number of units of standard required to achieve the qualification (qualifications for licensed occupations are exempt from this requirement).

Aligning qualifications to NQF levels

Aligning packages of units of standard to the NQF levels is a technically complex procedure. NQF level descriptors are combinations of requirements to learning outcomes such as knowledge, skills, and competence. Assigning packages of units to NQF levels requires making judgements about their relative 'value' against the requirements of NQF levels.⁴¹ NQF level descriptors are somehow "ideal". It may well be that for a certain package of standards, the requirements for knowledge and skills are lower than the requirements of the NQF level, while the requirements for workplace autonomy and for handling the anticipated risks at workplace, etc., the requirements are higher than it is required by certain NQF level. Each individual package of units of standard and related requirements for competencies need to be examined and decision on alignment with NQF level made. The newly packaged qualifications are to be compared with the existing packages of units to assess the relative complexity of tasks and related competencies to ensure their interrelatedness.

Qualifications weighting system

Qualifications weighting system can be an additional instrument for determining the NQF level of a package of units in the countries where units are assigned credit weight. The size (or weight) of the duration of learning required for mastering the unit of competency is interpreted as a measure of difficulty of attainment of this unit. Each unit of competency will carry a specific number of credit points (equivalent of duration of learning). Each level of the NQF will require a minimum number of credits for a qualification to be placed on it. The packaging rules must refer to the total number of 'credits which must be gained. The higher is the level of a qualification the more should be the required total number of credits to be gained. The credit weight of different units of standard may differ considerably. For this reason, each unit is to be assigned its credit weight.⁴²

For example, in Australia, the Certificate III in Engineering - Fabrication Trade requires:

- completion of all core units of competency (12 points),
- completion of Group A Fabrication stream units to the value of at least 40 points, and
- completion of units from Group B Certificate IV Trade specialization to bring the total value to at least 73 points.⁴³

⁴¹ R.Tuck: An introductory guide to national qualifications frameworks: Conceptual and practical issues for policy makers. ILO, 2007

⁴² Training Package Development Handbook. Part 2. 2007. © Commonwealth of Australia, 2007

⁴³ Certificate IV in Engineering - Fabrication Trade/Australia (Course code: MEM30305) involves 101 units of competency (Average duration- 3 years).

While the detail of industry preferred weighting systems will vary, the overriding aim is to apply a straightforward weighting system that aids flexibility in packaging.

In Australia, the practice of credit weighting of units of standards as a basis for forming qualifications or skills sets has been recently initiated. By contrast, in UK, unit credit weight is applied as a basis for assigning a qualifications type (level) to a package of units of standard (see **Section II.6**). Agreeing on packaging rules for each sector/qualification is a responsibility of organizations developing such standards.

Structure of qualifications in the forest and wood product sector of Australia⁴⁴

Not all the combinations of units of standard become qualifications because of their limited size. For instance, in the Forest and Wood Product sector, there are 25 qualifications and 31 registered skill sets (based on 328 competency units which are specific to the sector and over 300 units of competency imported from other qualifications). Sectoral qualifications involve one qualification of Advanced Diploma (advanced technician with some functions of a professional), 3 qualifications of Diploma (technician), 9 Certificates at Level IV, 7 Certificates at Level II, and one Certificate Level I. Performing functions for operating a particular machine (excavator, loader, etc.) is not recognized as a full qualification but rather as a “skills set”; in many other countries these jobs require full qualifications.

II.6. Vocational qualifications in UK

Qualifications types and levels

The UK qualifications types are linked to the size of the qualification expressed as a *duration of learning*. The size shows how much of the total qualifications time (TQT⁴⁵) and effort it takes to complete a qualification. There are three credit-based sizes of qualifications:

- “Award” corresponds to between 1 and 12 credits (1.0 credit point is an equivalent of 10 hours)
- “Certificate” corresponds to 13 -36 credits
- “Diploma” requires 37 credits and above.

The Regulated Qualifications Framework (RQF) level descriptors are used for describing the *difficulty (complexity)* of the learning outcome. The above RQF qualifications – awards, certificates and diplomas are awarded at any of the RQF levels (L1 - L8). The combination of the award type and the RQF level on which it is placed reflects the size and complexity of the completed training programme (its outcome).⁴⁶

Aligning qualifications to RQF levels

Levels are assigned to qualifications and their units of standard by direct comparison of the requirements for knowledge, understanding and skills contained in the units of standard with descriptors of the qualifications levels. In defining the RQF level for a qualification, the fit between the level descriptors and the requirements to a qualification is not expected to be perfect; qualifications might have a more knowledge- or skills-based focus. Smaller qualifications may cover only some of the characteristics set out in the RQF descriptor whereas bigger qualifications (covering more functions and typically taken over a longer period), are more likely to fit the RQF level descriptors better.

A summary of distinguishing features applied in the UK qualifications descriptors for the Levels 1-4 is given in **Chart 12**. The comparison of descriptors shows that the qualifications level is set to increase: on the way from the need to possess “basic” knowledge to “theoretical and technical knowledge”, and from the need to “know the procedures to complete well-defined (routine) tasks and straightforward

⁴⁴ Forest and Wood Products Training Package. Australian Government. 2015

⁴⁵ TQT is an estimate of the total amount of time that could be required for a learner to achieve and demonstrate the achievement of the required outcome.

⁴⁶ General Conditions of Recognition. Ofqual/15/5772. 2015

problems” to the requirements for “carrying out research and interpretation of information” and “awareness of different approaches to work”.

As far as the possession of skills is concerned, the qualifications levels will increase from the “use cognitive and practical skills” to “the selection of methods and procedures” and “using investigation for the review of effectiveness, and appropriateness of methods, actions and results.”

The anticipated job context influences the increase of qualifications level as long as the tasks and environment changes from “well-defined routine tasks” and “simple and straightforward problems” to the “complex” and “non-routine” tasks and uncertain job context. These differences between qualifications levels are non-measurable and can only be applied as relative features in comparing the learning outcomes of different qualifications.

