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European ICT Skills Meta-Framework - State-of-the-Art review, clarification of the realities, and recommendations for next steps

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EXECUTIVE SUMMARY

The CEN Workshop Agreement (CWA) first presents an in-depth analysis of the current state-of-the art of ICT Practitioner Skills/Competence frameworks in order to clarify the nature of the next steps towards a European ICT Skills Meta-Framework, and its relationship to the proposed European Qualifications Framework (EQF). Then, recommendations based on the results of the analysis are presented.

A comprehensive overview of ICT frameworks has been produced, and a structured inventory of five particularly significant ICT Practitioner Skills/Competence frameworks is presented, in terms of a number of key attributes. Three specific frameworks, representing the national approaches in three large Member States, are analysed in some detail, and certain findings are evident, based on their mutual similarities and differences. The overall structural paradigm and an example comparable profile for each are examined.

It is recognized that the specifics of the two-dimensional structure of such frameworks, involving vertical (level) and horizontal (functional activity) descriptors, depends on the purpose(s) for which each was designed. In addition the CWA examines the realities of the *continuing change* taking place within the ICT marketplace, and the lack of stability within the work-organisation and resultant skill-set specification by employers that arise from this lack of stability.

The CWA examines in some detail the relationship between Skills/Competence frameworks for ICT Practitioners and Qualifications Frameworks. It is noted that the proposed EQF consists of a set of 8 level descriptors, specifying learning outcomes in terms of Skills, Knowledge and wider Competences and so enables direct comparison of Qualifications thus described with occupational competence profiles. However, it is recognized that skills/competence frameworks specify the *demand* side of the ICT practitioner labour market, while qualification specifications relate to the *supply* side of the market. While a focus on learning outcomes has helped to relate these two worlds, it is recognized that they are not the same. The conclusion is that it is desirable to work for greater coherence at the European level of *both* (and that they are related), but that the variations of the labour market in different Member States means that the two developments can and should be considered *separately*, while each takes the other into account where appropriate.

A structured review of four significant ICT Practitioner Frameworks (the three major national frameworks in the EU and one from North America) was carried out and is presented, and Level Descriptors for the specification of ICT Practitioner competence are developed from the generic EQF descriptors. In addition, based on the comparisons of existing frameworks, broad *Guidance* is provided for appropriate and effective use and further development of such frameworks.

An "Ideal Scenario" is presented, aiming to introduce the potential benefits of greater coherence at the European level, and options are shown for possible ways of moving towards that world. It is recognized that there is a need for stronger evidence of benefits in relation to the different uses of such frameworks, and a set of recommendations for progressing increased coherence are made, in relation to both ICT Practitioner competence Frameworks and ICT Qualifications of different types.

The in-depth analysis of a range of evidence leads to the following conclusions:

- It is recommended to encourage and strengthen the process of convergence of ICT Practitioner skills/competence frameworks within the EU by means of a three step process:
 - i. Provide – via the CWA - basic information about frameworks, highlighting criteria that help to compare and to contrast various approaches and help companies and ICT professionals to select or adapt a framework that best fits their purpose and needs.
 - ii. Promote the guidance given in this document. New framework initiatives may be able, and should be encouraged, to base their implementation on it. Existing frameworks may progress towards convergence during stages of review and updating.
 - iii. Work towards an **e-Competence (reference) framework** and the provision of information as to how each framework/ profile or proficiency model is related to it, recognising that this is likely to take considerable time.
- It is accepted that Life-long Learning is of the utmost importance, especially in the ICT sector and ICT Practitioner occupations, where understanding, skills and competence need regular updating. Consequently, the recognition of professional qualifications and the transferability of all learning outcomes (regardless of how they were acquired, and including those from informal learning) must be supported at all ages.
- The “owners” of the major frameworks in Europe should be asked to collaborate in developing a two-dimensional framework, with horizontal skills/competence descriptors specifying profiles, clustered into relevant groups, whose level specifications would be based on the generic level descriptors in the CWA. This framework would be “neutral”, not subject to any national/cultural or constituency interests, and could be especially helpful in those Member States where no skills/competence framework for ICT practitioners yet exists.
- A scoping study should be undertaken to clarify options for the top-level structure of a European ICT Qualifications Framework, drawing on the reactions of stakeholders to discussions on the “possible structuring” shown in Annex F, and on horizontal descriptors arising from the proposed “two dimensional framework” where possible.
- Taking into account the emergence in recent years of *competence* in many Member States, the term *competence* framework in preference to *Skills/Competence* Framework should be used as a more comprehensive and holistic concept.
- The Commission should support a serious exercise of gathering concrete evidence of the benefits of using ICT Practitioner Skills/Competence Frameworks as part of providing, in relation to each relevant potential **use** of a European e-Competence Framework for ICT Practitioners (see Annex A), much greater clarity of justification for further commitment.
- Since language, terminology and semantics issues have posed problems during Phase 2, it is recommended that a project be undertaken to tackle this problem directly.
- (Approaches to) Methods and tools that could prove helpful in the development of a European ICT Qualifications Framework (for example, eCCO) should be supported.
- In order for more widespread employer buy-in to be achieved, it is strongly recommended that the CWA and the recommendations within it be presented, on an individual basis, to a number of key European employers, and that the distillation of

