PD CEN/TR 16234-2:2016

BSI Standards Publication

e-Competence Framework (e-CF) — A common European Framework for ICT Professionals in all industry sectors

Part 2: User Guide

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National foreword

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e-Competence Framework (e-CF) - A common European Framework for ICT Professionals in all industry sectors - Part 2: User Guide

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European foreword

This document (CEN/TR 16234-2) has been prepared by Technical Committee CEN/TC 428 "Project Committee - e-Competences and ICT Professionalism", the secretariat of which is held by UNI.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes CWA 16234-2:2014.

This Technical Report is the second part of the EN 16234 series, which is made up of the following three parts and which will replace CWA 16234-1:2014, CWA 16234-2:2014 and CWA 16234-3:2014:

— EN 16234-1, *e-Competence Framework (e-CF) - A common European Framework for ICT Professionals in all industry sectors - Part 1: Framework*

— CEN/TR 16234-2, *e-Competence Framework (e-CF) - A common European Framework for ICT Professionals in all industry sectors - Part 2: User guide*

— prCEN/TR 16234-3, *e-Competence Framework (e-CF) - A common European Framework for ICT Professionals in all industry sectors - Part 3: Methodology*

Part 1 is a fully standalone document, whilst part 2 and 3 rely on part 1.

A relationship with the European ICT Professional Profiles (CWA 16458:2012, original CWA updated by e-CF 3.0 competences and re-published in 2014) is established. A number of relevant e-Competences and their applying level(s), as defined by this standard, are assigned to each Profile.

CWA 16234-4:2014, composed of 15 case studies illustrating e-CF practical use from multiple sector perspectives, remains published and can be downloaded for free from the internet (*Official e-CF website: www.ecompetences.eu).*

Introduction

EN 16234-1 was established as a tool to support mutual understanding and provide transparency of language through the articulation of competences required and deployed by Information and Communication Technology (ICT) professionals.

The underpinning philosophy and principles adopted during the standard's construction that are vital for its application and for successive updates are explained in the Introduction of EN 16234-1.

1 Scope

This Technical Report supports understanding, adoption and use of EN 16234-1. It supports Information and Communication Technology (ICT) stakeholders, in particular:

— ICT service, demand and supply companies;

— ICT professionals, managers and human resource (HR) departments;

— vocational education institutions and training bodies including higher education;

— social partners (trade unions and employer associations);

— professional associations, accreditation, validation and assessment bodies;

— market analysts and policy makers; and

— other organizations and stakeholders in public and private sectors across Europe,

to adopt, apply and use the framework in their environment.

2 Normative reference

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 16234-1, *e-Competence Framework (e-CF) - A common European Framework for ICT Professionals in all industry sectors - Part 1: Framework*

3 Terms, definitions, symbols and abbreviated terms

For the purposes of this document, the terms, definitions, symbols and abbreviated terms given in EN 16234-1 apply.

4 General principles

This Technical Report provides guidance on how to apply EN 16234-1 from multiple ICT stakeholder perspectives. It addresses the fact that a European reference set of ICT competence definitions is unlikely to match all company or institution's needs perfectly. EN 16234-1 is intended for guidance and is designed to provide a common shared reference tool which can be implemented, adapted and used in accordance with ICT stakeholder requirements. The following implementation guidance is structured by stakeholder groups.

5 Adapting EN 16234-1 as a shared European reference to specific needs

5.1 Case studies

To support EN 16234-1 application within multiple environments, a series of illustrative case studies provide examples, benefits and hints of how to make best use of EN 16234-1. They relate to practical EN 16234-1 application experiences and have been elaborated together with EN 16234-1 applying organizations throughout Europe.

All case studies have been published as Part 4 of the European e-Competence framework version 3.0 CWA 16234-4:2014 and they can be downloaded for free from the internet (Official e-CF website:

www.ecompetences.eu). Table 1 provides an overview of the case studies published together with their respective key perspectives on EN 16234-1 application.

Table 1 — 15 case studies covering multiple ICT sector perspectives – overview

Case study	Title	Key perspectives
A	e-CF in large ICT demand organizations	• Job profile creation • Internal ICT staff development • Cross company and cross border common language
B	e-CF in a corporate/ ICT supplier environment	• e-CF for consultants • Identifying training needs • Training development • Competence gap identification
C	e-CF for SME's - competence need analysis and managerial dashboard	• Application in a micro enterprise environment • e-CF as a marketing aid • e-CF as a business development tool • Competence need analysis • Linking business strategy and competence development • Develop or buy new competences • e-CF for SME consultants
D	SME competence assessment and business card creation based upon the e-CF	• SME competence self-assessment • Business card creation • Business capability • e-CF for SME consultants
E	e-CF to build SME job descriptions	• Job description development • Intercompany communication • Recruitment aid
F	e-CF for qualification providers	• Matching education supply to market needs • The difference between competence development and traditional learning • Student motivation from a competence approach • EQF and e-CF compliance
G	e-CF in a certification environment	• Matching certification supply to market needs • Increasing transparency in the European e-Skills landscape
H	e-CF for ICT professional self-assessment	• Self-assessment • CV / Self promotion

Case study	Title	Key perspectives
I	e-CF for linking e-curricula supply and demand	• Competence connected to learning outcomes • e-CF and EQF compliance • Personal career development • Competence based e-curriculum
K	e-CF for ICT professional associations	• Assessment • Benchmark criteria • Community building
L	e-CF for ICT training quality improvement	• Specialized competences • Specialist role development • Matching education supply and demand
M	e-CF for assessment and career tools	• Assessing an ICT professional's capability • Recognition of formal and informal learning
N	e-CF for National and EU policy makers	• Ensuring qualified ICT workforce in the long term • Communication between policy makers and ICT business • e-Curricula building • Cross-European common language
O	e-CF to relate or integrate to other frameworks	• e-CF use in an established structure • Relating the e-CF to other frameworks • Relating workplace and qualification perspective by EQF and e-CF
P	e-CF for European ICT professional Profiles creation	• Including competence into a job Profile • Communication between HR, management and ICT professionals • Building and linking local profiles to a recognized European structure

5.2 Human resources management in ICT services (demand and supply – public and private)

5.2.1 General

Competence management, people development and HR planning are valuable components of employee management within companies and the public sector.

At a minimum, each employee should have:

— *In an existing role*, a clear description of the position to which he/she is assigned, including a mission statement, responsibilities, activities, outcomes, performance indicators and resources/ experience/ certifications required to perform the job correctly.

— *In a new role*, a competence assessment to measure the gap between his/her knowledge, skills and experience and those required by the position. When necessary, an individual development plan is established to fill the gaps.

At a more intensive level of people management, the following points are relevant:

— position descriptions derive from part of one or several job profile structures, each job profile including the levels of required competence;

— each job profile is part of a career path, allowing employees to understand progression routes;

— HR strategy and annual individual objectives derived from company needs (or ambitions);

— individual development plans taking into consideration annual individual objectives;

— using training catalogues, a training plan is created from consolidation of combined individual development plans.