Chart 12. Distinguishing features of descriptors of qualifications levels in UK⁴⁷:

<i>Descriptors</i>	<i>Level 1</i>	<i>Level 2</i>	<i>Level 3</i>	<i>Level 4</i>
Possession of knowledge and understanding	basic factual knowledge of: - a subject -procedures to complete well-defined routine tasks and address simple problems -is aware of relevant information	factual knowledge of: -procedures to complete well-defined (routine) tasks and address straightforward problems -can interpret information and ideas -is aware of relevant information	-factual, procedural and theoretical knowledge of a subject or field of work -interpret and evaluate information and ideas -is aware of nature of the area of work -is aware of different approaches to work	-practical, theoretical and technical knowledge of a subject or field of work - analyse, interpret and evaluate information - is aware of nature of approximate scope of the area of work -has informed awareness of different approaches to work
Possession of skills	-use cognitive and practical skills -select and use information -identify whether actions have been effective	- select and use cognitive and practical skills -identify, gather and use information -Identify how effective the action has been	- select and use cognitive and practical skills, methods and procedures - use investigation to inform action -review how effective methods and actions have been	-identify, adapt and use cognitive and practical skills -review effectiveness, and appropriateness of methods, actions and results
The context for application: Job tasks and their complexity	- <i>well-defined routine</i> tasks - simple problems	- <i>well-defined generally routine</i> tasks - straightforward problems	- <i>well-defined, but complex and non-routine</i>	- fairly <i>well-defined</i> , but complex and non-routine

⁴⁷ Qualification and component Levels. Requirements and Guidance for all awarding organisations and all qualifications. Ofqual/15/5774. 2015

Regulations for packaging units of competency into qualifications in UK⁴⁸

The qualifications in UK are based on “units of competency” (further, “units”). Since the criterion of “competence” (autonomy/responsibility) has been recently removed from the UK framework descriptors, the units of competency and the qualifications requiring different levels of job autonomy and responsibility and other parameters of job context can be assigned the same qualifications levels.

Competency-based qualifications are based on combinations of mandatory and optional units of standard. Units are packaged into the accredited qualifications and delivered by the Awarding organizations (AOs) which decide on the rules of combination of units. The common rule applied by the awarding bodies is that more than 50 per cent of unit credits must be at the same level as the qualification’s level or above.⁴⁹ Any unit of competency standard as well as the packaged qualification should show the TQT⁵⁰ and GLH (guided learning hours) for their completion which is a basis for assigning the credit weight and the qualifications (Award, Certificate, or Diploma).

Chart 13 describes the qualifications requirements for Level 3 NVQ Diploma in Heating and Ventilating Industrial and Commercial Installation (6188-30) 600/1009/5, developed by the City & Guilds UK. The total number of credits required for achieving this qualification is 60. To achieve this qualification, learners must accumulate 50 credits from the eight mandatory units plus a minimum of 7 credits from the optional units. Level 3 NVQ Diploma in Heating and Ventilating Industrial and Commercial Installation involves GLH 454 hours and 570 hours of Total Qualification Time (TQT) (what corresponds to the requirement for the credit size of Diplomas). All the units of standard are at NQF Level 3.

Chart 13. Units of standard for the qualification “Level 3 Diploma in Heating and ventilating industrial and commercial installation”, City & Guilds. UK⁵¹

Units	Units	Credit value	Guided learning hours (GLH)	Type of unit
Mandatory units				
301	Understand how to organise resources within BSE	3	26	knowledge
302	Understand and carry out electrical work on industrial and commercial heating and ventilating systems and components	12	102	combination
303	Understand industrial and commercial cold water system installation and pre-commissioning techniques	5	42	knowledge
304	Understand industrial and commercial hot water system installation and pre-commissioning techniques	5	42	knowledge
305	Understand industrial and commercial heating system installation and pre-commissioning techniques	5	42	knowledge
306	Understand industrial and commercial chilled water system installation and pre-commissioning techniques	5	42	knowledge

⁴⁸ After the QCF: A New Qualifications Framework. Decisions on Conditions and Guidance for the Regulated Qualifications Framework (RQF) Ofqual. September 2015; Qualification and component Levels. Requirements and Guidance for all awarding organisations and all qualifications. Ofqual/15/5774. 2015

⁴⁹ General Conditions of Recognition. Ofqual/15/5772. September 2015

⁵⁰ Total qualification time criteria for all qualifications. Ofqual/15/5775. 2015

⁵¹ Level 3 NVQ Diplomas in Heating and Ventilating (6188-30/31/32). Qualification handbook for centres. City & Guilds. 2017

307	Understand the principles and requirements of industrial and commercial fuel systems	12	112	knowledge
308	Install H&V industrial and commercial systems	3	4	performance
Optional units				
309	Understand industrial and commercial H&V maintenance techniques	5	38	knowledge
310	Maintain industrial and commercial H&V systems	2	4	performance
311	Understand industrial and commercial oxy-acetylene pipe jointing	5	38	knowledge
312	Perform industrial and commercial oxy-acetylene pipe jointing	2	4	performance
313	Understand industrial and commercial manual metal arc pipe jointing techniques	5	38	knowledge
314	Perform industrial and commercial manual metal arc pipe jointing	2	4	performance

Conclusions: What occupational standards and standard-based qualifications can help achieving

Development of occupational standards-based qualifications require expensive systems and strict procedures. First, it may be cost-inefficient to introduce them in the economies, industries and occupations which do not require high-skilled workforce. Second, the occupational standards and the standards-based qualifications do not bring automatic solutions to any national education/ training and employment problems such as the employment of graduates, nor they are able to immediately improve the productivity of the labour force. Third, what the introduction of standards-based qualifications can do is to improve the basis for linkages between the vocational education and training sector, on the one hand, and the industry, on the other hand, what can help improving relevance of graduates to the better-defined job requirements. Fourth, the introduction of occupational standards and standards-based qualifications improves the culture of the human resource training, recognition and continued upgrading in line with the qualification requirements.

