Towards a
European e-Competence Framework

A Guideline for its development

First Release, October 2007

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0. Introduction to guidelines

0.1. Purposes

The aim is to provide a guide for developing the European e-Competence Framework, which integrates the Expert Working Group (EWG) outcomes achieved so far.

The guideline provides directions in order to identify and describe ICT-related competences according to the EQF approach. It also outlines the methodological choices behind.

0.2. Target groups

The guide is addressed to the EWG who participates in developing the Framework and to any Stakeholder or Expert who wants to understand the model behind and the methods adopted.

Hence, this guideline is a practical tool for the Framework construction and a transparent device for technical communication as well.

1. Some definitions

1.1. Operational descriptions and learning outcomes

The operational descriptions are special descriptions being verifiable through observable behaviours or practical, experimental, empiric demonstrations, so that their content is measurable.

On the other hand, the EQF defines learning outcomes as *'statements of what a learner knows, understands and is able to do on completion of a learning process and are defined in terms of knowledge, skills and competence'.* They are just expressed in terms of operational descriptions.

With respect to this, the EWG decided to describe knowledge, skills and competences, operationally so to make them comparable with the EQF learning outcomes and to create a reasonable link between the competence Framework and the qualifications framework.

Moreover, operational description can also facilitate competence assessments.

Operational descriptions of competences use action verbs inside, which express the ability to do something: (to be able) to ….

1.2. Competence, knowledge, skill, attitude, ….

Items	Definition	Examples	Remarks
Competence	A demonstrated ability to apply knowledge, skills and attitudes to achieve observable results *(according to levels of autonomy and context complexity).*	Supervise the technical aspects of the software development work of other Ability to perform detailed specifications, coding, module testing, and parameter integrated solutions The provision of advice, assistance and leadership in improving the quality of software development, by focusing on process definition, management, repeatability and measurement. The facilitation of improvements by changing approaches and working practices, typically using recognised models such as the Capability Maturity Model Integration (CMMI), or the Software Process Improvement and Capability determination Model (SPICE). (*from eSkills UK, Airbus, SFIA*)	The descriptions are operational, that is, they describe observable behaviours, which can be demonstrated /assessed, so they implicitly refer to contexts. As operational descriptions of competences describe observable behaviours, they embed and integrate all the dimensions that actually real behaviours usually integrate: knowledge, skills, attitudes, self-responsibility and autonomy capacities The length of operational descriptions is limited. The examples show a minimum and a maximum length Competences described in the Framework represent companies' needs not individual competences[1]. Competences are "context" specific[2], they are not context free. I.e. any competence changes its <u>meaning</u> (no its sense) according to the business and work processes, as well as to technologies, which is referred to. In the examples above, their meaning will change if referred to Computer Hardware development or even to SW production instead of SW development

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[1] For "individual competences" we intend the concrete competences we can recognise in each real individual. The framework is built from companies' competence needs according to their expected business results (top-down approach).

[2] "Context specific" means that according to each specific context, competences may change their contents and hence may require being adapted. In other words, they cannot be applied into different contexts always in the same way, even though their sense is always the same: e.g., "supervising" has the same sense by speaking either of software development projects, or a cooks team in a restaurant; but its concrete and practical meaning completely changes. On the contrary, individuals' "meta-capacities" allowing them adapting competences and hence behaviours to different situations, learning to learn, etc. are really "context free". They are cognitive abilities depending on individual aptitudes and personal insights.

Skill	Ability to carry out managerial or technical tasks	Providing guidance on specified organisational requirements and procedures to immediate colleagues Managing communication plan To set application parameters	Managerial and technical Skills are the "components" of competences and specify some core abilities forming a competence
Attitude	Cognitive and relational capacity	Analysis capacity, synthesis capacity, … logical capacities, Flexibility, pragmatism, listening capacities, … The sense of responsibility (see Responsibility)	If skills are components, attitudes are the glue, which keeps them together. Attitudes could be even described by operational descriptions; actually, the most common impression is that they are strongly embedded inside competences and could be just found within competence descriptions themselves.
Knowledge	The set of know-what	What development methodologies are suitable for projects Programming languages Design tools	Knowldege can be even described by operational descriptions.
Competence areas	A set of competences clustered according to specific criteria	Strategy and Planning which includes Information strategy, Advice and guidance, Business /information systems strategy and planning, Technical strategy and planning (*from SFIA*)	The European e-Competence Framework can be organised by areas of competences

2. The European e-Competence Framework

2.1. Meaning

The European e-Competence Framework is addressed to:

- ICT industry and ICT end-users companies: HR managers, ICT Managers, ICT practitioners
- Educational and vocational training institutions
- Certification bodies
- Trade Unions
- ICT professionals
- ……