the reactions be written up as a starting point for the next stage of development towards a European e-Competence Framework.

The fact that this CWA has focused on ICT Practitioner Skills should in no way detract from the importance of User Skills, and a scoping study for options in relation to a European e-Competence Framework would be a natural follow-through to this CWA.

A considerable amount of new reference material is provided in the Annexes.

Acknowledgements

The Chair and Co-Chair of the ICT Skills Workshop, and the CWA authors Yosh Beier and Matthew Dixon, would like to express their gratitude to all those who gave their time to considering and discussing aspects of the Workshop's agenda, and to previous Project Team members for their contributions.

Foreword

This Draft CEN Workshop Agreement documents the second phase of the CEN/ISSS Workshop project in relation to ICT Skills.

The first phase work produced two initial CEN/ISSS Workshop Agreements:

- CWA 14925
Generic ICT Skills Profiles for the ICT supply industry (March, 2004), and
- CWA 15005
ICT Curriculum Development Guidelines for the ICT supply industry (May, 2004),
both being *reviews by the CEN/ISSS ICT-Skills Workshop of the Career-Space work*.

These Agreements drew on the pioneering European level work of the *Career-Space* consortium, and the next step – Phase 2 of the CEN/ISSS ICT Skills Workshop has been to broaden the stakeholder base and the focus of attention beyond the limited professional roles considered by Career-Space, and to examine the field in more depth at all skills/competence levels.

The main areas of development have arisen from recognition and analysis of:

- the range of existing ICT Skills/Competence Frameworks;
- the range of different purposes for which such Frameworks have been developed;
- the different types of relevant frameworks (e.g. for Practitioner Skills, for ICT User Skills, and for learning curricula);
- the particularly high rate of change within the field of Information and Communications Technologies, driven by waves of new enabling technologies, the resulting approaches to work organisation, and the resulting lack of stability of skills classification structures; and finally
- the need to ensure adequate consistency with emerging European Frameworks of relevance, in particular the proposed *European Qualifications Framework ("EQF")* and the *European Directive on Recognition of Professional Qualifications* for regulated professions¹.

Phase 2 of the Workshop has involved a considerable amount of work from a number of people, who have been actively involved since the conclusion of the ICT Skills Workshop's first phase. Following the approval, towards the end of 2004, of support for a second phase from D-G Enterprise through CEN, the scene was set at a meeting hosted by CEDEFOP in December 2004.

The main milestones in Phase 2 were as follows:

¹ Since there is no **regulation of practice** of ICT Practitioner work within the European Union, this Directive is currently of no direct relevance.

- “Kick-off” meeting 14-16 February 2005 under the auspices of the University of Karlsruhe (where the CEN/ISSS Business Plan for the project was approved, and the project team assembled);
- Second meeting 17-18 May in Brussels (where the focus of the meeting was on the relationship between the proposed Meta-Framework and the European Qualifications Framework, proposals for which were emerging, as well as relevance to the emerging new Directive on Recognition of Professional Qualifications)
- An ad-hoc meeting on 28th July in Brussels, initiated by Cepis and hosted by CEDEFOP, where a number of experts reviewed progress in the light of a briefing from Yosh Beier from the Project Team, and
- The Final meeting of the Workshop on 29-30 September 2005 at the Headquarters of CEN (where the Draft CWA prepared was discussed and approved in principle, subject to a number of modifications).

