



**CEN/ISSS Workshop on ICT Skills
CEN – European Committee for Standardization**

Towards a European e-Competence Framework

Interim Report

26th of October 2007

Authors:

Jutta Breyer, Terry Hook, Clementina Marinoni

based on the common development of content by the CEN nominated experts
(W. Berlin, J. Breyer, T. Hook, F. Lau, C. Marinoni, I. Rogalla)

together with the wider expert working group (EWG)

Content table

1. Introduction.....	4
1.1. Background and rationale	4
1.2. A common reference framework of e-competences, coming up from European ICT industry: Objectives and business benefits	4
1.3. A European multi stakeholder process – parties involved	6
2. The work programme and project planning.....	7
2.1. Pilot pre-phase 2006 and integration of its results in the CEN project work.....	7
2.2. The project plan 2007/08: aims, scheduling and steps completed so far	9
2.3. Main steps of work	11
2.3.1. The methodological phase	13
2.3.2. The operational work on competence description	14
2.3.3. The testing phase	14
2.3.4. Framework readjustment and consolidation	14
2.3.5. Elaboration of the user guideline	14
3. Work performance in 2007	15
3.1. Working structure and involved expert resources	15
3.2. Project milestones: The expert meetings.....	16
3.2.1. London meeting 12/06 – aims and outcomes	16
3.2.2. Milano meeting 05/07 – aims and outcomes	17
3.2.3. Paris meeting 10/07 –aims and expected outcomes	17
3.2.4. Further meetings planned	17
3.3. The work between the meetings: exchange by mail and conference calls.....	17
4. Main outcomes achieved so far – overview on project progress.....	18
4.1. A Europe-wide agreed definition of competence	18
4.2. The framework structure: levels and layers, competence areas and competences.....	19
4.3. How to identify and populate competences: ICT knowledge areas and ICT processes	19
4.3.1. ICT business and work processes.....	20
4.3.2. ICT knowledge areas	21
4.3.3. Building e-Competence areas	22
4.4. Definition of e-Competence levels compliant with the EQF	23
4.4.1. The European e-Competence Framework (EQF) levels.....	24
4.4.2. Which differences and how to define e-Competence levels compliant with the EQF	24
4.5. How levels help describe competences.....	28
4.6. European e-Competence Framework structure and layout – one example in progress of competence definition.....	29
4.7. Guidelines for the European e-Competence Framework development.....	32
5. Outlook - Planning of the further work.....	33
5.1. Elaboration of competence descriptions.....	33
5.2. Testing phase, framework readjustment and consolidation	33
5.3. Preparation of the user guideline.....	33
6. Outlook beyond the experts work: Framework implementation	34
6.1. A structure for maintaining and updating.....	34
6.2. Implementation within a long-term e-Skills strategy.....	35

7. Glossary	36
8. References	37
9. The expert working group (EWG) – members and acknowledgment.....	38

Annex:

- **Towards a European e-Competence Framework. A guideline for its development.** *First release, October 2007*

1. Introduction

1.1. Background and rationale

The CEN / ISSS Workshop on ICT Skills is a European work group consisting of both national and international representatives from the ICT industry, vocational training organisations, social partners and other institutions. The workshop aims to create long-term human resources (HR) and competence development strategies for the European Information and Communication Technology (ICT) sector.

In 2005 the workshop members concluded that national ICT framework stakeholders, as well as European ICT industry representatives – both HR and ICT managers – should develop a European e-Competence Reference Framework [1].

A common reference framework of ICT practitioner competencies, defined by HR and IT experts on a European level, will provide a Europe-wide working tool for all players of the sector, namely ICT practitioners, ICT managers as well as higher education, training and certification providers.

The framework stakeholders from SFIA, CIGREF and AITTS [2] underline the role and importance of national competence frameworks. These frameworks are rooted in national economies and qualification and training backgrounds and they will continue to play a significant role in the years ahead, irrespective of intensive efforts to create and implement a European Reference Framework for Qualifications based on learning outcomes (EQF) [3].

As the ICT sector is a sector that operates globally, the stakeholders of the major ICT frameworks in Europe recognize simultaneously the need for linking the different national frameworks at a European level. This can be achieved by the development and establishment of a two-dimensional European e-Competence Framework which defines the main levels and functional categories of ICT practitioner fields of activities on a “neutral” European level and, at the same time directly relates to the coverage of the contents of the existing national frameworks.

The framework is being developed in line with the EQF and closely linked to other existing national and European concepts and tools. The European e-Competence Framework aims to strengthen competitiveness of the European ICT labour force and business, always keeping in mind that ICT is a global business in a global environment, linked to international, national, sector, business or managerial competence frameworks.

The objective is to have the right people in the right place at the right time.

1.2. A common reference framework of e-competences, coming up from European ICT industry: Objectives and business benefits

Michelin, Eurocopter, Renault and Airbus among many other European companies deploy IT/IS services worldwide. They expend huge effort and cost to establish and update company internal ICT competence catalogues for HR planning, training and development. Sharing these efforts on a European level could save considerable resource and expense.

Today, large company's active in an international environment and in different home markets need to be able to relate to national or local qualifications. Moreover, corporations with and without functional competence systems (i.e. systems taking into account not only managerial

skills but also the specific competences for each job function) feel the need of shared reference sets of e-competence descriptors. In particular, companies without ICT competence systems see them as a help for developing homogeneous ICT career paths and facilitating internal mobility. All companies consider shared e-Competence frameworks as a way of communicating with customers and suppliers and building ICT communities. Furthermore, e-Competence frameworks can be used as a benchmark for new emerging ICT job profiles.

It can be expected that companies of some 50 and more employees are likely in the future to generate an ever growing proportion of their business from abroad, thus calling for HR strategies comparable to those of larger companies operating internationally. The efforts and resources required to establish competence frameworks are often underestimated. Especially in the long run, considerable investment is required to update and maintain competence structures. Companies running/considering such systems are understandably interested in transferring these obligations for two reasons:

- to stay in touch with developments in the ICT market (which, although generally not driven by their own companies) will result in changes in the work processes, profile shaping etc. within their company. In this sense, a European structure, with adequate resources to track market developments, could provide an objective, 'neutral' basis for updating.
- to create a reference framework and a tool-box which could enable adaptation to individual companies needs. This recognises that it is unrealistic that a European set of competences – or even profiles – would match any single company or institution's needs perfectly.

At the same time, the stakeholders of national ICT Competence Frameworks as CIGREF, AITTS and SFIA are conscious that these frameworks exist in parallel to each other which makes them difficult to apply in a cross-national environment. Some are mainly profile oriented which makes them less suitable for competence management.

Currently, there is no common agreement on how to talk about ICT knowledge, skills and competencies on a European level. This lack of transparency causes a mobility and efficiency problem which has an impact on the competitiveness of the European ICT sector and ICT dependant industries.

The framework will provide a cross-national communication and cooperation tool for the ICT industry, public sectors, training bodies, certification institutions and individuals.

The framework will bring a neutral, Europe-wide recognised benchmarking and reference tool for ICT which enables competency management and long term planning across Europe.

The forthcoming e-Competence Framework will strengthen the competitiveness of the European ICT labour force and business in the global market. Therefore, the framework has to provide a Europe-wide working tool for all players involved in ICT business: ICT practitioners will get clear guidelines to develop their competences in accordance with their position and progression. ICT managers will be enabled to anticipate and plan competence needs in accordance with their specific company development and recruitment policy. Finally, higher education, vocational training and certification providers will get a practical industry-based support for designing curricula. Regarding the ICT qualification supplier side, the framework has to be linked to a possible future standard format for describing and

understanding ICT qualifications across Europe. The ICT Qualifications Framework, consists of a set of qualitative and descriptive standards for creating transparency in the ICT qualification market and puts into practise the learning outcome approach promoted by the EQF, see www.ict-lane.eu [4] and other relevant initiatives).

From a global perspective, the framework will help to position European ICT business and values worldwide. Within Europe, the tool should inspire national stakeholders to create future frameworks in line with the forthcoming European e-Competence Framework.

The overall aim of this multistakeholder effort is clear: the ability to create, manage, plan and develop ICT competences that will be needed in a long term perspective across Europe.

1.3. A European multi stakeholder process – parties involved

From the beginning, the members of the core project group which initiated this process were aware that to create a real European Framework, the larger involvement of interested parties and experts was not only an option, but essential. Accordingly, the involvement of other countries, companies and stakeholders was considered strongly needed and planned for.

Early 2006, the framework stakeholders from AITTS, CIGREF and SFIA met for a kick-off in Berlin, supported by representatives from several European larger companies and a research foundation. During an intensive follow-up, they projected a programme for the work towards a European e-Competence Framework under the umbrella of the CEN/ISSS workshop on ICT Skills. At the e-Skills Conference in 2006 in Thessaloniki, the initiative and early achievements was presented as a multistakeholder and European sector driven effort.



Figure 1: Stakeholders involved in the project programme in October 2006

In order to achieve a European agreement and beneficial results at an international and national level, the Europe-wide further involvement of ICT sector players and stakeholders from business, politics and education has been maintained and cultivated as part of the working philosophy and strategy. Whilst at the political level it is important to get the larger multistakeholder public of the European ICT sector on board, at the expert working group level focus has been placed upon HR and IT management know-how from the European ICT industry.