It helps

- the understanding of local frameworks and their comparisons
- the building of job profiles
- the building of new local frameworks
- the understanding of ICT Business processes and their related e-Competences

It has to be

- an internationally working HR planning and development tool
- a guideline for the educational and vocational systems engaged in designing curricula and training initiatives in the ICT field
- in line with the European Qualifications Ffamework (EQF) and the other local ICT competence frameworks; i.e., it can be mapped onto the EQF as well as the other local frameworks can be mapped onto the European e-Competence Framework.
- general enough to fit the requirements described, not a copy of some specific already existing frameworks
- competence based not job profile oriented
- easily maintained and able to balance effectiveness (quality) and efficiency (costs)

Finally, **the Framework includes e-Competences and e-Competence areas needed by industry**; the Framework doesn't manage individual competences.

2.2. Structure

The European e-Competence Framework suggested so far has a multilayer structure (just as a simple hypertext). The EWG intention is to improve it step by step during its filling in with contents. In Figure 1 a provisional structure is shown.

In the next two chapters its structure will be detailed and indications on its construction provided.

Figure 1. European e-Competence Framework provisional structure
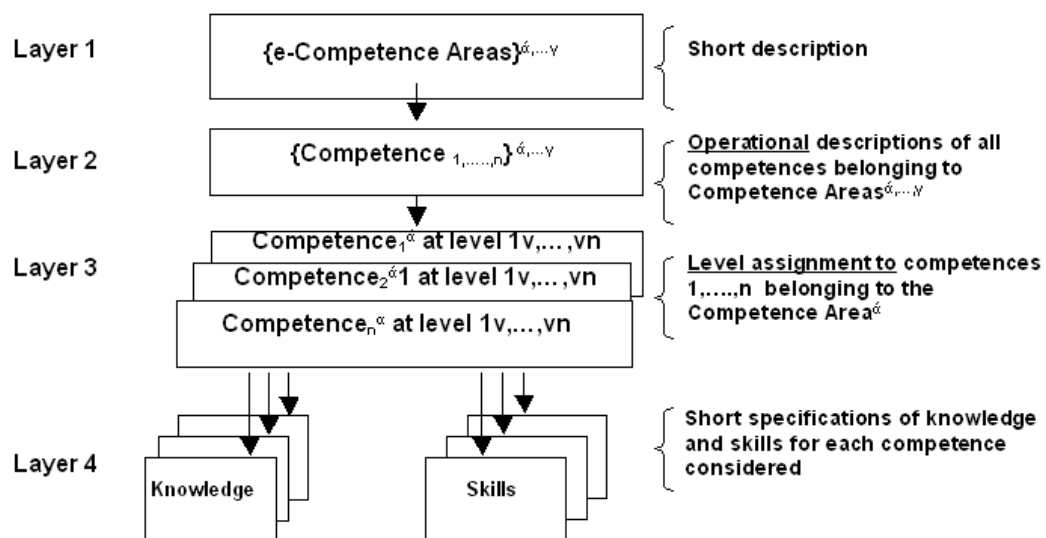
3. The e-Competence Areas

3.1. How to identify and populate e-Competence Areas

The e-Competence Framework is based on competence Areas and competences, instead of job profiles, being competence-based approaches more flexible and fostering local personalisation.

Accordingly, e-Competence Areas, *sets of competences clustered according to specific criteria*, are the fundamental blocks of the Framework and the main landmark to identify and to describe competences.

But which are the specific criteria to identify and populate e-Competence Areas in order to achieve common understanding and transparency?

The dimensions to be considered are:

1. ICT Business and work processes to identify e-Competence Areas and to construct the related sets of e-Competences

2. ICT knowledge Areas to help construct e-Competences related to the e-Competence Areas

The idea is to consider the whole ICT supply chain representing both ICT vendors and ICT end-users from any business sector. Hence, the aim is to gather the diverse points of views within a shared framework, by considering that ICT is a cross-sector.

3.1.1. The ICT business processes

"ICT processes" is the dimension identifying e-Competence Areas and their related sets of e-Competences, because Business and work processes generate companies' competence needs. So, just 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 ICT 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 public sector as well); any ICT professional and manager whatever function, role or job they have along 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 concerned with services 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 defined are shown in Table 1

Table 1: ICT processes defined

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

These processes selected reflect the main local ICT Frameworks considered (e.g. AITTS, SFIA, Eucip, etc.). They were also mapped on other international and recognised ICT processes models in order to test them through a "neutral" perspective. Two of them come from 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 included in the annex 4.

With respect to this,

- **e-Competence Areas** match up with the ICT processes defined, i.e., Plan, Build, Run, Enable and Manage can be also considered just as e-Competence Areas.

- **e-Competences** can derive from e-Competence Areas/ICTProcesses; examples of processes specifications (e.g. Conceiving, Designing / Developing, Integrating, Testing / etc) may be used as a guide to specify e-Competences.

