



international
qualifications



International qualifications

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Foreword

Many and very diverse qualifications, diplomas, certificates and licences are awarded outside the jurisdiction of public authorities, including by multinational companies, so there is a need to analyse further the character and typology of these qualifications, their credibility and value on the labour market, both for individuals and employers.

While international qualifications can be of relevance for the labour market they are also important in national and European perspectives as they promote common trust and cooperation at operational level. International qualifications feed in the context of the development and implementation of two European initiatives; the European qualifications framework (EQF) and the European classification of skills/competences, qualifications and occupations (ESCO). The EQF 2008 recommendation also specifies the need to increase transparency of qualifications awarded at international level, a challenge still not addressed systematically by the EQF. On the other hand, international qualifications are part of ESCO work in the qualifications pillar illustrating how awards influence the right to access and practise an occupation or task.

From experience gained from EQF/NQF (national qualifications framework) developments and ESCO work we observe there is high complexity in purpose, type, coverage, currency and competent bodies involved. This booklet is a first attempt to work on a typology of international qualifications, to present examples from various sectors and occupations, and finally to contribute to their better understanding to provide a basis for future EQF and ESCO developments.

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Acting Director of Cedefop

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Table of contents

Foreword	1
Acknowledgements	2
Executive summary	6
1. Setting the scene	8
1.1. What we mean by qualification	8
1.2. International qualifications	9
1.3. International qualifications and quality	10
1.4. Qualifications and licences	11
1.5. Context	13
2. Capturing international qualifications – Elements of a typology	14
2.1. Purpose – What the qualification is for	14
2.2. Type – How complete and how durable the qualification is	16
2.3. Coverage – Where the qualification can be used	17
2.4. Competent body – Who awards the qualification	18
2.5. Currency value – What the qualification can be exchanged into	19
3. International qualifications in practice	20
3.1. Administration and management	20
3.1.1. Project Management Institute (PMI) certifications	20
3.2. Education and training sector	22
3.2.1. Common European framework of reference for languages: learning, teaching, assessment	22
3.2.1.1. University of Cambridge ESOL	23
3.2.2. Association Montessori International	24
3.3. Financial services	25
3.3.1. European foundation certificate in banking (EFCB)	26
3.3.2. Accountant	27
3.4. ICT sector	28
3.4.1. European computer driving licence	29
3.4.2. Microsoft certifications	30
3.4.3. Cisco certifications	31
3.4.4. Cisco certified architect prerequisites	31

3.5. Personal services	33
3.5.1. Hairdressing	34
3.6. Sports sector	35
3.6.1. Volleyball international referee	37
3.7. Transport sector	39
3.7.1. Sea transport	40
3.7.2. Maritime training	40
3.7.3. Certificates for seafarers – IMO (STCW)	42
3.7.4. Master and chief mate on ships of 3 000 gross tonnes or more	42
3.8. Air transport	44
3.8.1. International Civil Aviation Organisation	45
3.8.2. European Aviation Safety Agency	45
3.8.3. Pilot licences	46
3.8.4. Air traffic controllers	48
3.8.5. Airbus training	51
3.8.6. Airbus Catia V5 composites	51
3.9. Road transport	52
3.9.1. International driving licence	54
4. The welding case	56
4.1. Welding	56
4.2. The EWF/IIW system	58
4.3. European Welding Federation	58
4.3.1. Guidelines and standards	59
4.4. International Institute of Welding	60
4.4.1. IIW manufacturer certification system	60
4.4.2. Certification to EN ISO 3834	60
4.5. Qualification	61
4.5.1. Training and qualifications for welding personnel	62
4.6. Certification	64
4.6.1. Relation between the welding qualification and certification titles	65
5. The way ahead	68
Bibliography	70

Annexes

I. List of abbreviations	73
II. Observing another world: the US Department of Labor – Career one-stop	77
III. International qualifications, certifications and licences	81
IV. Welding guidelines	86

List of tables

1. Project management professional	21
2. Cambridge English proficiency (CPE)	24
3. Montessori assistant to infancy training	25
4. European foundation certificate in banking (EFCB)	27
5. Chartered certified accountant	28
6. European computer driving licence (ECDL)	30
7. Microsoft certified technology specialist	31
8. Cisco certified architect	32
9. Hairdressing	35
10. Volleyball international referee	38
11. Master and chief mate on ships of 3 000 gross tonnes or more	44
12. ATPL – Airline transport pilot licence	48
13. Air traffic controllers	51
14. Airbus Catia V5 composites	52
15. International driving licence	55
16. European/international welding engineer (qualification)	65
17. Certified European/international welding engineer (certification)	67

Executive summary

An increasing number of widely recognised certificates and diplomas of high quality are being awarded at international level, outside public authorities' jurisdiction. These non-State qualifications are awarded by a range of bodies, organisations and companies representing a wide variety of stakeholders and interests. This trend goes against the 'traditional' concept of qualifications, as something awarded and guaranteed by national authorities, most frequently in the education and training sector. The international dimension of sectors like transport, ICT, construction, marketing and welding has raised issues on transparency, quality assurance and trust needed for the qualifications offered.

This booklet aims to:

- develop a conceptual framework to help identify and classify non-State and international qualifications;
- establish a basis for better understanding the function and value of these qualifications;
- provide concrete examples (cases) of international and non-State qualifications.

It has been written to support two European initiatives: European qualifications framework (EQF) and European classification of skills/competences, qualifications and occupations (ESCO).

We can distinguish five broad differentiating elements according to:

- (a) purpose – what is the qualification for;
- (b) type – how complete and which is the duration of the qualification;
- (c) coverage – where is the qualification used (geographical dimension);
- (d) competent body – which body awards the qualification;
- (e) currency – what can the qualification be exchanged into.

Qualifications play different roles in fulfilling public interest, such as health and safety and quality assurance requirements, meeting the needs and controlling access to practising tasks, technologies, professions and occupations, and in some cases, in defending interests of professional groups and bodies.

We can distinguish international qualifications in all types of formally-recognised modules and certificates. Duration of qualifications is a crucial dimension.

Geographical coverage and institutional validity is an interesting aspect defining where international qualifications are recognised and are valid.

There is big diversity in companies, organisations and other bodies developing, providing and awarding international qualifications including international organisations, international sector and branch bodies, multinational enterprises and EU bodies.

Finally, the value of international qualifications depends on several factors, like what kind of information is provided by the qualification in question, what we know about the learning process, what we know about use of learning outcomes, what kind of quality assurance is carried out, what we know about assessment and standards, and if they are updated.

From the examples presented it is evident there is a strong relation between type of international qualification and the sector, occupation or profession it relates to.

Qualifications in the transport sector gives an example of the international dimension as the sector represents a 'globalised' case that has led to marked uniformity in standards related to safety. It also had an impact on traditional qualifications as new professional profiles had to be developed for transparency of certification procedures.

In welding qualifications we analyse a sector with a high degree of international organisation and in which sectoral organisations play a larger and more autonomous role than organisations in other sectors. Although welding qualifications exist in national qualification structures, the international welding sector has for decades created harmonised standards and different types of qualifications.

1. Setting the scene

More and more qualifications – certificates and diplomas - are awarded at international level, outside national authorities' jurisdiction. These 'non-State' qualifications have been developed and awarded by a wide range of bodies, organisations and companies addressing various purposes. This trend goes against our traditional understanding of qualifications, as 'papers of value' guaranteed by national authorities and can be seen as a direct reflection of globalisation of economies and labour markets.

Individuals need to be able to use their qualifications in more than one country and employers need to be able to judge the level of skills and competences held by potential employees. This trend is particularly visible in sectors like ICT and transport where international organisations, sectoral bodies as well as multinational companies already play a key role in defining and awarding qualifications and thus, in setting the requirements for skills and competences.

1.1. What we mean by qualification

To understand increasing importance of international qualifications, it is necessary to start with the basic term qualification and how this is understood and described. According to the EQF recommendation (European Parliament; Council of the European Union, 2008), a qualification is 'a formal outcome of an assessment and validation process which is obtained when a competent body determines that an individual has achieved learning outcomes to a given standard'. Defined in this broad way, the term qualification helps to clarify what can be considered as the separate building blocks of a qualification:

- learning outcomes; a qualification must clarify what the holder is expected to know, be able to do and understand. A qualification's relevance to future recipients depends on its ability to signal learning outcomes clearly;
- assessment and validation process; a qualification must be based on reliable and valid assessment procedures able to capture the essence of the knowledge, skills and competences held by an individual learner;
- need for standards; standards are critical to qualifications as they define what a learner is expected to know, be able to do or understand. Standards

can be seen as the reference point around which the entire qualification process turns. Standards are also critical for relevance of the qualification to future users (for example, in the labour market) as they define the level and profile to be achieved;

- recognition process; a qualification is a ‘paper of value’ and its currency depends on a formal stamp of approval or recognition. Recognition can be seen as the final step in the qualification process, confirming that the process has been appropriately carried out and that the qualification can be trusted;
- role of competent bodies.

1.2. International qualifications

A qualification’s value and relevance is largely defined through combination of these elements. For international qualifications operating outside national borders and awarded outside the remit of national authorities, particular challenges exist:

- they must be able to signal their profile and level precisely to be understood across national and sectoral borders;
- they must be able to demonstrate that assessment procedures applied are reliable and valid. Quality standards in this area (see ISO 17024) reflect this need for transparent and trustworthy procedures and processes:
- they must be based on standards reflecting relevant stakeholders’ needs, in effect requiring initial development and continuous review based on active contributions of these stakeholders;
- their formal recognition will potentially draw various sources of legitimacy. In some cases international law is applied, as for automatic recognition in the EU internal market. In other cases, legitimacy of a qualification will reflect market position and power (such as in the ICT sector);
- even at national level a wide variety of bodies may award a qualification on behalf of State authorities. This variety increases further for international qualifications, including a wide range of public and private bodies, international organisations, sectoral bodies and associations as well as private companies.

While definition of qualification helps us to understand some of the similarities and differences between national and international qualifications, a systematic review of qualifications developing outside national bodies’ control is currently lacking. While this partly reflects the recent character of these developments, it even more reflects the big variety of stakeholders

involved. As no single source exists, various sources must be systematically exploited and used as a basis for further analysis. The purpose of this booklet is therefore to:

- develop a conceptual framework which can help identify and classify international qualifications;
- establish a basis for better understanding the function and value of these qualifications;
- provide concrete examples (cases) of international and non-State qualifications.

1.3. International qualifications and quality

As mentioned in Section 1.2 the extent to which an international qualification is considered to be credible, depends partly on whether transparent quality assurance arrangements are in place. While this is a problem encountered also by national qualifications, the extreme diversity of international qualifications makes them even more dependent on visible and trusted mechanisms of quality assurance. The standard ISO/IEC 17024 *Conformity assessment – General requirements for bodies operating certification of persons* introduces clear quality criteria to underpin award of certificates. Released in 2003, it is designed to harmonise the personnel certification process worldwide and in the European Union ISO/IEC 17024 replaced EN 45013 (1989). The standard provides a uniform set of guidelines for organisations managing qualifications and certification of persons, including procedures for development and maintenance of a certification scheme. It is designed to help bodies certifying persons to conduct well-planned and structured evaluations using criteria for competence and grading to ensure impartiality and reduce any conflict of interest.

These standards focus on **division of roles** making sure that training providers and learning assessors are not identical. The purpose is to ensure that assessment of learning outcomes according to a relevant standard is carried out transparently and reliably and can be fully trusted by the receiver – be that an individual or employer.

In Europe, the European Committee for Standardisation (CEN) ⁽¹⁾ is a major provider of European standards and technical specifications. It is the only

(1) <http://www.cen.eu/cen/Pages/default.aspx> [accessed 3.4.2012].

recognised European organisation according to Directive 98/34/EC for planning, drafting and adopting European standards in all areas of economic activity except for electrotechnology (Cenelec – European Committee for Electrotechnical Standardization) and telecommunication (ETSI – European Telecommunications Standards Institute).

Outside Europe, the two most important organisations are the International Organisation for Standardisation (ISO) ⁽²⁾ which deals with standards worldwide, and the American Society for Testing and Materials (ASTM) ⁽³⁾ that publishes standards that have wide global recognition.

There is a close working relationship between CEN and ISO and, in many areas, standards are developed jointly under what is known as the Vienna agreement ⁽⁴⁾ which was signed in 1991 ensuring technical cooperation and coordination.

1.4. Qualifications and licences

The term ‘licence’ is frequently used as a synonym for ‘qualification’ and ‘certificate’. This may in some cases cause confusion and it is therefore important to clarify how a licence (to practise) relates to and differs from a qualification and certificate.

In general the term to license (or to grant license) means to give permission. A licence may be granted by a party (‘licensor’) to another party (‘licensee’) as an element of an agreement. In particular a licence may be issued by public authorities to allow an activity that would otherwise be forbidden. It may require paying a fee, meeting certain technical, financial or institutional requirements and/or proving a capability. The requirement may also serve to keep the authorities informed about a type of activity, and give them an opportunity to set conditions and limitations, for example for health and safety and environmental reasons. Historically, universities have also used the term licence to indicate that somebody is allowed to teach at this level (the Finnish and Swedish ‘licentiate’ grades reflect this tradition).

For the purpose of this booklet it is important to note that licence is used in a broader sense than certificate. Including in this analysis all internationally-based ‘licences’ to practise occupations and tasks would be misleading as it

⁽²⁾ <http://www.iso.org/iso/home.htm> [accessed 3.4.2012].

⁽³⁾ <http://www2.astm.org/index.shtml> [accessed 3.4.2012].

⁽⁴⁾ http://www.iso.org/iso/about/the_iso_story/iso_story_vienna_agreement.htm [accessed 3.4.2012].

would go far beyond qualifications. While a certificate or qualification formally acknowledges that learning outcomes have been assessed in accordance to a standard, granting a licence may rest on criteria having little to do with knowledge, skills and competences. To some extent we can say that licensing has a more explicit regulatory role and intervenes further in market processes than qualifications and certificates.

A challenge for this analysis is therefore to decide when the terms certificate and licence de facto overlap and are used as synonyms. For welding the 'personnel certification scheme' provides a simple means by which job capability can be assessed and recognised. It defines the education, knowledge, experience and responsibility profile required for a range of conventional welding tasks, and provides a professional assessment procedure. A person having acquired a certificate in this scheme is automatically licensed to perform specific tasks or jobs.

1.5. Context

This booklet is written for development and implementation of two European initiatives: the European qualifications framework and the European classification of skills/competences, qualifications and occupations.

EQF establishes a European, learning outcomes-based reference framework for qualifications aiming at improving transparency and comparability of qualifications. While the EQF mainly is about comparing national qualifications, the 2008 recommendation also points to a need to increase transparency of qualifications awarded at international level. This challenge has still to be addressed systematically by the EQF.

ESCO intends to develop multilingual terminology on occupations, skills, competences and qualifications. The qualifications part of this work will have to include qualifications awarded at European and international levels. An important objective of ESCO is to indicate the relationship between occupations, skills and competences and qualifications; exemplified by the fact that qualifications and certificates in many cases directly influence the right to access and practise an occupation or task.

Cedefop's work in this area may support both initiatives mentioned above. Lack of an overview of international qualifications makes it difficult for both the EQF and ESCO to achieve their objectives. This report is a first effort to increase transparency, notably by pointing to existing sources and clarifying the concepts to be used for mapping and analysis. Increased transparency is important as international qualifications do not respond to a single set of standards and quality assurance mechanisms; their quality and relevance can therefore be difficult to judge for individuals and employers.