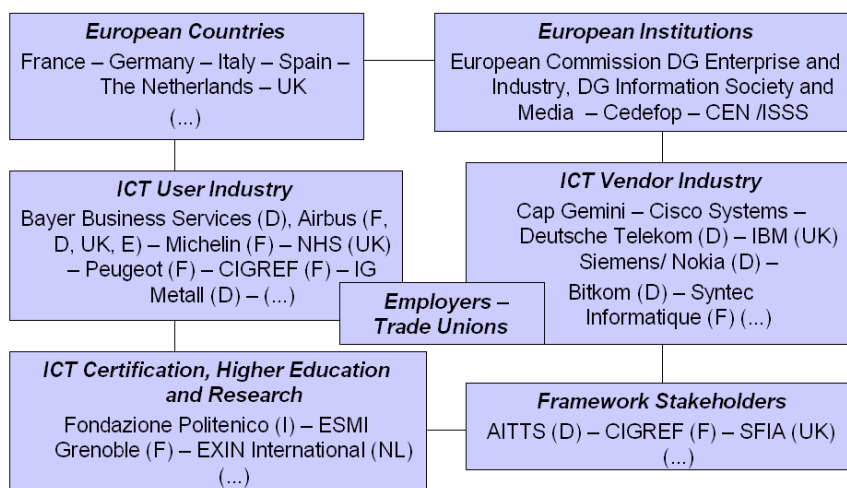


Figure 2: Stakeholders involved in September 2007 (Extract)

As figure 2 shows, this strategy of continuously enlarging the multistakeholder group has shown some important results and the supporting and contributing community has grown step by step. This success shows the real power of the CEN/ISSS workshop: It is an ideal platform for creating and maintaining multistakeholder partnerships of the ICT sector across Europe.

2. The work programme and project planning

Starting from a kick-off meeting in March 2006 in Berlin and with an intensive follow-up by phone and mail, the framework stakeholders, the companies and the research foundation involved in the development of the CEN project proposal, elaborated a detailed work programme towards a European e-Competence Framework. This work programme was divided into two phases: A pilot pre-phase on methodology carried out in 2006 and a larger work programme for 2007/08 which aims to establish the European e-Competence Framework for Europe-wide use.

2.1. Pilot pre-phase 2006 and integration of its results in the CEN project work

In 2006, an expert group – currently composed by representatives from different European countries (France, Germany, United Kingdom, Italy), frameworks (CIGREF, SFIA, AITTS), ICT vendor and user business as well as higher education and research, elaborated and agreed on a work programme “Towards a European e-Competence Framework”.

To accelerate the process, a pilot project on the methodology was carried out in a project pre-phase 2006, in order to prepare the co-funded project work towards a European e-Competence Framework in 2007/08. This work was conducted by exchange and discussion of suggestions and working papers by mail and conference calls and a final expert working group meeting in December 2006 in London. Explorative work by Clementina Marinoni (Fondazione Politecnico di Milano) in order to analyse and compare existing frameworks from European countries and industry provided the basis of this work.

In order to shape a common language and to find a shared methodology, this explorative work consisted of an analysis and comparison of some job profiles (e.g. Project Coordinator, Software Developer, Application Architect) coming from the four local frameworks Airbus, AITTS, Cigref, SFIA. To carry out the analysis and comparison, an initial common structure was defined which consisted of task statements and groupings according to different scopes (plan, do, evaluate and monitoring, manage), knowledge identification and connections to EQF levels. Rules were suggested for job profile descriptions such as specifying project dimension, risk level, context complexity and unpredictability, type of responsibility for either direct or people's performances, etc. These specifications were needed in order to clarify and determine competence levels, hence the links between competences and job profile descriptions to the EQF. Starting from the common structure defined by the exercise, a competence definition in addition to a way of describing competences was decided leading, towards a common agreement on how to talk about knowledge, skills and competences on a European level.



Towards a European e-Competence Framework: Overview of the methodology work in 2006

Complete schedule: 03/2006 – 12/2006: work and agreement on the methodology ("common language")
 01/2007 – 06/2008: definition of ICT competencies on a European level (incl. elaboration of a user guideline)

- according to European ICT employer's needs
- in line with implementation and further development of the EQF
- classified in major fields of ICT activities

Inputs	Main questions / decisions to make	Organization / Timeline
<p>SFIA / CIGREF / AITTS</p> <ul style="list-style-type: none"> • The stakeholders provide their national frameworks for analysis <p>Fondazione Politecnico</p> <ul style="list-style-type: none"> • Results of the comparing exercise: <ul style="list-style-type: none"> - Project Manager - Software Developer - Application Architect / Systems Developer • Suggestions about possible alternatives for the decisions to make (s. column 2) • Suggestions on relationship between EU definitions and national frameworks <p>CIGREF / EMSI Grenoble</p> <ul style="list-style-type: none"> • TIC Référentiel as a best practise example of a ICT competence FWV (built as guideline for higher education, not for competence management) <p>Companies (Airbus et al.)</p> <ul style="list-style-type: none"> • Competence catalogues from companies as best practice examples from industry 	<p>To decide by the expert group</p> <ol style="list-style-type: none"> 1. How to define the competencies? <ul style="list-style-type: none"> - Acceptance of the common language (e.g. check, do, plan..) - Will knowledge be integrated? - If yes, on which level of detail? 2. How will the framework look like? <ul style="list-style-type: none"> - E.g. one page per competence? - Or a database? 3. What will be the criteria for classification? → ICT areas 4. How to explicate the levels of competencies and their relationship to the EQF? <p>To decide by the CEH Workshop Members</p> <ol style="list-style-type: none"> 5. How will the FWV be maintained and updated? <ul style="list-style-type: none"> - level of detail for updating - frequency 6. Who will be the "owner" (and responsible for updating) of the FWV? <ul style="list-style-type: none"> - a European ICT organization? 7. Business model for future diffusion and maintaining? 	<p>06 / 2006</p> <ul style="list-style-type: none"> • Delivery of the exercise results (incl. first methodological suggestions) • Opening the online working platform (provided by Fondazione Politecnico) • First feedback by phone and mail <p>Conference call in 07 / 2006</p> <ul style="list-style-type: none"> • Discussion of the results • State of involvement of other countries and companies <p>08 – 09 / 2006</p> <ul style="list-style-type: none"> • Preparative distribution of practical material (examples related to company's daily practice) <p>Meeting in 10 / 2006</p> <ul style="list-style-type: none"> • discussion of main questions • decisions (s. column 2) <p>Conference call in 11 / 2006</p> <ul style="list-style-type: none"> • agreement on the meeting's results • definition of the methodology for the work in 2007-08

Figure 3: The work programme agreed for the pilot pre-phase 2006. Some dates were removed, some questions go on being crucial for the work 2007/08.

Despite some date amendments and some remaining open questions crucial for the ongoing work in 2007/08, the most important result of the pilot pre-phase could be reached: Although each national and company-internal framework reflects its local and cultural specifications, they have many common elements and it was accepted as a realistic proposition to create a set of European reference competences which could be used as connection points between each.

As crucial input for the work in 2007/08, the experts agreed on a common European definition of competence (s. 4.1.) and elaborated a suggestion for the structure of the forthcoming framework (s. 4.2.). Thanks to these fundamental results, the work in 2007 could start quickly.

2.2. The project plan 2007/08: aims, scheduling and steps completed so far

As a first step of the work starting in March 2007, the experts nominated by CEN agreed on a project plan, determining the most important steps, the respective timeline, the resources involved and the responsible for lead management in each case. This plan was circulated discussed between the workshop chairman and co-chairs and has been published for discussion on the web space of the CEN/ISSS workshop community.

This plan has been followed as the road map for the project and, if necessary, readjusted according to the ongoing work. Table 2 provides an overview on the latest iteration of the project plan and progress achieved so far, table 1 the legend for reading the project plan.

The outcome of steps accomplished – focused on the methodology on how to elaborate the framework – will be explained in detail in part 4 of this report.

<p><i>Project plan 2007/08 - legend</i></p> <p>LM = lead management</p> <p>CEN nominated experts</p> <p>JB – Jutta Breyer (<i>project management and communication</i>)</p> <p>WB – Wilfried Berlin (<i>ICT, framework testing and implementation</i>)</p> <p>TH – Terry Hook (<i>ICT, methodology</i>)</p> <p>FL – Frédéric Lau (<i>ICT, methodology</i>)</p> <p>CM – Clementina Marinoni (<i>methodology</i>)</p> <p>IR – Irmhild Rogalla (<i>methodology</i>)</p> <p>EWG = Expert working group (s.3.1.)</p> <p>CAG = Chairman Advisory Group (Chairman, Co-Chairs, Steering Committee)</p> <p>WIP = work in progress</p>

Table 1: Project plan 2007/08 - legend

WORK STEPS / TIMELINE	APPROPRIATE RESOURCES	LM	Working methods, meeting dates	WIP
01/07-02/07 <ul style="list-style-type: none"> summary outcomes 2006: establishment of a set of rules acceptance of the common language (provisional, to be optimised step by step during the WIP) 	expert working group	CM	<ul style="list-style-type: none"> common agreement outcomes expert meeting London exchange by mail and phone 	ok
03/07 <ul style="list-style-type: none"> development and agreement business plan, work programme and structure 	CEN experts	JB	<ul style="list-style-type: none"> elaboration project plan exchange by mail and phone contacting EWG (JB) 	ok
03/07-06/07 <ul style="list-style-type: none"> How to identify ICT competence areas (by crossing ICT knowledge areas and ICT processes) further decisions about methods (granularity, how to identify competencies) 	CEN experts, supported by expert working group	CM	<ul style="list-style-type: none"> by mail and phone 1st suggestion CM agreement CEN experts feedback EWG + CEN 	ok
03/07-07/08 <ul style="list-style-type: none"> development of a structure of future up-keeping and updating of the framework 	CEN workshop community	CAG	<ul style="list-style-type: none"> regularly reporting and exchange by mail, phone and meetings Next Steering Committee Meeting 15th Nov. 07, plenary meeting 16th Nov. 	open
04/07-05/07 <ul style="list-style-type: none"> definition of competence levels readjustment of definitions: ICT knowledge areas and ICT processes start elaboration of pilot competence descriptions 	CEN experts, expert working group	CM, IR, TH	<ul style="list-style-type: none"> CEN experts pre-meeting 23th May 07 Milano EWG meeting 24th-25th May 07 in Milano, Italy follow-up by mail and phone (3 sub-teams) 	ok