A Glossary in Section 6 provides short descriptions of these items.

However, if Processes can identify e-Competence Areas and their sets of competences, nonetheless they are not enough alone either to construct e-Competences or to populate e-Competence Areas. In fact, technology can largely affect their meaning as well.

3.1.2.   The ICT knowledge areas

"ICT Knowledge Areas" is the dimension helping construct e-Competences and hence populate e-Competence Areas; in fact, competences may get different meanings according to the different ICT Knowledge Areas, which are referred to.

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

SW testing or to Computer HW testing. Hence, an e-Competence Area is also to be populated according to the knowledge areas, which its competences refer to.

They can suggest punctual piece of knowledge related to competences (Layer 4 – Figure 1). Hereafter Table 2 illustrates the main reference ICT Knowledge Areas

Table 2: ICT Knowledge Areas identified

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

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

These areas are consistent with the ISO approach to the OSI (Open Systems Interconnection) Service Definition model and with the Industry perspective as well.

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. Two main ICT knowledge macroareas: the first one is "technology oriented", the second one is "business driven".
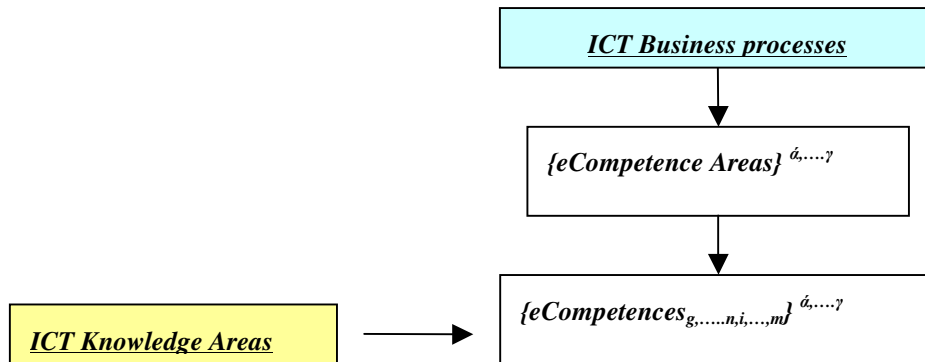
A Glossary in Section 6 (Tool Box) provides short descriptions of these items.

3.1.3. e-Competence Areas building

The e-Competence Areas identification and population is a step by step – top down approach as shown in Figure 2

Figure 2: A step by step – top down approach for building e-Competence Areas with

The relevant e-Competence Areas (layer 1) are going to be identified and populated by a grid which crosses the relevant ICT business processes (e.g. Plan, Build, Run…) with appropriate ICT knowledge areas (e.g. Application SW, Microelectronics, …).

Figure 3 shows an example.

Figure 3. How to identify and populate e-competence areas

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

Table 3: Procedure 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 3. Describe the reference e-Competence Area with a short operational description	Layer 1
4. List the titles of the major competences related to the e-Competence Area described	
5. Evaluate whether these competences can refer to all the ICT Knowledge Areas listed in Table 2 or rather to only some of them	Layer 2
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 → Use the ICT Knowledge Areas - Table 2. as an aid to add Knowledge	Layer 4
9. 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	
10. If b), repeat the process from step 4 on	
11. 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]*	

In Table 3, layer 3 is not included because it refers to competence levels assignment. This task is explained in the next two sections.

For the population of the Framework, priority Processes and ICT Knowledge Areas will be chosen, being not required to populate the whole Framework at a glance.

4. The e-Competence Levels

4.1. The European Qualifications 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.

In Table 4 EQF definitions are provided:

Table 4. EQF definitions

Knowledge	Skills	Competence
'Knowledge' is the outcome of the collection and assimilation of information through learning. In the EQF, knowledge is described as theoretical and/or factual.	*'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)*	*'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.*

Within the EQF, Competences, Skills and Knowledge are described in terms of height, depth and breadth within an increasing context complexity. (See the *RECOMMENDATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the establishment of the European Qualifications Framework for lifelong learning, Annex 1, Bruxelles, 5.9.06*).

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.
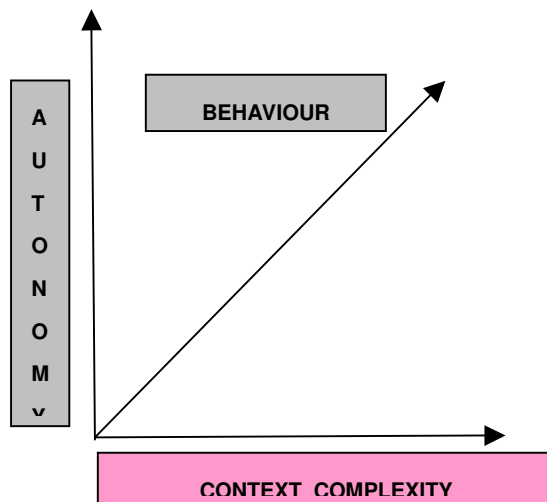
As the EQF and e-competence framework address different topics, namely qualification relationships within EQF and IT professional competence descriptors within the e-competence framework, it is not possible to use the same level definitions[3].