2. Capturing international qualifications – Elements of a typology

International qualifications are awarded by a wide range of stakeholders for many different purposes and functions. To understand this diversity we suggest looking at the following five aspects:

- (a) purpose – what is the qualification for;
- (b) type – how complete and how durable is the qualification;
- (c) coverage – where is the qualification used (geographical and institutional coverage);
- (d) competent body – which body awards the qualification;
- (e) currency – what can the qualification be exchanged into.

While such a typology must be broad enough to cover extreme variation, it must also be precise enough to capture specificity of qualification developments in different sectors, occupations and professions. It can be seen as a first step in a long-term process where questions related to quality assurance and trust must play a key role. While the origin and basis of national qualifications is in most cases transparent, diversity of international qualifications makes it difficult for potential users to decide whether they are faced with a ‘low quality’ qualification or not. Qualifications are increasingly offered for sale on the Internet and through commercial channels, which raises a serious question on our ability to sort good from bad.

2.1. Purpose – What the qualification is for

In preparing for the ESCO qualifications pillar ⁽⁵⁾, an analysis of close to 500 qualifications listed by the Swedish employment services was carried out. This analysis showed that apart from traditional national qualifications, a high number of other qualifications existed with the following main purposes:

⁽⁵⁾ ESCO (2012). Developing the qualifications pillar: sources, principles and examples. SEC 015, February 2012.

- qualifications awarded at national level but regulated at European and international levels, for example medical doctors and ship's navigators;
- qualifications linked to specific tasks and technologies, for example specifying expected learning outcomes for welders and users of ICT software;
- qualifications linked to occupations and professions, for example specifying required levels of knowledge, skills and competence for pilots and truck drivers.

In some cases these three categories overlap. As demonstrated by the sample analysed for ESCO, however, the three categories point to important common purposes. Qualifications play an important role in controlling access to and practise of tasks, technologies, professions and occupations. This control function is frequently motivated by health and safety and quality assurance requirements. It is, for example, widely accepted that welding of bridges and treatment of patients both involve risks and require clear and high quality standards. In other cases use of qualifications to control access and practise may be linked to particular interests of professional groups and bodies. Controlling numbers of practitioners in a profession can be important to safeguard salaries and working conditions.

The ICT sector provides a particular example of task and technology-related certificates and licences. They are in most cases awarded by multinational companies (Apple, Cisco, Microsoft, Oracle, Sun) and exemplify the role of private companies in certifying skills and competences. We also find ICT certification developed outside multinational companies. The European computer driving licence (ECDL) is currently the best known and widely used of these ⁽⁶⁾.

In several industry and service sectors we find elaborate systems of certification based on European or international agreements and recognised across borders. Examples include aviation, railroad transport, merchant shipping, financing and banking and logistics. The qualifications required for aviation and merchant shipping refer to particularly rigid international standards and requirements strictly supervised by respective international

⁽⁶⁾ The particular situation in the ICT sector, and the challenges involved in reviewing diverse qualifications awarded by different stakeholders in different settings, explains why major players have initiated development of the ICT competence framework. This framework, taken forward by the European Standardisation Organisation (CEN), is intended to provide a cross-border reference point for public institutions, enterprises, educational institutions and others. <http://www.ecompetences.eu/> [accessed 3.4.2012].

organisations such as the International Maritime Organisation (IMO) and International Air Traffic Association (IATA). While aviation and merchant shipping provide the strongest examples of this kind of internationally-based qualification, some other sectors are joining this trend, such as banking and financial services. It should be noted that use of qualifications to regulate access to and practise of occupations and tasks can take many forms. While some sectors, like transport, may operate based on formal agreements between national authorities, other and less formal arrangements may be used, for example linking certificates to membership of professional associations.

2.2. Type – How complete and how durable the qualification is

At national level, qualifications are frequently distinguished as full or partial. Full qualifications – for example a master degree or a vocational qualification – signal successful completion of an initial education and training sequence, giving access to a particular occupation or providing a general basis for entrance to the labour market. Partial or component qualifications can either be seen as building blocks (modules or units) to be combined into a full qualification or can be used for renewal or specialisation purposes. The distinction between initial and continuing education and training complements the above distinction between full and partial qualifications and indicates the location of a particular qualification in relation to an education, training and learning career.

International qualifications can to some extent be distinguished according to these categories. While full international qualifications reflecting initial education and training are typically encountered in the transport sector (pilots, seafarers), partial or component international qualifications linked to continuing education and training seem to be more common. The following main distinctions can be made:

- partial qualifications which can be combined as building blocks towards a full, initial qualification;
- partial qualifications building on a full, initial qualification and signalling that successful specialisation and/or renewal has taken place;
- stand-alone qualifications linked to a particular task, technology or occupation with no particular relation to any initial education or training sequence or full qualification.

Generally, partial international qualifications seem to be closely oriented towards needs of the labour market. The need for rapid and targeted updating of knowledge, skills and competences – reflecting the global character of technologies and markets – largely explains why international qualifications flourish.

We can also distinguish types of qualifications according to duration and lifespan. In the case of Microsoft, for example, lifespan of a certification varies. Some certificates provide recertification paths to allow regular updating of the latest technological developments. In this way many certificates lose their value when Microsoft discontinues mainstream support for a related technology. These ‘outdated’ certificates still appear on individual transcripts but in most cases, upgrade paths, which allow candidates to earn certification with fewer exams, are offered to holders of previous version certificates.

2.3. Coverage – Where the qualification can be used

For traditional qualifications awarded by national authorised bodies, geographical and institutional coverage can largely be taken for granted. The situation is very different for qualifications awarded outside national jurisdiction and control. In such cases qualifications must explicitly communicate where they can be used – geographically and institutionally. As shown in Chapters 3 to 5, this is not straightforward. While all qualifications have been awarded at international level, their actual coverage and validity differs substantially. While qualifications awarded by the IMO have global coverage, supported by the UN, coverage of welding certificates is limited to member countries of the International Welding Organisation. These limitations are even more important in the sports sector where international cooperation is limited and validity of particular certificates is thus reduced.

Coverage of qualifications linked to specific tasks and technologies is frequently not a result of formal agreements and decisions, but reflects their size, status and position within the economy and labour market. In some cases, such as Microsoft and Cisco certifications, their coverage can be – de facto – global. Mapping international qualifications needs to specify where a qualification can be used, geographically and institutionally.

2.4. Competent body – Who awards the qualification

There is big diversity in the companies, organisations and other bodies involved in developing, providing and awarding international qualifications. We can distinguish the following main categories of awarding bodies:

- international level, such as international transport organisations or authorities;
- EU bodies, agencies and foundations promoting mainly common European standards of safety and environmental protection such as the European Aviation Safety Agency (EASA);
- European and international sectoral organisations, associations, social partners organisations, federations and institutes promoting common sectoral reference standards at European level;
- multinational companies, networks and associations focusing mainly on particular professional needs linked to international technologies and specialised markets.

Chapters 3 to 5 illustrate that new actors are getting involved in awarding qualifications. Corporate universities, for example, have developed rapidly in the USA over the past 20 years, with some, like McDonald's Hamburger University established in 1962, having a longer history. Many such initiatives exist in large companies (such as Ernst and Young or Lufthansa) and large organisations.

2.5. Currency value – What the qualification can be exchanged into

Qualifications are carriers of information and value ('currencies') extensively influencing the way individuals and education/training as well as labour market institutions interact with one another.

An international qualification's value depends on two factors, the learning outcomes themselves and market position of the awarding institution. It is important for a proposal of a typology for qualifications to consider how this 'relative' value can be transmitted. The trust required for a strong currency depends on the factors introduced in Chapter 1, notably:

- what kind of information is provided by the qualification in question; what we know about the learning process; what we know about use of learning outcomes, etc.;
- what kind of quality assurance is carried out; how explicit and transparent the processes are; whether international norms are involved (for example ISO 17024 or similar);
- what we know about the assessment process; who assesses and how transparent this process is;
- what we know of use of standards; whether these standards are explicit and visible and correspond to real needs;
- whether qualifications (standards) are updated.

The qualification enables its holder to prove competences, skills and experience and it gives the recipient, the employer, a trusted basis on which to judge the qualified person's labour market value. This means that a qualification is not seen as a characteristic of a person in the sense of competence, but is seen as the tangible outcome of a qualification process, for example, a diploma. In this sense, qualifications represent a kind of currency accepted within what has been called a 'zone of mutual trust'.

The value of certifications linked to technologies is their adaptability to specific sectoral needs and responsiveness to the changing working environment. However, there is a danger that overprovision of certificates and licences may end up creating confusion over acquired skills and competences when examined by employers, thereby diminishing their real value. Flexibility and tailor-made solutions offered to the labour market in many cases is counterbalanced with the complication created due to the high number of international certifications on offer.

3. International qualifications in practice

The following chapter deals with selected examples of international qualifications. Selection of cases is not considered comprehensive as it is mainly based on anecdotal evidence and experiences from work on sectors and European pilot projects. Further work is needed in this area with contributions from national actors and authorities. The main need is based on the proposed elements of a typology to develop further an analytical framework for analysing existing data collected mainly at sectoral/occupational level and to help identify and analyse all types of international qualifications.

The cases were selected from different sectors, occupations and professions. It is extremely difficult to stick to the definitions used for sectors at European policy level as many qualifications correspond to occupations and professions found in different sectors especially when examined at country level. The case of welding is a clear example as we can find welders in the chemicals, rubber and plastic sectors as well as in electricity, water, waste and gas.

3.1. Administration and management

In administration and management many qualifications address specific needs and tasks. These types of certifications provide enterprises with employees who have acquired their skills through globally-recognised standards and certifications.

3.1.1. Project Management Institute (PMI) certifications

The PMI is the world's leading non-profit membership association for the project management profession, with more than 600 000 members and certificate holders in more than 185 countries.

The certifications offered recognise knowledge and competence, including project management, offering credentials held today by more than 400 000 practitioners worldwide. PMI's standards for project, programme and portfolio management are the most widely recognised standards in the profession. The standards are developed and updated by PMI volunteers with experience in

every type of project, to provide a common language for project management around the world.

The PMI offers a comprehensive certification programme for project practitioners of all education and skill levels. Credential holders are all over the world in industries, ranging from healthcare, telecommunications and finance to IT and construction. Currently PMI certifications are:

- project management professional,
- certified associate in project management,
- programme management professional,
- PMI scheduling professional,
- PMI risk management professional.

The project management professional credential is accredited by the American National Standards Institute (ANSI) against the International Organisation for Standardisation 17024. The 17024 standard includes requirements for examination development and maintenance, and for quality management systems for continuing quality assurance. In addition, PMI is also registered against the ISO 9001:2000 standard for quality management systems. This accreditation provides third-party affirmation of quality in development, management and governance of the project management professional credential.

The PMI administers a globally-recognised, professional programme certified to the ISO 9001 quality standard. To be eligible for these credentials, candidates must first meet specific educational and project or programme management experience requirements and also agree to a code of professional conduct. The final step is passing a computer-based multiple-choice examination designed to assess and measure ability to apply project or programme management knowledge. Examinations are administered globally with translation aids in 10 languages.

Table 1. **Project management professional**

Purpose	Specific task
Type	Certification
Coverage	International
Competent body	Project Management Institute accredited by the American National Standards Institute (ANSI)
Currency	High value on the labour market

3.2. Education and training sector

3.2.1. Common European framework of reference for languages: learning, teaching, assessment

The Council of Europe has actively promoted learning modern languages since establishment of the Council for Cultural Cooperation in the late 1950s. At that time modern languages were still in many countries shadowed by classical languages for educating an intellectual, cultural or social elite. They were needed primarily in diplomacy and commerce. Otherwise, professional translators and interpreters mostly mediated international communication. By 1960, Europe had recovered from the Second World War and internationalisation of European society was beginning to be felt, affecting all classes and ages of the population. Over the past 40 years, the process has continued and accelerated, necessitating profound reorientation and reorganisation of the social organisation of language learning, teaching and assessment, which is still far from complete.

Developed by scientific research and wide consultation, the common European framework of reference (CEFR) provides a practical tool for setting clear standards to be attained at successive stages of learning and for evaluating outcomes in an internationally comparable manner ⁽⁷⁾. It provides a basis for common recognition of language qualifications, thus promoting educational and occupational mobility. It is increasingly used in reform of national curricula and by international consortia for comparing language certificates.

A European Union Council resolution (November 2001) ⁽⁸⁾ recommended use of this Council of Europe instrument for setting up systems of validation of language competences. The Committee of Ministers of the Council of Europe addressed a recommendation to Member States on use of the common European framework of reference for languages and promotion of plurilingualism: CM/Rec(2008)7E.

The CEFR is a document which describes comprehensively (a) the competences necessary for communication, (b) the related knowledge and skills and (c) the situations and domains of communication. It defines levels of attainment in different aspects of its descriptive scheme with an illustrative

⁽⁷⁾ http://www.coe.int/t/dg4/linguistic/cadre_en.asp [accessed 21.3.2012].

⁽⁸⁾ http://www.coe.int/t/DG4/Portfolio/?L=E&M=/documents_intro/common_framework.html [accessed 3.4.2012].

descriptors scale. It helps clearly define teaching and learning objectives and methods and provides the necessary tools for assessing proficiency.

The CEFR has become a key reference document and valuable tool for educational and professional mobility and is currently available in over 35 language versions. It describes language ability on a scale from A1 for beginners to C2 for those who have mastered a language. This makes it easy for anyone involved in language teaching and testing (learners, teachers, teacher trainers, etc.) to see the level of different qualifications. It also means that employers and educational institutions can easily compare qualifications and see how they relate to exams they already know in their own country.

3.2.2.1. *University of Cambridge ESOL*

University of Cambridge ESOL (ESOL stands for ‘English for speakers of other languages’) was involved in early development of this standard and all examinations are aligned with the levels described by the common European framework of reference. This is consistent with the original aspirations behind the framework described by Professor John Trim, one of the CEFR authors: *‘What we were aiming at was something which will be a common reference point that people working in different fields and people using it for entirely different things and in very different ways could refer to in order to feel that they were part of a common universe’*.

There is growing evidence to support the view that Cambridge ESOL exams reflect the CEFR in various ways. This is a natural outcome of several factors, such as historical legacy, conceptual synergy, and empirical underpinning. Benefits of the relationship between CEFR and Cambridge ESOL exams are perhaps best judged by the extent to which together they enable language learning/teaching to flourish and encourage achievements to be recognised.

Exams take place in over 130 countries and depend on the work of thousands of professionals. These include Cambridge ESOL’s permanent staff of around 400, staff in over 2 700 centres and more than 50 000 preparation centres, as well as tens of thousands of examiners, teachers and publishers. There are around 2 700 authorised exam centres providing Cambridge English exams worldwide.

Cambridge English exams are officially accepted by thousands of universities, employers and governments globally. They can open doors to higher education, improve job prospects and, as they are so well-known globally, increase mobility.

Table 2. **Cambridge English proficiency (CPE)**

Purpose	Specific task
Type	Certification
Coverage	International
Competent body	University of Cambridge/Council of Europe
Currency	High value on the labour market

3.2.2. **Association Montessori International**

Training centres accredited by the 'Association Montessori International' (AMI) operate throughout the world offering courses that prepare adults to work with children at three levels: assistants to infancy (0-3), casa dei bambini (3-6) and elementary (6-12). The AMI training group is responsible for course content and academic guidance as well as selection of trainers and continuous assessment of their ongoing training. It has been providing this type of training since 1974.

The training of trainers programme provides participants with an opportunity to deepen their understanding of the ideas and principles of Maria Montessori and develop the skills to pass knowledge gained to future generations of Montessori teachers. The assistants to infancy training course prepares adults for helping young children to develop their individual human potential to the full. The course provides an opportunity to study, in depth, Montessori pedagogy and practices along with current medical and psychological approaches to child development in the first three years of life.