WORK STEPS / TIMELINE	APPROPRIATE RESOURCES	LM	Working methods, meeting dates	WIP
05/07-04/08 <ul style="list-style-type: none"> elaboration and implementation of communication strategies and info material addressed to companies who can contribute and be involved in the work in progress 	CEN experts (Marketing) CEN workshop community	(PR) JB	<ul style="list-style-type: none"> s. Business Plan Marketing and Communication 	WIP
06/07-07/07 <ul style="list-style-type: none"> Continuing EWG's Milano meeting teamwork (ICT knowledge areas – ICT processes – levels – example of fully defined competence area) 	expert working group (divided in 3 sub-teams)	JB, CM	<ul style="list-style-type: none"> self-organised by teams agreed suggestions to CM and EWG by 15th June 	ok
09/07 <ul style="list-style-type: none"> Elaboration of the guidelines for the European e-Competence development 		CM	<ul style="list-style-type: none"> elaboration of the guideline by CM, discussion by mail/phone 	ok WIP
10/07-04/08 <ul style="list-style-type: none"> Identification of main ICT competence areas (layer 1) Identification of related core competences (layer 2) Operative work on elaboration of competence descriptions 	expert working group, CIGREF HR group, Airbus team	FL, WB	<ul style="list-style-type: none"> CEN experts pre-meeting 10th October 07 Paris, France EWG meeting 11th-12th Oct 07 in Paris follow-up by mail and phone CIGREF meetings Airbus teamwork? accompanying work by mail and phone 	
10/07 <ul style="list-style-type: none"> Interim report to the European Commission 	CEN experts	JB	<ul style="list-style-type: none"> 1st suggestion JB by mail individual contribution of each expert per field of expertise agreement by mail + phone discussion and review on the Paris EWG meeting 	ok
12/07 <ul style="list-style-type: none"> first testing competence descriptions 	Airbus team, CIGREF HR group,	WB. FL	<ul style="list-style-type: none"> feedback by mail and phone 	

WORK STEPS / TIMELINE	APPROPRIATE RESOURCES	LM	Working methods, meeting dates	WIP
	EWG members			
01/08 <ul style="list-style-type: none"> • first draft of the user guideline 	CEN experts	CM, JB, TH	<ul style="list-style-type: none"> • 1st suggestion by mail according to criteria elaborated during the WIP • agreement by mail and phone 	
04/08-05/08 <ul style="list-style-type: none"> • testing of the framework by potential users • further development and readjustment 	Airbus team, CIGREF HR group members, EWG members (also supplier side!)	WB. FL	<ul style="list-style-type: none"> • February 08 EWG meeting in London 	
05/08-06/08 <ul style="list-style-type: none"> • validation of the framework • adjustment of the user guideline 	CEN experts (if necessary expert working group)	CM	<ul style="list-style-type: none"> • June 08 EWG meeting in Germany (to decide according to the WIP) 	
07/08-09/08 <ul style="list-style-type: none"> • dissemination for broader use 	CEN experts (Marketing), CEN workshop community	JB	<ul style="list-style-type: none"> • s. Business Plan Marketing and Communication 	
10/08 <ul style="list-style-type: none"> • final report to the European Commission • CWAs on framework and user guideline 	CEN experts	JB	<ul style="list-style-type: none"> • 1st suggestion JB by mail • individual contribution of each expert per field of expertise • agreement by mail + phone 	

Table 2: Current version of the project plan 2007/08

2.3. Main steps of work

The work listed in detail in the project plan (2.2.) can be summarised in five main steps. While step one, two and three are focused on methodology about how to build the European e-Competence Framework, step four will be dedicated to the operational development of competence descriptions and step five to the elaboration of the user guideline addressed to the different target groups.

As figure 4 shows, steps 1, 2 and 3 on methodology have been achieved: Based on a common European understanding of competence (1), the experts agreed on a way of how to

identify competence areas (2), on a framework structure and on a definition of competence levels in line with the European Qualifications Framework (3).

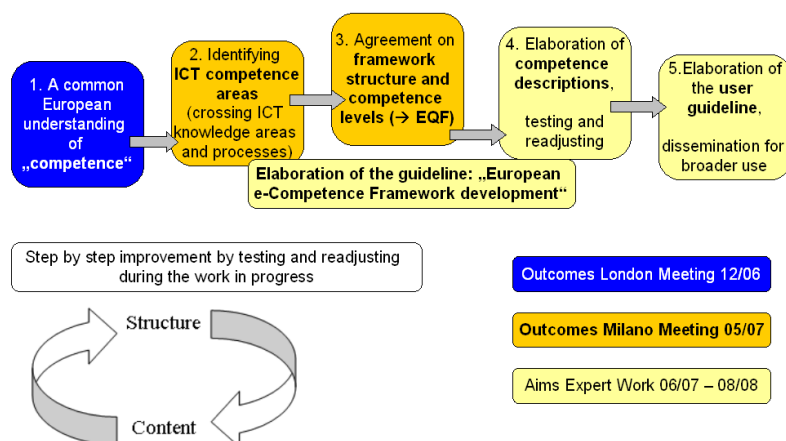


Figure 4: Main steps of work

Within the overall project approach, it is important to underline the provisional status of interim results. The methodology adopted is to constantly compare content and structure and then formulate the next iteration. By its philosophy of continuous testing and readjusting, both structure and content of the forthcoming framework can be improved step by step during work progress.

2.3.1. The methodological phase

All involved experts and stakeholders are conscious that for a broad acceptance and applicability of the forthcoming European e-Competence Framework, intelligent links to other existing concepts and tools – both on national and international level – are crucial.

Consequently, the methodological phase of the project work is of particular relevance for success and has to be planned and carried out very carefully.

As a first step, agreement on a common European language about how to define competences has been crucial. To reach such a common base of understanding, European HR and IT experts started to work at methodological level in the pilot phase during 2006. On the base of an analysis of existing national and company-internal ICT competence frameworks and the European Qualifications Framework (EQF), these experts agreed on a common “European language” for competence description (s. 4.1.). A second outcome of the work was a first suggestion for a possible structure of the forthcoming framework (s. 4.2.)

Both the Europe-wide agreed definition of competence as well as the provisionally defined structure of the e-Competence Framework were taken as the basis for the further work on methodology in 2007. As next methodological steps during this year, the experts had to decide about how to identify the relevant ICT competence areas and competences (s. 4.3.). Another challenge was to find a pragmatic approach to levelling within the European e-Competence Framework, by defining the levels in a way which would be in line with the European Qualifications Framework, EQF (s. 4.4.). The outcomes on both questions were tested and put into practise by elaborating a first example of competence description (s. 4.4.)

In answering these main questions, an important step of the work has been reached:

European HR and ICT experts have elaborated and agreed on the main principles and guidelines for the practical elaboration of the European e-Competence Framework

The corresponding “Guideline for the European e-Competence Framework development” (s.4.5. and annex) provides the rules for the operative work on the framework and its competence descriptions.

2.3.2. The operational work on competence description

Once the experts have reviewed, discussed and approved the guidelines for the e-Competence Framework development the operational work on competence description can start. Taking the guidelines as the reference tool, European HR and ICT experts will identify and describe ICT competences needed and applied by industry, in order to build a Europe-wide applicable reference framework of competences coming up from ICT vendor and user business.

Again the working method will be to continuously improve the framework structure and content by comparing and optimising where meaningful.

2.3.3. The testing phase

The testing phase will start in parallel to work on competence descriptions. By doing so, it can be ensured that possible deficiencies in the guidelines and methodological work or misinterpretations in use can be corrected and readjusted during work progress.

A further and wider test of the forthcoming e-Competence Framework will take place when a complete set of competence areas has been identified and populated with competence descriptions.

2.3.4. Framework readjustment and consolidation

Once the framework has been tested in a larger way, it can be readjusted and validated according to company feedback.

2.3.5. Elaboration of the user guideline

The elaboration of the user guideline will commence in parallel with testing of competence descriptions. A deciding quality feature for the emerging e-Competence Framework will be its usability and applicability for all stakeholders. In particular, the user guideline must address

- *ICT practitioners* with clear guidelines for developing their competencies in accordance with their job role and future development,
- *ICT managers* with inputs to anticipate and plan the competence needs meeting company recruitment and development policy,
- *Higher Education, Vocational Training and Certification Providers* for designing curricula to meet employer needs.

The user guideline will be edited and published in a pragmatic and clear way, enabling users to use the European e-Competence Framework according to individual and specific needs. As for the framework itself, the guideline should be easily understood in each European country and region. It should also be applicable within the context of ICT business, politics and vocational training – bearing in mind that Information and Communication Technology is a global business operating in a global environment.

3. Work performance in 2007

3.1. Working structure and involved expert resources

As explained in part 2.1. of the report, an expert group – currently composed by representatives from different European countries (France, Germany, United Kingdom, Italy), frameworks (CIGREF, SFIA, AITTS), ICT vendor and user business as well as higher education and research, elaborated and agreed on a work programme “Towards a European e-Competence Framework”. Working together with a common purpose, they provided the basis for a European working community on a technical level. This has been supplemented by a continuously growing broad support provided on a political and multistakeholder level, namely by the CEN/ISSS workshop community on ICT Skills in Europe and the European Commission institutions.

In 2007, a group of seven – now six – experts financed by CEN, started with the methodological and operational work on the framework. These experts are backed on technical, political and industrial levels by the larger community.