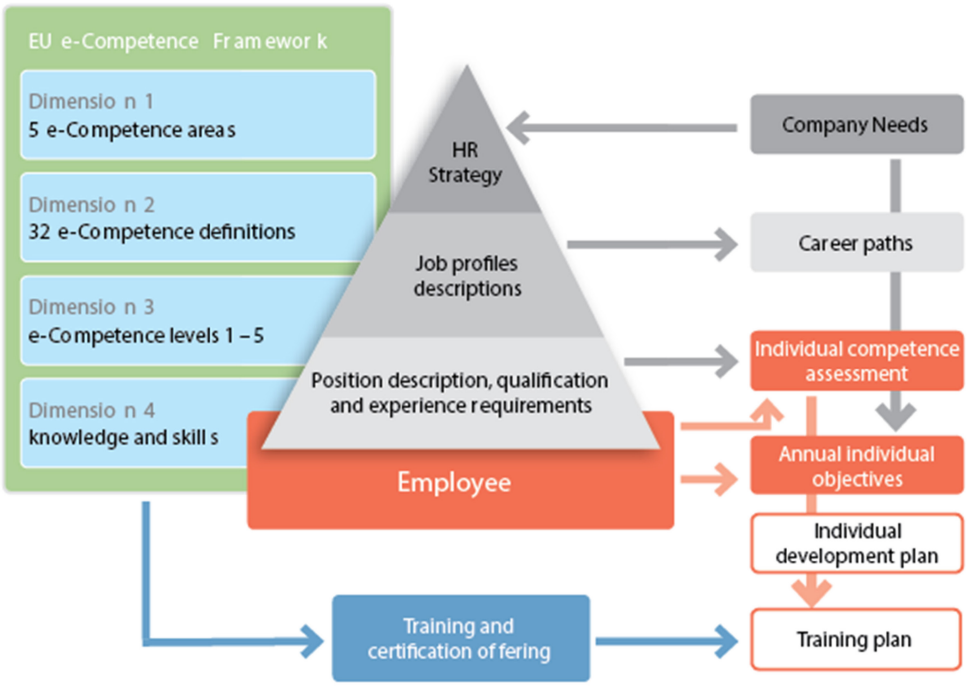

Figure 1 — The use of the European e-Competence Framework is multiple within ICT organizations

The four dimensions of EN 16234-1 support the employee and the competence management process on multiple levels. As shown in Figure 1, it provides a consistent level of granularity and continuity.

For further practical illustrations, see Table 2.

Table 2 — Case studies illustrating EN 16234–1 use in support of HR management (Source: CWA 16234–4:2014)

Case study	Title	Key perspectives
A	e-CF in large ICT demand organizations	• Job profile creation • Internal ICT staff development • Cross company and cross border common language
B	e-CF in a corporate/ ICT supplier environment	• e-CF for consultants • Identifying training needs • Training development • Competence gap identification

5.2.2 Small and medium-sized enterprises (SMEs)

There are differences between ICT SMEs and larger organizations when considering the application of competences. Such differences are more related to business approach than size. In particular, agile SMEs focused on continuous improvement and innovations are likely the target groups of EN 16234-1.

However, size may influence:

— the type of e-competences considered as relevant for the organization; namely, the smaller the enterprise, the smaller its interest in standardization and formalization of internal processes;

— the perspective of e-competence application and use. The smaller the enterprise, the greater the interest in e-competences, for internal business purposes;

— EN 16234-1 as an internal tool becomes more and more relevant when size increases.

In this ICT SME context, types of EN 16234-1 application may be as follows:

1. self-assessment, addressing people, the organization, the company as such;

2. company presentation to clients, as a business card;

3. support company growth, as a compass, a managerial dashboard.

The key perspectives of the possible EN 16234-1 applications mentioned above can be summarized as follows:

— Competence need analysis tool;

— Marketing aid;

— Competence development tool linked consistently to the business strategy.

Mapping skills and competence with EN 16234-1 is straightforward. Enterprises may access EN 16234-1 vocabulary and definitions and, if doubts arise, consult this Technical Report or check with the official e-CF website where FAQs and answers are available.

For small ICT enterprises, it is very useful to demonstrate ownership of competences required to fulfil client demands. Customers no longer look for technical skills only; they seek business partners able to work in teams, manage projects and processes, and communicate.

EN 16234-1 describes such skills within full competence descriptions. Using EN 16234-1, enterprises are able to describe technical and soft competences inclusively, a key ability when managing relationships with other companies and stakeholders as it enhances the quality of communication.

Therefore, EN 16234-1 is an effective tool to help SMEs identify, articulate and communicate their complex 'know-how'.

Moreover, Dimension 2 of EN 16234-1 can support SMEs in identifying e-competences that describe their core activities and their business. EN 16234-1 provides the structure and appropriate articulation by which management can analyse current competence capability, future requirements and support the development of business strategy.

Generally, the SME start point for use of EN 16234-1 is analysis of Dimension 2. Some guiding questions to help navigate EN 16234-1 for e-competence need analysis, linked to the business strategy, are as follows:

— Is this competence coherent with my business?

— Have I ever fully practiced this competence?

— If I haven't, for what business aims would it be useful?

The aim is to analyse the relevance of e-competences to the mission and strategy, recording whether such e-competences are currently prevalent within the company or not and at which "intensity"; high, medium, low.

If the exercise is aimed at building a business card for clients, then for each e-competence identified as prevalent in the company at a high level, the entrepreneur and staff need to list specific evidence illustrating those e-competences. The evidence examples may be products/services, developed projects, examples of clients, etc. Then the entrepreneur and staff should also be able to identify assessment criteria to evaluate their e-competences.

The task of identifying assessment criteria is supported by EN 16234-1 as the operational descriptions implicitly include the way of evaluating them.

Finally, to make ICT SMEs more familiar with navigating EN 16234-1, the entry point to reach the 40 e-competences does not need to follow Dimension 1, Plan, Build, Run, Enable and Manage but may deploy an alternative route using:

1. Company Overview;

2. Markets and Customers;

3. Innovation and Research;

4. Business environment and business competences.

To each of these four categories a set of e-Competences has been related. This alternative navigation approach called the EN 16234-1 functional view looks as in Table 3.

Table 3 — The functional view of EN 16234–1

1 Company Overview	e-Competence to be checked
1.1 Description of company management	A.1. IS and Business Strategy Alignment
	A.4. Product/ Service planning
	D.1. Information Security Strategy Development
	D.2. ICT Quality Strategy Development
	D.10. Information and Knowledge Management
	E.2. Project and Portfolio Management
	E.3. Risk Management
	E.6. ICT Quality Management
	E.9. IS Governance
1.2 Description of company organization/departments	D.3. Education and Training Provision
	D.4. Purchasing
	D.5. Sales Proposal Development
	D.7. Sales Management
	D.8. Contract Management
	E.8. Information Security Management
	D.12. Digital Marketing
2 Markets and Customers	Competence to be checked
2.1 Main products and services offered - also if the product(s)/service(s) are standard and/or customized	A.2. Service Level Management
	B.5. Documentation Production
	C.1. User Support
	C.2. Change Support
	C.3. Service Delivery
	C.4. Problem Management
2.2 Target market sectors – describe also if the market is horizontal, vertical and/or both	D.6. Channel Management
2.3 Market differentiators (what differentiates their offering within the marketplace?): includes factors such as: technology; product range; customer service; aftersales support; user focus (i.e. in design/application); skills; price.	A.5. Architecture Design
	A.6. Application Design
	B.1. Application Development
	B.2. Component Integration
	B.3. Testing
	B.4. Solution Deployment
	B.6. Systems Engineering
	D.11. Needs Identification
2.4 Future positioning: Market trends and how they will change their strategy or approach to the market as a result.	E.1. Forecast development
	E.5. Process improvement
	E.7. Business change management
2.5 Description of main marketing channels: (e.g. advertising, web, exhibitions and fairs, business networks, etc.)	E.4. Relationship management
3 Innovation and Research	Competence to be checked
3.1. Nature of 'technology watch' activities. (Potential sources include: conferences and seminars; vendor partner programmes; in- house seminars; one-to-one client interactions; technical user forums and focus groups; feedback from distributors)	A.7. Technology Trend Monitoring
4 Business Environment and Business Competences	Competence to be checked
4.1 Business model and Business processes	A.3. Business Plan Development
	A.8. Sustainable Development
4.2 Human resources: In context of the above include discussion of aspects such as:	D.9. Personnel Development
4.3 Approach to training and personal development (including job rotation, percentage of HR turnover)	D.3. Education and Training Provision

For further illustrations, see Table 4.