The casa dei bambini teacher training course prepares adults for helping young children to develop their individual human potential to the full. The course provides studies of Montessori pedagogy and practices including characteristics of the child from three to six years of age, the needs expressed during this stage of development, and the means available to assist the child's work of self-construction.

Training formats have three options: full-time training in three academic-year courses, full-time training in a combination of academic-year and summer courses for a total of three courses and full-time training in two courses, combined with a series of seminars held over two to three years. The seminars are equivalent, for the purpose of the training of trainers programme, to attendance at one full training course.

Table 3. **Montessori assistant to infancy training**

Purpose	Sectoral need
Type	Full qualification
Coverage	Number of countries
Competent body	Association Montessori International
Currency	High value on the labour market

3.3. Financial services

The financial service sector is important in Europe. Financial and insurance activities include financial service activities, insurance, reinsurance and pension funding, except compulsory social security and activities auxiliary to financial services and insurance services which are offered by banks, financial planners and insurance companies.

An interesting consideration referring to the need for transparency arising from the survey by the European sectoral social dialogue ⁽⁹⁾ is emergence of employment profiles:

- recruitment is increasingly standardised in terms of the level of training required;
- short vocational higher education, predominantly legal or commercial for sales management;
- long higher university education or higher technical college or business school, for other core job activities.

Social partners underlined one of the first routes to follow is definition of criteria allowing for clear and precise equivalences to be established for competences and qualifications; to achieve European certification for equivalent national qualifications without seeking systematic harmonisation of diplomas designed in complex national systems, which correspond to specific economic and social cultures. An early example of a unique certification leading to uniform qualifications in Europe in the broad financial services sector is the European foundation certificate in banking (EFCB).

⁽⁹⁾ <http://ec.europa.eu/social/main.jsp?langId=en&catId=782&newsId=535&furtherNews=yes>
[accessed 3.4.2012].

3.3.1. European foundation certificate in banking (EFCB)

The EFCB is a business-oriented qualification designed in a Leonardo da Vinci-funded initiative by the European bank training network (EBTN), the professional association of leading banking institutes in Europe. EBTN has a central role in accrediting training programmes and certifying knowledge and/or competences in the financial services sector. The EFCB system was officially announced in 2003 and is composed of two main elements: the standard examination model (SEM) and the accreditation model (AM). The SEM is the quality model of the EFCB, as it sets the examination profile and requirements for validity, reliability, acceptability and transparency of the examination. Specifically, in the SEM the exam form defines the method in which the examination is to be organised, while the exam profile describes the knowledge to be tested (thus, the EFCB is a knowledge-based qualification).

The accreditation model guarantees that the standard examination model is observed by organisms accredited to provide the EFCB examination at national level; in particular, a set of accreditation requirements is established, encompassing the syllabus content of the training programme underlying the EFCB, the examination approach and procedures, envisaged strategies for handling recognition of prior learning (including non-formal and informal achievements), etc. The European foundation certificate in banking, based on national study programmes and qualified national examinations, is recognised by all accredited institutes. At present there are 17 accredited institutes that have issued more than 7 500 certificates.

The EFCB is a European standard examination developed by the European bank training network. The EBTN is a network of professional bodies and banking associations from across Europe and 18 of its members from 16 European countries originally developed the EFCB.

Candidates are awarded both a diploma in financial services and the EFCB on successful completion of the course. Candidates taking the EFCB develop knowledge and understanding of the:

- monetary and economic environment in which European banks operate;
- bank customers, products and service requirements; and
- fundamentals of marketing, management and ethics.

The European foundation certificate in banking is based on a standard examination model which is the quality model for Europe.

Table 4. **European foundation certificate in banking (EFCB)**

Purpose	Sectoral need, quality assurance
Type	Certificate
Coverage	European
Competent body	European bank training network
Currency	High value in the sector

3.3.2. Accountant

An accountant is a practitioner of accountancy (UK) or accounting (US), which is measurement, disclosure or provision of assurance of financial information that helps managers, investors, tax authorities and other decision-makers allocate resources.

Chartered certified accountant – designatory letters ACCA (Association of Chartered Certified Accountants) or FCCA (Fellow Member of the Association of Chartered Certified Accountants) – is a British qualified accountant designation awarded by the ACCA. The term chartered certified accountant was introduced in 1996. Prior to that date, ACCA members were known as certified accountants and it is still permissible for an ACCA member to use this term. Members of ACCA with sufficient post-qualification experience are designated fellows, and use the designatory letters FCCA in place of ACCA.

The term chartered refers to the royal charter granted by Her Majesty the Queen in the United Kingdom. Chartered certified accountants work in all fields of business and finance. Some are engaged in public practice, some work in the private sector and others are employed by government bodies.

Since chartered certified accountant is a legally protected term, individuals who describe themselves as such must be members of ACCA. If they carry out public practice engagements, they must comply with additional regulations such as holding a practising certificate, being insured against any possible liability claims and submitting to inspections. Subjects examined include financial accounting, management accounting, auditing, taxation, financial management, performance management, strategic management and company law.

The chartered certified accountant qualification is legally recognised by all member countries of the European Union under the mutual recognition directive. This recognition extends to European economic area nations and

Switzerland. For example, holders of the ACCA or chartered certified accountant qualification could practise as an accountant in all member countries of the European Union, European economic area and Switzerland, but could only describe themselves as ACCA or chartered certified accountants rather than local professional accountants. Access to local professional qualifications is based on an aptitude test. However, it is necessary to be a citizen of one of the EEA States or Switzerland to benefit from this directive.

Table 5. **Chartered certified accountant** ⁽¹⁰⁾

Purpose	Sectoral need, quality assurance
Type	Certificate/licence
Coverage	EU and EEA countries
Competent body	Association of Chartered Certified Accountants
Currency	High value in the sector

3.4. ICT sector

ICT is among the leading sectors in Europe ⁽¹¹⁾ and affects economic growth across the economy in three ways:

- for the EU as a whole, the ICT sector share of total business value added is 8.5% and the ICT sector employment constitutes 3% of total business sector employment in the EU;
- the most important benefits of ICT arise from its effective use and ICT investments help to raise labour productivity;
- use of ICT throughout the value chain enables firms to increase their overall efficiency and makes them more competitive.

The legal basis for European standardisation, including the ICT domain, is the technical standardisation directive. Annual ICT standardisation programmes aim at promoting standardisation work in support of EU policies and legislation. Competitiveness of European industry and social inclusion are

⁽¹⁰⁾ From Wikipedia.

⁽¹¹⁾ http://ec.europa.eu/enterprise/sectors/ict/competitiveness/index_en.htm [accessed 21.3.2012].

dependent on effective use of ICT and knowledge, skills and competences of the European workforce and population. E-skills are the doorway to many opportunities.

The European Commission (EC) adopted a policy communication on e-skills ⁽¹²⁾ for the 21st century: fostering competitiveness, growth and jobs.

3.4.1. European computer driving licence

ECDL (European computer driving licence) and ICDL (international computer driving licence) are two global standards in end-user computer skills certification in the ICT sector. The roots of this quality standard in ICT date back to 1995, when the Council of European Professional Informatics Societies (CEPIS) created a task force to examine how to raise ICT skills levels in industry throughout Europe. The task force was funded by the European Commission through the Esprit research programme. The task force identified the Finnish computer driving licence as a suitable model and after some modifications the European computer driving licence, gained European-wide acceptance. In January 1997, the ECDL foundation was launched as a central coordinating body to ensure that ECDL is implemented at an equal standard throughout Europe, and subsequently throughout the world.

The ECDL foundation is the certifying authority of the international computer skills certification programme – ECDL/ICDL. Certification programmes are built with over a decade of experience in delivering ICT certification programmes to over 11 million people, in 41 languages across 148 countries, through a network of over 24 000 test centres. The ECDL foundation is a non-profit organisation that benefits from support of experts from national computer societies and international organisations across the globe. It works with communities, local and regional authorities, national governments, international bodies such as the United Nations and other development and international non-governmental organisations (NGOs), in delivering its certification programmes.

The ECDL foundation has offices in Dublin, Brussels, and Singapore, and appoints national partners (also known as ‘operators’) around the world to implement its certification programmes at national level. This global delivery network operates under strictly defined quality assurance standards achieving consistency of programme implementation around the world.

⁽¹²⁾ <http://ec.europa.eu/enterprise/sectors/ict/e-skills/> [accessed 3.4.2012].

Table 6. **European computer driving licence (ECDL)** ⁽¹³⁾

Purpose	Sectoral need – technological developments
Type	Certificate/licence
Coverage	European/international
Competent body	European professional informatics societies
Currency	High value in the sector

3.4.2. Microsoft certifications

Microsoft certifications are designed to provide recognition needed for personal career development in the ICT sector and provide employers with validated skills from one of the top trend-setting companies in the world. Microsoft certifications are available for most Microsoft technologies and all skill levels and are for IT professionals and developers of all skill levels from entry-level positions to solution architects.

Microsoft certified professional (MCP) is a programme of professional certifications for both IT professionals and developers awarded by Microsoft. Individual certifications are awarded by passing one or more exams. Beneath the MCP programme are various more targeted and focused certifications (Microsoft certified IT professional, etc.).

Like Apple, Cisco, Oracle, Red Hat, Sun and Ubuntu programmes, certifications mainly focus on a respective product, as opposed to employment aptitude tests designed for programmer trainee jobs. These branches of technical series with the MC (Microsoft certified) prefix include Microsoft certified IT professional (MCITP), Microsoft certified master (MCM), Microsoft certified architect (MCA), Microsoft certified professional developer (MCPD), Microsoft certified technology specialist (MCTS).

Exams usually last between two and three hours and consist of 40 to 90 multiple choice, drag and drop, solution building questions and simulated content where students are required to perform certain appropriate common administrative tasks.

⁽¹³⁾ <http://www.ecdl.com/> [accessed 21.3.2012].

Table 7. **Microsoft certified technology specialist**

Purpose	Sectoral need – technological developments
Type	Certificate
Coverage	International
Competent body	Microsoft
Currency	High value in the sector

3.4.3. Cisco certifications

Widely-known IT certification programmes available through Cisco (another leading company in the sector) focus on the network professional's needs. Five levels of general IT certification are offered: entry, associate, professional, expert and architect, the highest level of accreditation in the Cisco career certification programme. Various tracks such as routing and switching, network security and service provider are available, adapted to individual needs.

Traditional educational institutions that teach Cisco skills are called 'Cisco networking academy' (Wikipedia). Cisco networking academy students can request exam vouchers that allow them to take the exam over an extended period of time. Cisco courses are offered at various institutions and training is available from Cisco learning partners such as the Cisco 360 learning programme for CCIE (Cisco certified internetwork expert) and the Cisco learning network.

The lowest level of Cisco's certification is CCENT (Cisco certified entry networking technician). CCENT covers basic networking knowledge and is appropriate for entry-level network support positions and is the first step towards a CCNA (Cisco certified network associate) certification. CCENT certified people can install, manage, maintain and troubleshoot a small enterprise network, including basic network security.

3.4.4. Cisco certified architect prerequisites

Cisco certified architect is the highest level of accreditation in the Cisco certification programme. This award recognises the architectural expertise of network designers who can support increasingly complex networks of global organisations and effectively translate business strategies into evolutionary technical strategies.

There are no formal training programmes available for the Cisco certified architect. However, candidates wishing to attain this certification must face a board of Cisco-appointed committee members and defend their proposed network solution. Candidates wishing to apply to become a Cisco certified architect must also hold a valid Cisco design (CCDE – Cisco certified design expert) certification, validating their expert design and business level skill set.

A Cisco certified architect gathers the business requirements and objectives necessary to produce a blueprint for an integrated, large-scale, complex, global network. They can translate business parameters and objectives into functional requirements for network design and in addition, can clearly communicate and advocate Cisco network architectures.

The Cisco architect certification is administered as a board exam. Candidates propose and defend an architecture solution to a set of business requirements, and are asked to modify their proposals ‘on the fly’, based on additional requirements presented by the board. Prerequisites include a CCDE certification, approximately 10 years of industry experience, and acceptance into the programme via an application process.

Table 8. **Cisco certified architect**

Purpose	Sectoral need, technological developments
Type	Certificate/licence
Coverage	International
Competent body	Cisco
Currency	High value in the sector

We conclude the ICT sector section by observing that the primary value in technology certifications for IT professionals is its ability to open new doors on the job front. However, in a critical article ‘Is Microsoft certification becoming worthless?’ published on www.trainingsignal.com, Brian Nelson states that for businesses and IT managers, the primary value has been the assurance that employees or potential employees were skilled in a complex technology. Today’s array of Microsoft titles and certifications makes it difficult to determine what level of skill a person has, and worse, which if any certification requirements should be used in a job posting. To the question if Microsoft certifications still have value, he answers no as according to him confusion seems to dominate among those trying to make use of the new certification titles. Many job postings

resort to vague guesses about certification requirements. One such listing says 'Microsoft certified systems administrator (MCSA), Microsoft certified technical specialist, Microsoft certified master, or equivalent.'

Considering almost the whole range of administrator certifications is covered, one wonders if those hiring even know what the certifications mean, and if professionals holding higher level certifications would get any extra value from them. Strategically, computer professionals would want to aim for broader certifications.

3.5. Personal services

This sector ⁽¹⁴⁾ has specific characteristics such as a large majority of women workers (over 80%). Many work part-time and only stay in the sector for short periods of time. The sector has also a significant number of self-employed workers and undeclared work is common. Over the last years there have been few innovations in technology, products and techniques. New developments have largely revolved around improving user-friendliness, quality and safety of mass-marketed products for home use, particularly colouring products. Reduction in business resulting from this trend towards 'do it yourself' is leading the personal services industry to seek to compete on quality, and diversify and develop new niche markets such as health and beauty treatments. In some EU countries, significant efforts have also been made to raise training standards and quality of entrants into the profession, while at the same time restructuring hairdressing into a holistic fashion and beauty service provider.

The social partners signed a code of good conduct in June 2001, and through guidelines, stress the need for undertakings to have motivated, well-trained staff, enjoying the confidence of their customers and working in a spirit of cooperation. The standards cover various themes of interest to employees in the sector: salaries, redundancy, health and safety problems, undeclared work, etc. While these are only recommendations, the partners are following them up in the framework of the European sectoral social dialogue by setting up specific projects. The initiatives developed in recent years have been directed mainly towards training (including via the Internet) and improving the work environment.

⁽¹⁴⁾ <http://ec.europa.eu/social/main.jsp?catId=480&langId=en&intPagId=51> [accessed 21.3.2012].

3.5.1. Hairdressing

Analysis of the personal services sector (Cedefop, 2009) could be addressed from many perspectives, based, for instance, on different points of view offered by alternative classification systems and sector categorisation approaches. Thus, NACE ⁽¹⁵⁾, ISIC ⁽¹⁶⁾ and ISCO ⁽¹⁷⁾ categorisations could be considered (in their various versions). Further, established frameworks in the European sectoral social dialogue, could be taken into account. Thus, in NACE and ISIC the personal services sector encompasses multiple activities and related professions, while ISCO defines a specific hair and beauty group of occupations. Further, European sectoral social dialogue involves two main parties, the hair and beauty section of UNI Europa ⁽¹⁸⁾ and Coiffure EU ⁽¹⁹⁾, representing employees and employers in the hairdressing trade (not including cosmetics industries).