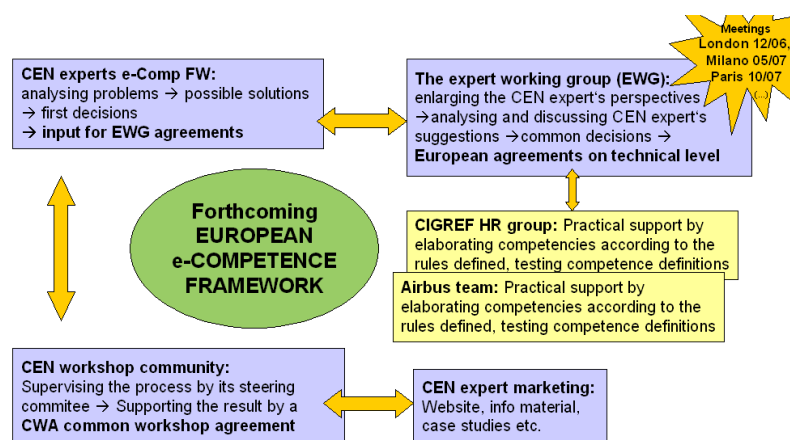


Figure 5: Working structure and involved resources on technical, political and industrial level

The CEN experts, highly experienced in the elaboration and/ or implementation of ICT competence frameworks on national or company-internal level, analyse the problems which have to be solved, in order to agree on possible solutions and initial ideas which provide the basis for input for the wider expert working group (EWG).

The expert working group consists of the CEN experts and further interested and experienced representatives from European ICT stakeholders and Industry. The collective experts provide a high level of know-how in human resources and ICT management, framework development, implementation and maintenance. The experts come from ICT vendor industry (e.g. Cisco, Deutsche Telekom) and ICT user industry (e.g. Michelin, Bayer

Business Services), higher education, qualification and certification providers (e.g. ESMI Grenoble, EXIN International), trade unions (e.g. IG Metall) and further local frameworks. These colleagues are very valuable and essential to enlarging the CEN expert's perspective. They analyse and discuss the CEN experts input in order to reach common decisions to achieve European agreement on the technical content for the forthcoming e-Competence Framework.

Practical support for elaborating the competences according to the rules defined and for testing the competence definitions is scheduled to be provided from the CIGREF HR group, a network consisting of human resources responsables from French ICT user companies, including the Airbus team.

The CEN marketing expert supports the process through a two-step approach: Firstly addressing the community who can contribute to the framework elaboration – namely HR and ICT managers coming from industry or further framework stakeholders. In the second step, once the technical and practical work on the framework is completed, communication and awareness activities will be addressed to the larger interested public and the potential framework users.

The technical work process towards the e-Competence Framework is supported and monitored by the CEN/ISSS workshop community on ICT Skills. The CEN/ISSS Steering Committee supervises the project work and the final results should be agreed and communicated by a CEN workshop agreement (CWA). The knowledge of ICT qualifications, certification and human resource development across Europe provided by CEN/ISSS, as well as the wide-spread contacts of the workshop members provide an important background for the project.

3.1. Project milestones: The expert meetings

The meetings of the expert working group are considered as project milestones and are essential components of work progress. During the CEN co-funded phase from 2007 to 2008, the workshop meetings are organised over three days. On the first day the CEN experts come together physically and review and agree work achievements to date. This agreement provides the input for the following two day meeting of the larger expert working group. To reach an appropriate, "European" work ambiance independent of national, and regional influences, the meetings take place in different metropolis across Europe.

3.1.1. London meeting 12/06 – aims and outcomes

The London expert meeting in December 2006 was the completion of the methodological pre-phase in 2006 and at the same time the kick-off for a set of EWG meetings to be held during 2007/08.

The most important aims were to set up a European expert community and to create a common understanding of the framework content and objectives. Based on previous research work conducted in 2006, the experts, over two days, compared and analysed the specific characteristics and benefits of existing frameworks and definitions, in order to agree on a pragmatic and common approach on how to define competence at a European level (s.4.1.). In addition they made proposals on how the structure of the forthcoming e-Competence framework should look (s.4.2.).

3.1.2. Milano meeting 05/07 – aims and outcomes

The Milano expert meeting was the first meeting in the CEN co-financed phase. It was conducted over three-days, enabling the CEN experts to discuss content to be shared and enhanced by the larger experts working group (EWG).

The main aims were to consolidate the London outcomes achieved so far on competence definition and framework structure. Also to decide on how to identify relevant ICT competence areas and competences, how to describe them and how to define and assign the competence levels. These should be compliant with the EQF, but appropriate for an industry-applied competence framework. In order to demonstrate a working model, a first example of competence definition was commenced and completed although this was to be considered as a work in progress.

Organised in three sub-groups and continuing their work post meeting by mail and phone, the experts provided important results which provided the elements needed for the guideline “European e-Competence Framework development”: Decisions were taken and definitions elaborated about ICT knowledge areas and ICT processes and the way to use them for identifying ICT competence areas and competences. An additional outcome was the establishment of a scheme for level assignment. All results will be explained in more detail in part 4 of the report.

3.1.3. Paris meeting 10/07 – aims and expected outcomes

The most important aim of the next expert group meeting in Paris will be to test and if necessary to readjust the guideline for the European e-Competence development (s. 4.). Additionally, experts have to decide about the practical ways and division of tasks for the operational work on competence descriptions as well as the testing phase.

3.1.4. Further meetings planned

Until the accomplishment of the European e-Competence Framework in autumn 2008, three more meetings are planned, probably in the United Kingdom, Germany and Italy. Concrete dates and aims will be established based on work in progress. A general overview can be viewed by consulting the project plan (s. 2.2.).

3.2. The work between the meetings: exchange by mail and conference calls

Whilst the three-day-workshops between CEN experts and members of the expert working group represent observable milestones of the project work, the work between the meetings is also crucial. Each meeting has an intensive follow-up: Here the challenge is to summarise the most important results and to provide and extract synthesis results acceptable and applicable for all experts involved. Where relevant, the experts go on working in sub-teams according to their specific experiences and competences, as exemplified by the Milano meeting. The project and methodological lead management provide direction for the further work encompassing next steps and expected outcomes plus preparation of the next meeting. The experts are experienced in virtual communication techniques and maintain contact through e-mail and conference calls.

4. Main outcomes achieved so far – overview on project progress

This chapter summarises the most important outcomes of the expert work achieved in 2007, based on the methodological pre-phase carried out in 2006. Some parts of it are taken from the respective sections of the guide “Towards a European e-Competence Framework – A guideline for its development” (s. annex and 4.7.)

4.1. A Europe-wide agreed definition of competence

Competence – “a demonstrated ability to apply knowledge, skills and attitudes for achieving observable results”.

Taking into account the definition of knowledge, skills and competences within the EQF, the experts defined **competence** as “*a demonstrated ability to apply knowledge, skills and attitudes for achieving observable results*”.

Consequently, the related descriptions will embed and integrate knowledge, skills and attitudes. The competence descriptions of the forthcoming European e-Competence Framework will be operational, that is, they describe observable behaviours which can be demonstrated and assessed, so they implicitly will refer to contexts.

As operational descriptions of competences describe observable behaviours, they embed and integrate all the dimensions that real behaviours usually integrate: knowledge, skills, attitudes, self-responsibility and autonomy capacities.

The competences described in the framework will represent company needs, not individual competences. Additionally, competences are considered as context specific, they are not context free. I.e. any competence changes its meaning (no its sense) according to the business and to the work processes, as well as to technologies which the competence is referring to.

The item **skill** is defined as “*ability to carry out managerial or technical tasks*”. Managerial and technical skills are the components of competences and specify some core abilities which form a competence.

Attitude means in this context the “*cognitive and relational capacity*” (e.g. analysis capacity, synthesis capacity, flexibility, pragmatism...). If skills are the components, attitudes are the glue, which keeps them together.

Attitudes could be even described by operational descriptions; in reality, the most common impression is that they are strongly embedded inside competences and could be found within competence descriptions themselves.

Knowledge represents the “*set of know-what*” (e.g. programming languages, design tools...) and can be described by operational descriptions.

4.2. The framework structure: levels and layers, competence areas and competences

For the structure of the forthcoming European e-Competence Framework, the experts have agreed provisionally on a four layer approach. The EWG intention is to improve this step by step during the framework's filling with contents. In figure 6 the provisional structure is shown.

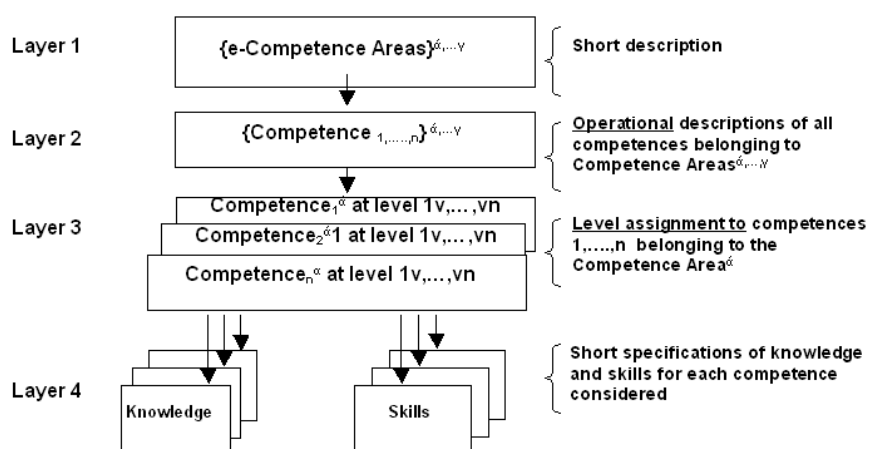


Figure 6: Provisional structure for the forthcoming e-Competence Framework

The provisional structure of the forthcoming e-Competence Framework is based on competence areas (layer 1) and competences (layer 2), instead of job profiles, being competence-based approaches more flexible and fostering local personalisation.