Table 4 — Case studies illustrating EN 16234–1 use in support of SMEs (Source: CWA 16234–4:2014)

Case study	Title	Key perspectives
C	e-CF for SME's - competence need analysis and managerial dashboard	• Application in a micro enterprise environment • e-CF as a marketing aid • e-CF as a business development tool • Competence need analysis • Linking business strategy and competence development • Develop or buy new competences • e-CF for SME consultants
D	SME competence assessment and business card creation based upon the e-CF	• SME competence self-assessment • Business card creation • Business capability • e-CF for SME consultants
E	e-CF to build SME job descriptions	• Job description development • Intercompany communication • Recruitment aid

5.3 A common reference for local frameworks

In the first instance, EN 16234-1 establishes a European common language for ICT competences. It also supports the definition of jobs, training courses, qualifications, career paths, formal and non-formal learning paths, certifications, etc. in the ICT related business areas. In this way, local, national, European and global ICT user and supply organizations have access to a shared reference. In addition, national ICT frameworks can be linked to the e-Competence Framework and gain a European dimension:

— National ICT competence frameworks, qualification systems, job profiles, etc. become comparable to competence frameworks, qualification systems, job profiles from other countries;

— National ICT competence frameworks, qualification systems, job profiles, etc. receive guidance on how to link, to implement the EQF into a specific business area, being linked by the EQF levels to the e-Competence levels;

— ICT competences and proficiency levels become comparable to competences of other business areas and sectors in Europe.

Before comparing EN 16234-1 to other ICT frameworks, ICT qualification systems or anything else that might be similar to a framework (referred below as a frame), it may be useful to answer a few questions:

a) What is the focus and the target of the frame?

b) What are the main principles? What is the context of the frame?

c) What is the subject-matter of the frame? Which elements are used and classified? Is it competence, qualifications, job profiles, learning outcomes, higher education or something else?

1) Which level is used for describing the elements? Which level of abstraction is used?

2) What about the granularity of the elements?

3) Is there more than one level of description? (for example: titles, short descriptions, long descriptions)

d) How to build the structure of the frame? Which dimensions are used for classifying the elements?

1) What are the references for the dimensions? (for example: content, levels of proficiency, benchmarks)

2) For every dimension: Is it uni- or multidimensional?

3) How about the relationship between the dimensions? Are they independent?

e) Are there further application or guiding documents (for example: instructions, how to categorize elements)?

The answers can be compared with the characteristics of the European e-Competence Framework, as explained in this document, thus enabling linkage.

5.3.1 Relating to existing frameworks

5.3.1.1 General

For existing frameworks, EN 16234-1 provides added value. The European dimension allows transparency, comparability and the creation of European knowledge, skill and competence areas. It will "facilitate trans-national mobility for workers and learners and contribute to meeting the requirements of supply and demand in the European labour market" [from the EQF document, 23 April 2008].

Existing national or local ICT frameworks differ from each other and are embedded in specific environments; they can link to the European reference Framework in individual ways. The following four examples show possible approaches and the potential for application of EN 16234-1 to existing frameworks. The four framework examples are for illustration, they are not exhaustive.

5.3.1.2 Example 1: The United Kingdom developed "SFIA – Skills framework for the information age"

SFIA provides a common reference model for the identification of the skills needed to develop effective information systems (IS) making use of information and communications technologies (ICT). It is a simple and logical two-dimensional framework consisting of areas of work on one axis and levels of responsibility on the other. The overall purpose of SFIA is to assist organizations employing ICT professionals to ensure that the right skills are developed and deployed to best effect to:

— reduce ICT project risk,

— retain staff,

— make recruitment effective,

— enhance the effectiveness and efficiency of the IT function, and

— provide appropriate development and career paths for IT professionals.

SFIA uses a common language and a sensible, logical structure that can be used to facilitate the processes of skills development in all businesses using or providing Information Technology. It is easily

understood by ICT professionals, HR managers, employers, education and training providers and government personnel.

There are 96 skills described in SFIA version 5 and these can be deployed at a range of up to 7 levels (1 = follow, 2 = assist, 3 = apply, 4 = enable, 5 = ensure, advise, 6 = initiate, influence, 7 = set strategy, inspire, mobilize). Each level is defined by the autonomy, influence, complexity and amount of business skill deployed. The SFIA descriptions are reviewed periodically to ensure that they are up to date and meet the needs of the IT Industry. [1)]

Linking SFIA skills to EN 16234-1 can be straightforward. It is possible to link the 7 levels of the SFIA Framework to the 5 e-competence levels of the e-CF. Using Table 5 below, SFIA skills can be consistently related, from a level perspective, to the competences defined within dimension 3 of the e-CF.

Table 5 — Linking SFIA skills to the EN 16234–1

SFIA Level	SFIA level Descriptor	Abbreviated e-CF Level Descriptor	e-CF Level
7	Set strategy inspire, mobilize	Overall accountability and responsibility	5
6	Initiate, influence, ensure	Extensive scope of responsibility	4
5	Advise	Respected for innovative methods and use of initiative	3
4	Enable		
3	Apply	Operates with capability and independence in specified boundaries	2
2	Assist	Able to apply knowledge and skills to solve straight forward problems	1
1	Follow	Not Applicable	none

5.3.1.3 Example 2: The French “CIGREF framework on job profiles”

The CIGREF nomenclature presents a set of ICT occupations grouped into families that are used in most information system departments of major French companies. It is a tool that was built by consensus among HR professionals. Companies use it as template to build their own repository by adding their own specifications.

The template includes:

— a title and other common names used in organizations,

— a mission describing the purpose of the job,

— a description of significant activities and tasks,

— the skills needed classified into three distinct categories: IT skills, general skills and attitudes.

In 2002, CIGREF had identified the need to simplify and standardize the list of knowledge and skills: The introduction of the e-Competence Framework and its four dimensions responded to this need.

1) Text adapted from the SFIA website www.sfia.org.uk. See there for detailed descriptions of skills deployed at each level.

The links between the European e-Competence Framework and the CIGREF framework can be made by using the dimension 2 for describing activities and by using dimension 3 for describing competences required to perform the job correctly.

Consequently, the latest version of the CIGREF framework published in 2012 was adapted: using e-Competence dimension 2, activities were described with more consistency and by using the dimension 3, knowledge and skills were replaced by competences, making it easier to understand.

This approach provided simplified job profiles and where necessary, it is possible to obtain more detail by using the link between dimension 3 and 4, i.e. knowledge and skills associated to the corresponding level of competence.

This linkage between the CIGREF framework and the e-CF is illustrated in Figure 2.

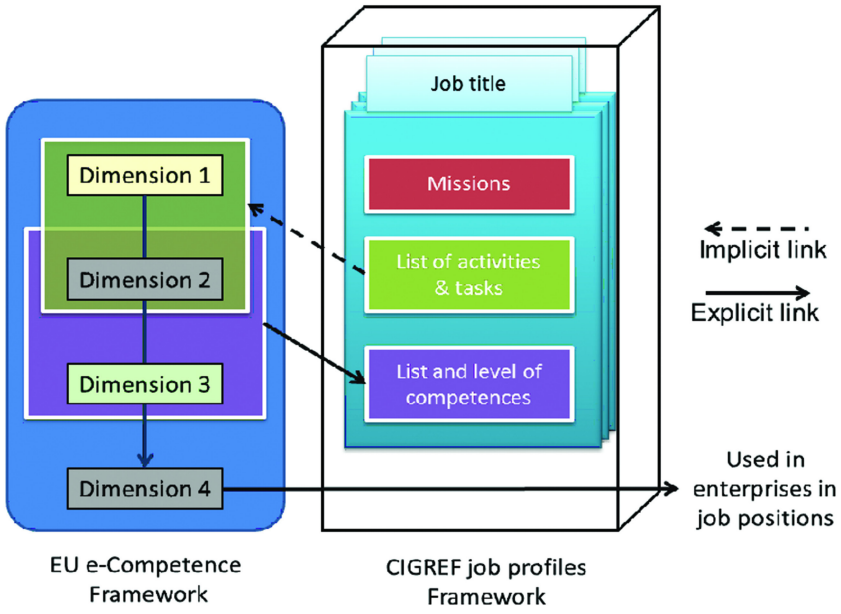

Figure 2 — Linkage between the CIGREF job profile framework and the EN 16234-1

5.3.1.4 Example 3: The German Vocational and Educational Training

AITTS is a system of career profiles associated to three levels of proficiency (completed by a fourth basic level, the IT occupations from the German "dual system"). AITTS provides both, a competence and qualifications framework, as it comes additionally with a methodology for workflow embedded qualification.