The hairdressing sector has an established qualification structure recognised by European stakeholders based on a European agreement on implementation of European hairdressing certificates. In this European perspective, future training of the hairdressing trade can be divided into three levels; level A corresponds to national training standards, while levels B and C correspond to European standards. Regulation, which dominates other sectors, is not present in hairdressing as transnational regulation does not exist, in spite of a de facto certification, which suggests there is a real sectoral reference standard at European level.

Looking at practical examples of projects developed over the years in EUC hair, the European social partners agreed that, by relating both the European hairdressing certificate 'level B' and the management training programme 'level C' to the EQF, they placed the training programme in a European standard system expected to be equivalent to recognition and quality of training programmes at European level. In fact, the fundamental principle behind sectoral standards in the hairdressing sector is that, in the European hairdressing certificate, each country is expected to decide how to get from level 'A' to level 'B' and level 'C'.

The approach used in the Leonardo da Vinci programme EQF hair project ⁽²⁰⁾ for referencing the European hairdressing certificate with the EQF

⁽¹⁵⁾ NACE: classification of economic activities in the European Community.

⁽¹⁶⁾ ISIC: international standard industrial classification of all economic activities.

⁽¹⁷⁾ ISCO: international standard classification of occupations.

⁽¹⁸⁾ <http://www.uniglobalunion.org> [accessed 21.3.2012].

⁽¹⁹⁾ <http://www.coiffure.eu/> [accessed 21.3.2012].

⁽²⁰⁾ <http://www.dfkf.dk/EQF-Hair.aspx> [accessed 21.3.2012].

consisted of testing the three types of learning outcomes in the EQF (knowledge, skills, and competences) against the same three types of learning outcomes in the European hairdressing certificate level 'B'. Based on this, EQF level 4 was selected as the best fit for the European hairdressing certificate (EHC). Through a comparable methodology, referencing the European hairdressing certificate level 'C' to the EQF was evaluated. According to the analysis, level 'C' would be considered equivalent to EQF level 5.

In the Leonardo da Vinci programme EUC hair - European certification in hairdressing ⁽²¹⁾ the quality assurance system for European standards in hairdressing was divided into a *de facto* certification system, and accreditation procedures and recommendations. Project partners decided that training institutions offering (updated) European hairdressing certificate level 'B' can be accredited by national authorities announcing that the institutions concerned are able to teach national level A and European level B.

Table 9. **Hairdressing**

Purpose	Sectoral need, health and safety
Type	Full qualification
Coverage	European
Competent body	UNI Europa hair and beauty – Coiffure EU (EU social partners)
Currency	High value in the sector – requirement to enter

3.6. Sports sector

Sports ⁽²²⁾ is an area of human activity that greatly interests citizens of the European Union and has enormous potential for bringing them together, reaching out to all, regardless of age or social origin. According to a 2004 Eurobarometer survey approximately 60% of European citizens participate in sporting activities regularly in or outside some 700 000 clubs, which are themselves members of a plethora of associations and federations. Most sporting activity takes place in amateur structures. Professional sport is

⁽²¹⁾ <http://www.dkf.dk/EQF-Hair/EU-project.aspx> [accessed 3.4.2012].

⁽²²⁾ http://ec.europa.eu/sport/white-paper/whitepaper8_en.htm#2 [accessed 21.3.2012].

growing and contributes equally to the societal role of sport. In addition to improving health of European citizens, sport has an educational dimension and plays a social, cultural and recreational role. The societal role of sport also has potential to strengthen the EU's external relations.

Between March 2010 and March 2011 the European Observatory of Sport and Employment (EOSE) conducted a project 'Actions towards the lifelong learning strategy for sport and active leisure: LLL sport' ⁽²³⁾ in conjunction with national representatives from nine European countries. EOSE acts at the European level to serve as a source of knowledge and a facilitator to support development of the sport and active leisure sector.

The LLL sport project aimed to bring national stakeholders together to put in place structures to ensure a well-qualified workforce ready to meet the challenges the sector faces and allow the sector to contribute to wider agendas including health, education, social inclusion and economic development. Another goal was to raise awareness of LLL sport strategy and commitment to it through engagement and partnership with national and regional stakeholders from sport and education.

LLL sport strategy is based around defining the sector and its occupations, a work-based competence framework, learning outcomes framework and quality assurance process.

The main actors in sports qualifications include ministries, national qualifications authorities, sports federations and other organisations in the sport movement, universities, technical colleges and training providers. Through examination of national education and training systems in the sports sector, a pattern emerged showing that sports education is offered through three main types of providers: national sports federations; vocational or technical colleges and providers; and higher education institutions.

It can be concluded that sport and active leisure as a sector is well served regarding qualifications provision across Europe by a wide range of education providers and types of education spreading right across all spheres of vocational and academic provision from short vocational courses to masters and doctorate levels. However, in professional sports we have several international qualifications with close links to international federations and commissions.

Golf, for example, is unique among sports in the size and diversity of its labour market with many golf qualifications, some recognised in national qualification systems and others purely sector-based but with an international

⁽²³⁾ <http://www.eose.eu/blog/> [accessed 21.3.2012].

character. The European golf industry supports a workforce of 350 000 employees according to a 2009 study by the KPMG/Oxford economics company. New golf markets have emerged in recent years particularly in southern and eastern Europe and there is a gap at European level between competences required by golf employers and learning outcomes acquired by graduate/employees through training. These new markets lack quality initial vocational training relevant to golf employers' needs. In established golf markets, training processes focus on learning inputs. The European occupational standards for golf project (Golf stand) ⁽²⁴⁾ was developed mainly to produce a range of indispensable European occupational standards to define the competences, skills and knowledge needed for those working as golf professionals.

3.6.1. Volleyball international referee

International referees qualifications are very important for professional sports and have significant value for the labour market. In volleyball, *'International referees are those international referee candidates as stated in Article 2.1.3 of the FIVB sports regulation, who within the five years following the course they passed, have been certified by their continental refereeing commission as having officiated at least three matches of which two must be as first referee, at any continental championship including qualification tournaments and/or continental games organised by Olympic continental bodies or confederations'*. In June 2011, there were 435 international referees from 48 European countries. Although there is pressure on referees there are enough to cope with the current number of top-level games played. For example, in Europe there were 520 top-level club matches and 599 national team competition matches in the 2010-11 season. This is the most active federation and shows the considerable importance of leagues in Europe.

To get an international referee qualification, candidates have to follow a course certified by the International Volleyball Federation (FIVB). Courses include: leadership in high-level refereeing; psychological aspects of refereeing; communication in high-level refereeing; perception and evaluation of top-level referees by top-level coaches; new referee evaluation system; psychological strategies in refereeing; international refereeing candidate courses (IRCC); continental courses; national courses; and refresher courses. All these can only be organised by a national federation, development centre, continental confederation or the FIVB.

⁽²⁴⁾ <http://www.golf-stand.com/> [accessed 21.3.2012].

Only under the direction and approval of the FIVB refereeing commission can international refereeing candidate courses be organised by national federations affiliated to the FIVB, development centres and continental confederations, provided the procedure is duly followed. If a course does not provide the full duration, standard or programme, if six countries at least do not take part, or if no examination is held participants will not receive an attestation and the course will not be validated by the refereeing commission. Regarding entry conditions, participants should have been registered by the FIVB at least three times in the last five years. National federations are responsible for checking registration with the FIVB. In case of doubt the FIVB can be consulted.

Participants follow an entry test to check their basic knowledge of the official volleyball rules and English. The FIVB reserves its right to reject applicants not in compliance with the regulations. The minimum age to participate in an international refereeing course is 25 and maximum 41. Each participant must also present an official medical certificate with his individual registration form.

Once the theoretical instruction is completed, participants sit theoretical and practical examinations as follows:

- scoring test (with scoring practice);
- written examination (official test of the refereeing commission);
- practical examination during volleyball tournament (one complete match during the tournament);
- oral examination (20 minutes for each participant).

When the examinations are over, the course director gives an attestation to every participant showing the result of the examinations. The FIVB events department sends a certificate to candidates who passed the examination and have been approved by the refereeing commission.

Table 10. **Volleyball international referee**

Purpose	Sectoral need
Type	Certificate/licence
Coverage	International
Competent body	FIVB International Volleyball Federation
Currency	High value in the sector – requirement to enter

3.7. Transport sector

The transport sector (European Commission, 2009) is one of the most important sectors for the European economy. Its importance stems not only from its size (which is estimated to be EUR 803 billion or 6.6% of European GDP in 2007), but because it plays a crucial role in connecting other economic actors to one another. The transport sector is characterised by great diversity and different transport modes that come with different technologies, regulations, challenges, knowhow, and skills requirements.

The main categories are:

- air transport (passenger and freight),
- transport by waterway/sea,
 - international high sea transport (passenger and freight),
 - ship transport on rivers, canals and lakes (passenger and freight, for practical reasons referred to ‘inland waterway transport’),
- rail transport (passenger and freight),
 - subway, metro and tram system,
 - domestic trains,
 - international trains,
 - high speed trains,
- road transport (short distance and long distance, passenger and freight, heavy and light commercial vehicles),
 - passenger transport (bus, coach and taxi),
 - short distance freight trucks (heavy and light),
 - long distance freight trucks (mostly heavy).

The sector is also an important employer in Europe with some 9.62 million workers in the EU in 2006. It had a total added value of EUR 530.2 billion in 2006, most of which was generated by the road sector.

The annual growth rate in added value between 1995 and 2006 was 4.3%, which is almost double the annual growth of 2.3% in added value in the total European economy for the period. The transport sector (especially freight) is affected strongly by the current economic crisis and SMEs play an important role, especially in road freight transport, with a large share taken by micro companies of less than 10 employees. Labour force survey data show that only 21.1% of persons employed in the sector in 2005 were women and employees with medium qualification comprise the highest share. There is a trend for skill needs to shift from low-qualification levels towards medium and

higher qualification levels as shown in the latest (March 2012) Cedefop skills forecast ⁽²⁵⁾.

3.7.1. Sea transport

The sea transport industry plays an important economic role since about 90% of European trade is transported by sea. High percentages of GDP of several coastal Member States are estimated to have been generated from sea-related industries and services by employing many workers. The sea-related sector includes different economic activities, professions and qualifications and is an example of sectoral qualifications agreed on and recognised at international level thanks to a well-structured process performed by social partners.

Maritime professions have an international dimension as the sea implicitly represents a 'globalised' sector that has led to marked uniformity in the standards related to safety at sea. Globalisation has also had an impact on traditional qualifications since it has resulted in a need to define new professional profiles and ensure transparency of certification procedures.

3.7.2. Maritime training

The International Maritime Organisation operates at international level. It was established in Geneva in 1948 and since the 1960s it has acquired a major role in all matters concerning shipping transportation and safety of ships and human lives. At present, the IMO acts on behalf of the United Nations.

In 1978, the IMO adopted a convention on standards of training, certification and watch keeping for seafarers (STCW convention), which represents an international benchmark for maritime qualifications. It applies to all seafarers apart from those who serve on warships, wooden ships, fishing vessels and yachts. The STCW sets up the qualification structure which identifies the mandatory minimum requirements to perform a specific profession. Each qualification is divided into a standard of competence, onboard training, near coastal voyages, special training, master, and period of seagoing service. The standard of competence indicates the level of proficiency to be achieved for the proper performance of functions onboard ships in accordance with internationally-agreed criteria; in the standard, knowledge, understanding and proficiency are specified with methods for demonstrating and criteria for

⁽²⁵⁾ <http://www.cedefop.europa.eu/EN/about-cedefop/projects/forecasting-skill-demand-and-supply/skills-forecasts.aspx> [accessed 21.3.2012].

evaluating the competence itself. Since the qualification process is top-down and the STCW represents the main benchmark and tool, each Member State has to implement nationally what has been set up in the convention. As described in the convention, national authorities are in charge of establishing criteria and requirements for issuing a qualification.

The European Commission enacted several directives in line with requirements set up by the convention on sea-related qualifications, such as 2001/25/EC (defines the minimum level of training of seafarers) and 2005/45/EC (rules for common recognition of seafarers' certificates issued by Member States).

The STCW convention is an example of an international qualifications framework, originally set up to guarantee safety at sea. Nevertheless, it is a remarkable tool designed to list the main compulsory requirements for sea-related workers who need to hold a well-structured qualification. It also sets up national objectives and quality standards. Quality standards cover administration of the certification system, all training courses and programmes, examinations and assessments carried out by or under the authority of a party, and the qualifications and experiences required of instructors and assessors. At Member State level, responsible authorities check compliance of national implementation with what is set in the STCW convention.

The STCW convention requires that training leading to issue of a certificate has to be 'approved'. The International Maritime Organisation does not approve any training courses or institutes. This is a privilege and responsibility of member governments who are parties to the STCW convention. The maritime administration of an STCW party in accordance with convention requirements normally gives approval.

Additionally, the convention requires that training and assessment of seafarers are administered, supervised and monitored in accordance with provisions of the STCW code; and those responsible for training and assessment of competence of seafarers are appropriately qualified in accordance with provisions of the code.

Initial approval of a maritime training programme by a maritime administration might include assessment of items such as those listed below to ensure that the training institute or training programme meet appropriate STCW convention standards:

- scope and objectives of the training – such as to meet the requirements of STCW regulation II/1;
- minimum entry standards – age, sea experience, other training, medical fitness, etc.;

- intake limitations, student/staff ratio, etc.;
- staff qualifications, experience in subject, teaching skills, assessment skills;
- facilities and equipment necessary to meet objectives;
- written programmes, syllabus, timetable and course material;
- method of training: lectures, practical, videos, etc. and percentage of time devoted to each;
- assessment methods: examination, practical, continuous assessment, etc.;
- certification issued on completion to meet STCW requirements.;
- maintenance of student and other records;
- security of information;
- quality standards system requirements to ensure standards are maintained.

3.7.3. Certificates for seafarers – IMO (STCW)

Directive 2005/36/EC of the European Parliament and of the Council of 7 September 2005 on recognition of professional qualifications applies to maritime occupations covered by Directive 2008/106/EC ⁽²⁶⁾ promoting compliance with the obligations laid down in the Treaty and abolishing obstacles to the free movement of persons and services between Member States. Common recognition of diplomas and certificates provided for under Directive 2005/36/EC does not always ensure a standardised level of training for all seafarers serving on vessels flying the flag of a Member State. This is, however, vital for maritime safety and it is therefore essential to define a minimum level of training for seafarers in the community. The level should be based on standards of training already agreed at international level, namely the International Maritime Organisation convention on standards of training, certification and watch-keeping for seafarers (STCW convention 1978), revised in 1995. All Member States are parties to that convention.

3.7.4. Master and chief mate on ships of 3 000 gross tonnes or more

Competent staff does not only uphold maritime safety and safeguard the marine environment in the EU, they are also essential to support growth and prosperity of the maritime industry in Europe. The European maritime industry suffers from an increasing lack of European seafarers ⁽²⁷⁾, in particular officers. Such shortage is likely to increase in the coming years to the detriment of the maritime industry which needs maritime expertise and experience. The main

⁽²⁶⁾ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:323:0033:0061:EN:PDF> [accessed 21.3.2012].

⁽²⁷⁾ http://ec.europa.eu/transport/maritime/seafarers/seafarers_en.htm [accessed 21.3.2012].

objective of European maritime policy in this field is to prevent abusive practices on board ships calling at EU ports, improve social guarantees for seafarers on board EU-flagged ships and make the maritime profession more attractive.

The EU attaches importance to working and living conditions on board because they also contribute to maritime safety by preventing accidents caused by human factors. EU legislation on labour, equality, and non-discrimination is quite substantial for EU workers and is applicable to seafarers with some exceptions currently under review by the Directorate General for Employment, Social Affairs and Equal Opportunities. Educating and training seafarers is important for the EU, to maintain and develop knowledge and skills levels in the maritime sector as well as maritime safety. It is therefore essential to define and maintain a minimum level of training for seafarers in the EU.