III. COMPETENCY-BASED ASSESSMENT

III.1. Categories used in qualifications assessment⁵²

A qualifications assessment system is a set of policies and methods to ensure that assessments of numerous candidates, using many different assessors, in varying situations, are consistent, fair, valid and reliable. An assessment system includes a set of regulations of the qualifications awarding bodies and organizations conducting assessment; the assessment principles, criteria, methods and tools; requirements for validation of assessment materials and processes; the reporting arrangements; appeals process; recognized sites for assessment, and requirements for qualifications of assessors.

Assessment is a process of collecting evidence and making judgments on whether competency has been achieved (or to what extent it has been achieved), to confirm that an individual has satisfied the qualifications requirements.

⁵² Based on: Standards for Registered Training Organisations (RTOs). Australian Government 2015. National Vocational Education and Training Regulator Act 2011. National Commonwealth of Australia. 2015; General Conditions of Recognition. Ofqual. UK. November 2014; Allen Consulting Group. VET quality project report. Australia. March 2013

Evidence is the information gathered, which should provide proof of competency against the qualification requirements.

Assessment principles commonly involve fairness, flexibility, validity and reliability.

Assessment guidance is developed through building the *evidence profile* of the unit of standard. It should involve information collected from: the learning outcomes of the unit of competency; the relevant component of the unit of standard (evidence guide⁵³) which may determine the assessment context, critical elements of assessment, assessment methods, etc.; the unit of standard's range statement; unit requirements for employability skills; the NQF level of the qualification or unit. Assessment guidance may be provided in any other materials which specifically set out the industry advice for the assessment of certain units and qualifications. Assessment guidance may involve the *assessment criteria* to be applied in assessment.

Awarding organization is the body which may be legally recognized for issuing qualification awards on behalf of the government or any other agency or industry. Awarding organization develops or approves the assessment guidance and validates assessment decisions.

Assessment centre is an organisation accredited by the awarding organization for conducting assessment leading to the award of credit or qualifications.

Assessment site is a location accredited for or considered appropriate for assessment (training center, an enterprise, a dedicated organization, etc.) which possesses the required technologies, machines, materials, processes and competent assessors.

Assessors are persons who are formally qualified in the relevant trade and in the area of assessment who assess a learner's competence in accordance with specified criteria and guidelines.

Assessment methods are the techniques for gathering evidence. Methods may involve:

- direct observation of workplace performance,
- formal testing according to the assessment plan
- structured interview and written test
- references obtained from employers (reports that the candidate was using a certain technology for some time), (third party evidence)
- review of products (samples of work brought from workplaces demonstrating the use of a certain technology),
- portfolio (a structured combination of the above methods).

Assessment tools and instructions for gathering and interpreting evidence may include the following components:

- requirements for context of assessment (physical and organizational environment)
- an *outline of evidence* (involving assessment criteria/benchmarks) to be used in assessment and in making the assessment decisions
- plan of technical interview, practical tasks, questionnaires, plan for group discussion, etc.
- recommended duration of assessment and qualifications of assessors
- the administration of assessment, recording and reporting requirements

Assessment strategy/plan: the overall planning document for the assessment process which may include purpose, context, personnel involved, competency standards and related assessment benchmarks, assessment methods and tools, organizational arrangements, the agreed steps a student takes within the assessment, the recording and reporting on assessment.

⁵³ In the countries applying competency-based training and assessment, evidence guide is a compulsory part of units of occupational standards

Assessment of outcome of formal learning refers to the assessment of structured (modular-based) learning that is linked to the attainment of the qualification (for example, a certificate, diploma). Assessment can be conducted on completion of each learning module (or unit of standard) as well as through clustering of modules/units of standard (holistic assessment).

Competency-based assessment is the one when the assessment decision is made in the form: “competent” or “not yet competent”. *Assessment of technical competencies* involves assessment of compliance with criteria for technical knowledge and skills and their application in defined context. *Assessment of academic and generic competencies* involves either combined (with technical competencies) assessment or separate assessment.

Statement of assessment result is commonly a protocol of assessment signed by the assessor/s, external verifier and the candidate. The form should state results of testing of individual units of standard. *Validation* is the assessment instruments and process quality review. It involves checking that the assessment methods and tools continue producing valid, reliable, sufficient, etc. evidence for making assessment judgements.

III.2. Regulations of assessment process

Standards for organizations delivering assessment

Certain standards are commonly established for the organizations accredited for delivering national qualifications and their assessment. Such standards are summarized in **Chart 14**.

Chart 14. Summary of the requirements for the qualifications awarding and assessing organizations⁵⁴

Assessment practices to be regularly validated

1. Assessment practices should meet the requirements of nationally accredited qualifications
2. Assessment is to be delivered:
 - by appropriately qualified assessors with the right support services, facilities and equipment.
 - in the facilities, whether physical or virtual, and equipment capable to support assessment
 - in line with the approved assessment strategy developed for each qualification
3. Assessment practices should undergo systematic validation. Validation is undertaken by one or more persons who are not directly involved in the delivery and assessment of the training product being validated, and who collectively have:
 - a) vocational competencies and current industry skills relevant to the assessment being validated;
 - b) current knowledge and skills in vocational teaching and learning; and
 - c) the training and assessment qualification

Trainers and assessors

4. Training and assessment is to be delivered only by persons who have:
 - a) vocational competencies at least to the level being delivered and assessed;
 - b) current industry skills directly relevant to the training and assessment being provided; and
 - c) current knowledge and skills in vocational training and learning.
 - d) Industry experts may also be involved in the assessment, working alongside the trainer and/or assessor to conduct the assessment.
5. Qualified assessors should possess the national qualification in training and assessment

⁵⁴ Standards for Registered Training Organisations ASQA. Australia. 2015

Some countries have developed sets of *guiding principles* for the assessment, for instance:

“Fairness” - Learner should be informed about the assessment process, and provided with the opportunity to challenge a result of the assessment. In the assessment process, where appropriate, reasonable adjustments can be applied to take account of the individual learner’s needs.

“Flexibility” - Assessment should be flexible to the individual learner by: assessing competencies held by the learner no matter how or where they have been acquired; drawing from a range of assessment methods and using those that are appropriate.