The issues at stake are complex and challenging. This CEN Workshop recognizes that progress towards the “Ideal Scenario” of a European Framework of what could be termed “e-Competence” is aspired to by many who are active in this area, and that progress has perhaps so-far been slow. This CEN Workshop has worked to find a proposition that moves things in a positive direction for supporting the contribution of ICT Skills to achieving the strategic “Lisbon goals”, while retaining the support of key stakeholders and employers of ICT Practitioners in a market that has still to achieve maturity and stability.

As Co-Chairs of this Workshop, we would like to acknowledge with gratitude the very considerable support of all those who have contributed to the production of this CWA, in particular the final *Project Team members* and authors Yosh Beier and Matthew Dixon.

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0 Introduction

Key Terms

It is essential that the meaning attributed in the CWA to a small number of key terms is put in context for, and understood by, the reader. The purpose of this initial “alert” is to “flag” that these terms must be interpreted carefully – more clarification about their specific use is provided in the following sections (and in particular in Annex E).

Skills and Competences:

These two concepts are powerful and relatively complex, are central to the subject of the CWA, and undoubtedly viewed with different nuances in different (stakeholder) communities and between some Member States. Depending on the usage made in different communities, the meaning of the two terms can be relatively close or importantly different. A detailed analysis of their meaning across Europe is provided in the recent CEDEFOP report by Winterton et al. – see References. The CWA draws heavily on the CEDEFOP study, and makes a recommendation about the future use of these terms in the names of relevant central concepts. Generally the frameworks under examination in the CWA are described as Skills/Competence Frameworks.

Employer²:

An employer is an organisation, either in private or public sectors of the economy that pays people who work for it, on some basis generally specified within employment legislation in each Member State. In particular an employer *provides information* about the requirements of the work (jobs) it offers, *recruits* people into employment, as well as *providing guidance and support* for the individual employee to improve, through learning of different kinds, their Knowledge, Skills and Competences.

European Meta-Framework:

There has been considerable discussion of the differences between *meta-* and *reference-*frameworks (and -models and -data). The term *Meta-framework* is generally used in the CWA to indicate that the work associated with the development of a Meta-Framework, and its use, is in no way intended to duplicate or compete with that already carried out in the development and updating of any existing relevant framework, whether national (within individual Member States) or of any other kind. It is important to recognize, therefore, that the use of “Meta” in the CWA may not in all cases be the same as its use in some other fields, in particular, in Computer Science.

Qualification and Certification:

Certification often means the awarding of a certificate, or other testimonial, that formally recognizes and records *success in the assessment* of Knowledge, Skills and/or Competences, as the final step in the completion of a Qualification. However, it is also used, in particular in relation to ICT Practitioner occupations, to mean the Qualification as a whole. It is important to be aware of these two (“narrow” and “broad”) meanings of Certification.

² It is important to note that significant numbers of ICT Practitioners within the EU sometimes work on a contract basis as ICT “contractors” or “consultants”. The skills of such self-employed ICT Practitioners also need developing and updating, but their work relationship is with *customers* (rather than employers), and – since their relationships with customers are in general shorter (sometimes significant shorter) than those of employees with their employers – they generally have to take full responsibility for developing their own Knowledge, Skills and Competencies.

0.1 Background

Information and Communication Technology (ICT) Skills³ are of strategic importance for Europe. The raising of ICT skills within the EU will form part of the means by which the challenging Lisbon objectives (for Europe to become *“the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth, with more and better jobs and greater social cohesion”*) are to be achieved. It is recognized that education and training provision within the EU must be further improved to better match demand for skills, to improve access and equal opportunities⁴, to increase the productivity of workers and raise social inclusiveness.