The European Council in its proposal for a directive of the European Parliament and the Council amending Directive 2008/106/EC on the minimum level of training of seafarers (Brussels, 8 December 2011) specifies minimum requirements for master and chief mate on ships of 3 000 gross tonnes or more.

Training and certification of seafarers is regulated by the International Maritime Organisation convention on standards of training, certification and watch-keeping for seafarers 1978 (STCW convention), which entered into force in 1984 and which was significantly amended in 1995.

All Member States are parties to the STCW convention and only Finland, because of a parliamentary scrutiny reservation, has objected to the Manila amendments ⁽²⁸⁾. Member States therefore have to align their national rules with the Manila amendments.

According to these amendments, the mandatory minimum requirements for certification of masters and chief mates on ships of 500 gross tonnes or more to become a master or chief mate on ships of 3 000 gross tonnes or more requires:

- every master and chief mate on a seagoing ship of 3 000 gross tonnes or more to hold a certificate of competence.

Every candidate for certification shall:

- meet the requirements for certification as an officer in charge of a navigational watch on ships of 500 gross tonnes or more and have approved seagoing service in that capacity:
 - for certification as chief mate, not less than 12 months; and
 - for certification as master, not less than 36 months; however, this period may be reduced to not less than 24 months if not less than 12 months of such seagoing service has been served as chief mate; and

- have completed approved education and training and meet the standard of competence specified in section A-II/2 of the STCW code for masters and chief mates on ships of 3 000 gross tonnes or more.

The term ‘certificate of competence’ means a certificate issued and endorsed for masters, officers and GMDSS (global maritime distress and safety system) radio operators in accordance with provisions of the directive and entitling the lawful holder thereof to serve in the capacity and perform the functions involved at the level of responsibility specified therein. The ‘certificate of proficiency’ means a certificate other than a certificate of competence issued to a seafarer stating that the relevant requirements of training, competences or seagoing service in this directive have been met.

Table 11. **Master and chief mate on ships of 3 000 gross tonnes or more**

Purpose	Sectoral need – health and safety, technological needs
Type	Full qualification
Coverage	International
Competent body	International Maritime Organisation
Currency	High value in the sector – requirement to enter

3.8. Air transport

Among different modes of transport, air transport ⁽²⁹⁾ has experienced the fastest growth. However, it must overcome saturation of its infrastructures. The EU is committed to modernising and adapting the infrastructure to increasing passenger flows, while also improving their rights and safety. To do this, the EU is working to implement ‘the single European sky’. Introducing optimum traffic management technologies will enable challenges related to economic efficiency, safety and respect for the environment to be reconciled. Aviation professions have a strong international dimension and respective qualifications have a global character based on international standards.

⁽²⁹⁾ http://europa.eu/legislation_summaries/transport/air_transport/index_en.htm [accessed 21.3.2012].

3.8.1. International Civil Aviation Organisation

A specialised agency of the United Nations, the International Civil Aviation Organisation (ICAO) was created in 1944 to promote safe and orderly development of international civil aviation throughout the world. It sets standards and regulations necessary for aviation safety, security, efficiency and regularity, as well as for aviation environmental protection. The organisation serves as the forum for cooperation in all fields of civil aviation among its 191 member countries.

According to the terms of the convention, the organisation is made up of an assembly, a council of limited membership with various subordinate bodies and a secretariat.

As the governing body, the council gives continuing direction to the work of ICAO. The council adopts standards and recommended practices and incorporates them as annexes to the convention on international civil aviation.

The ICAO works in close cooperation with other members of the United Nations family such as the World Meteorological Organisation, the International Telecommunications Union, the Universal Postal Union, the World Health Organisation and the International Maritime Organisation. Non-governmental organisations, which also participate in ICAO's work, include the International Air Transport Association, the Airports Council International, the International Federation of Airline Pilots Associations, and the International Council of Aircraft Owner and Pilot Associations.

All flights are handled in the same, uniform manner, whether by air traffic control, airport authorities or pilots at the controls of their aircraft. Behind the scenes are millions of employees involved in manufacturing, maintenance and monitoring the products and services required in the never-ending cycle of flights. Modern aviation is one of the most complex systems of interaction between human beings and machines ever created. These highly precise processes require universally accepted standards known as standards and recommended practices (SARPs) that cover all technical and operational aspects of international civil aviation, such as safety, personnel licensing, operation of aircraft, aerodromes, air traffic services, accident investigation and the environment. Without SARPs, our aviation system would be chaotic and unsafe.

3.8.2. European Aviation Safety Agency

The European Aviation Safety Agency (EASA) is the centrepiece of the EU's strategy for aviation safety. Its mission is to promote the highest common standards of safety and environmental protection in civil aviation. Air transport

is considered one of the safest forms of travel and as air traffic continues to grow a common initiative is needed at European level to keep air transport safe and sustainable. The agency develops common safety and environmental rules at European level. It monitors implementation of standards through inspections in Member States and provides necessary technical expertise, training and research. The agency works hand in hand with national authorities which continue to carry out many operational tasks, such as certification of individual aircraft or licensing pilots.

The EASA also carries out executive responsibilities in type-certification: certification of specific models of aircraft, engines or parts approved for operation in the EU. The aviation industry benefits from common specifications, cost-efficient services and a single point of contact.

The agency's main tasks currently include:

- rule-making: drafting aviation safety legislation and providing technical advice to the European Commission and Member States;
- inspections, training and standardisation programmes to ensure uniform implementation of European aviation safety legislation in all Member States;
- safety and environmental type-certification of aircraft, engines and parts;
- approval of aircraft design organisations worldwide and production and maintenance organisations outside the EU, Canada and US;
- authorisation of third-country (non EU) operators;
- coordination of the European Community programme SAFA (safety assessment of foreign aircraft) regarding safety of foreign aircraft using community airports;
- data collection, analysis and research to improve aviation safety.

In a few years, the agency will also be responsible for safety regulations regarding airports and air traffic management systems.

Airworthiness directives are issued by EASA, acting in accordance with Regulation (EC) No 216/2008 on behalf of the European Community, its Member States and European third countries that participate in the activities of EASA under Article 66 of that regulation.

3.8.3. Pilot licences

Pilot licensing or certification refers to permits to fly aircraft issued by the national aviation authority (NAA) in each country, establishing that the holder has met a specific set of knowledge and experience requirements. This includes taking a flying test. A certified pilot can then exercise a specific set of privileges in that nation's airspace. Despite attempts to harmonise requirements between nations, differences in certification practices and

standards from place to place limits full international validity of national qualifications. In addition, US pilots are certificated, not licensed, although the word license is still commonly used informally ⁽³⁰⁾. Legally, pilot certificates can be revoked by administrative action, while licensing (such as a driver's licence) requires intervention by the judiciary system.

In the United States, pilot certification is regulated by the Federal Aviation Administration (FAA), a branch of the Department of Transportation (DOT). In Canada, licences are issued by Transport Canada. In the United Kingdom, licences are issued by the Civil Aviation Authority (CAA).

In most European countries, licences are issued by the national aviation authority according to a set of common rules established by the Joint Aviation Authorities known as joint aviation rules – flight crew licensing (JAR-FCL).

The EASA published ⁽³¹⁾ in August 2010 a proposal to the European Commission for a harmonised regulation on flight crew licensing (Part-FCL) in the form of an 'opinion'. This new regulation will ensure that the same pilot licensing requirements and related high safety levels apply in all Member States. This 'opinion' covers requirements for pilot licensing for aeroplanes, helicopters, airships, powered-lift aircraft, sailplanes and balloons. Measures to ensure smooth transition to the new rules are also provided.

As requested by the European Parliament in its agenda for sustainable general and business aviation, the newly developed light aircraft pilot licence, which is part of the new regulation, will ease access to aviation for a broader public while maintaining a high level of safety.

A flying academy ⁽³²⁾ is a flight school, which is partially owned by airline pilots and orientated to training professional pilots. In a flying academy focus is on professional care and integrated training.

The abbreviation ATPL means airline transport pilot licence and is the highest level of aircraft pilot certification. ATPL courses are designed to train pilots to work in an airline company. Those certified as airline transport pilots are authorised to act as pilot-in-command of an aircraft in air carrier service (airline).

⁽³⁰⁾ http://en.wikipedia.org/wiki/Pilot_licensing_and_certification [accessed 21.3.2012].

⁽³¹⁾ <http://easa.europa.eu/communications/press-releases/PRen27082010.html> [accessed 21.3.2012].

⁽³²⁾ <http://www.atpl.at/index.php> [accessed 21.3.2012].

Course entry requirements:

- minimum age of 18 years;
- class 1 medical certificate;
- at least private pilot licence holder;
- sufficient level of knowledge of mathematics and physics;
- acceptable English language skills;

Holders of an airline transport pilot licence:

- enjoy all privileges of holders of a private pilot licence;
- act as pilot-in-command or co-pilot in airplanes engaged in commercial air transportation.

Applicants have to go through ground training covering: air law and ATC (air traffic control) procedures, airframes and systems, electrics, powerplant, emergency equipment, instrumentation, mass and balance, performance, flight planning and monitoring, human performance and limitations, meteorology, general navigation, radio navigation, operational procedures, principles of flight and communications.

Table 12. **ATPL – Airline transport pilot licence**

Purpose	Sectoral need, health and safety, technological needs
Type	Full qualification
Coverage	International
Competent body	International Civil Aviation Organisation
Currency	High value in the sector – requirement to enter

3.8.4. Air traffic controllers

Commission Regulation (EU) No 805/2011 of 10 August 2011, lays down detailed rules for air traffic controllers' licences and certain certificates pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council.

The licence introduced by Directive 2006/23/EC of the European Parliament and of the Council of 5 April 2006 on a Community air traffic controller licence has proved to be a successful tool for recognising the specific role air traffic controllers play in safe provision of air traffic control. Establishment of EU-wide competence standards has reduced fragmentation, making for more

efficient organisation of work in the framework of growing regional collaboration between air navigation service providers. Therefore, maintaining and improving the common licensing scheme for air traffic controllers in the EU is an essential element of the European air traffic control system.

To improve Member States' confidence in one another's air traffic controller licensing systems, common rules for obtaining and maintaining licences are indispensable. It is therefore important, to ensure the highest level of safety, to introduce uniform requirements for training, qualifications, competence and access to the air traffic controller profession. This should lead to provision of safe, high-quality air traffic control services and contribute to recognition of licences throughout the EU, thereby increasing freedom of movement and availability of air traffic controllers.

'Air traffic control service' is a service provided to prevent collisions between aircraft, and, on the manoeuvring area, between aircraft and obstructions, and expediting and maintaining an orderly flow of air traffic; 'licence' is a certificate, by whatever name it may be known, issued and endorsed in accordance with this regulation and entitling its lawful holder to provide air traffic control services in accordance with the ratings and endorsements contained therein.

Applicants for air traffic controller licence shall:

- (a) be at least 21 years old. However, Member States may provide a lower age limit in duly justified cases;
- (b) hold a student air traffic controller licence;
- (c) have completed an approved unit training plan and successfully passed the appropriate examinations or assessments in accordance with specific requirements;
- (d) hold a valid medical certificate;
- (e) have demonstrated an adequate level of language proficiency.

Civilian air traffic controllers' licensing is standardised by international agreement through ICAO⁽³³⁾. Many countries have air traffic control schools, academies or colleges, often operated by the incumbent provider of air traffic services in that country, but sometimes privately. These train student controllers walking in off the street to the standards required to hold an air traffic control licence, which contains one or more ratings. These are subqualifications denoting the air traffic control discipline or disciplines in which the person has been trained. ICAO defines five such ratings: area (procedural), area radar, approach (procedural), approach radar and aerodrome. In the United States, controllers may train in several similar

⁽³³⁾ <http://www.icao.int/> [accessed 21.3.2012].

specialties: tower, ground-controlled approach (GCA), terminal radar control, or enroute control (both radar and non-radar). This phase of training takes between six months and several years.

Whenever air traffic controllers are posted to a new unit or start work in a new sector within a particular unit, they must undergo a period of training on the procedures peculiar to that particular unit and/or sector. The majority of this training is done in a live position controlling real aircraft and is termed on-the-job training (OJT), with a fully qualified and trained mentor or on-the-job training instructor (OJTI) also 'plugged in' to the sector to give guidance and ready to take over in a second should it become necessary. The length of this phase of training varies from a matter of months to years, depending on complexity of the sector. Only once a person has passed all these training stages will they be allowed to control on their own.

Eurocontrol, the European Organisation for the Safety of Air Navigation, is an intergovernmental organisation made up of 39 Member States and the European Community. Today, with its partners, Eurocontrol is committed to building a single European sky required for the 21st century and beyond. The single European sky (SES) is being developed based on the regulations contained in two legislative packages adopted by the European Parliament in March 2004 and March 2009. This regulatory framework was drafted by the European Commission with assistance of from and is designed to help the aviation community increase capacity of the European airspace. Founded in 1960, it is a civil-military organisation that has developed into a vital European repository of air traffic management (ATM) excellence, both leading and supporting ATM improvements across Europe.

The Luxembourg-based Institute of Air Navigation Services, also known as IANS, provides training for European air traffic controllers and aviation experts throughout Europe. It delivers a comprehensive syllabus covering the following subjects: air traffic management, communications, navigation and surveillance (CNS).

Eurocontrol's training activities are planned and provided to benefit from economies of scale. Training courses support ATM/CNS activities in a pan-European context by delivering training and awareness programmes that harmonise skill levels of air traffic controllers and ATM specialists across the network. The institute offers both classroom-based courses and e-learning distance services. In doing so, Eurocontrol contributes directly to achieving the single European sky performance scheme by helping the ATM community achieve their network performance targets through provision of training expertise on request.

Specific training courses cover: development and maintenance of ATM surveillance products; development of controller selection tools; support for implementation of SESAR (single European sky air traffic management research) improvements; dedicated support requiring the agency's specific expertise.

Table 13. **Air traffic controllers**

Purpose	Sectoral need, health and safety, technological needs
Type	Full qualification
Coverage	European/international
Competent body	International Civil Aviation Organisation/Eurocontrol
Currency	High value in the sector – requirement to enter

3.8.5. Airbus training

Airbus customer services training centres ensure smooth entry into service of Airbus aircraft by providing operators with a wide range of training courses for pilots, flight attendants, maintenance staff and performance engineers. These courses are provided through a global network of training centres ensuring flexibility for Airbus customers. Airbus training centres in Toulouse, Miami, Hamburg and Beijing offer interactive courses with constantly updated programmes to train flight and cabin crews as well as maintenance personnel. These include the new Airbus pilot transition (APT) course, which incorporates the latest maintenance/flight training device; the new Airbus pilot instructor course (APIC); an entry level training course for junior pilots.

The Airbus training centre in Toulouse coordinates training of flight crews, cabin attendants and maintenance personnel for airline customers coming from every part of the world. Airbus also accredits training partners for providing of training courses.

3.8.6. Airbus Catia V5 composites

The professional qualification to use Catia V5 demonstrates competence and ability and is recognised across the wider engineering industry. Airbus approved training partners offer this qualification required to Airbus design engineering systems throughout the world. The courses are all Airbus accredited and provide certification following successful completion. This

training is intended for all composite designers working on the Airbus A350 programme. Duration of the course is four days and the objective is to enable trainees to design a complex composite part using Catia V5 CPD workbench, understand the composite design process, identify the difference between solid and grid approaches, apply composite design methods, understand manufacturing constraints and adapt stress inputs to the design rules.