“Validity” - An assessment decision is to be based on the evidence of performance of the individual candidate. Assessment of the range knowledge and skills that are essential to competent performance may be integrated with their practical application; validity is demonstrated when a learner could utilise these skills and knowledge across *a range of contexts* relevant to the units being assessed.

“Reliability” - The assessment results are comparable irrespective of the personality of assessor conducting the assessment.⁵⁵

Rules of evidence

Rules of evidence in assessment require the assessor to get assured that:

- the learner has the skills, knowledge and attributes as described in the unit of competency and associated assessment guidance.
- the quality, quantity and relevance of the assessment evidence are sufficient for making a judgement on a learner’s competency.⁵⁶
- where the qualifications awarding body sets a rule as to the quantity or type of evidence generated by learners, it must ensure that the assessment makes the rule clear, and that the rule is applied to all learners taking the assessment
- where the rule is set as to how the final mark for a qualification will be calculated from marks for different assessments, it must ensure that the qualification makes the rule clear, and that the rule is applied to all learners taking the assessment⁵⁷

Improving reliability of competency-based assessment

Each unit of competency contains assessment requirements grouped into three areas: performance evidence (performance criteria), knowledge and skills evidence, and assessment guidelines. Performance and knowledge evidence describe what a learner must demonstrate in order to be considered competent. Assessment guidance may describe the conditions under which a learner must demonstrate evidence, including any specific requirements for resources, trainers and assessors and the context for assessment. For each qualification an awarding body is expected to develop a Qualification Handbook with the details of the qualification and assessment guidance.⁵⁸ The Qualification Handbook will list a structure of units of standard and the related assignments for their assessment.

Assessment is *reliable* when assessment decisions are consistent (similar) across different learners and different assessors in the same unit or module. A well-designed assessment system includes measures to minimise variation of judgements between assessors. The same evidence presented by different learners or interpreted by different assessors should result in the same decision. One of the measures for improving reliability is the “*evidence criteria*” (decision-making rules) which may be developed for judging the complex performance. Evidence criteria could include model answers (where appropriate)

⁵⁵ Standards for Registered Training Organisations ASQA. Australia. 2015

⁵⁶ Standards for Registered Training Organisations ASQA. Australia. 2015; Develop Competency-Based Assessment Plans. Singapore Workforce Development Agency. Quality Assurance Division. 2012

⁵⁷ Decisions on Conditions and Guidance for the Regulated Qualifications Framework (RQF). Ofqual. 2015; General Conditions of Recognition. September 2015. Ofqual/15/5772

⁵⁸ Arrangements with Centres which deliver training and assessment on behalf of AO. General Conditions of Recognition. September 2015. Ofqual/15/5772

and descriptions of observations needed to accurately assess skills and application of knowledge in a defined context. Benchmarks for practical activities must be broad enough to allow for variations in the task being undertaken and any variations in the context but must include ‘observable behaviour’.

Validation of assessment

Assessment methods and tools require validation. Validation is a review of assessment processes and judgements made by the assessment organization. Validation is generally conducted after assessment is complete. Validation plans should be implemented for each individual qualification. While every assessment judgement cannot be validated, validation is implemented through sampling of assessment decisions.

Awarding bodies in UK

The largest awarding organization in UK –City and Guilds of London Institute – is recognized by Ofqual for issuing awards for 2,660 qualifications. City and Guilds has over 10,000 approved centres worldwide. Any organization (college, company, etc.) which is interested in delivering the City&Guilds qualifications can apply by filling in the website form to become a “centre”. City&Guilds offers 37 qualifications in building services industry, 61 qualifications in business services, etc.⁵⁹

EAL is the awarding organization for the engineering, manufacturing, building services and related sectors which offers about 200 qualifications. This body works through its External Verification Service with recognised assessment centres. Centres rely on their EAL External Verifier as a partner for expert support and guidance. Over 100,000 learners embark on an EAL qualification each year in schools, colleges, universities, private training facilities and workplaces. Each of EAL's recognised centres is allocated a dedicated External Verifier (EV). EAL is a rare awarding body which employs a complete team of EVs who are fully qualified professionals. Other awarding bodies use external verifiers who are not their staff members. EAL also provides to the centres a range of learning and assessment resources from learner guides and delivery support materials to assessment tools.⁶⁰

For the qualifications related to UK glass, print, coatings & construction industries, 80 organizations are recognized as training and assessment centres by the GQA Qualifications which is an awarding organization. Out of them only 12 are companies (which are recognized for conducting assessment only of their employees), others are colleges, polytechnics and private training centres. Like in Australia, some organizations in UK are recognized for running both, training and assessment programmes, while some other organizations conduct either training or assessment only.⁶¹

III.3. Interpreting requirements of occupational standards for assessment

Unpacking of units of standard⁶²

The unit/qualification assessment is *valid* when it assesses the performance in line with the evidence requirements. The assessment requirements contained in the units of standard, their evidence guides and other documentation need to be interpreted enabling to design methods and tools for assessment. It is the responsibility of assessors to select or design the assessment methods appropriate for the type of evidence being collected.

⁵⁹ <http://www.cityandguilds.com/qualifications-and-apprenticeships#fil=uk>

⁶⁰ <http://www.eal.org.uk/abouteal>

⁶¹ <http://www.gqaqualifications.com/approved-centres/>

⁶² Troubleshooting guide: Assessment in VET. Department of Training and Workforce Development, Western Australia, 2013 (5th Ed.)

“Unpacking” the unit of competency is the process of consulting units of standard to locate and interpret the critical aspects of competency they contain in order to be built into their delivery and/or assessment strategies and plans. Unpacking also helps in the selection of assessment methods and tools. Units of competency may contain both mandatory requirements and advisory information.