Layer 3 provides the level assignment to each competence and where necessary and meaningful, a same competence can be defined on various levels. Layer 4 provides a short specification of knowledge and skills for each competence considered.

Chapter 4.3. and 4.4. provide further explanation on the e-Competence framework structure and indications on its construction.

4.3. How to identify and populate competence areas: ICT knowledge areas and ICT processes

As illustrated above, the e-Competence Framework is based on competence areas and competences. The e-Competence areas, sets of competences clustered according to specific criteria, are the fundamental blocks of the framework and the main navigation aid to identify and to describe competences.

In order to proceed, the EWG had to clarify a fundamental question: Which are the specific criteria to identify and populate e-Competence areas in order to achieve common understanding and transparency?

The two dimensions on which the experts agreed to be considered are:

- ICT business and work processes to identify e-Competence areas and to construct the related sets of e-Competences
- ICT knowledge areas to help construct e-Competences related to the e-Competence areas.

The underlying aim was to consider the whole ICT supply chain representing both ICT vendors and ICT end-users from any business sector. Hence diverse points of view will be catered for within a shared framework applicable to the ICT supply industry and equally to the ICT User industries..

4.3.1. ICT business and work processes

An ICT process is the dimension identifying e-Competence areas and related sets of e-Competences, because business and work processes generate company competence needs. As an example, the production process determines sets of competences; the design process determines other sets of competences, and so on. In other words, competences can never be “context free”.

The European e-Competence framework intends to include competences needed to develop, operate and manage ICT projects and processes, as well as competences for exploiting and innovating ICT, for making decisions, developing strategies, and foreseeing new scenarios in the Information and Communication Technology field.

It addresses any target group involved in ICT business processes i.e., both suppliers and customers (ICT industry and end-users companies including services and the public sector); any ICT professional and manager whatever function, role or job they have engaged in an ICT business process.

Accordingly, the model of reference ICT processes is to be comprehensive and to cover:

- ICT processes concerned with designing, developing, implementing a project
- ICT processes supporting projects realization, the starting up and disposal of ICT systems, etc.
- ICT processes concerned with managing, formulating strategies, innovating, etc...

Consequently, the ICT processes were defined as shown in table below:

Plan	Build	Run	Enable	Manage
<i>Examples: Conceiving, Designing</i>	<i>Examples: Developing, Integrating, Testing</i>	<i>Examples: Controlling and exploiting operations, Maintaining, Supporting, Training, Documenting, Transitioning</i>	<i>Examples: Security, Quality management, Marketing and selling, Distributing/ supplying, Procuring, Acquiring (incl. outsourcing), Disposing</i>	<i>Examples: Managing and operating, Defining strategies and applying, Risk management, Forecasting, Improving, Innovating</i>

*Table 3: ICT business processes
(for short descriptions of the items see the guideline annex)*

In order to ensure coherence and wide applicability of the forthcoming e-Competence Framework, the processes selected reflect the main local and national ICT Frameworks considered (e.g. AITTS, CIGREF, SFIA, Eucip, etc.). They were also selected according to

international and recognised ICT processes models, in order to test them through a “neutral” perspective and to increase the Europe-wide acceptance of the methodology chosen. Two important sources were

- a) ITIL®- IT Infrastructure Library v3/ISO 20000 (2007-2005) and
- b) CMMI®-Capability Maturity Model Integration DEV/1.2, Carnegie Mellon – SW Engineering Institute, 2006.

The exhaustive list is indicated in the annex – Guideline on e-Competence Framework elaboration.

With respect to this, e-Competence areas match up with the ICT processes defined, e.g. plan, build, run, enable and manage can also be considered just as e-Competence areas.

Consequently, e-Competences can derive from e-Competence areas/ ICT processes; examples of processes specifications (e.g. conceiving, designing / developing, integrating, testing / etc.) may be used as a guide to specify e-Competences.

4.3.2. ICT knowledge areas

ICT knowledge areas provide the dimension helping construct e-Competences and hence populate e-Competence areas. Competences may gain different meanings according to the different ICT knowledge areas to which they refer.

Just as an example, the competence: “(to be able to) *Test software - The ability to create a plan for, and to document and execute software or software component testing aimed at identifying problems...*” differs from the competence: “(to be able to) *Test hardware components - ...*”, inside the e-Competence area “BUILD”. Their meaning changes according to whether they refer to application software testing or to computer hardware testing. Hence, an e-Competence area is also to be populated according to the knowledge areas, which its competences refer to.

The table below illustrates the main reference ICT knowledge areas the experts agreed on:

ICT Knowledge Areas						
Microelectronics, Components, Semiconductors, etc.	Computing Hardware	Industrial Control Systems	Communication equipments and services	Software Infrastructure	Business applications	System Integration

*Table 4: ICT knowledge areas
(for short description of the items see section 6 of the guideline annex)*

The ICT Knowledge areas defined include both Information Technology and Telecommunications, Software and Hardware technologies with a focus on microelectronics as well, in order to provide a comprehensive model.

These areas are consistent with the ISO approach to the OSI (Open Systems Interconnection) Service Definition model; the perspectives and practical daily experience of the technical experts coming from ICT vendor and user industry have also been reflected.

In particular, concerning the reference ISO/OSI model, it distinguishes "services to allow open system interconnection" from "user applications". Services span communication (e.g. routing, switching, data link connection), session and dialogue management (e.g. synch point management, presentation, syntax definition), application enablers (e.g. e-mail or process synchronization). All these services are application independent (they are a middleware as a matter of fact). On the contrary, application is outside OSI scope: in fact, application is "business process" (ERP; CRM, SCM,..) and utilizes OSI services to work in a distributed environment. So there are two main ICT knowledge macroareas: the first one is "technology oriented", the second one is "business driven".

4.3.3. Building e-Competence areas

Accordingly, the e-Competence area identification and population is a step by step – top down approach as shown in figure 8:

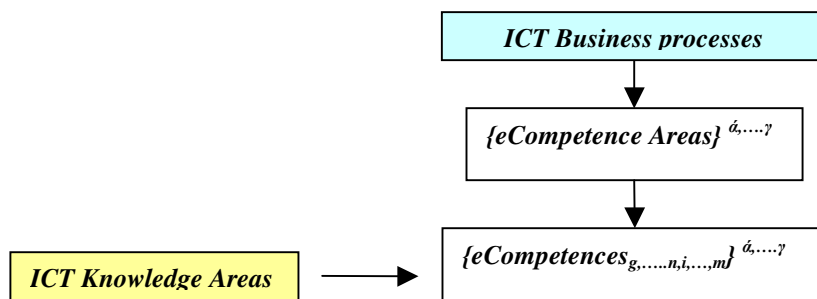


Figure 7: a step by step – top down approach for building e-Competence areas with ICT business processes and ICT knowledge areas

The relevant ICT competence areas (layer 1) are to be identified and populated by a grid which crosses the relevant ICT business processes (e.g. conceive, develop, test...) with appropriate ICT knowledge areas (e.g. Applications, Telecommunications, ...).

Figure 7 shows a short summary of the procedure the experts have agreed upon.

	Processes*				
	Plan	Build	Run	Enable	Manage
ICT knowledge areas**	Examples: Conceiving, Designing	Examples: Developing, Integrating, Testing	Examples: Controlling and exploiting operations, Maintaining, Supporting, Training, Documenting, Translating	Examples: Security, Quality management, Marketing and selling, Distributing/ supplying, Procuring, Acquiring (incl. outsourcing), Disposing	Examples: Managing and operating, Defin. strategies and applying, Risk management, Forecasting, Improving, Innovating
Microelectronics: Components, Semiconductors					
Computing hardware					
Industrial Control Systems					
Communication equipments and services					
Software Infrastructure					
Business Applications					
System Integration					

↓

build business applications (e.g. develop,)

Figure 8: How to identify and populate e-competence areas

According to the schemas below, a procedure could be established to identify and populate e-Competence Areas:

1. Choose the reference ICT process among the processes listed in Table 1;	
2. Name the reference e-Competence Area. It can be easily called with the same name as the process selected	Layer 1
3. Describe the reference eCompetence Area with a short operational description	
4. List the titles of the major competences related to the e-Competence Area described	Layer 2
5. Evaluate whether these competences can refer to all the ICT Knowledge Areas listed in Table 4 or rather to only some of them	
6. Describe each competence listed before with a short operational description	
7. Indicate which ICT Knowledge Areas they are referred to	
8. Indicate which skills and knowledge determine them	Layer 4
9. Read again the e-Competence Area description and evaluate whether α) It needs further explanation β) It suggests further competences to be added and described operationally	
10. If b), repeat the process from step 4 on	
11. Assign a code to the eCompetence Area, to the reference competences identified and to the related Skills and knowledge. <i>[Coding criteria to be defined]</i>	

Table 5: Procedure to identify and populate e-Competence Areas

4.4. Definition of e-Competence levels compliant with the EQF

The recommendation of CWA 15515 to align the framework closely to the EQF categories has been followed in order to avoid inconsistencies between the EQF and the future European e-Competence Framework. However, as an industry-addressed competence framework needs descriptors for IT professional competence (not qualifications), it is not possible to use exactly the same level definitions. For this reason the experts had to find a way how to define the e-Competence levels according to the framework's specific aims and target groups, but still compliant with the EQF.

4.4.1. The European e-Competence Framework (EQF) levels

The purpose of levels within a framework is to provide benchmarks with which framework users can readily identify performance at a predefined capability level.

Levels are often described and given a numeric abbreviation, the EQF uses eight levels (1-8). To provide consistency, each level is identified through a common set of parameters; the descriptors deployed in the EQF are knowledge, skills and competence.