Table 14. **Airbus Catia V5 composites**

Purpose	Sectoral need –technological needs
Type	Certification
Coverage	Sectoral/Airbus and aerospace engineering industry companies
Competent body	Airbus
Currency	High value in the sector – requirement to enter

3.9. Road transport

The aim of the European Union’s land transport policy is to promote mobility that is efficient, safe, secure and environmentally friendly. EU policy objectives for road transport are therefore to: promote efficient road freight and passenger transport services; create fair conditions for competition; promote and harmonise safer and more environmentally-friendly technical standards; ensure a degree of fiscal and social harmonisation; and guarantee that road transport rules are applied effectively and without discrimination.

Legislation applying to road transport services establishes common rules on access to the profession and the market, sets minimal standards for working time, driving time and rest periods (including enforcement and use of tachograph) for professional road transport, and sets minimum annual vehicle taxes, as well as common rules for tolls and user charges for heavy goods vehicles. It harmonises maximum weights and dimensions of road vehicles. The Commission also promotes more and safer parking areas along the trans-European road network.

In December 2009 new regulations on road transport were adopted, including Regulation (EC) No 1071/2009. Since 4 December 2011, admission to the occupations road haulage operator and road passenger transport operator in the European Union is governed by Regulation (EC) No

1071/2009. This regulation replaces Directive 96/26/EC as amended by Directive 98/76/EC.

According to the regulation, operators must fulfil four criteria to access the profession:

- good repute, to ensure adequate entrepreneurial ethical conduct. Manipulating a tachograph, for example, would be considered a serious infringement leading to loss of good repute;
- financial standing, requires operators to have capital assets every annual accounting year of at least EUR 9 000 for the first vehicle and EUR 5 000 for each additional vehicle;
- professional competence, assesses practical knowledge and aptitude of professionals by means of an obligatory exam with common arrangements, marking and certificates;
- be effectively established in a Member State.

A transport manager responsible for respect of road transport legislation must be designated by each road transport operator. National authorities have to carry out regular checks to ensure that undertakings continue to satisfy these four criteria. To help monitor road transport undertakings, Member States have to set up national electronic registers which will be, from 2013, interconnected to ease cooperation and exchange of information at European level.

The purpose of these rules is to:

- achieve greater harmonisation of standards between Member States, particularly on required levels of financial standing and expected standard of professional competence;
- facilitate the right of establishment in other Member States and the mutual recognition of professional status;
- improve the overall professional standing and quality of road transport;
- prevent unscrupulous firms from seeking to gain market share by skimping on safety and working conditions.

Completion of an internal market for road transport with fair conditions of competition requires uniform application of common rules on admission to occupations of road haulage operator or road passenger transport operator (road transport operator). Such common rules contribute to achievement of a higher level of professional qualification for road transport operators, rationalisation of the market and improved quality of service, in the interests of road transport operators, their customers and the economy as a whole, as well as improvements in road safety. They also promote effective exercise of the right of establishment by road transport operators.

Council Directive 96/26/EC of 29 April 1996 on admission to occupations of road haulage operator and road passenger transport operator and common recognition of diplomas, certificates and other evidence of formal qualifications intended to promote the right to freedom of establishment in national and international transport lays down minimum conditions. However, experience, an impact assessment and various studies show the directive is being applied inconsistently by Member States. Such disparities have several adverse consequences, in particular distortion of competition and lack of market transparency and uniform monitoring, as well as a risk that undertakings employing staff with a low level of professional qualification may be negligent or less compliant with the rules on road safety and social welfare, which could harm the sector's image.

Knowledge to be considered for official recognition of professional competence by Member States must cover at least subjects listed in the directive for road haulage and road passenger transport respectively. Applicants must have knowledge and practical aptitude necessary for managing a transport undertaking.

The minimum level of knowledge should not be below level 3 of the training-level structure laid down in the Annex to Council Decision 85/368/EEC(1) ⁽³⁴⁾. This is the level of knowledge acquired during compulsory education, which is supplemented either by vocational training and supplementary technical training or by secondary school or other technical training.

Member States have to organise a compulsory written examination which they may supplement with an optional oral examination to establish whether applicant road transport operators have achieved the required level of knowledge in the subjects and in particular their capacity to use instruments and techniques relating to those subjects, and to fulfil the corresponding executive and coordination duties.

3.9.1. International driving licence

An estimated 300 million people ⁽³⁵⁾ in the EU hold a driving licence. The EU is striving to harmonise requirements for obtaining a licence as well as the design. The harder the test for obtaining a driver's licence, the safer the driver

⁽³⁴⁾ Council Decision 85/368/EEC of 16 July 1985 on comparability of vocational training qualifications between Member States of the European Community. *Official Journal of the European Union*, L 199, 31.7.1985, pp. 56-59. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31985D0368:en:HTML> [cited 5.4.2012].

⁽³⁵⁾ http://ec.europa.eu/transport/road_safety/behavior/driving_licence_en.htm [accessed 21.3.2012].

is. Theoretical and practical tests could also become harmonised in all EU countries.

European legislation on driving licences has a direct impact on the life of European citizens. Improving road safety is one of the main objectives of driving licence legislation. Recognition of driving licences also eases free movement of citizens. Implementation of a single model throughout the European Union would ensure greater security.

The conditions for issuing driving licences are laid down in Directive 91/439/EEC of 29 July 1991. The main contents are:

- necessary to pass a test of knowledge (theory) and a test of skills and behaviour (practical);
- required to meet minimum standards of physical and mental fitness to drive;
- mandatory to have normal residence in the Member State issuing the licence;
- harmonisation of categories of driving licences;
- minimum ages for driving different types of vehicles;
- progressive access in categories A, C and D, from light vehicles to larger or more powerful vehicles;
- creation of a community driving licence model (paper and plastic card).

Directive 2006/126/EC of 20 December 2006 will replace Directive 91/439 on 19 January 2013. The new rules introduced by Directive 2006/126/EC will reduce possibilities of fraud, guarantee a true freedom of movement for EU drivers and reinforce safety on European roads.

Table 14. **International driving licence**

Purpose	Sectoral need, health and safety
Type	Certificate/licence
Coverage	European/International
Competent body	European Commission
Currency	Requirement to enter

4. The welding case

4.1. Welding

Welding ⁽³⁶⁾ is a fabrication or manufacturing process that joins materials, usually metals or thermoplastics, by causing coalescence usually by fusion and solidification. This is often done by melting the work pieces and adding a filler material to form a pool of molten material (the weld pool) that cools to become a strong joint, This is in contrast to soldering and brazing, which involve melting a lower-melting-point material between the work pieces to form a bond between them, without melting the work pieces.

Many different energy sources can be used for welding, including a gas flame, an electric arc, a laser, an electron beam, friction, and ultrasound. While often an industrial process, welding may be performed in many different environments, including open air, underwater and in outer space. Welding is a potentially hazardous undertaking and precautions are required to avoid burns, electric shock, vision damage, inhalation of poisonous gases and fumes, and exposure to intense ultraviolet radiation.

Until the end of the 19th century, the only welding process was forge welding, which blacksmiths had used for centuries to join iron and steel by heating and hammering. Arc welding and oxy-fuel welding were among the first processes to develop late in the century, and electric resistance welding followed soon after. Welding technology advanced quickly during the early 20th century as World War I and World War II drove demand for reliable and inexpensive joining methods. Following the wars, several modern welding techniques were developed, including manual methods like shielded metal arc welding, now one of the most popular welding methods, as well as semi-automatic and automatic processes such as gas metal arc welding, submerged arc welding, flux-cored arc welding and electroslag welding. Developments continued with invention of laser beam welding, electron beam welding, electromagnetic pulse welding and friction stir welding in the latter half of the century.

⁽³⁶⁾ <http://en.wikipedia.org/wiki/Welding> [accessed 21.3.2012].

Today, science continues to advance. Robot welding is commonplace in industrial settings, and researchers continue to develop new welding methods and seek an even greater understanding of weld quality and properties. The underlying aim is to increase productivity, and improve product quality and reliability. A significant ‘driver’ is the safety critical nature of welded products and components.

Welding is important in our societies because most engineering products (for example in transport, power generation, oil and gas, processing, construction, etc.) rely on welding, and serious consequences (catastrophic loss of life and destruction) continue to arise from welding failures. It has been estimated that repairing an unacceptable weld can cost five to six times more than the cost of welding it correctly the first time.

Welding technology is applied in different production processes of various industries and, as a cross-sector technology, is very important for the global economy. Current research reveals that the European market share in joining technology supplies amounts to one third of world markets (Cedefop, 2011).

Due to a high degree of international organisation, sectoral organisations play a larger and more autonomous role with welding qualifications than organisations in other sectors. There are qualifications in national qualification structures, and at the same time, the international welding sector (through the European Welding Federation and the International Institute for Welding) has been active in harmonising standards and qualifications for decades, offering different types of welding qualifications. An entirely sector-based qualifications system has been established which exists next to, and sometimes fully or partially integrated with, national qualification structures.

It is interesting to note that welding has had harmonised training and qualifications developments dating back to the early 1990s. Technological changes and the need for a health and safety guarantee supported by quality assurance covering all processes led the professional ‘community of practice’ to think in terms of a ‘welding quality chain’; the links in the chain being those with welding responsibilities, such as welders, non-destructive testing (NDT) personnel, welding inspectors, welding coordinators, quality managers, etc. It was necessary for all ‘links in the chain’ to acquire and exercise appropriate competence.

Competent practice was supported by various European and international standards such as EN ISO 3834 ⁽³⁷⁾ (formerly EN 729) on quality requirements for welding, and EN ISO 14731 ⁽³⁸⁾ (formerly EN 719) on welding coordination.

⁽³⁷⁾ http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=35145
[accessed 21.3.2012].

Compliance with standards become a requirement, and the standards and EU directives made reference to the need for competence based on the European Federation for Welding, Joining and Cutting (EWF) and the International Institute for Welding (IIW), 'system'. In addition, product standards and client specifications also played a role in establishing the importance of competence being assured through use of personnel with relevant EWF/IIW qualifications.

4.2. The EWF/IIW system

The EWF/IIW 'system' specifies detailed requirements for learning and assessing several different welding functions at different levels. The 'guidelines' created specify threshold requirements for access, curricula, learning provision and assessment in some detail, all of which have been agreed at European, and then international level. The processes and quality assurance are controlled by the (EWF/IIW) *international authorisation board* (IAB) and implementation through *authorised national bodies* (ANBs). Audit of the ANBs, at their expense, is carried out every two-and-a-half years.

The EWF European training and qualification system for welding personnel started around 1990, and in June 2011 there were 42 ANBs, with welding bodies of seven other countries applying. All major industrialised countries of the world are now involved and the number of IIW diplomas awarded reached some 67 000 in 2011. About 113 000 EWF diplomas have been awarded, although the rate has been easing since the 'international' diploma became available. Diplomas are recognised in most countries, and are generally needed for an individual to be able to carry out any serious welding work.

4.3. European Welding Federation

The European welding community created the European Council for Cooperation in Welding (ECCW) in 1974 with participation of Belgium, Denmark, Germany, Ireland, France, Italy, the Netherlands and the United Kingdom. Work on harmonisation of training and qualification of welding personnel in Europe started in 1980 with an analysis of existing levels of

⁽³⁸⁾ http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=35151
[accessed 21.3.2012].

education in welding in the EU and EFTA countries and, from the results, it was possible to define common harmonised levels of education, training and qualification.

In 1992, the European Federation for Welding, Joining and Cutting was created and membership of EWF enlarged with participation of all countries from the European Community to EFTA and eastern European countries. This was the year guidelines for European welding engineer, technologist and specialist were approved and implementation started with the first three authorised national bodies approved in Spain, Portugal and the UK.

In 1997, a formal agreement was signed between the International Institute for Welding and EWF to develop an international qualification system based on the EWF system. Observers became full members, making EWF an organisation of 24 members. In the same year weld-on, the first cooperation pilot project was approved under the Leonardo da Vinci programme and since then 17 pilot projects have been finalised. In June 2011, EWF was running 10 pilot projects.

Based on equivalent EWF documents the IIW qualification system was formally established in 2000 and operation rules were issued. The first IIW guidelines were issued including international welding engineer, international welding technologist, international welding specialist and international welding practitioner. The first international authorised national body approved was China followed by Japan, Australia and USA.

4.3.1. Guidelines and standards

The EWF committee for education and training prepared guidelines for courses, giving the contents in terms of themes and keywords with minimum teaching times assigned to them. Access to harmonised courses is only for those with appropriate general education, different in each country.

One way for a company to show that its welding production and products meets appropriate quality requirements is through implementation of EN ISO 3834 (formerly EN 729). Revised and updated in 2005, this is the single most important standard regarding achievement of welding quality. Many EN product standards and EU directives require manufacturers to comply with EN ISO 3834.

4.4. International Institute of Welding

The International Institute of Welding was founded in 1948 by the welding institutes/societies of 13 countries who considered it crucial to make more rapid scientific and technical progress possible at global level. Their vision was for the IIW to be ‘the international vehicle by which innovation and best joining practices could be promoted, while providing an international platform for exchange and dissemination of evolving welding technologies and applications’.

The IIW is today a universal reference, the largest worldwide network for welding and allied joining technologies, boasting 54 countries from the five continents. Through its 25 technical commissions and working units, the organisation’s technical focus encompasses joining, cutting and surface treatment of metallic and non-metallic materials by such processes as welding, brazing, soldering, thermal cutting, thermal spraying, adhesive bonding and microjoining. IIW also embraces allied fields including quality assurance, non-destructive testing, standardisation, inspection, health and safety, education, training, qualification, design and manufacturing.

4.4.1. IIW manufacturer certification system

In 2007, the European Welding Federation and the International Institute for Welding created a single system for manufacturer certification according to ISO 3834 based on the EWF system. IAB is the structure within IIW that implements this as an IIW certification system. EWF certificates remain in place for European countries that prefer them.

4.4.2. Certification to EN ISO 3834

Development of European and international standards is having a profound effect on manufacturing companies as success in this business depends on compliance with a bewildering array of requirements which seem to change almost daily.

Many companies have achieved certification to ISO 9001 of their quality management systems. But where significant use is made of a special process such as welding, such certification is unlikely to provide demonstration of capability of the company to manufacture products of the required quality.

EN ISO 3834 can overcome this shortfall and support a manufacturing company’s ability to sell its products in both domestic and overseas markets. Compliance with EN ISO 3834 provides the possibility for a ‘one-stop-shop’ to achieve global recognition of the company’s capability.

Entitled 'quality requirements for welding', the standard provides details of how to control the various welding and welding-related operations to achieve the desired quality consistently. A key feature of the standard is the requirement to ensure that people with welding responsibilities are competent to discharge those responsibilities and this can be achieved by incorporation of another standard, the EN 719/ISO 14731 'welding coordination - tasks and responsibilities'.

Independent certification to EN ISO 3834 benefits manufacturers by providing an authoritative third party statement of commercial value and this type of certification can be achieved alongside an ISO 9001 certification or it can stand alone. The stand-alone option may be more attractive to companies in which welding operations are simple.

EN ISO 3834 itself is not a quality system standard but it can be used as a useful tool for fulfilling EN ISO 9001:2000 requirements for special processes when this standard is applied by the manufacturer. It can also be used by manufacturers on its own as a way of demonstrating to a third party that manufacturing welding products is carried out according to an appropriate quality requirement level.

Whenever a manufacturer refers to compliance with a certain ISO 3834 quality level, it should be sufficient to demonstrate that the manufacturer's capabilities are fully adequate for control of welding activities in relation to the type of product or welding work being carried out by the company.