The system of profiles and the methodology for qualification are linked by reference processes: described work processes that serve simultaneously as a reference for the particular job role and its curriculum. These reference processes are extensive and detailed curricula for each career profile. They have been worked out in co-operation with more than 60 representatives from the ICT industry and training providers. There, the structure of the learning content is decided not on the basis of a formal organization of the subject, but rather on the basis of the work process.

Linking AITTS profiles to the European e-Competence Framework is initially easy, as both are structured from business and working processes. Additionally, the main target of AITTS is to advance the capability of ICT employees in the workplace and this is very close to the e-CF definition of competence.

Most AITTS profiles are composed of more than one competence. They are integrated into the German system of occupations and offer a wide range of opportunities to obtain jobs by enhancing qualifications and competences.

See some examples in Table 6.

Table 6 — Linking German AITTS and IT Occupation profiles to the EN 16234–1

AITTS 'level'	German Profiles	Linked to / composed of e-Competences	e-CF level
Operative Professionals	IT Business Manager	A.4 Product Planning	3
		D.5 Sales Proposal Development	3–4
		D.8 Contract Management	3
		D.9 Digital Marketing	3
		D.12 Personnel Development	3–4
		E.2 Project and Portfolio Management	3
		E.3 Risk Management	3
		E.5 Process Improvement	3
		E.6 ICT Quality Management	3
		E.7 Business Change Management	3
		if applicable some other and some more (not part of the e-CF)	
Specialists	IT Project Coordinator	D.5 Sales Proposal Development	2
		E.2 Project and Portfolio Management	2–3
		E.3 Risk Management	2
		E.6 ICT Quality Management	2
		E.8 Information Security Management	2
		(if applicable some other)	
IT Occupations (German Dual System)	IT specialist in application development	A.6 Application Design	1
		B.1 Application Development	2
		B.2 Component Integration	2
		B.3 Testing	1
		B.4 Solution Deployment	1–2
		B.5 Documentation Production	1–2
		C.1 User Support	1
		E.2 Project and Portfolio Management	2
		(if applicable some other)	

5.3.1.5 Example 4: The European Certification Model for ICT Professionals EUCIP

The current EUCIP model provides for the definition and measurement of ICT skills and is currently used as the basis for the provision of certification and services in seven countries across Europe. The EUCIP certification program, which was developed by The Council of European Professional Societies

(CEPIS), is a professional certification and competency development scheme, aimed at informatics professionals and practitioners[2)].

EUCIP and the e-Competence Framework have common features and interesting potential synergies (see Figure 3). The e-CF, as a common, accepted reference point for ICT professional competences, has the potential to be an important input into the future evolution of EUCIP and its associated certification and service offering:

— e-CF Dimension 4 (Knowledge and Skills) link to EUCIP Competence Categories and more detailed topics. Referring to granularity of e-CF Dimension 4, EUCIP provides more in depth detail at this level finalized to support activities such as assessment.

— e-CF Dimension 3 (Proficiency) articulates analytically levels for each e-Competence that in EUCIP levels are defined as general classes of knowledge and skill depth.

— e-CF Dimension 2 (e-Competences) are statements of competence that are linked to EUCIP elective profile Tasks and can offer a more structured and process oriented framework of job tasks definition.

— e-CF Dimension 1 (e-Competence areas) coincide with EUCIP knowledge areas and outline additional supporting processes (Enable and Manage) embedded in EUCIP core areas.

EUCIP's high level of granularity is useful for training departments to design and develop curricula and learning initiatives. It can provide detailed guidelines to identify knowledge and skill topics.

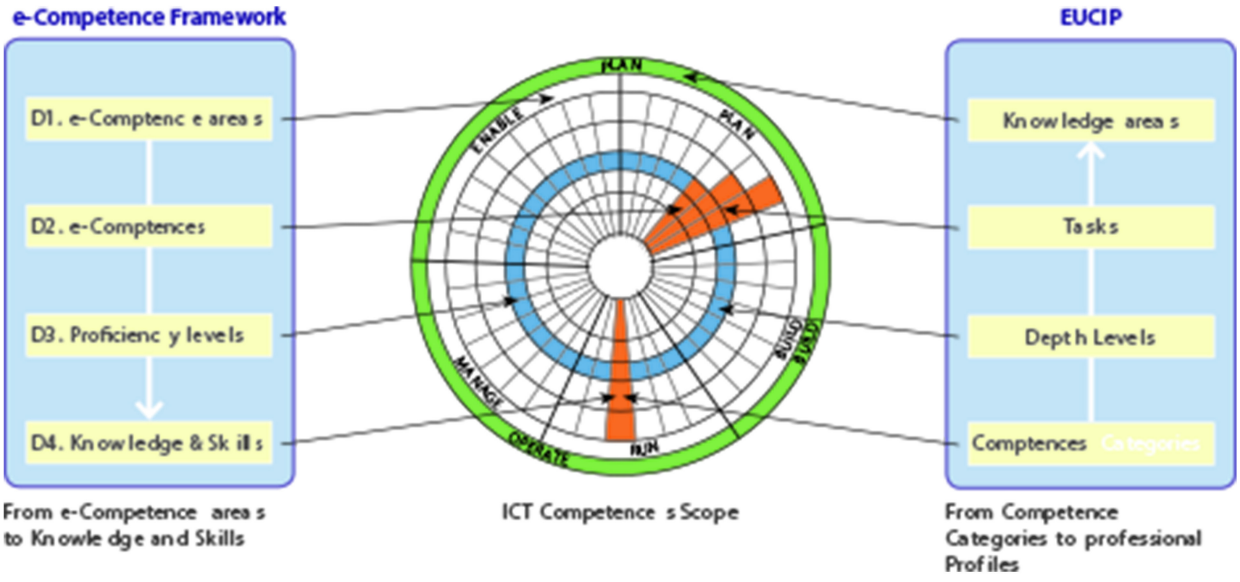

Figure 3 — Linking EUCIP components to EN 16234-1

The 22 profiles that make up EUCIP Professional have moved to Version 3.0.

The detailed competences set out in these profiles have been revised to reflect what individuals operating in these profiles should be able to do in the current technological and business environment. Importantly, the profiles have been updated to include references to the European e-Competence Framework.

2) For all relevant information around EUCIP see: www.eucip.org

Consequently, the official EUCIP 3.1 documents (i.e. the current version, released in 2011) explicitly references to the e-CF in various sections.

In order to place the EUCIP Professional Profiles in the context of certain frameworks and schemes, specific references, where relevant, are provided at the end of each profile. The following frameworks or schemes are referenced (see section 1.3 of the current EUCIP version 3.1): e-CF, SFIA, CIGREF, AITTS, Borsa Lavoro.

The European e-Competence Framework is seen as particularly important as it is intended to act as a European-level point of reference for a broad range of activities including practitioner continuous professional development.