Within the EQF, competence is described in terms of responsibility and autonomy.

Knowledge	Skills	Competence
<i>'Knowledge' is the outcome of the collection and assimilation of information through learning. In the EQF, knowledge is described as theoretical and/or factual.</i>	<i>'Skills' are the ability to apply knowledge and use know-how to complete tasks and solve problems. In the EQF, skills are described as cognitive (use of logical, intuitive and creative thinking) and practical (involving manual dexterity and the use of methods, materials, tools and instruments)</i>	<i>'Competence' is the proven ability to use knowledge, skills and other abilities to perform a function against a given standard in work or study situations and in professional and/or personal development. In the EQF, 'Competence' is described in terms of responsibility and autonomy.</i>

Table 6 – Definitions provided by the EQF

Within the EQF, Competences, Skills and Knowledge are described in terms of height, depth and breadth within an increasing context complexity. [5]

4.4.2. Which differences and how to define e-Competence levels compliant with the EQF

The agreed objective of the European e-Competence Framework is to provide an International HR management and planning tool for the ICT industry (including vendors and users, large companies and SME's). It aims to support the ability to manage and plan competencies within a long term perspective across Europe. Therefore it is intended that the European e-Competence Framework will provide a bridge between performance standards in WORK or STUDY situations.

As the EQF and e-competency frameworks address different topics, namely qualification relationships within EQF and IT professional competence descriptors within the e-competence frameworks, it is not possible to use the same level definitions.

Whilst *responsibility* is not a readily transferable definition to the e-competence framework, *autonomy* is a recognisable parameter of competence. By using *autonomy* as one characteristic, we facilitate connection between the two frameworks.

Nonetheless, *Autonomy* alone is not sufficient to describe competence when applied to the work place and therefore further definition is required. The diagram below uses three parameters to provide height, depth and breadth to competency level descriptors.

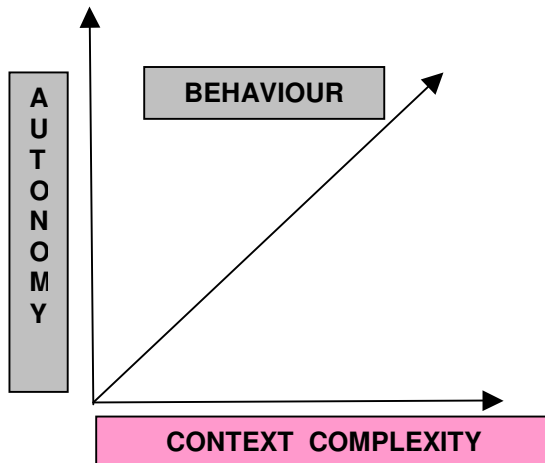


Figure 8. Three parameters to provide height, depth and breadth to competency level descriptors

The main difference between EQF and e-Competence Framework is that within the EQF, these three dimensions are articulated within the descriptions of competences, skills and knowledge. Within the e-Competence Framework these three dimensions are made explicit.

Autonomy indicates competence height and ranges between “Responding to instructions” and “Making personal choices”.

Context Complexity provides an indication of competence breadth and ranges between “Structured – Predictable” situations and “Unpredictable – Unstructured” situations.

Behaviour can express the observable outcome of attitude. Attitudes, i.e. cognitive, emotional, relational, social psychological dispositions, ‘are the glue’ which bind competency descriptions together but they are difficult to observe and articulate. On the contrary, *behaviour* is a measurable and observable characteristic and provides a third dimension for level construction. The manner in which individuals analyse, plan and execute tasks varies with competence progression. This developing *behaviour* includes an element of experience which is a parameter often valued and referred to by employers. In the e-Competence Framework, *behaviours* can be described in terms of “core action verbs” and range between “the ability to apply” and “the ability to conceive”.

With regard to number of levels; based on experience of employers, five levels of competence are commonly applied to support career and workforce development

A typical employer structure is displayed below:

e-Competence Level	Generic Job Description	Typical Tasks
5	Principal	IS strategy or programme management
4	Lead Professional or Senior Manager	IS strategy/holistic solutions
3	Senior Professional or Manager	Concepts/Basic principles
2	Professional	Consulting
1	Associate	Support/Service

Table 7. A typical employer structure and a proposal for related EQF comparison

In the Table 7, **typical tasks descriptions** intend to better explain roles and responsibility at each level.

Consequently, the expert working group accepted a five level structure which relates to the EQF as follows.

e-Competence Level	EQF Level
5	8
4	7
3	6
2	4 and 5
1	3

Table 8: A proposal for related EQF comparison

The complete e-Competence Framework levels schema compliant with the EQF levels is shown below.

EQF levels	EQF Levels descriptions	e-Comp Levels	eComp Level descriptions	Typical Tasks	Complexity	Autonomy	Behaviour
8	Knowledge at the most advanced frontier, the most advanced and specialised skills and techniques to solve critical problems in research and/or innovation, demonstrating substantial authority, innovation, autonomy, scholarly or professional integrity	5	Principal Overall accountability and responsibility; recognised inside and outside the organisation for innovative solutions and for shaping the future using outstanding leading edge thinking and knowledge	IS strategy or programme management.	Unpredictable - unstructured	Makes personal choices : Has authority and responsibility for all aspects of a significant area of work, including policy formation and application. Is held fully accountable for actions taken and decisions made, both by self and subordinates.	Conceiving, transforming, innovating, finding creative solutions by application of a wide range of technical and / or management principles
7	Highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking, critical awareness of knowledge issues in a field and at the interface between different fields, specialised problem-solving skills in research and/or innovation to develop new knowledge and procedures and to integrate knowledge from different fields, managing and transforming work or study contexts that are complex, unpredictable and require new strategic approaches, taking responsibility for contributing to professional knowledge and practice and/or for reviewing the strategic performance of teams	4	Lead Professional / Senior Manager Extensive scope of responsibilities deploying specialised integration capability in complex environments; full responsibility for strategic development of staff working in unfamiliar and unpredictable situations	IS strategy/holistic solutions.		Has defined authority and responsibility for a significant area of work, including technical, financial and quality aspects. Establishes organisational objectives and delegates assignments. Accountability for actions and decisions taken by self and subordinates.	
6	Advanced knowledge of a field of work or study, involving a critical understanding of theories and principles, advanced skills, demonstrating mastery and innovation in solving complex and unpredictable problems in a specialised field of work or study, management of complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable work or study contexts, for continuing personal and group professional development	3	Senior Professional / Manager Respected for innovative methods and use of initiative in specific technical or business areas; providing leadership and taking responsibility for team performances and development in unpredictable environments	Consulting	Structured - unpredictable	Interprets instructions; makes choices: Works under broad direction. Full accountability for own technical work or project / supervisory responsibilities. Receives assignments in the form of objectives. Establishes own milestones, team objectives and delegates assignments. Work is often self-initiated.	Planning, making decisions, supervising, building teams, forming people, reviewing performances, finding creative solutions by application of specific technical or business knowledge/skills
5	Comprehensive, specialised, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge, expertise in a comprehensive range of cognitive and practical skills in developing creative solutions to abstract problems, management and supervision in contexts where there is unpredictable change, reviewing and developing performance of self and others	2	Professional Operates with capability and independence in specified boundaries and may supervise others in this environment; conceptual and abstract model building using creative thinking; uses theoretical knowledge and practical skills to solve complex problems within a predictable and	Concepts/Basic principles		Designing, managing, surveying, monitoring, evaluating, improving, finding non standard solutions	

4	Factual and theoretical knowledge in broad contexts within a field of work or study, expertise in a range of cognitive and practical skills in generating solutions to specific problems in a field of work or study, self-management within the guidelines of work or study contexts that are usually predictable, but are subject to change, supervising the routine work of others, taking some responsibility for the evaluation and improvement of work or study activities		sometimes unpredictable context		Structured - predictable	Works under general supervision. Uses discretion in identifying and resolving complex problems and assignments. Specific instruction is usually given and work is reviewed at frequent milestones. Determines when problems should be escalated to a higher level	Scheduling, organising, integrating, finding standard solutions, interacting, communicating, working in team,
3	Knowledge of facts, principles, processes and general concepts, in a field of work or study, a range of cognitive and practical skills in accomplishing tasks. Problem solving with basic methods, tools, materials and information, responsibility for completion of tasks in work or study, adapting own behaviour to circumstances in solving problems	1	Associate Able to apply knowledge and skills to solve straight forward problems; responsible for own actions; operating in a stable environment	Support/Service.		Responds to instructions: works under routine supervision. Uses minor discretion in resolving problems or enquiries. Works without frequent reference to others	Applying, adapting, developing, deploying, maintaining, repairing, finding basic-simple solutions,

Table 9.: e-Competence Framework levels compliant with EQF levels

4.5. How levels help describe competences

Levels can help articulate competence because they provide suggestions and guidance about what to take into account. This model of levels offers a pattern to build competence descriptions with all the necessary attributes inside. i.e., each competence should embed the three dimensions mentioned above: autonomy, context complexity and behaviours and this schema shows what is included at each level.

Consequently, the levels schema can be used as a support to frame competence descriptions, to verify competence descriptions and to assign levels to competences described. It is also to be underlined that the level assigned to any competence indicates the “lower bound”. I.e., that competence can be found from that level up. Hence, if a person has a specific competence, it only means that he/she cannot be positioned **under** the level assigned to the competence considered. The Table just suggests key attributes for competences at each levels; i.e. each level can be characterized by key words, which only determine the starting point for the related competences.

Accordingly, in Table 10 a reformulation of the procedure shown in section 4.3.3 is provided.