Safety and profit depend on technical control of welding operations, so key staff in all welding activities need to have an appropriate level of competence in welding technology and its application. This means that, in addition to employing competent and tested welders, manufacturers should ensure that engineers, designers and technicians who deal with welding matters have proven relevant competence. This is increasingly becoming a contract requirement, a trend expected to accelerate as new European directives and European/international standards for welding come into force.

4.5. Qualification

In 1999, the International Institute of Welding launched an international programme for qualification of personnel involved in welding operations. The definition used for qualification is attainment by an individual learner of a defined body of knowledge by means of training and examination. Qualification is confirmed by issuing a 'diploma' which is valid for life. It is important to stress

that qualification, in itself, does not indicate that the diploma holder is competent to do a particular job.

Under supervision of the International Authorisation Board, this scheme allows:

- authorised national bodies to deliver diplomas of international welding engineers (IWE), technologists (IWT), specialists (IWS), practitioners, inspectors and welders, among others;
- authorised national bodies for company certification (ANBCC) to deliver the certification ISO 3834 'Quality requirements for fusion welding of metallic materials'.

The international authorisation board's day-to-day work is handled by a secretariat and working groups on education, training and qualification and implementation and authorisation.

Effectively, holders of IWE, IWT and IWS diplomas are considered to be able to satisfy the requirements to be responsible welding coordinators, according to ISO standard, ISO 14731, 'Welding coordination; tasks and responsibilities'. Qualifications of international welding inspection personnel (IWIP) are referenced in ISO 3834, 'Quality requirements for fusion welding of metallic materials' and due to continually increasing, global use of ISO 14731 and ISO 3834 standards, numerous countries are implementing IIW international programmes.

4.5.1. Training and qualifications for welding personnel

European Welding Federation courses' guidelines cover all professional levels in welding technology and related areas, such as thermal spraying, adhesive bonding, plastics welding and underwater welding, leading to recognised qualifications in 42 countries.

The EWF system is recognised in Europe and abroad and its adoption outside Europe was established through an agreement signed between the International Institute of Welding and EWF for development of an international scheme based on EWF training guidelines and qualification procedures. This agreement states that IIW guidelines will replace equivalent EWF guidelines. Harmonised international training and qualifications are given for the following levels:

- I/EWE, international/European welding engineer;
- I/EWT, international/European welding technologist;
- I/EWS, international/European welding specialist;
- I/EWP, international/European welding practitioner;
- I/EWIP, international/European welding inspection personnel;

- IWSD, international welded structures designer;
- IW – international welder.

Other education and training guidelines and special courses developed up to now are:

- EAW, European aluminothermic welder;
- EDW, European MMA diver welder;
- EPW, European plastic welder;
- ETSS, European thermal spraying specialist;
- ETSP, European thermal spraying practitioner;
- ETS, European thermal sprayer;
- EAE, European adhesive engineer;
- EAS, European adhesive specialist;
- EAB, European adhesive bonder;
- EWS-RW, European welding specialist for resistance welding;
- EWP-RW, European welding practitioner for resistance welding;
- special course in laser welding (engineer, technologist and specialist levels);
- special course for robot welding at specialist level;
- special course for welding reinforcing bars at specialist level;
- special course on weld imperfections for non-destructive personnel;
- special course on personnel with responsibility for macroscopic and microscopic metallographic examination;
- special course on personnel with responsibility for heat treatment of welded joints;
- special course on risk management in welded manufacture.

Guidelines (International Institute of Welding guidelines; International Authorisation Board, 2005) present minimum requirements for theoretical education, practical training and examination of specific qualifications, and use of them is restricted to organisations approved by authorised national bodies. A key feature of the guidelines is they prescribe in detail the required learning outcomes on a topic by topic basis. The term used is 'expected results'.

If we take an example of the guideline for the IW, approved in January 2005, the education and training programme consists of three modules '1' to '3'.

The full International Institute of Welding course consists of modules, divided into theoretical education, practical training and examination. Practical training - practice in welding and test welding - is based on relevant instruction and exercise schedules as in the guideline. It comprises three levels of education and training: 'fillet welder', 'plate welder' and 'pipe welder'.

Special requirements for each welding process are given in various modules. It is for authorised national bodies to decide whether it is desirable to add knowledge on specific materials to the course. This knowledge should be in addition to the basic knowledge specified in the guideline. Access to module 1 requires appropriate health, physical and mental capability and also enough knowledge or education in metalworking. Successful completion of one module qualifies for participation in the next module. With existing knowledge and proven skill, the programme may be entered at a higher level, provided the candidate demonstrates a capability (practically and theoretically) to meet the entry requirements. Access to module 2 is possible after demonstrating the required level of skill by passing the tests described in module A. This logic also applies to the remaining levels. Practical skill may be proven by adequate and valid ISO 9606 or equivalent certificates.

In Annex IV there is additional information regarding content of theoretical and practical training.

4.6. Certification

As already mentioned, diplomas issued under the qualification system do not, in themselves, indicate job competence. The EWF/IIW personnel certification scheme provides a simple means by which job capability can be assessed and recognised and it follows acquisition of a qualification. It defines the profile of education, knowledge, experience and responsibility required for a range of conventional welding tasks, and provides a professional assessment procedure. It is actually a step following acquisition of a specific qualification and it is closely linked to licensing. In 2007, EWF and IIW agreed to transfer the EWF personnel certification scheme to IIW. There are five levels of certification titles:

- European/international welding engineers,
- technologists,
- specialists,
- practitioners,
- welders.

The first three are deemed to satisfy competence requirements of ISO 14731 providing the certificate holder's range of EOF satisfactory experience matches their job specification. To get the certification there are five steps that should be followed. For example, for a certified international/European welding engineer the steps are the following:

- technical knowledge requirement is acquisition of the international/European welding engineer qualification (IIW/EWF diploma);
- two years recent experience of relevant job content and level;
- demonstration of maintaining and developing technical knowledge;
- assessment by the ANB;
- issue of certificate ‘certified international/European welding engineer’ (renewed every year by repeating steps two, three and four above – ‘surveillance’);

4.6.1. Relation between the welding qualification and certification titles

Let us examine more closely the relation between the qualification and certification titles for the European/international welding engineer.

For the qualification title it is agreed that entry to the international welding engineer (International Institute of Welding; International Authorisation Board, 2007) programme should be at postgraduate level. Participants should have a primary degree in an engineering discipline or its equivalent recognised by a national government and assessed by the ANB. Therefore, participants should have at least a bachelor degree.

There are also cooperation arrangements, for example, with universities, according to which an undergraduate having finalised module 1 as part of an undergraduate course can be exempt from that module in the postgraduate course.

The I/EWE syllabus is used in universities in different European countries as the scholar part of the MSc in Welding Technology. This has led to a definition of a credit structure (ECTS – European credit transfer and accumulation system) for each of the modules in the I/EWE course.

Table 15. **European/international welding engineer (qualification)**

Purpose	Sectoral need – health and safety, technological needs, quality assurance
Type	Certificate
Coverage	International
Competent body	International Institute of Welding and European Welding Federation
Currency	High value in the sector – requirement to enter

Personnel certification scheme certificates should not be confused with IIW/EFW diplomas ⁽³⁹⁾. The latter testify that the holder demonstrated an appropriate level of knowledge of welding technology at one particular point in time. The diplomas awarded are, like a degree, valid for life. There is no check on whether individuals have kept up to date with the technology or whether they have continued to be involved in it. As an extreme example, a person could gain an international welding engineer diploma by doing the full course within a few months of graduating with a university degree in engineering. There is no requirement for industrial experience, and this person would still be a properly qualified international welding engineer 20 years later, even if they had spent the entire 20-year period in a completely unrelated occupation. Therefore IIW/EFW diplomas are a statement of historical attainment. In contrast, the personnel certification scheme has three main objectives:

- testify that applicants have demonstrated the appropriate level of knowledge of welding technology at a point in time. The knowledge requirement is the appropriate IIW/EFW diploma;
- require applicants to have been working satisfactorily on specified welding tasks and to have exercised specified responsibilities appropriate to the level of certification sought over two years of the three-year period prior to certification;
- require applicants to demonstrate that they have kept up to date with welding technology; that is, maintaining and developing their knowledge base.

Certificates are valid for three years only after which, if holders wish to be recertified, they must demonstrate that relevant competence and knowledge have been maintained. More recently EFW introduced certification schemes for welders, including plastics welders.

⁽³⁹⁾ Newsletter: news and information about the EFW and the IAB/IIW, 2010.

Table 16. **Certified European/international welding engineer (certification)**

Purpose	Sectoral need – health and safety, technological needs, quality assurance
Type	Certificate/licence
Coverage	International
Competent body	International Institute of Welding and European Welding Federation
Currency	High value in the sector for a specific period (3 years) – requirement to enter

In summary:

- competence in welding is key for the safety, reliability and cost-effectiveness of welded products. This applies to all personnel;
- over the past 20 years IIW and EWF have developed and installed a comprehensive harmonised qualification system which promotes the adoption of best practices in terms of competence demonstration;
- competence in welding was recognised in ISO 3834 and ISO 14731 and these standards quote the EWF/IIW qualification system as an exemplar;
- the EWF/IIW system is underpinned by a rigorous quality assurance regime;
- the system has been used throughout the world and over 180 000 diplomas have been awarded (December 2010).

EWF and IIW are two major welding organisations in which international expertise in welding and related technologies is assembled. For nearly 30 years, these organisations have been developing guidance documents and technology exchange mechanisms to support companies seeking to adopt best practice in welding. This has been an effort, culminating in installation of unique and comprehensive training, qualification and certification systems, applied to both people and companies, harmonised worldwide.

5. The way ahead

Working on international qualifications is complicated considering the diversity and complexity of the concept. For this report an international qualification is a certificate, diploma, degree or title developed, awarded and recognised in more than one country. International qualifications can be issued in the framework of an international, national, regional or sectoral qualification system. Elements of the typology presented in the previous chapters are offered as a first attempt to capture what is behind the term international qualification. Our main concern has been to introduce an analytical framework inclusive and broad enough to capture existing diversity in this field. The previous chapters have demonstrated that the term hides an extensive variety of qualifications, certificates, diplomas and (to some extent) licences which can be identified and analysed according to five aspects of awarding body, type, purpose, coverage and exchange value (currency).

There is big diversity in the companies, organisations and other bodies involved in developing and awarding international qualifications. Quality assurance is the crucial dimension regarding value and recognition by the labour market. Types of international qualifications become highly important when considering the effect of licensing and certification as licensing intervenes further in the market process. Discussion on the real value of international qualifications can be very complicated due to different social, economic and sectoral elements. Flexibility and tailor-made solutions offered to the labour market is in many cases counterbalanced by complications created due to the many international certifications on offer. Geographical and institutional coverage are key points and will have to be considered for each qualification as, although coverage is frequently clearly indicated, in several sector-based certificates limited coverage exists in practical terms.

What unites this extreme variety of qualifications is the fact that they are not restricted to a particular national system or territory. They are all ‘non-state’ qualifications whose exchange value is defined outside the traditional national qualifications systems. This raises some key-questions and challenges relevant to policy-makers as well as to users – be these individual citizens or employers.

An interesting general observation is that transparency of national qualifications is improving as it is becoming easier to review which qualifications

exist, by whom they have been awarded and where they can be used. The reason is introduction of national qualifications frameworks and development of more sophisticated databases that have reduced some of the complexity traditionally faced by users. The opposite applies to international qualifications. Gaining importance of qualifications awarded outside national jurisdiction has increased complexity and lack of transparency. There is currently no single institution or body, at national or international levels, with an overview of or fully understanding developments. For users, individuals or employers, the situation is deteriorating rather than improving. The situation described in this booklet points to a need to deepen mapping of international qualifications and gradually come up with a system making it easier for users to review developments.

Quality issues are of fundamental importance as although in national qualifications quality is a central issue systematically involving a broad range of stakeholders and attracting considerable political attention, in international qualifications quality is still crucial but far more difficult to comprehend fully. While market forces are important (the role played by certificates from multinational companies is a direct reflection of their market position), individuals increasingly face a problem of how to distinguish 'rogue' and 'fake' qualifications from 'serious' qualifications reflecting high levels of learning. While ISO and EN standards have played a role, future developments will require a much more systematic effort to understand and address quality of international qualifications. To some extent, those awarding qualifications must become more accountable and willing to be open about the processes leading to award of a certificate or diploma.

Future work lies at the crossroads of transparency and quality. Overall relevance of international qualifications requires that they are trusted by potential users. This can only be achieved by systematically creating an overview of what exists and emerges, and by systematically addressing the need for accountability and openness regarding the process leading to a particular qualification. International and national qualifications are both value papers which require trust if they are to fulfil their roles in the labour market and society. Without this trust they will fail and in the worst case mislead individuals and employers.

Cedefop will continue work on international qualifications to address transparency and quality. This work will take place in the context of ESCO and EQF but will also seek to create an independent and trustworthy review and understanding of developments.

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Pilot projects

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ANNEX I

List of abbreviations

ACCA	Association of Chartered Certified Accountants
AM	Accreditation model
AMI	Association Montessori International
ANB	Authorised national bodies
ANBCC	Authorised national bodies for company certification
ANSI	American National Standards Institute
APIC	Airbus pilot instructor course
APT	Airbus pilot transition
ASTM	American Society for Testing and Materials
ATC	Air traffic control
ATM	Air traffic management
ATPL	Airline transport pilot licence
CAA	Civil Aviation Authority
CCDE	Cisco certified design expert
CCIE	Cisco certified internetwork expert
CCENT	Cisco certified entry networking technician
CCNA	Cisco certified network associate
CEFR	Common European framework of reference
CEN	European Committee for Standardisation
Cenelec	European Committee for Electrotechnical Standardization
CEPIS	Council of European Professional Informatics Societies
CNS	Communications, navigation and surveillance
CPE	Cambridge English proficiency
DOT	Department of Transportation
EAB	European adhesive bonder
EAE	European adhesive engineer
EAS	European adhesive specialist
EASA	European Aviation Safety Agency

EAW	European aluminothermic welder
EBTN	European bank training network
ECCW	European Council for Cooperation in Welding
ECDL	European computer driving licence
ECTS	European credit transfer and accumulation system
EDW	European MMA diver welder
EFCB	European foundation certificate in banking
EHC	European hairdressing certificate
EOSE	European Observatory of Sport and Employment
EPW	European plastic welder
EQF	European qualifications framework
ESCO	European classification of skills/competences, qualifications and occupations
ESOL	English for speakers of other languages
ETS	European thermal sprayer
ETSI	European Telecommunications Standards Institute
ETSP	European thermal spraying practitioner
ETSS	European thermal spraying specialist
EWf	European Federation for Welding, Joining and Cutting
EWP-RW	European welding practitioner for resistance welding
EWS-RW	European welding specialist for resistance welding
FAA	Federal Aviation Administration
FCCA	Fellow Member of the Association of Chartered Certified Accountants
FIVB	International Volleyball Federation
GCA	Ground-controlled approach
GMDSS	Global maritime distress and safety system
I/EWE	International/European welding engineer
I/EWIP	International/European welding inspection personnel
I/EWP	International/European welding practitioner
I/EWS	International/European welding specialist
I/EWT	International/European welding technologist
IAB	International authorisation board

IANS	Institute of Air Navigation Services
IATA	International Air Traffic Association
ICAO	International Civil Aviation Organisation
ICDL	International computer driving licence
IIW	International Institute for Welding
IMO	International Maritime Organisation
IRCC	International refereeing candidate courses
ISIC	International standard industrial classification
ISO	International Organisation for Standardisation
IW	International welder
IWE	International welding engineers
IWIP	Qualifications of international welding inspection personnel
IWS	International welding specialists
IWSD	International welded structures designer
IWT	International welding technologists
JAR-FCL	Joint aviation rules – Flight crew licensing
MC	Microsoft certified
MCA	Microsoft certified architect
MCITP	Microsoft certified IT professional
MCM	Microsoft certified master
MCP	Microsoft certified professional
MCPD	Microsoft certified professional developer
MCSA	Microsoft certified systems administrator
MCTS	Microsoft certified technology specialist
NAA	National aviation authority
NACE	Statistical Classification of Economic Activities in the European Community
NDT	Non-destructive testing
NQF	National qualifications framework
OJT	On-the-job training
OJTI	On-the-job training instructor
PMI	Project Management Institute
SAFA	Safety assessment of foreign aircraft

SARPs	Standards and recommended practices
SEM	Standard examination model
SES	Single European sky
SESAR	Single European sky air traffic management research
STCW	Standards of training, certification and watch-keeping for seafarers

ANNEX II

Observing another world: the US Department of Labor – Career one-stop

Career one-stop is a big web portal developed by the US Department of Labor as a tool to help job-seekers, students, businesses, and career professionals. Sponsored by the US Department of Labour it covers all types of qualifications including international. The site provides a facility to browse by occupation categorised as follows:

- architecture and engineering,
- arts, design, entertainment, sports, and media,
- building and grounds cleaning and maintenance,
- business and financial operations,
- community and social services,
- computer and mathematical,
- construction and extraction,
- education, training, and library,
- farming, fishing, and forestry,
- food preparation and serving related,
- healthcare practitioners and technical,
- healthcare support,
- installation, maintenance, and repair,
- legal,
- life, physical, and social science,
- management,
- office and administrative support,
- personal care and service,
- production,
- protective service,
- sales and related,
- transportation and material moving.