The assessment guidance which can be drawn from units of standard will commonly involve:

- the elements of competency (listing of workplace functions) and the related performance criteria;
- evidence guide which may describe:
 - critical aspects of evidence (knowledge, skills and attributes);
 - any other aspect stipulated as mandatory (such as the assessment contexts, methods of assessment or a requirement that assessment to be conducted over a certain period of time);
- the range statement which may determine the application of legislation, equipment, assessment context and locations, etc.; It may indicate whether it is necessary to assess some or all of these. Many range statements include ‘must’ statements, so it is important not to rely solely on the evidence guide.
- key competencies/employability skills to be assessed
- any prerequisite or co-requisite units of standard to be completed before the assessment of the unit/qualification in question can be conducted.

The requirements for critical elements of knowledge and skills

The *requirements for critical elements of knowledge and skills* are to be fully integrated in the assessment. Knowledge requirements identifies what a person needs to know in order to perform the work in an informed and effective manner. Skills requirements describe the application of knowledge to workplace situations. It means that requirements for knowledge and skills are linked in descriptions of competencies. The following approaches are used to make the knowledge and skills explicit in assessment including:

- referring to relevant knowledge in the assessment tools to ensure the expected degree of complexity is understood and assessed;
- directly assessing the knowledge aspects of performance by specifying these in the assessment tools;
- informing assessors about the requirement that a candidate should apply knowledge during assessment of performance.

All the above mandatory components for demonstrating evidence need to be included in the document called an *evidence outline*. Then the assessment methods, tools, strategies and plans need to be designed to ensure that valid and sufficient evidence will be gathered for each mandatory aspect.

Applying evidence guides in units of standard

The Australian units of competency “evidence guides” provide advice and specifications for assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and other elements of the relevant units of standard.⁶³

Evidence guides may contain the following requirements:

- a. *Evidence and critical aspects for assessment* required to demonstrate competency in the unit, for instance:
 - Interpret work order and locate and apply information.
 - Apply safety requirements, including use of personal protective equipment.
 - Follow work instructions and inspection processes to minimise the risk of injury to self and others, prevent damage and wastage of goods, equipment and products

⁶³ Units of standard in UK do not have “evidence guides”.

- Complete failure analyses on a minimum of three different climate control systems with real or simulated multi-system and intermittent faults and identify and document the most appropriate rectification measure.
 - Analyse and validate or recommend variations to a minimum of two available repair/ modification methods for different climate control systems, etc.
- b. *Requirements to context of and specific resources* for assessment:
Assessment may occur on the job or in a workplace simulated facility with process equipment, materials, work instructions and deadlines.
- c. *Requirements to methods of assessment*
Methods of assessment should:
- confirm consistency and accuracy of performance together with application of underpinning knowledge.
 - be by direct observation of tasks with questioning on underpinning knowledge and it must also reinforce the integration of key competencies.
 - be applied under project related conditions (real or simulated) and require evidence of process.
 - must confirm that the demonstrated competency is able to be applied in other contexts, etc.

An example of interpretation of requirements arising from performance criteria of the unit of standard for selection of assessment methods is provided in **Chart 15**.

Chart 15. Interpreting evidence requirements for assessment of the unit “Set out and assemble cabinets, showcases, and wall units”, Australia

Evidence requirements for the unit of competency (drawn from performance criteria)	Possible assessment methods
Competency element 1	
<ul style="list-style-type: none"> - Materials are selected and prepared to design requirements for components. - Length and joint details are transferred from set-out to component material and each checked in preparation for machining. - Set-out material is marked for appropriate identification of components. 	A work-related practical task in a simulated environment where a number of different cabinetry specifications are provided and the student is required to select the necessary materials from a supplied inventory and mark them out to specification in preparation for matching components.
Competency element 2	
<ul style="list-style-type: none"> - Drawer components are assembled to specifications, with bottoms fitted and fixed. - Runner types for the drawers are determined and installed to specified dimensions and manufacturer’s product specifications - Drawers are installed with specified clearances and prepared for installation. 	A workplace or work-related observation of performance where pre-cut components are assembled in correct order with appropriate techniques used to ensure the finished product is to specifications and fit for purpose.

Requirements for assessment of a whole qualification

In France, the assessment and certification requirements refer to the whole qualification rather than to individual units of competency. These requirements are stated in a separate, from the qualification description, document (“Referentiel de Certification”). For an example of assessment specifications for the qualification of Diploma/Technician in Chemical Industry Level IV, see **Chart 16**.

Chart 16. Summary of assessment requirements for the Diploma/Chemical Industry, Level IV. France

Modalities	Competencies to be assessed	Duration of examination	Requirements for organization of assessment
Scenario of assessment (Assessment strategy)	<ul style="list-style-type: none"> - Organize and prepare a chemical production - Start, stop and regulate a chemical production facility - Monitor the compliance of feed materials of chemical production - Diagnose and resolve technical malfunctions of an installation in the chemical production 	9 hours	<p>The assessment scenario should involve operation of production processes in chemical industry involving the production of products, distillation, heat exchange, absorption, extraction, automation and regulation.</p> <p>Assessment is divided into 3 phases:</p> <ul style="list-style-type: none"> - 1st phase (3h): a candidate should analyse the entry data, calculate the process and prepare a practical test. - 2nd phase (duration 4h): The candidate performs the practical test by constantly ensuring compliance with cleanliness, hygiene and safety requirements. - 3rd phase (2h): The candidate uses the results, draws conclusions, and draft the minutes of the test. <p>These 3 phases are carried out in the presence of a supervisor. The 2nd phase requires presence of a technical assessor.</p>
Technical interview	<p>Core issues:</p> <ul style="list-style-type: none"> - Coordinate technical activities of production workers in the chemical industry. - Train operators in a workstation in new technologies or chemical industrial production 		<p>Technical questionnaire includes questions to verify the knowledge associated with the required competencies.</p> <p>Questioning should take place prior to the practical test.</p>
Maintenance in chemical industry	<ul style="list-style-type: none"> - Organize and prepare a chemical production - Start, stop and regulate a chemical production facility - Monitor the compliance of feed materials of chemical production - Diagnose and resolve technical malfunctions of an installation in chemical production - Participate in technical studies on a chemical production facility - Coordinate technical activities of production workers in the chemical industry 	30 min.	<p>Technical maintenance test takes place in two parts:</p> <p>Part 1: After having observed the practical test and the report made, as well as responses to technical questionnaire, the jury will check understanding of the candidate of the various stages of the simulation (10 minutes).</p> <p>Part 2: In the activity report the candidate should present to the jury the problems treated during his test (10 minutes)</p> <p>The jury will question the candidate for 10 minutes on the basis of the written report and oral presentation.</p>