1. Choose the reference ICT process among the processes listed in Table 1;	
2. Name the reference e-Competence Area. → It can be easily called with the same name as the process selected	Layer 1
3. Describe the reference e-Competence Area with a short operational description	
4. List the titles of the major competences related to the e-Competence Area described	Layer 2
5. Evaluate whether these competences can refer to all the ICT Knowledge Areas listed in Table 2 or rather to only some of them	
6. Describe each competence listed before with a short operational description → Use the reference Levels schema - Table 7. as an aid to frame competence descriptions	
7. Indicate which ICT Knowledge Areas they are referred to	
8. Assign the appropriate level according to the reference levels schema → A same competence could be identified and described at different levels → Mind that when you refer to a level, it indicates the "lower bound"	Layer 3
9. Indicate which skills and knowledge determine them → Use the reference Levels schema - Table 7. as an aid to add Skills → Use the ICT Knowledge Areas - Table 4. as an aid to add Knowledge	Layer 4
10. Read again the e-Competence Area description and evaluate whether a) It needs further explanation b) It suggests further competences to be added and described operationally → Use the ICT Knowledge Areas - Table 2. as an aid to identify new competences → Use the reference Levels schema - Table 7. as an aid to add and frame new competence descriptions	
11. If b), repeat the process from step 4 on	
12. Assign a code to the e-Competence Area, to the reference competences identified and to the related Skills and knowledge. [Coding criteria to be defined]	

Table 10: The reformulated procedure with levels to identify and populate e-Competence Areas

4.6. European e-Competence Framework structure and layout – one example in progress of competence definition

In parallel to the work on e-Competence area definition and population, as well as level assignment in line with the EQF, a sub-team of experts started to construct an initial example of a competence area for use as a practical framework component.

The result of this work is a standard table which can be used for operational work on competence description development as well as providing an example of a competence definition. Both outcomes are showed in the tables below but should be regarded as *pilot work in progress*.

European e-Competence Framework structure and layout			
Layer1 e-Competence Area	Layer2 Competences_	Layer 3 Level (EQF compliant)	Layer4 Knowledge and skills related to competences
	n) [competence title] [competence description] [reference to ICT Knowledge Area where applicable]	[insert a level from 1 to 5]	[list of related skills and knowledge]

Table 11 – European e-Competence Framework structure and layout

European e-Competence Framework structure and lay-out: an example <i>in progress</i>			
Layer1 e-Comp Area	Layer2 Competences_	Layer 3 Level (EQF compliant)	Layer4 Knowledge and skills related to competences
Build			
b1	<p>Develop applications/software components - The ability to develop, produce and document a component of an information system by using a good working program leading to an application component with appropriate documentation ready for use.</p> <p>applies to: Software Infrastructure, Business Applications</p>	1	<p>Understand spec</p> <p>understand environment Program Write documentation</p>
b2	<p>Configure application components The ability to set application parameters and optimize the execution of the application components, on the basis of the specifications of the developed (software) component.</p> <p>applies to: Business Applications</p>	1	<p>Understand spec</p> <p>understand environment Manipulate application parameters Write documentation</p>
b3	<p>Assemble software components - The ability to put together several (software) components by using their interfaces, according to the specifications and constraints, the standards and the procedures.</p>	2	

b4	Integrate software components - The ability to integrate a software component or a group of components, in an existing software architecture or system, according to the defined plan for the information system	2	
b5	Test software - The ability to create a plan for, and to document and execute software or software component testing aimed at identifying problems (i.e. bugs, performance issues and incorrect or incomplete functionality) in the software or component or any adjacent systems. applies to: Software Infrastructure, Business Applications	1	Create test environment Conduct unit testing Conduct user testing Conduct integration testing Accuracy/attention to detail
b6	Deploy software - The ability to deliver software or software components to the operational environment including all the necessary support and documentation in order to have the software run correctly.	2	
b7	Construct Hardware components applies to: Microelectronic, Computing HW, Embedded sys	1	Understand spec understand environment Electrical engineering Write documentation
b8	Test hardware components applies to: Microelectronic, Computing HW, Embedded sys	1	Create test environment Conduct unit testing Conduct user testing Conduct integration testing Conduct board/circuit/hw testing Accuracy/attention to detail
b9	Integrate components applies to all	2	move components into place configure components in final environment
To be completed			

Table 12 – a European e-Competence example *in progress*

4.7. Guidelines for the European e-Competence Framework development

According to the results described above, a guideline has been edited which integrates all important expert working group (EWG) outcomes achieved so far. The guideline provides the directions and rules in order to identify and describe ICT related competences needed and applied by European industry, according to the EQF approach. It also outlines and explains the underpinning methodological choices and decisions.

The guidelines are addressed to the EWG who participate in developing the European e-Competence Framework and to any stakeholder or expert who wants to understand the model construction.

The guide provides a practical tool for the framework construction and it is also a transparent device for technical communication at the expert level.

To provide a self explanatory tool, the guidelines are required to be complete and exhaustive; they summarise the main principles and concepts needed for enabling an expert to work on the framework. Consequently, the guide is composed of eight main chapters:

0. Introduction to guidelines	2
0.1. Purposes	2
0.2. Target groups	2
1. Some definitions	3
1.1. Operational descriptions and learning outcomes	3
1.2. Competence, knowledge, skill, attitude,	3
2. The European eCompetence Framework	5
2.1. Meaning	5
2.2. Structure	6
3. The eCompetence Areas	6
3.1. How to identify and populate eCompetence Areas	6
3.1.1. The ICT business processes	7
3.1.2. The ICT knowledge areas	8
3.1.3. eCompetence Areas building	8
4. The eCompetence Levels	10
4.1. The European Qualifications Framework (EQF) Levels	10
4.2. Which differences and how to define eCompetence levels compliant with the EQF	10
5. How levels help describe competences	13
6. Open questions	14
7. Tables of tools	14
8. Annexes	14
8.1. Team work 1	14
8.2. Team work 2	14
8.3. Team work 3	14
8.4. ICT Processes test	14

*Table 13: Guideline for the the European e-Competence Framework development
Table of contents First release Oct. 07*

The table reproduced here represents the content of the first release which was edited in September and is currently in the final improvement process. It has been circulated among the CEN experts and the expert working group and will be amended according to comments and experiences gained over the next few weeks.

The guideline “Towards a European e-Competence Framework – A Guideline for its development” is attached as an annex to this report.

5. Outlook – Planning of the further work

5.1. Elaboration of competence descriptions

Based upon the results achieved so far (point 4) which are summarised in the guidelines, the operational work on competence description can start. Consequently, the next steps of the project work will be to identify the relevant e-Competence areas applied and needed by ICT vendor and user business and to populate them according to the rules defined.

An important support for this activity will come from the CIGREF HR group, under the leadership of Frédéric Lau. Further experts will be involved, coming from the expert working group and the CEN nominated experts themselves. The operational elaboration of competence descriptions must be coordinated and monitored along with compliance to a standard methodology. The aim of the project scheduling is to finish the work on competence definition in spring 2008.

5.2. Testing phase, framework readjustment and consolidation

The testing phase will start in parallel to the work on the competence descriptions. This will ensure that possible failings and omissions in guidelines or methodology can be rapidly corrected.

The initial test, conducted by Airbus, members of the CIGREF HR group and further companies (both ICT suppliers and users) is scheduled to start in November or December 2007. This will be followed by a larger testing phase for the whole framework in spring 2008.

According to the results of the testing phase, the framework will be readjusted and consolidated. In accordance with project scheduling, this will take place between April and July 2008.

5.3. Preparation of the user guideline

The elaboration of the user guideline will start during work on the competence descriptions and the testing phase. A deciding quality feature for the emerging e-Competence Framework will be its usability and applicability for all sector stakeholders. Each target group addressed will need clear indications on how to use the framework and adapt it according to the specific context and needs. In particular, the user guide will need to address

- *ICT practitioners* with clear guidelines for developing their competencies in accordance with their job role and future development,
- *ICT managers* with inputs to anticipate and plan the competence needs meeting company recruitment and development policy,
- *Higher Education, Vocational Training and Certification Providers* for designing curricula to meet employer needs.

The guideline will be dedicated to addressing questions such as:

- The link to further development and implementation of the European Qualifications Framework (EQF)
- Links to national frameworks as e.g. CIGREF, AITTS, SFIA, enhancing them by a European perspective (instead of representing a competitive product)
- The link to a future European ICT Qualifications Framework (e.g. by sharing definitions and levels)
- Links to company-internal HR planning and management concepts (career paths, job positions, annual performance review etc.)

The user guideline will be edited and published in a pragmatic and clear way, enabling users to use the European e-Competence Framework according to individual and specific needs. As for the framework itself, the guideline should be easily understood in each European country and region. It should also be applicable within the context of ICT business, politics and vocational training – bearing in mind that Information and Communication Technology is a global business operating in a global environment.

6. Outlook beyond the experts work: Framework implementation

From the outset of the e-Competence Framework initiative, the involved stakeholders observed an ever increasing interest in this forthcoming transnational HR development, management and planning tool for the European ICT sector.

This cross-national reference framework with clear guidance on how to adopt it on national, regional or a company-internal level, taking into account cultural and business specifics is in high demand by the European ICT market.

Consequently to meet expectations, it is important to start early thinking about the practical implementation and maintenance of the forthcoming tool.

6.1. A structure for future maintaining and updating

As indicated in the project plan and discussed in several meetings, the following aspects of governance and maintenance are relevant:

- Who will (can, wants to) be the intellectual owner of this multistakeholder driven effort?
- Ownership bestows responsibility: What structures can be deployed for framework maintenance and development? In an ideal case and where wished, the European e-Competence Framework could become a kind of trend-setter and orientation for national framework updating and provide a platform for mutual inspiration.