Under each occupational group title, there is a further deviation which in transportation and material moving is the following:

- aircraft cargo handling supervisors,
- airfield operations specialists,
- airline pilots, co-pilots, and flight engineers,
- ambulance drivers and attendants, except emergency medical technicians,
- automotive and watercraft service attendants,
- bridge and lock tenders,
- bus drivers, school or special client,
- bus drivers, transit and intercity,
- captains, mates, and pilots of water vessels,
- cleaners of vehicles and equipment,
- commercial pilots,
- conveyor operators and tenders,
- crane and tower operators,
- dredge operators,
- driver/sales workers,
- excavating and loading machine and dragline operators,
- first-line supervisors of helpers, labourers, and material movers, hand,
- first-line supervisors of transportation and material-moving machine and vehicle operators,
- flight attendants,
- gas compressor and gas pumping station operators,
- heavy and tractor-trailer truck drivers,
- hoist and winch operators,
- industrial truck and tractor operators,
- labourers and freight, stock, and material movers, hand,
- light truck or delivery services drivers,
- loading machine operators, underground mining,
- locomotive engineers,
- locomotive firers,
- machine feeders and off bearers,
- material moving workers, all other,
- mine shuttle car operators,
- motor vehicle operators, all other,
- motorboat operators,
- packers and packagers, hand,
- parking lot attendants,
- pump operators, except wellhead pumpers,

- rail transportation workers, all other,
- rail yard engineers, dinkey operators, and hostlers,
- railroad brake, signal, and switch operators,
- railroad conductors and yardmasters,
- refuse and recyclable material collectors,
- sailors and marine oilers,
- ship engineers,
- subway and streetcar operators,
- tank car, truck, and ship loaders,
- taxi drivers and chauffeurs,
- traffic technicians,
- transportation attendants, except flight attendants,
- transportation inspectors,
- transportation workers, all other,
- wellhead pumpers.

The whole system is based on ‘certifications’ which are usually an examination or a record of work-related credentials. Certifications are documents issued to an individual by an external organisation to communicate a certain level of skill attainment to a potential or current employer, or, in some cases, to a regulatory authority. For a certification to be included in the certification finder, it must require education, training, work experience, or examination; and must not be a State-required licence, although it may lead to a licence. It must provide a certification documenting level of education, training, work experience or passing an examination for that occupation or credential. All this system is open to international qualifications.

Every qualification provides through the appropriate links information on the content, the provider and the certification process. If we take the example of an ICT qualification such as the Microsoft certified systems administrator, a type of international qualification existing almost in all countries we can easily find any type of additional information.

*Certification Microsoft certified systems administrator:
Microsoft Windows 2000 server.*

The certification description mentions that this certification is for administrators who want to demonstrate their ability to implement successfully, manage, and troubleshoot Microsoft Windows 2000 server environments (there are also more updated certificates for other Windows versions). The certifying organisation is Microsoft corporation and certification details provide

information among others on the type of exam (oral or written exam required) and the possibilities offered for the renewal of it. It is stated that 'Microsoft certification enables you to keep your skills relevant, applicable, and competitive. In addition, Microsoft certification is an industry standard that is recognised worldwide—which helps open doors to potential job opportunities. After you earn your Microsoft certification, you have access to a multitude of benefits, which can be found on either the MCP or the MOS member site'.

ANNEX III

International qualifications, certifications and licences

ICT certifications

The following table lists indicatively Microsoft certifications by name and describes how they enable IT professionals to help display and validate their skills and experience.

MCTS	A Microsoft certified technology specialist (MCTS) certification helps enable IT professionals to target specific technologies and to distinguish themselves by demonstrating in-depth knowledge and expertise.
MCITP	A Microsoft certified IT professional (MCITP) certification helps enable IT professionals to demonstrate comprehensive skills in planning, deploying, supporting, maintaining, and optimising IT infrastructures.
MCDST	A Microsoft certified desktop support technician (MCDST) certification helps enable IT professionals to demonstrate technical and customer service skills in troubleshooting hardware and software operation issues in Microsoft Windows environments.
MCSA	A Microsoft certified systems administrator (MCSA) certification helps enable IT professionals to demonstrate their ability to administer network and systems environments with Windows server 2003–based business solutions. NB: For newer Microsoft technologies, such as Microsoft exchange server 2010, Windows server 2008, or Microsoft SQL server 2008, you should pursue the MCITP certification.

MCDBA	A Microsoft certified database administrator (MCDBA) certification helps enable IT professionals to demonstrate their ability to design, implement, and administer Microsoft SQL server databases.
MCSE	A Microsoft certified systems engineer (MCSE) certification helps enable IT professionals to demonstrate their ability to design and implement an infrastructure solution with Windows server 2003–based business solutions. NB: For newer Microsoft technologies, such as exchange server 2010, Windows server 2008, or SQL server 2008, we recommend that you pursue the MCITP certification.
Microsoft certified technology Specialist for Microsoft Dynamics	A Microsoft certified technology specialist certification helps enable IT professionals to demonstrate their proficiency with Microsoft dynamics and related business products.
Microsoft certified IT professional for Microsoft Dynamics	A Microsoft certified IT professional certification helps enable IT professionals to demonstrate professional proficiency with Microsoft dynamics in one of three areas: applications, developer, or installation and configuration.
MTA	A Microsoft technology associate (MTA) certification helps students explore career options in technology, prepare for advanced studies and MCTS exams, and demonstrate their fundamental knowledge of hardware and IT infrastructure.

Seafarers

Directive 2008/106/EC outlines the minimum training levels to be met by seafarers. Referring to standards set by the International Maritime Organisation, the directive strengthens these requirements by entering them into European law.

Master and deck department

- Certificate for officers in charge of a navigational watch on ships of 500 gross tonnes or more;
- certificate for masters and chief mates on ships of 500 gross tonnes or more;
- certificate for ratings forming part of a navigational watch.

Engine department

- Certificate for officers in charge of an engineering watch in a manned engine-room or designated duty engineers in a periodically unmanned engine-room;
- certificate for officers and second engineer officers on ships powered by main propulsion machinery of 3 000 kW propulsion power or more;
- certificate for officers and second engineer officers on ships powered by main propulsion machinery of between 750 kW and 3 000 kW propulsion power;
- certificate for ratings forming part of a watch in a manned engine-room or designated to perform duties in a periodically unmanned engine-room.

Radio communication and radio personnel

- Certificate for GMDSS radio personnel.

Personnel on certain types of ships

- Certificate for masters, officers and ratings on tankers;
- certificate for masters, officers, ratings and other;
- certificate for personnel on ro-ro passenger ships;
- certificate for masters, officers, ratings and other;
- certificate for personnel on passenger ships other than ro-ro passenger ships.

Emergency, occupational safety, medical care and survival functions

- Certificate for basic safety training and instruction for all seafarers;
- certificate for proficiency in survival craft, rescue boats and fast rescue boats;
- certificate for advanced fire fighting;
- certificate for medical first aid and medical care.

Aviation

Light aircraft pilot licence – LAPL

- LAPL for aeroplanes - (A),
- LAPL for helicopters – LAPL(H),
- LAPL for sailplanes – LAPL(S),
- LAPL for balloons – LAPL(B).

Private pilot licence (PPL), sailplane pilot licence (SPL) and balloon pilot licence (BPL)

- PPL aeroplanes – PPL(A),
- PPL helicopters – PPL(H),
- PPL airships – PPL(As),
- sailplane pilot licence (SPL),
- balloon pilot licence (BPL).

Commercial pilot licence – CPL

- Aeroplane category – CPL(A).

Multicrew pilot licence – MPL

- Licence

Airline transport pilot licence – ATPL

- Aeroplane category – ATPL(A),
- helicopter category – ATPL(H).

Instrument rating – IR

- Aeroplane category,
- helicopter category,
- airship category.

Class and type ratings

- Aeroplane category,
- helicopter category,
- powered-lift aircraft category,
- airship category.

Additional ratings

- Aerobatic rating,
- sailplane towing and banner towing ratings,
- night rating,
- mountain rating,
- flight test rating.

Instructors

- Flight instructor — FI,
- type rating instructor — TRI,
- class rating instructor — CRI,
- instrument rating instructor — IRI,
- synthetic flight instructor — SFI,
- multicrew cooperation instructor — MCCI,
- synthetic training instructor — STI,
- mountain rating instructor — MI,
- flight test instructor — FTI.

Examiners

- Flight examiners — FE,
- type rating examiners — TRE,
- instrument rating examiner — IRE,
- synthetic flight examiner — SFE,
- flight instructor examiner — FIE.

ANNEX IV

Welding guidelines

Theoretical education

An example of what is included in the guideline for module 1: Welding processes and equipment is as follows:

General introduction to welding technology

Objective for IWE: Understand (gain knowledge to understand in general) the developments in welding processes including accepted terminology, standards and abbreviations.

Scope	Qualification teaching hours	IWE 3 P1 ⁽⁴⁰⁾=3
History		x
Definitions		x
Schematic presentation of welding processes		x
Terminology		x
Picture and brief description with characteristics		x
Applicability of the most common welding processes		x
General applications for welding		x
Abbreviations used for welding processes		x
Hints in use for welding processes		x
Classification of welding processes (IIW, ISO, CEN and national standards)		x

Expected Result for IWE:

1. Detail the differences between each major type of welding process, e.g. arc, resistance, flame, forge, etc.
2. Differentiate between processes with reference to standards.
3. Recognise a welding process by the common abbreviation.
4. Explain the historical evolution of welding.

⁽⁴⁰⁾ P1 = maximum teaching hours which can be included.

Practical education

Students have to become as familiar as possible with the problems and typical defects associated with incorrect use of the different welding methods and therefore during their exercises students are guided by skilled welding teachers.

Practical training hours: 60 (oxyacetylene welding and cutting 6, MMA 10, TIG 10, MIG/MAG + flux cored arc welding 14, demonstrations or video presentations on processes 20). Candidates may be exempted from practical training, on a process-by-process basis, if they can demonstrate practical experience and/or training in the process concerned.

Examination and qualification

The respective guideline seeks to achieve harmonisation and a common standard in examination and qualification of professional welding engineers. National welding organisations, being members of the International Institute of Welding, commonly acknowledge diplomas awarded to international welding engineers in any member country, following examination conducted in accordance with this guideline. Education must have followed this IIW guideline and the national body authorised by IIW must have conducted the examination. This authorised national body will normally be the national welding organisation, which is the IIW member but could also be another organisation if agreed with the IIW member.

Any training course leading to an International Institute of Welding examination must be approved by the authorised national body. The number of teachers required to give the course shall be sufficient to ensure that the essential specialist knowledge and industrial experience to cover the syllabus are adequately represented.

An examination board, acting on behalf of authorised national bodies supervises examinations. In this way, independence, integrity and fairness of the examination system are maintained. Admission to the examination leading to award of the international welding engineer diploma will be restricted to those who:

- (a) who comply with the minimum requirements specified in the directory of access conditions;
- (b) for the standard route, have attended at least 90% of the course, approved by the ANB, according to this guideline. Exceptions are at the discretion of the ANB;
- (c) have attended a distance learning course approved by the ANB fulfilling the requirements of guideline IAB 195-2004;

- (d) for the alternative route, have successfully passed the ANB detailed assessment.

The guideline defines minimum requirements for examinations and authorised national bodies are free to exceed these if they wish. The examination procedures described below are designed to test the candidate's knowledge and understanding of different situations in welding technology. There are written and oral examinations in each of the following modules:

- (a) welding processes and equipment,
- (b) materials and their behaviour during welding,
- (c) construction and design,
- (d) manufacturing and applications engineering.

At the discretion of the examination board the examination shall consist of a:

- (a) series of essay questions covering the whole field of the module; or
- (b) series of multiple choice questions covering the whole field of the module;
or
- (c) a combination of (a) and (b).

The minimum time for the written examination is two hours per module, eight hours in all for the international welding engineers level. Oral examination is also mandatory for the IWE level and is designed to test understanding and ability to reason in the field of welding. For this level the total time devoted to the oral examination, covering all modules has to be a minimum of one hour per candidate. Candidates reaching >75% of the maximum possible mark in the written examination in one module may be exempt from the oral examination in that module.

Written and oral examinations usually have equal importance (50%), but the weight of the oral examination may, at the discretion of the board of examiners be set anywhere within the range of 40 to 60%. Any changes should be announced before the start of the examination. To pass the examination candidates should achieve at least 60% of the maximum possible mark in each module. All modules should be completed within a period of three years from the date of the first (modular) examination. If a candidate fails an examination, the three years validity of the individual passed parts of the IWE examination, may be extended by decision of the lead assessor, if it has not been possible for the ANB to organise necessary reexaminations within the three-year period.

Failure in any individual module requires reexamination only in the module failed. Examinations shall be retaken within two weeks to 15 months of the initial examination and, in case of a second failure; one further attempt is permitted within one to 15 months from the date of the second examination. If candidates fail three times in any of the modules, they have to repeat classes of the failed modules and retake exams of all the modules, irrespective of having passed exams of other modules. Candidates who feel they have been unfairly treated during the examination procedure have the right to appeal to the authorised national body. After successful examination the authorised national body awards a diploma to the candidate.



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international qualifications

An increasing number of qualifications – certificates and diplomas – are awarded at international level, outside the jurisdiction of national authorities. These ‘non-State’ qualifications have been developed and are awarded by a wide range of bodies, organisations and companies addressing various purposes. What unites this extreme variety of qualifications is that they are not restricted to a particular national system or territory. They are all qualifications whose exchange value is defined outside traditional national qualifications systems. This raises some key questions and challenges for policy-makers as well as users – be they individual citizens or employers. This report is a first effort to increase transparency in this field, notably by pointing to existing sources and clarifying the concepts to be used for mapping and analysis.

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