The Synthesis Report of the *European e-Skills/Competence Forum* (Ee-SF, 2004) defined e-skills as consisting of three key types:

- ICT Practitioner Skills
- ICT User Skills, and
- e-Business Skills

While in no way questioning the importance of ICT User and e-Business Skills, this CWA addresses frameworks for ICT Practitioner Skills⁵.

Expressions of interest in the development of such a Framework have been made in a number of contexts, not least in the European e-Skills Forum Synthesis Report, and the Final Declaration of the *European e-Skills 2004 Conference* in Thessaloniki. The European Centre for Vocational Training (CEDEFOP) and the European Commission have expressed support for the proposal. The Council of European Professional Informatics Societies (CEPIS) took an active part in turning this commitment into action and co-sponsored, with CEDEFOP, this Workshop under the auspices of CEN/ISSS.

0.2 Purpose of the European ICT Skills Meta-Framework

The purpose of the proposed ICT Skills Meta-Framework (**ICT Skills M-F, or just M-F**) is primarily **to promote better understanding within the European Union about the nature and structure of the ICT Practitioner Skills required by employers.**

As will be seen, frameworks can be used for a number of possible purposes, and the design is generally strongly influenced by the main intended purpose. Annex A shows, in tabular form, a number of possible purposes for which a European ICT Skills Meta-Framework could be used, together with information, for each, on the potential Uses, Benefits and Costs of a possible *European level framework* for Practitioners.

³ The term **skill** is used here, as generally within this document, in its broadest sense. Within the communities whose work involves using these concepts, **competence** would generally be the preferred broadest concept, encompassing *Knowledge, Skills* and wider *Competences* (see CEDEFOP, 2005 (Winterton et al.)).

⁴ Inclusion is addressed in the i2010 Communication (for further information see document COM(2005) 229 final, source: europa.eu.int/comm/secretariat_general/impact/docs/ia_2005/COM(2005)229.pdf, last visit January 2006)

⁵ defined by the European e-Skills Forum as *“The capabilities required for researching, developing and designing, managing, the producing, consulting, marketing and selling, the integrating, installing and administering, the maintaining, supporting and service of ICT systems”*

A Meta-Framework is one which *stands beyond* (or *above*) (other) frameworks, in the sense of describing (other) frameworks. A Meta-Framework is a framework **about** frameworks. There are a number of existing frameworks for ICT Practitioners within the EU and beyond, and the proposed Meta-Framework would “stand *beyond*” them in particular because it is not intended, or designed, to stand *alongside* them.

It is not a “new” ICT Practitioner Skills/Competence Framework, but attempts to encompass and disseminate information about existing (and possible future) such frameworks, for the benefit of all.

Better understanding about ICT Skills can be useful in a number of ways, but extensive discussions as part of the Workshop process have concluded that the greatest value from this Meta-Framework can be gained from its use as:

- a tool for structured comparison between existing ICT Practitioner Skills/Competence Frameworks;
- a guidance resource on which those considering the possibility of developing their own Frameworks can draw;
- a conceptual basis for planning future developments that would help assure a greater supply of competent ICT Practitioners to European employers; and
- a starting point from which the proposed *European Qualifications Framework* can be applied to, and evaluated for, ICT Practitioner work, both by employers and by practitioners planning their careers.

ICT Practitioner work, and the skills and competences that are required to carry it out, arise from the way in which work on ICT products, services and systems is organized. Just as Information and Communication Technologies themselves are highly complex and continuing to evolve, so the skill-sets⁶ needed in relation to deploying and using ICT are both very complex and not yet stable or mature in terms of coherence of their classification. As a result, efforts to clarify and codify the structures of these skills have not yet reached a level of stability that enables adequate agreement at the European level on classification frameworks that could be thought of as a possible *future standard* for the European Union.

This is explained in more detail in the next Section.

⁶ again, read in the **broadest** sense – or as competence

1 Scope

The scope issues in this workshop are very important, but they relate, rather than just to the types of skills considered, to the clarification and positioning of precisely what the proposed ICT Skills Meta-Framework is (and what it is not).