This means concretely:

- The ownership of the European e-competence framework needs to be agreed and established.
- A business model is required which will encourage free use of the framework by the intended beneficiaries but will generate a revenue flow which can be invested in future maintenance and development.
- There are strong ties between the e-Competence Framework and the e-Skills portal project. Recommendations from the ICT skills and career portal study regarding financial scenarios and sponsorship should be studied and applied to sustainability of the e-competence framework

6.2. Implementation within a long-term e-Skills strategy

In the European multistakeholder context of Information and Communication Technology, the work on the European e-Competence Framework can be considered as one among other contributions towards a long-term e-Skills strategy in Europe.

In order to achieve the long-term aim, which is the ability to create, manage, plan and develop e-competences that will be needed in a long-term perspective across Europe, a mutual connection, integration and implementation of different initiatives and tools will be crucial.

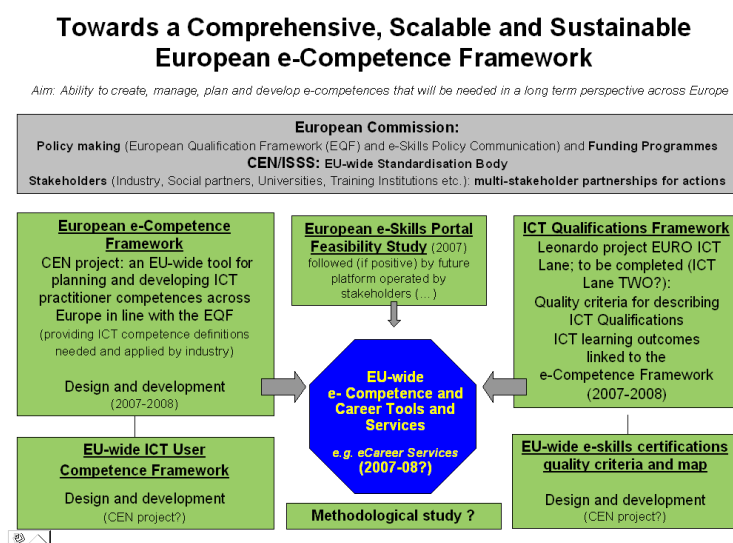


Figure 9: European e-Competence Framework and practical implementation

Figure 9 shows the forthcoming e-Competence Framework in its European context and the impact it might have. In order to create a sector framework, it has to be connected to a future European ICT Qualifications Framework, e.g. by sharing ICT reference areas, some definitions and the EQF as reference of levelling, and further interoperable European career development tools. Regarding practical implementation, it should, for example, be predestined as a core reference for a future European e-Skills and Career Portal.

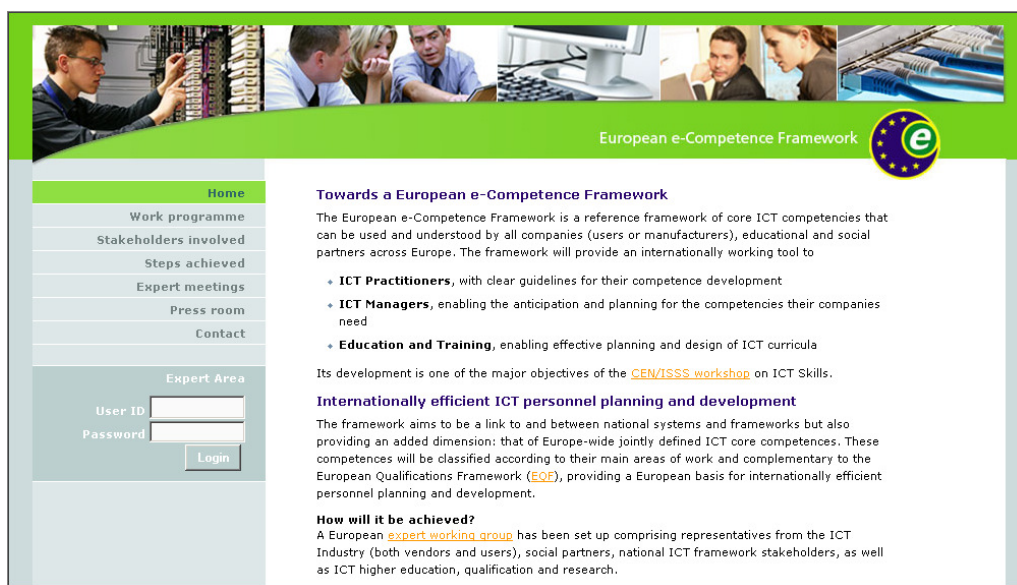
7. Glossary (in progress)

Item	Definition	Source and further information
Attitude	Cognitive and relational capacity	Outcome London Expert Meeting 12/06; Draft Guideline (CM) p.3
Competence (European agreement)	A demonstrated ability to apply knowledge, skills and attitudes to achieve results	Outcome London Expert Meeting 12/06; Draft Guideline (CM) p.3
Competence area	A set of competences clustered according to specific criteria	Outcome EWG 06/07; Draft Guideline (CM) p.4
European e-Competence Framework	A Europe-wide agreed reference framework of ICT competences, defined according to European ICT industry's needs and practise (both vendors and users)	Outcome stakeholders meetings and pilot pre-phase 2006, CEN project proposal
European Qualifications Framework (EQF)	A European reference framework for qualifications (s. Qualifications framework)	Proposal for a Recommendation of the European Parliament and of the Council on the establishment of the European Qualifications Framework for lifelong learning (presented by the Commission). Brussels, 5.9.2006
Knowledge	The set of know-what	Outcome London Expert Meeting 12/06; Draft Guideline (CM) p.3
Level	Proficiency level Learning level	
Skill	Ability to carry out managerial or technical tasks	Outcome London Expert Meeting 12/06; Draft Guideline (CM) p.3
Qualification	Both the process to get a title and the title itself	DG Education and Culture and experts teams for EQF conceiving and developments
Qualifications Framework	A Qualification framework provides an indication of qualifications levels. In particular, the EQF has 8 levels expressed through "learning outcomes" based descriptions of Knowledge, Skills and Competences Usually, Qualifications Frameworks are references for "full qualifications". On the contrary, new trends foster the use of these Qualifications Frameworks for not-full qualifications, too and for competences developed in non formal-informal learning contexts as well.	DG Education and Culture and experts teams for EQF conceiving and developments

8. References

- [1] CEN Workshop Agreement CWA 15515 – What European ICT Practitioners do
- [2] AITTS Advanced IT Training System in Germany www.kibnet.org, CIGREF ICT Job Nomenclature in France www.cigref.fr, SFA Skills for the Information Age in United Kingdom. www.e-skills.uk.
- [3] Implementing the Community Lisbon Programme: Proposal for a Recommendation of the European Parliament and of the Council on the establishment of the European Qualifications Framework for lifelong learning (presented by the Commission). Brussels, 5.9.2006
- [4] This work, covering the ICT qualification supplier side, takes place under a Leonardo da Vinci co-funded initiative (2006-2008): Towards a shared European language for ICT Qualifications and Competencies. www.ict-lane.eu
- [5] Implementing the Community Lisbon Programme: Proposal for a Recommendation of the European Parliament and of the Council on the establishment of the European Qualifications Framework for lifelong learning (presented by the Commission). Brussels, 5.9.2006. Annex

The website of the work towards a European e-Competence Framework is found online:



European e-Competence Framework

Home

- Work programme
- Stakeholders involved
- Steps achieved
- Expert meetings
- Press room
- Contact

Expert Area

User ID

Password

Login

Towards a European e-Competence Framework

The European e-Competence Framework is a reference framework of core ICT competencies that can be used and understood by all companies (users or manufacturers), educational and social partners across Europe. The framework will provide an internationally working tool to

- **ICT Practitioners**, with clear guidelines for their competence development
- **ICT Managers**, enabling the anticipation and planning for the competencies their companies need
- **Education and Training**, enabling effective planning and design of ICT curricula

Its development is one of the major objectives of the [CEN/ISSS workshop](#) on ICT Skills.

Internationally efficient ICT personnel planning and development

The framework aims to be a link to and between national systems and frameworks but also providing an added dimension: that of Europe-wide jointly defined ICT core competences. These competences will be classified according to their main areas of work and complementary to the European Qualifications Framework (EQF), providing a European basis for internationally efficient personnel planning and development.

How will it be achieved?

A European [expert working group](#) has been set up comprising representatives from the ICT Industry (both vendors and users), social partners, national ICT framework stakeholders, as well as ICT higher education, qualification and research.

www.ecompetences.eu

9. The expert working group (EWG) – members and acknowledgment

October 2007, including CEN nominated experts:

Airbus, Germany/ France/ UK/ Spain - Wilfried Berlin (*CEN nominated expert*)
Bayer Business Services, Germany - Nadine Feuerherdt
BITKOM, Germany - Martin Schmidt
Cap Gemini, The Netherlands - Tonny Wildvank
CIGREF, France - Frédéric Lau (*CEN nominated expert*)
Cisco Systems, global level - Brian Yothers
Deutsche Telekom, Germany - Markus Lecke
E-Skills UK, United Kingdom - Terry Hook (*CEN nominated expert*)
ESMI Grenoble, France - Marc Prunier
EXIN International, The Netherlands - Jan Dirx
Fondazione Politecnico di Milano, Italy - Clementina Marinoni (*CEN nominated expert*)
IG Metall, Germany - Karl-Heinz Hageni
Institut PI (AITTS), Germany - Irmhild Rogalla (*CEN nominated expert*)
Michelin, France - Hubert Delafon
PSA Peugeot Citroen, France - Etienne de Rouge
Prometric, Belgium - Yann Le Faucheur
Syntec Informatique, France - Claire Heitz

Project Coordination: Jutta Breyer, Germany (*CEN nominated expert*)

The CEN nominated experts would like to express their high appreciation and sincere thanks to the members of the EWG for their time and commitment in providing very valuable and indispensable input into this work.