One of the strategic objectives of EUCIP is to provide a detailed competence scheme that sits under and references the competences set out in the e-CF in order to provide a range of certifications and services to IT professionals and industry across Europe.

At last, each EUCIP profile identifies a subset of the 36 e-CF competences to allow a fully e-CF based description of competence requirements.

The table in Figure 4 summarizes e-CF competences associated with each EUCIP Profile.

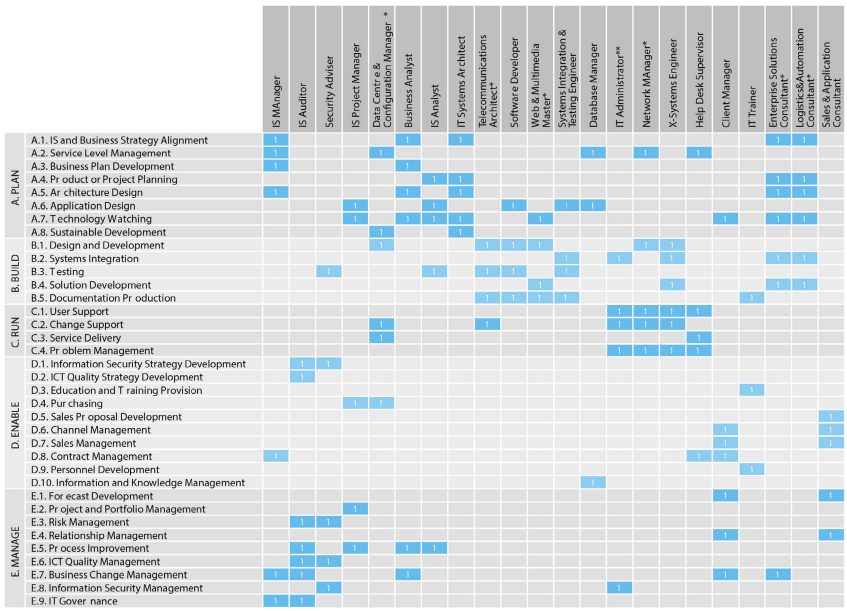

Figure 4 — Overview of e-CF competences associated with the EUCIP Profiles

The four examples from national environments of the United Kingdom, France and Germany as well as from Europe show that it is possible to link all different kinds of frameworks to EN 16234-1.

EN 16234-1 is therefore sufficiently generic to be adaptable to:

— the requirements of the different countries,

— the requirements of the various companies and organizations,

— technological evolutions for the next few years,

— future services.

For further illustrations, see Table 7.

Table 7 — Case study illustrating EN 16234–1 use in support of existing frameworks (Source: CWA 16234–4:2014)

Case study	Title	Key perspectives
O	e-CF to relate or integrate to other frameworks	• e-CF use in an established structure • Relating the e-CF to other frameworks • Relating workplace and qualification perspective by EQF and e-CF

5.3.2 Inspiration for new national/ local frameworks

The EN 16234-1 can also be directly adopted or adapted to meet specific cultural contexts and needs.

Before using this standard for developing a local ICT framework, it is useful to address a few questions. The first step is to clarify intended targets and purposes of the local framework. The second is to decide about adopting or adapting the full EN 16234-1 or only parts of it. For this purpose, it is useful to consider the following:

— Is it possible to compare the typical processes from local ICT companies to the processes used in the e-CF (in the categories plan, build, run, enable, manage)?

  To answer this question it might be helpful to look at the (typical) business processes of local ICT companies and at the adopted national or international standards for ICT product and/or service development and maintenance (e.g. CMMI, ITIL)

— In which ICT areas (look at dimension 1 of the e-CF) do local ICT companies operate? The focus of the e-CF is on processes and competences in the areas of *Software Infrastructure*, *System Integration*, *Communication equipment and services*. For other areas, such as *Microelectronics/ Components/ Semiconductors*, *Computing hardware or Industrial Control Systems,* it may be necessary to modify or amend competences.

— What national, local, economic, social or cultural characteristics exist that make it necessary to modify the competence descriptions or the level descriptions from the e-CF?

— Are relationships from the modified EN 16234-1 to existing qualifications, training or national/local educational system possible and helpful? If learning outcomes are orientated on competences, linking to e-CF may be straightforward.

Using the EN 16234-1 to link to formal and informally acquired qualifications is straightforward if they are orientated towards competence. From a competence perspective, it is unimportant from when and where a qualification is awarded or how many study hours are involved. Competence demands demonstrable capability obtained through a combination of experience, formal or informal acquired abilities/skills and knowledge.

The European e-Competence Framework can be used as a reference model for recognizing competence informally acquired by ICT professionals through their career.

For further illustrations, see Table 8.

Table 8 — Case study illustrating EN 16234–1 use in support of forthcoming frameworks (Source: CWA 16234–4:2014)

Case study	Title	Key perspectives
N	e-CF for National and EU policy makers	• Ensuring qualified ICT workforce in the long term • Communication between policy makers and ICT business • e-Curricula building • Cross-European common language

5.4 Reference for qualifications, training and certification

EN 16234-1 also provides an input for educational and vocational training and certification institutions.

The Bologna process (1999) expressed its programmatic intention of generating "a new enhanced European co-operation" especially focused on higher education and employability. In addition, the Bruges-Copenhagen Process (2001-2002) promoted transparency, mobility and inter-institutional co-operation to strengthen vocational education and training as well as the recognition of competences and qualifications.

Accordingly, EN 16234-1 is a consistent way of connecting companies to schools, universities and training institutions: thus promoting Europe-wide inter-institutional co-operation. EN 16234-1 demonstrates industry competence needs, and educational and training institutions can be informed by the e-CF when constructing and designing training programmes.

Moreover, the European e-Competence Framework provides a consistent link to the European Qualifications Framework (EQF) because the e-competence descriptions are in line with the EQF learning outcomes-based language. It therefore also supports mutual understanding and communication between industry and education and training systems.

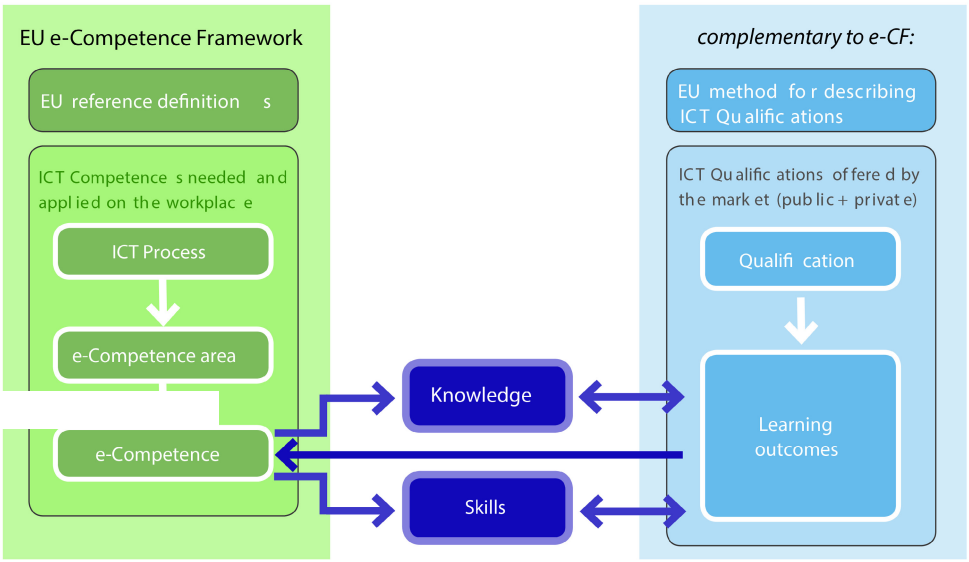

Figure 5 — Links between e-CF competences and ICT qualification offers can be easily established by the framework dimension 4, making explicit knowledge and skills

In Figure 6, the possible role of EN 16234-1 to support and inspire new training processes is highlighted.