	<ul style="list-style-type: none"> - Train operators in a workstation or new technologies or - chemical production 		
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III.4. Assessment strategies, methods, and tools

Assessment strategies

Assessment strategies should ensure that the assessment is based on collecting “valid” and “sufficient” evidence. Deciding ‘how much of evidence is enough’ enabling to make the assessment judgements requires participation of an assessor. It is important that assessment judgements are based on evidence collected *over a time span* that matches the nature of the workplace tasks being assessed, and that evidence is collected in a *range of situations* including occasions where responses to contingency situations are needed. It is a responsibility of the assessor to determine what and how much of evidence is required to make the assessment judgement, how to assess, submit and present the evidence. Availability of resources and facilities required for the assessment should be considered, including any workplace simulation requirements. Selecting the appropriate assessment methods will involve consideration of the student’s needs, the nature of the work activity being assessed, a location of the assessment to ensure an adequate, safe and accessible environment.

If an assessment has been guided by the mandatory evidence requirements (evidence guide of a unit of competency, the assessment guidelines, etc.) and the assessor is comfortable that a student can consistently apply his/her knowledge, skills and attitudes in a range of workplace contexts over time, it is assured that the *valid* and *sufficient evidence* of competence has been gathered. These considerations lay out a foundation for the assessment strategies.

Assessment strategies may determine qualification requirements for assessors and verifiers, assessment environment, access of candidates to assessment, recommended methods of assessment, and quality control of assessment. An example of the assessment strategy is presented in **Chart 17**.

Chart 17. Summary of the “Unit assessment strategy for performing manufacturing operations Level 1 and 2”. SEMTA. UK.⁶⁴

Source of requirements	Content of requirements
Assessor requirements	<p>Assessment must be carried out by competent assessors who as a minimum must hold the Level 3 Award in “Assessing Competence in the Work Environment”.</p> <p>Assessors must be able to demonstrate that they have verifiable, relevant and sufficient <i>technical competence</i> to evaluate and judge performance and knowledge evidence requirements as set out in the relevant unit outcomes and assessment criteria. This will be demonstrated either by holding a relevant technical qualification or by proven industrial experience of the technical areas to be assessed. The assessor’s technical competence must, at the very least, be at the same level as that required of the learner(s) in the units being assessed.</p>
Verifier requirements	<p>Internal quality assurance (internal verification) must be carried out by competent verifiers that as a minimum must hold the Level 4 Award in the “Internal Quality Assurance of Assessment Processes and Practices”. They should have <i>technical understanding</i> of the area being assessed.</p>

⁶⁴ SEMTA “Unit Assessment Strategy. “Performing Manufacturing Operations NVQ Level 1 and 2.” January 2011

	External quality assurance (External Verification) must be carried out by persons that as a minimum must hold the Level 4 Award in the “External Quality Assurance of Assessment Processes and Practices”. They should have <i>technical awareness</i> of the area being assessed.
Assessment environment, access	It is recommended that this qualification to be assessed where the environment replicates that expected in industry. Where applicable, the machinery, tools, materials, equipment and resources used must be representative of industry standards and there must be sufficient equipment/resources available for each learner to demonstrate their competence individually.
Carrying out assessment	The units for assessment should be specifically selected to cover a wide range of tasks. The evidence will depend on the learner’s choice of “bulleted items” listed in the unit assessment criteria. Where the assessment criteria give a choice of bulleted items (for example ‘any three from five’), learners do not need to provide evidence of competence concerning other criteria to complete the unit.
Assessing performance	To demonstrate consistent competent performance for a unit, a minimum of three different examples of performance of the unit activity will be required. Items of performance evidence often contain features that apply to more than one unit, and can be used as evidence in any unit where they are suitable. Performance evidence must be: <ul style="list-style-type: none"> - products of the learners’ work, such as items produced or worked on, plans, charts, reports, standard operating methods, documents produced as part of a work activity, records or photographs of the completed activity together with evidence of the way the candidate carried out the activities - assessor observations or authenticated reports of the activity undertaken
Assessing knowledge and understanding	Knowledge and understanding can be demonstrated: <ul style="list-style-type: none"> - practical demonstrations and explanation of the process if such methods are the most appropriate for the units of standard - assessors’ questions to make sure that the learner has an appropriate level of knowledge and understanding
Witness testimony	Where observation is used to obtain performance evidence, this must be carried out against the unit assessment criteria and by a qualified assessor. Witnesses must be technically competent in the process that they are providing testimony for, to at least the same level of expertise as that required of the learner.
Quality control of assessment	The Awarding Organisation must ensure that an assessment and quality assurance strategy is developed and deployed at the Centre delivering this qualification.

*Clustering units of competency as an assessment strategy*⁶⁵

Assessment of real work capabilities involves demonstration of competence in a number of units at one time. In designing the assessment strategy, the opportunities for competence to be assessed in an integrated way (holistically) should be identified. Clustering of some of the competency units is able to reflect a real work task or particular job role and may also result in reducing the time and cost of assessment. The assessment involving clustering of units could also involve assessment of employability skills in an integrated manner.