Concerning EQF competence definition in terms of responsibility and autonomy, 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 competence level descriptors.

Figure 4. Three parameters to provide height, depth and breadth to competence level descriptors

The main difference between EQF and e-Competence Framework is that within the EQF, these three dimensions drown in the levels descriptions of competences, skills and knowledge. On the contrary, in 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

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[3] As competences are *demonstrated abilities to apply knowledge, skills and attitudes to achieve observable* result, within the e-Competence framework, levels are just assigned to competences. Accordingly, the following paragraphs focus on competence dimension only, which includes knowledge and skills.

Behaviour can express the observable outcome of attitude; attitudes, i.e. cognitive, emotional, relational, social psychological dispositions, 'are the glue' which bind competence descriptions together but they are difficult to observe and articulate. On the contrary, *behaviour* is a measurable and observable characteristic and may provide 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".

Concerning 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

Table 5. A typical employer structure and a proposal for related EQF comparison

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**

In the Table 5, *tasks descriptions* intend to better explain role and responsibility at each level. Consequently, the EWG accepted a five level structure which relates to the EQF as follows.

Table 6. A proposal for related EQF comparison

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

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

Table 7. e-Competence Framework levels compliant with EQF levels

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.**		**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.**	**Unpredictable - unstructured**	**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	Planning, making decisions, supervising, building teams, forming people, reviewing performances, finding creative solutions by application of specific technical or business knowledge/skills

	Knowledge & Skills		Role	Context	Supervision	Activities
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 sometimes unpredictable context	**Concepts/Basic principles**	often self-initiated.	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			**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,

5. How levels help describe competences

Levels can help describe competences 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, included attitudes[4] as well. 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 an aid to frame competences descriptions, to verify competences descriptions and to assign levels to competences described as well. 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.

Moreover, Table 7 can also help identify Skills (see layer 4 of Figure 1).

Consequently, in Table 8 on the following page a reformulation of the procedure shown in section 3.1.3 is provided.

Table 8: The reformulated procedure with levels to identify and populate e-Competence Areas

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[4] Just as an example of attitudes "embedded" in competence descriptions, the following sentence embeds several attitudes and managerial skills: "The *provision of advice*, *assistance* and *leadership* in improving the quality of software development …" [*from SFIA*].

Attitudes are implicit in the meaning related to "provision of advice, assistance, leadership"; in fact they imply the abilities to listening to, to communicate, to analyse and synthesize, etc.; leadership itself can be considered as a managerial skill and it can be also made explicit at Layer 4 (see Figure 1).

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 3. Describe the reference e-Competence Area with a short operational description	Layer 1
4. List the titles of the major competences related to the e-Competence Area described 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	Layer 2
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 2. 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]	

6. Open questions

In order to develop a flexible, practical European e-Competence Framework, which can be easily updated and maintained, helping stakeholders understand, compare and also build new local e-Competence Frameworks, it is also necessary to define

a) how to code the items inside, i.e. Areas of e-Competences, Competences, Skills and Knowledge

b) **if** and how to cluster Competences, i.e. if and how competences have to be grouped inside any e-Competence Area, according to defined criteria

In particular, about point a), there are several ways to assign codes to items, e.g. "Speaking" codes (not recommended), alphabetical characters, numbers, etc. Moreover, how to code may also depend on how to cluster items. So point a) and point b) are in some ways related.

Concerning point b), there are at least two ways to cluster competences inside e-Competence Areas, i.e., within e-Competence Area "BUILD", competences can be clustered according to

→   competence types. E.g. "develop", "testing", "configuring", etc

→   knowledge Areas: e.g., Application SW, System SW, Computer HW, etc.

Number and complexity of competences described inside the e-Competence Areas can justify their clustering. If these factors don't compromise e-Competence Framework flexibility, transparency and readability, it will not necessary to find further criteria for classifying competences.

7. Tables of tools *(see Excel Sheets enclosed)*

- Table 1. Processes and Glossary
- Table 2. Knowledge Areas and Glossary
- Table 7. Levels
- Table 8. Population procedure and an example in progress

8. Annexes

8.1. Team work 1: final results – ICT Knowledge Areas

8.2. Team work 2: final results – How to populate the e-Competence Areas

8.3. Team work 3: final results – Levels

8.4. ICT processes test