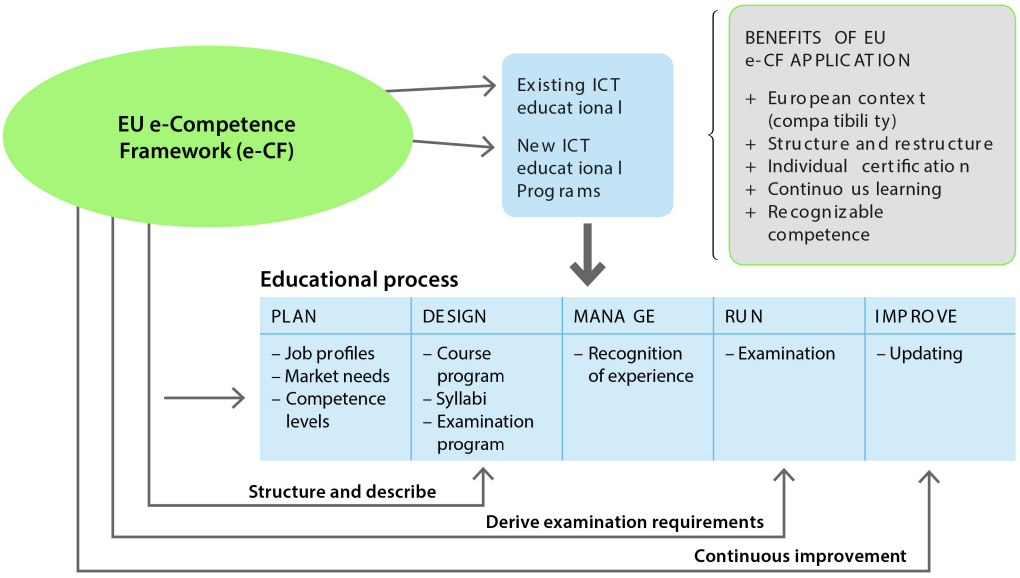

Figure 6 — EU e-CF application by ICT education, training and certification institutes (public and private)

For further illustrations, see Table 9.

Table 9 — Case studies illustrating EN 16234–1 use in support of qualifications, training and certification (Source: CWA 16234–4:2014)

Case study	Title	Key perspectives
F	e-CF for qualification providers	• Matching education supply to market needs • The difference between competence development and traditional learning • Student motivation from a competence approach • EQF and e-CF compliance
G	e-CF in a certification environment	• Matching certification supply to market needs • Increasing transparency in the European e-Skills landscape
I	e-CF for linking e-curricula supply and demand	• Competence connected to learning outcomes • e-CF and EQF compliance • Personal career development • Competence based e-curriculum

5.5 Support of ICT professional career development

The European e-Competence Framework provides a pragmatic competence overview of the European ICT labour market from industry and public sector perspectives.

The framework can be used by individuals to self-assess and articulate a personal competence profile. This may then be compared with a European job role defined in e-CF competence terminology. Consequently, individual competence gaps can be used to focus personal development on areas for improvement. This activity may be driven by personal motivation or through collaboration within an employers structured personal development programme.

For further illustrations, see Table 10.

Table 10 — Case studies illustrating EN 16234–1 use in support of ICT professional career development (Source: CWA 16234–4:2014)

Case study	Title	Key perspectives
K	e-CF for ICT professional associations	• Assessment • Benchmark criteria • Community building
L	e-CF for ICT training quality improvement	• Specialized competences • Specialist role development • Matching education supply and demand
M	e-CF for assessment and career tools	• Assessing an ICT professional's capability • Recognition of formal and informal learning

5.6 Support of HR planning and job profiles development

The competences provided by the European e-Competence Framework can be used as bricks for building job profiles according to specific company and work place needs.

Complementary to the European e-Competence Framework, the CEN ICT Skills Workshop has developed a set of typical European ICT Professional Profiles which can be used for reference and adapted to ICT related to specific contexts, e.g. at National, regional, sub-sector or company level.

Figure 7 shows the graphical overview of all profiles defined and their positioning within the European environment.

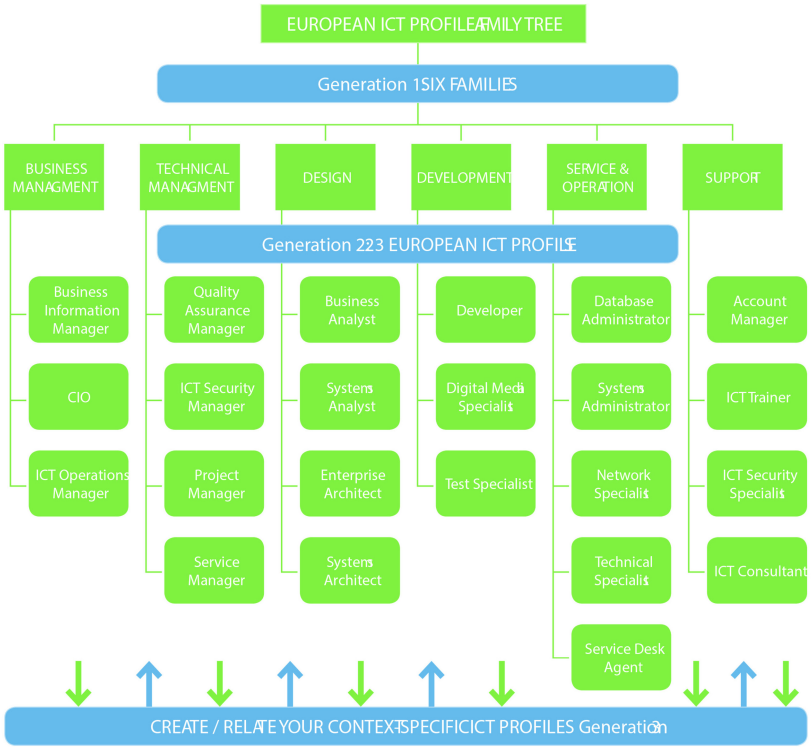

Figure 7 — 23 European ICT Professional Profiles in 6 families – Top of a European Profile family tree

The Profile “Quality Assurance Manager” shows an example of how these profiles were defined; the EN 16234-1 e-Competences are a key component of this.

Table 11 — EU ICT Professional Profiles example "Quality Assurance Manager" built upon the e-CF

Profile title	QUALITY ASSURANCE MANAGER (16)		
Summary statement	Ensures that Information Systems are delivered according to organizational policies (quality, risks, Service Level Agreement).		
Mission	Establishes and operates an ICT quality approach compliant with the organization's culture. Ensures that management controls are correctly implemented to safeguard assets, data integrity and operations. Is focused and committed to the achievement of quality goals and monitors statistics to forecast quality outcomes.		
Deliverables	Accountable	Responsible	Contributor
	• Audit report	• Quality performance indicators	• Quality assurance • ICT quality policy • Risk management policy • Information security policy
Main task/s	• Establish and deploy the ICT quality policy • Organize and provide quality training • Provide ICT managers with quality performance indicators • Perform quality audits • Organize customer satisfaction surveys • Assist project team members to build and perform project quality plans		
e-competences *(from e-CF)*	D.2. ICT Quality Strategy Development		Level 4–5
	E.3. Risk Management		Level 3
	E.5. Process Improvement		Level 3
	E.6. ICT Quality Management		Level 4
KPI area	Achievement of company quality goals		

For further illustrations, see Table 12.