⁶⁵ Guidelines for assessing competence in VET. Department of Training and Workforce Development, Western Australia, 2013. 5th Edition 2013

Clustering units of competency is an effective learning and assessment strategy where:

- units share a common application and/or the same knowledge requirements reflecting the complexity of the workplace;
- several units need to be applied to complete the work task
- individual units of standard do not reflect all the required dimensions of competency

However, there can be some confusion over how the assessment judgements should be made on such type of evidence. The challenge is to ensure that judgements are based on the verification that mandatory requirements of each unit and element of competency have been demonstrated. When units are clustered, it is essential that all the elements of competency are assessed and that the assessment plan shows how this is done. It is important *not to*:

- cluster units which do not share the same NQF level or a similar employability skills profile;
- create overly large clusters: by combining too many units you may create very large and unwieldy assessment tasks; and
- make invalid judgements – while integrated evidence gathering is very useful, judgements about evidence need to be based on the verification that each unit requirement has been demonstrated

Assessment methods and tools

A specific combination of assessment methods, tools, time schedules, etc. is part of the *assessment strategy*. Assessment methods are approaches to the information gathering required for assessment. *Assessment tools* /instruments are specific activities designed to be used for the assessment. Collecting different types of evidence requires different assessment methods and tools. An assessment tool for its proper functioning may require an “observation checklist” specifying the evidence and how it will be collected. For example, if observation of performance in workplace is used which is followed by a brief interview, then the *assessment tools* might consist of:

- a) instructions for the candidate to conduct certain activities,
- b) key points to be observed at assessment of the activities
- c) a protocol for recording the results, decisions and observations
- d) a questionnaire and a checklist for correct responses from the interview, etc.

The use of simulation is commonly required when conducting assessment in the real workplace may have a potentially high impact on customers and a high cost of failure. The normal practice is to protect these technologies and processes from any risk. Therefore, assessment of candidates often cannot be undertaken in normal operating environments but rather in simulated environments.

Evidence matrix

Once assessment methods and tools have been selected, it may be useful to do a mapping exercise to ensure that all the evidence gathered through these tools will reflect the critical requirements of the unit(s) of competency. This would result in an *evidence matrix* -a map which helps the assessor to demonstrate that all the requirements have been included in the assessment. The *assessment plan* needs to demonstrate how all the elements of competency have been addressed in assessment.

III.5. Assessment process

Assessment plan

An assessment process should be planned. **Chart 18** shows what an assessment plan may contain:

- what will be assessed (the range of units/elements of competency and related evidence requirements);
- assessment methods and tools that will be used;
- assessment time schedule;

- where the assessment will take place (the context of the assessment, assessment sites);
- criteria for decision making (the aspects that will guide judgments), etc.

Chart 18. Template for the assessment plan

Assessment task: Produce a workplace job safety induction kit

Assessment method: Group project

Assessor(s): Assessor (working with others to assess the kit)

Date of assessment: # March 20##

Units of competency/elements to be assessed

1. Organise workplace information

- Gather information on job safety requirements/practices for the kit from appropriate sources
- Determine suitability of information for induction kit purpose

2. Design and produce text documents

- Design user-friendly kit documentation suited to the intended audience
- Produce final documentation proofed and reviewed

3. Collaborate in a creative process

- Work collaboratively with others in the kit design and production

Brief description of the assessment task

Students work in teams of three to create an induction kit for beginning workers in the industry which details the workplace safety practices to be followed.

Documents from the workplace or work placement and research are to be used to develop the kit.

Assessment will be made on the content and layout of the finished product and also the teamwork demonstrated during the development of the product.

Resources required: Access to: real workplace; application software; organisation's style guide; printer; bank of images for the kit illustration; and documents containing the industry workplace safety standards which may be copied and pasted.

Instructions for students

Students receive detailed specifications of the kit objectives, the content to be included in the induction kit and the style to be used.

Conducting assessment

When *preparing a student for assessment*, the assessor needs to ensure that⁶⁶:

- the assessment purpose, context, plan and process, the assessment team, the name of the internal verifier, and the presence of the external verifier (appointed by the awarding organization) are explained to the candidate;
- the candidate has understood the assessment plan and the appropriate documentation;
- the performance requirements have been explained to the student;
- the assessment methods have been explained and clarified between the student and the assessor;
- any legal or ethical rights and responsibilities associated with the assessment have been explained to the student (his/her rights and responsibilities in the assessment);
- the appeals process has been explained to the student.

When *conducting the assessment activity*, the assessor needs to ensure that:

⁶⁶ Guidelines for assessing competence in VET. Department of Training and Workforce Development, Western Australia, 2013. 5th Edition 2013

- the assessment is conducted in accordance with the assessment plan;
- evidence specified in the assessment procedure is gathered using the agreed tools;
- evidence is evaluated (in terms of validity, sufficiency, etc. and other national or industry requirements);
- the assessment decision is made in accordance with the specified criteria.

When *recording evidence*, the assessor needs to ensure that:

- assessment results are recorded accurately and follow record-keeping policies and methods;
- confidentiality of assessment results is maintained;

When *providing feedback* to a candidate the assessor needs to ensure that:

- clear and constructive feedback is given to the student
- feedback includes guidance on overcoming gaps in competency or further goals or training opportunities if appropriate;
- the student is given information on reassessment opportunities and the appeals process; and
- any assessment decision dispute is reported to the supervisor within the awarding organization

*Retention requirements for completed student assessment items*⁶⁷

Completed student assessment items should be retained by the assessment organizations:

- the actual piece(s) of work completed by a student or evidence of that work
- the assessor's completed marking guide, criteria, and observation checklist for each student.

The retained evidence must have enough detail to demonstrate the assessor's judgement of the student's performance against the standard required. The assessment organization is required to securely retain, and be able to produce all completed assessment items for each student for a period of six months from the date on which the judgement was made.

Databases of the results of assessment are commonly maintained by the qualifications awarding bodies which collect assessment protocols from the assessments centres and which make final decisions on approval of results and on issue of awards. Such databases are open only to registered users. Employers may register with databases and access data to verify if the job applicant has a valid certificate.

III.6. Validation and continuous improvement of assessment tools

National regulations commonly require that assessment tools be systematically reviewed and improved. Assessors are required to participate in validation and moderation processes by:

- reviewing their assessment processes, evidence-gathering tools, evidence records and judgements to ensure that they comply with the principles of good assessment (valid, reliable, flexible and fair) and the rules of evidence (valid, sufficient, current and authentic);
- comparing assessment processes, evidence-gathering tools, evidence records and judgements made by different assessors for the same units of competency; and
- evaluating their assessment strategies through seeking reactions to their assessment methods, tools, processes and judgements from others- assessors, industry practitioners, and candidates.