Classification frameworks are *highly complex*, particularly abstract things as only a certain level of abstraction allows for the emergence of classifiable structure. Information and Communication Technologies (ICT), the focus of ICT skills, are also highly complex. The concepts in both involve a number of aspects of *abstractness* and *subtlety*, e.g. the degree and granularity of abstraction and questions of delineation. This results in the fact that the underlying understanding necessary to validly assess different aspects of the design of an ICT Skills Meta-Framework is not very widespread. As in the ICT market as a whole, therefore, many aspects of debates around these topics include discussions involving considerable limitations of understanding.

Classification Frameworks for skills, Competences and qualifications can also be very *powerful* concepts, since they can be applied in a number of important ways. These include:

- supporting HR and workforce development initiatives,
- describing certain roles in order to present attractive images of industry activity in order to encourage people to initiate their careers or apply for jobs in this work,
- helping to consistently communicate expectations about competences required by employers from individuals in order to effectively perform in given roles of the industry,
- providing a valid set of “targets” – in terms of performance expectations - for education and training provision (and the qualifications awarded following successful completion of this learning),
- classifying jobs in relation to recruitment and salary data, and
- capturing occupational structure for statistical data collection on the workforce.

The continuing changes in occupational structure in ICT work pose continuing challenges for those attempting to find adequate occupational classifications that span the economy as a whole (in particular, at the international level through the *International Standard Classification of Occupations* - ISCO⁷).

The design of frameworks arises first and foremost from the intended *purpose*, or *application*. This is fundamental, since – although frameworks designed for one purpose can be, and often are, used for purposes beyond those they were designed for, they may well not be particularly well-suited for the other applications, and so may not perform effectively in that context. In short, frameworks – once created - *can “take on a life of their own”*, and this can often produce unexpected, and sometimes undesirable, effects in other contexts.

And finally, the scope of the stakeholder context is one where governments’, employers’ and individuals’ interests are involved, from Member States with a wide range of cultures and traditions – across the three relevant “worlds” of enterprise, employment and education.

Given these realities, there has, during the course of the workshop activity, understandably been a considerable amount of discussion around what is needed, not all of which has yet resulted in satisfactory conclusions or adequate consensus. The response of the project

⁷ Currently undergoing revision by the International Labour Organisation

team⁸ to these challenges has been to work to maintain precision and clarity in relation to what is being proposed.

During the course of the project, details of the structure of the proposed European Qualifications Framework emerged. The proposed EQF is of course a very important proposition, and is a major structural initiative to facilitate greater coherence for Lifelong Learning in Europe, while responding to the Lisbon objectives. The second part of the current project has therefore developed recommendations as to how ICT qualifications would relate to the proposed EQF.

In clarifying the most constructive response of the ICT Skills Meta-Framework project to the emergence of the proposed EQF, it is essential to be clear about the difference between a Skills (or perhaps more correctly, a Competence) Framework and a Qualifications Framework. While most people would assume that the term qualifications relates to knowledge acquisition and academic achievement in the early years of life within the formal education system, it covers, in the European Union of today, a number of qualifications that are neither assessed or awarded in the early years within the formal education system, nor involve only the assessment of knowledge and understanding. In addition in the field of professional activity a considerable amount of professional competence is gained by means of informal and non-formal learning that has in the past not been recorded or recognized by qualifications.

For this reason, and in order to strengthen the link between learning, qualifications and employer competence needs, the proposed EQF has been designed around learning outcomes, specified in terms of sets of Competences: Knowledge, Skills, and wider Competences ("KSCs"). The Workshop participants welcome this approach, in that it is ultimately not the way in which a qualification was achieved that matters but the individual's employability and, once employed, his/her ability to meet an employer's performance expectations.

Thus qualifications relate primarily to the supply side of the labour market, providing certain evidence of an individual (job applicant)'s capabilities to perform certain aspects of a job, while skills (or competence) frameworks express the structure of labour market demand (employers' skill needs).

In short, the main priority of an ICT Practitioner Skills/Competence Framework (and any European Meta-Framework related to such frameworks) is to provide something largely specified by employers, and of real value to them as well as to those employed as - and those seeking work as - ICT Practitioners, as well as stakeholders associated with both sides of the labour market. Its contribution as a platform via which the proposed EQF can be applied in relation to ICT Practitioner work remains secondary in the context of this Workshop.

⁸ The project team drafted a preliminary paper for the work group discussion.