Table 12 — Case studies illustrating EN 16234–1 use in support of HR planning and job profiles development (Source: CWA 16234–4:2014)

Case study	Title	Key perspectives
A	e-CF in large ICT demand organizations	• Job profile creation • Internal ICT staff development • Cross company and cross border common language
E	e-CF to build SME job descriptions	• Job description development • Intercompany communication • Recruitment aid
O	e-CF to relate or integrate to other frameworks	• e-CF use in an established structure • Relating the e-CF to other frameworks • Competences and job profiles • Relating workplace and qualification perspective by EQF and e-CF
P	e-CF for European ICT professional Profiles creation	• Including competence into a job Profile • Communication between HR, management and ICT professionals • Building and linking local profiles to a recognized European structure

5.7 Support of recruiting and sourcing processes

Using EN 16234-1 as a core reference for ICT recruiting and sourcing processes can facilitate improved and efficient correlation between competence demand from recruiting and/or sourcing companies and competence supply from job seekers and the ICT supply side.

Within companies, the recruiting process usually involves at least three interested parties:

— Line management responsible for the person to be recruited. They need to define as precisely as possible the job in terms of mission statements, responsibilities, activities, work environment and, of course, the required competences and qualifications.

— An HR representative, who must define the compensation in relationship with HR policies (level of responsibility, expected career evolution…) and with the evolution of the job position.

— Potential applicants (internal or external), who need to clearly understand the specification of the job, the company, compensation and benefits.

Communication between these three parties is a key issue influencing the effectiveness and success of the recruitment process.

The European e-Competences Framework provides a common and concise language for those involved in recruitment:

— Dimension 1 and 2 can be used to define the scope of the job.

— Dimension 3 can be used to define the required competences and proficiency level.

— Dimension 4 can be used to highlight some particular knowledge and skills required and to design assessment sessions.

The use of an internationally shared competence language in job advertisements supplied by employers and recruiters and understandable by job seekers will increase transparency and efficiency of the HR recruitment process.

Using EN 16234-1 for competence profiling in online job portals can also benefit employers, recruitment agencies and job seekers by sharing a common language.

For further illustrations, see Table 13.

Table 13 — Case studies illustrating EN 16234–1 use in support of recruiting and sourcing processes (Source: CWA 16234–4:2014)

Case study	Title	Key perspectives
A	e-CF in large ICT demand organizations	• Job profile creation • Internal ICT staff development • Cross company and cross border common language
E	e-CF to build SME job descriptions	• Job description development • Intercompany communication • Recruitment aid
O	e-CF to relate or integrate to other frameworks	• e-CF use in an established structure • Relating the e-CF to other frameworks • Competences and job profiles • Relating workplace and qualification perspective by EQF and e-CF

5.8 Support of understanding learning paths and training offers

As EN 16234-1 provides guidance for ICT education and training systems, it can also provide a useful reference for young people, employees and job seekers. Individuals who intend to improve their competences or to retrain according to industry requirements can refer to EN 16234-1 as a guide. The e-CF offers a clear picture of competence related to business areas and proficiency levels.

In addition, e-Competence can be related to training and qualification programmes as the European e-CF language is in line with EQF learning outcomes-based recommendations. Consequently, individuals can see opportunities for personal growth aided by EN 16234-1, and also select appropriate training programmes.

For further illustrations, see Table 14.

Table 14 — Case study illustrating EN 16234–1 use in support of understanding learning paths and training offers (Source: CWA 16234–4:2014)

Case study	Title	Key perspectives
H	e-CF for ICT professional self-assessment	• Self-assessment • CV/Self promotion

5.9 A common reference for policy makers, professional associations and market analysts

EN 16234-1 provides a European Standard reference for communicating competence needs in a transnational and European ICT environment. It articulates knowledge, skills and competence as needed and applied in the ICT workplace for the ICT vendor and user industry as well as in the public sector.

The e-Competence definitions of the Framework can therefore be used and understood as a shared international reference. In practise, the e-CF supports sector associations, policy makers, market surveyors and further players and organizations involved in anticipating, evaluating and planning ICT skills and competence needs in a long-term perspective across the European ICT Sector.

For further illustrations, see Table 15.

Table 15 — Case study illustrating EN 16234–1 use in support of policy makers, professional associations and market analysts (Source: CWA 16234–4:2014)

Case study	Title	Key perspectives
N	e-CF for National and EU policy makers	• Ensuring qualified ICT workforce in a long-term • Communication between policy makers and ICT business • e-Curricula building • Cross-European common language

Annex A
(informative)

Use of ICT sector terminology

EN 16234-1 does not establish new definitions; e-CF good practice is to apply existing definitions in a way that stakeholders clearly understand and that add value to the articulation of competence descriptions.

Table A.1 shows examples of ICT sector related terminology used within the e-CF, accompanied by the descriptions/ definitions adopted based upon common usage.

Table A.1 — Examples of ICT sector related terminology used within the e-CF

Cloud Computing
A style of computing in which scalable and elastic IT-enabled capabilities are delivered as a service using internet technologies. (Source: Gartner) The Cloud computing model is able to address the three layers of the commonly used service model: IaaS (Infrastructure as a Service), PaaS (Platform as a Service) and SaaS (Software as a Service). In Technical terms, a Cloud is a virtual space carried on one or more servers, disposed in one or multiple locations. It contains multiple fragments of information, which are duplicated and distributed in virtual space. A specific application is required to recreate the information and deliver it as a service. In terms of typology, there are four categories of Cloud Computing, organized around the usage (Private or open to partners, public or others) and the management (managed by the organization or by a supplier, outside the organization): 1. for private use, with an internal management (I manage my own Cloud) 2. for open use, with an internal management (I manage a Cloud and propose services to others) 3. for a private use, with an external management (I use a Cloud managed by a supplier) 4. for an open use, with an external management (I propose to others, as my customers, to use a Cloud managed by a supplier) In economic terms, with Cloud Computing, the notion of consumption prevails over the concept of use: you buy a subscription, a license to consume, not a license to use.
e-leadership
Within the e-CF context, e-leadership is used as a specific expression of leadership. The “e” is used as an all-inclusive acronym relating to combinations of ICT and business, including all technical ICT fields, all business fields and activities by enterprises or people in developing, using, supplying, servicing etc. and related to all competences on all levels. The combination of ‘e’ and leadership in the e-CF means: the ability to initiate and to instigate innovative processes by convincing others to collaborate and to apply entrepreneurial spirit in support of transformational processes driven by technology.
ICT Information and Communication Technology
The abbreviation ICT stands for Information and Communication Technology. It is used in many different contexts and, from a technical point of view, ICT relates to digital computers and internet (communication) systems, including software, hardware and networks. From an economic and political point, ICT relates to a cross sector of enterprises, including manufacturers, supplier or service providers related to the technical ICT field.

Information Security
Information Security is the ongoing process of exercising due care and diligence to protect information, and information systems, from unauthorized access, use, disclosure, destruction, modification, disruption or distribution. The never-ending process of information security involves ongoing training, assessment, protection, monitoring and detection, incident response and repair, documentation, and review. The consequences of failure make information security an indispensable part of all the business operations across multiple domains" (backed by current standards, ISO/IEC 27000 and US).
Leadership
The e-CF uses the word 'leadership' in its general accepted meaning, as defined in the Oxford English Dictionary, 'the action of leading a group of people or an organization, or the ability to do this'. Competence descriptors incorporating 'leadership' are normally to be found at levels 4 and 5 in the e-CF where responsibilities for people and influence over others are required. This is usually expressed as follows, 'provides leadership' meaning that the competence involves not only possessing the appropriate knowledge and skills but also the ability to inspire others to follow within a competence field.
Lean Management and People Management
"Lean management is the sum of thought, methods and procedures for the management without waste along the entire value chain in order to meet current and future customer expectations3)".
Legal matters: IPR and data protection
Legal matters are not explicitly enshrined in the e-CF but there are two issues that are of particular relevance to the ICT Professional/Management community: IPR and data protection. ICT Professionals/Managers must ensure that they comply with national and international laws relating to these matters. IPR is a legal concept that relates to ideas and concepts of human intellectual creativity for which exclusive rights are recognized. National laws grant originators exclusive rights to intangible assets, such as inventions and designs. The main categories of these rights are copyright, patents, trademarks, design and retention of confidential information. Data Protection laws have been enacted to control how organizations, business or governments use personal data. National laws establish a framework of rights and duties that are designed to safeguard personal data. Data protection laws balances the legitimate needs of organizations to collect and use personal data for business and other purposes against the right of individuals to respect for the privacy of their personal details.
Mobility
Mobility reflects the ability to exchange information without the sender or receiver being subjected to any constraint of place (anywhere), of content (anything), of time (anytime), of media (any device), of number or availability of stake holders (anybody). Mobility enables exchange of anything from anywhere for anybody with any device at anytime. Technically, mobility relies on all communications networks with Internet access. It also uses specific equipment such as smartphones, laptops or tablets, which have the ability to stay connected permanently to the Internet. From a process perspective, mobility can deport work processes at different locations to answer specific situations. (from CIGREF report)