Reliable assessments are those when different assessors come to the same judgement about the same student on the same unit of competency, regardless of their means of gathering evidence. Awarding bodies or the organizations conducting assessment should develop processes to enhance the consistency of assessments, such as consultations with industry and professional development for assessors. Validation involves checking that the assessment tools continue producing a valid, reliable, sufficient, etc. evidence to enable judgements to be made.

⁶⁷ Retention requirements for completed student assessment items. ASQA 2013

Conclusions regarding assessment

The qualification assessment requirements arising from mandatory guidance for competency-based evidence determined by the occupational standards and the qualifications assessment rules may determine the:

- critical elements of evidence involving technical specifications
- range of industry technologies, materials, etc. in which competencies should be demonstrated (as determined by the range statement)
- contexts in which evidence of competency needs to be demonstrated as well as the types of assessment sites, etc.
- strategy and methods of assessment as well as the number of assessment tests to be conducted over time (for instance, the requirement for a compulsory theoretical examination).

When the qualification specifications and the assessment guidance are ill-structured or insufficiently detailed, the assessment organizations and awarding bodies will have a problem in agreeing on the types of acceptable evidence for awarding the qualifications.

The following *needs to be avoided* at assessment:

- assessment of each performance criterion separately;
- assessment of key competencies/employability skills independently of competencies for job/task functions;
- assessment of all the items in the range statement, instead of only those that are directly applicable or “critical”.

REFERENCES

1. After the QCF: A New Qualifications Framework. Decisions on Conditions and Guidance for the Regulated Qualifications Framework (RQF). Ofqual. UK. 2015;
2. Allen Consulting Group. VET quality project report. Australia. March 2013;
3. Arrangements with Centres which deliver training and assessment on behalf of AO. General Conditions of Recognition. Ofqual/15/5772.UK. September 2015.
4. AQF Glossary of Terminology. <http://www.aqf.edu.au/aqf/about/terminology/>
5. Australian Qualifications Framework. 2nd Edition. 2013
6. Develop Competency-Based Assessment Plans. Singapore Workforce Development Agency. Quality Assurance Division.2012
7. Decisions on Conditions and Guidance for the Regulated Qualifications Framework (RQF). Ofqual. UK. 2015;
8. European Qualifications Framework for Lifelong Learning (EQF) 2008 (http://ec.europa.eu/eqf/terms_en.htm)
9. Fine, S.A. and Wylie, W.W. An Introduction to Functional Job Analysis, Methods for Manpower Analysis. Upjohn Institute for Employment Research. No. 4, September 1971;
10. Fine, S.A. Functional Job Analysis Scales. A Desk Aid. S. A. Fine Associates, 1989.
11. Forest and Wood Products Training Package. Australian Government. 2015
12. General Conditions of Recognition. September 2015. Ofqual/15/5772
13. Guidelines for assessing competence in VET. Department of Training and Workforce Development, Western Australia. 2013
14. Guide to developing assessment tools. ASQA. 2015;
15. Guide for the Training and Qualification of Welding Personnel: Level II—Advanced Welders. Funded by U. S. Department of Education. Grant V.244B30006. AWS. US
16. Guthrie, H. Competence and competency -based training: What the literature says. NCVET. 2009 ILO Guidelines on Training in the Ports Sector. ILO, Geneva. 2012
17. Millet. D. Summary on the elaboration of French professional certifications. Paper for OECD. 2014
18. National Occupational Standards Quality Criteria with Explanatory Notes. UK Commission for Employment and Skills and the Alliance of Sector Skills Councils. Revised June 2011;
19. National VET quality project report. Allen Consulting Group. Australia. March 2013;
20. NOS Strategy 2010-2020. UK Commission for Employment and Skills. Revised Strategy June 2011
21. OECD reviews of evaluation and assessment in education. An international perspective on evaluation and assessment. 2013
22. Qualification and component Levels. Requirements and Guidance for all awarding organisations and all qualifications. Ofqual/15/5774. 2015
23. Qualification handbook for centres 600/2639/X. Level 3 Diplomas in Engineering Construction (2660). City&Guilds. London. 2011
24. Qualification handbook. Level 2 Progression Award in Electrical and Electronics Servicing – Consumer/ Commercial Electronics (6958-01). City&Guilds. London. 2006.
25. Regional model competency standard: Manufacturing industry. ILO. Bangkok 2007
26. Skills Certificate for Building Construction – Cabinet making and Millwork. School of Business, Engineering and Technology. Pasadena City College. (<http://webcms.pasadena.edu/>)
27. Standards for Training Packages. Department of Industry. Australian Government. 2012
28. Standards for Registered Training Organisations (RTOs). Australian Government 2015.
29. Specification for Qualification and Certification for Level IV—Expert Welders. AWS QC12-96.US
30. Total qualification time criteria for all qualifications. Ofqual/15/5775. 2015
31. Training Package Development Handbook. Part 2. 2007. © Commonwealth of Australia, 2007
32. Training Package Products Policy. National Skills Standards Council, Australia.2012 (Source: http://www.nssc.natese.gov.au/training_packages/standards_and_policies/training_package_products_policy#anchor_71610)
33. Training package assessment materials kit. Department of Education, Training and Youth Affairs. Commonwealth of Australia. 2001

34. Troubleshooting guide: Assessment in VET. Department of Training and Workforce Development, Western Australia, 2013 (5th Edn.)
35. Tuck, R. An introductory guide to national qualifications frameworks: Conceptual and practical issues for policy makers. ILO, 2007
36. Turnbull. P. An international assessment of training in the port sector. ILO, Geneva. 2011
37. Unit Assessment Strategy. "Performing Manufacturing Operations NVQ Level 1 and 2." SEMTA. UK. 2011.
38. User Guide to the Standards for RTO. ASQA. 2015
39. 115 uses of occupational standards. Caple Melbourne Limited 2001, with acknowledgements to B. Mansfield & L. Mitchell. Towards a Competent Workforce. Gower 1997