3) http://www.leancenter.it/LeanManagement/tabid/75/language/it-IT/Default.aspx

Innovation
From the OECD, “innovation differs from an invention or discovery to the extent that it is part of an application perspective “ Invention is a process which is constrained only by the inventive capacities of inventors and by the available resources (money, human or material resources) to realize them. Invention calls for proliferation and human creativity. The present system is then disrupted and reorganized taking into account the new invention. It is at this moment that we have the innovation. Innovation transforms speculative or exploratory invention into an economic and industrial reality. It leads to a process of new practice which leads to effective use; it is a passage to the act *(from CIGREF report).* The concept of innovation covers a set of processes: — the discovering and identifying of an idea; — the writing of multiple business plans to transform this idea in a solution or product (human, finance, sponsor, users, perimeter; need targeted...); — the evaluation and prioritization of the different solutions described in business plans; — the building of a “proof of concept” to validate one or more chosen solutions; — the management of the technology transfer to operational teams; — the follow of the development and integration of the solution; — the capitalization on the success or the failure of the transformation of the initial idea. In that way, innovation can be a competence: to be able to innovate is the capability to oversee and to manage all these specifics processes from initial idea to final product, in a coherent approach to answer a need.

Annex B
(informative)

Development history of EN 16234-1

In 2005, further to the recommendations of the European e-Skills Forum, the CEN ICT Skills Workshop members agreed that national ICT framework stakeholders as well as European ICT industry representatives – both human resources and ICT experts – should consider developing a European e-Competence Framework.

Encouraged and accompanied by the European Commission, ICT framework stakeholders coming from the French association of large ICT demand companies CIGREF, the SFIA representing sector association e-Skills UK and the AITTS representing German social partners IG Metall and BITKOM met with representatives from European larger companies (Airbus, Michelin) and the applied research foundation Fondazione Politecnico di Milano for a kick-off early 2006 in order to put this intention into practice.

During an intensive follow-up, they designed a programme to work towards a European e-Competence Framework under the umbrella of the CEN Workshop on ICT Skills. These efforts were welcomed and recognized in the Communication of the European Commission on "e-Skills for the 21st Century: Fostering Competitiveness, Growth and Jobs" of September 2007 and the Competitiveness Council Conclusions of November 2007.

In order to achieve a European agreement and useful results at an international and national level, the Europe-wide involvement of further ICT sector players and stakeholders from business, politics and education has been crucial to the framework development philosophy and strategy. Whilst at the political level it was important to get the larger multi-stakeholder public of the European ICT sector engaged, at the expert working level, focus was placed upon HR and IT management know-how from the European ICT industry.

The European e-Competence Framework version 1.0 was published in 2008 from the outcome of two years e-Skills multi-stakeholder, ICT and human resources experts' work from multiple organization levels (CWA 15893-1 and CWA 15893-2).

The European e-Competence Framework version 2.0 was published in 2010, now also with dimension 4 fully developed, and it was accompanied by an updated user guide and a newly developed methodology documentation. Presented in CWA 16234-1, CWA 16234-2 and CWA 16234-3, the second version of the framework built upon the e-CF version 1.0, taking into account the first e-CF application experience and feedback from ICT stakeholders across Europe. An easy to use online tool was published to support navigation through the framework and user-specific profile building in English language.

The European e-Competence Framework version 3.0 was presented in 2014 by the CWA 16234:2014 document, being the result of the CEN ICT skills Workshop Project "e-CF support and maintenance – towards e-CF version 3.0" (2012-2013). Version 1.0 was focused upon pioneering development of dimensions 1, 2 and 3 and version 2.0 provided the framework developed in all four dimensions. Version 3.0 project activity was guided by the overall maturity of the e-CF, reviewing framework underlying principles, content, plus practical acceptance and use by deploying stakeholders.

Feedback from more than 120 stakeholders from across Europe and abroad was systematically evaluated and considered within the e-CF version 3.0 updating process. Many technical suggestions were backed by e-CF user practical experience that provided high value to the updating activity.

Care has also been taken to ensure that existing users of version 2.0 are able to adopt version 3.0 without excessive effort. Guided by the overall mission to minimize changes but maintain continued framework relevance and continued ease of application for multiple ICT stakeholders in compliance

with the e-CF Founding principles; the framework update to version 3.0 was characterized by the following highlights:

— Four new competences have been added:

  — A.9 Innovating;

  — B.6 Systems Engineering;

  — D.11 Needs Identification;

  — D.12 Digital Marketing.

— As a response to stakeholder comments received in the context of version 1.0 and 2.0, the design and development process was articulated more clearly:

  — The v 2.0 competence B.1 Design and Development has been divided into two competences: → B.1 Application Development and B.6 Systems Engineering.

  — This leads to further clarity and refinement of the design element within: A.5 (systems design) and A.6 (applications design).

  — The development element of the process is further enhanced in: B.1 (related to applications) and B.6 (related to systems).

— The need to consider new emerging business, technology and development process trends (mobile, cloud, big data, lean management, iterative approach…) and to consider the changing priorities of existing issues (e.g. security) were addressed across the entire framework and incorporated within relevant dimensions.

— Extracting value from the "e-CF into SME" project (see CWA 16367:2011), the perspective of small and medium-sized enterprises has been incorporated within version 3. Examples include the new competence D.11 Needs Identification, the applied research perspective is now addressed and a new competence A.9 Innovation introduced

— A systematic review was taken of leadership components of the e-CF, also informed by the concept of e-leadership and where relevant both components were further integrated.

Project activities supporting the framework update helped to expand the exchange of information between the network of e-CF stakeholder supporters and users across Europe. Some information exchanges were systematically registered by documenting case studies to illustrate e-CF use in practice.

In summary, the CEN ICT Skills Workshop Project "e-CF support and maintenance – towards e-CF version 3.0" (2012-2013) led to the following documented outcomes:

— European e-Competence Framework 3.0. A common European framework for ICT Professionals in all industry sectors (CWA Part 1);

— User guidelines for the application of the European e-Competence Framework (CWA Part 2);

— Building the e-CF. A combination of sound methodology and expert contribution. Methodology documentation (CWA Part 3);

— 15 case studies illustrating practical e-CF application experiences from multiple perspectives (CWA Part 4).

Supporting e-CF application within multiple environments; the case studies provide examples, benefits and hints of how to make best use of the e-CF. They have been elaborated in collaboration with European-wide e-CF users.

The European e-Competence Framework is a key component of the "Grand Coalition for Digital Jobs" launched by the European Commission in March 2013 to fill the digital gap.

Within CEN/PC 428, CWA 16234:2014 was transferred into a European Standard (EN).

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4) Available from *www.ecompetences.eu*

5) Available from *www.ecompetences.eu*

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