

A Model for European e-Competence Framework Development in a University Environment

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Abstract

The paper describes a model of implementation of the European e-Competence Framework in Sofia University by using the methodology and tools developed in the frames of the EC Sixth Framework European Integrated Project Ten-Competence. The work is a follow up activity of an internal university project for implementation a curricula in computing based on the ACM/IEEE recommendations.

Keywords: life-long learning, competence development, ICT practitioner

1. Introduction

As a result of an internal university project for re-designing the computing curricula according to the ACM/IEEE CC2005 series recommendations[1] and several European ICT curricula recommendations, Sofia University (SU) has developed bachelor programs in Computer Science, Software Engineering and Information Systems [12]. In addition SU offered a large number of ICT master degree programs and most of them included **compulsory internship** student placement. The programs are oriented mostly **towards needs of global ICT industry**. The Centre of Information Society Technologies at SU took the initiative of opening the university towards life-long learning provision [8]. Recently the Centre was identified as an example of good practice in multi-stakeholder partnerships for e-skills in Europe [7]. The academic programs were enhanced with courses provided by some big vendors. A set of courses were opened to external clients, coming from industry, government and other organizations. The **cooperation with the local ICT industry** is considered as a

strategic goal of the university in order to better adapt the computing curricula towards the needs of this industry, and to open doors for a professional carrier for every graduate. Several bi-lateral programs for carrying out student internship programs with some local ICT companies were launched. Every student has two tutors – one from the university, and the other - from the company, and each internship ends with evaluation by a company tutor. Usually after the internship students receive offers for full time position at the same company. In parallel, some organizational changes were driven towards implementing a new model of university [9,10,11]. The model we are heading is **eUniversity: a research and entrepreneurial university which integrates ICT in all university activities, including the ones related to the outside knowledge intensive organizations** [9].

2. Towards e-Competence Framework Development

The fast growing e-Skills gap is a major concern of the EC and other European stakeholders[4,7]. The European e-Skills Forum has clasified “e-skills” in three main categories: **ICT practitioner skills**, **ICT user skills** and **e-Business skills**. In May 2008 were adopted the *Recommendations of the European Parliament and the Council on the Establishment of the European Qualifications Framework (EQF) for lifelong learning*[13]. The recommendations aim to contribute to modernising education and training systems, the interrelationship of education, training and employment and building bridges between formal, non-formal and informal learning, leading also to the validation of learning outcomes acquired

through experience. There were defined **eight levels** of the EQF in terms of knowledge, skills and competence. The main objective is **to create a common reference framework** which would serve as a translation device between different qualifications systems and their levels, whether for general and higher education or for vocational education and training. This will improve the transparency, comparability and portability of citizens' qualifications issued in accordance with the practice in the different Member States. Each level of qualification should be attainable by way of a variety of educational and career paths.

In September 2008 were published the European e-Competence Framework - e-CF (version 1.0) and the user guidelines for its application [2,3]. The initiative of development of e-CF has been launched as a **multi-stakeholder partnership** by a large number of European ICT and human resource experts. The e-CF is focused only on the ICT practitioner Skills and would make possible **creation of a long-term human resources and competence development strategies** for the European ICT community. The e-CF is structured from **four dimensions** which reflect different levels of business and human resource planning requirements in addition to job/work proficiency guidelines (see fig.1).

The table is titled "European e-Competence Framework v.1.0 overview". It is a grid with 5 columns: Dimension 1 (e-Comp. areas A-E), Dimension 2 (32 e-Competences identified), and Dimension 3 (e-Competence proficiency levels e-1 to e-5, related to EQF levels 3-8). The proficiency levels are further divided into sub-levels e-1, e-2, e-3, e-4, and e-5. The e-competences are grouped into five dimensions: A. PLAN, B. BUILD, C. RUN, D. ENABLE, and E. MANAGE. Each cell in the grid is either empty or contains a green square, indicating the presence of a specific e-competence at a specific proficiency level.

Dimension 1 e-Comp. areas (A-E)	Dimension 2 32 e-Competences identified	Dimension 3 e-Competence proficiency levels e-1 to e-5, related to EQF levels 3-8				
		e-1	e-2	e-3	e-4	e-5
A. PLAN	A.1. IS and Business Strategy Alignment					
	A.2. Service Level Management					
	A.3. Business Plan Development					
	A.4. Specification Creation					
	A.5. Systems Architecture					
	A.6. Application Design					
	A.7. Technology Watching					
B. BUILD	B.1. Design and Development					
	B.2. Systems Integration					
	B.3. Testing					
	B.4. Solution Deployment					
	B.5. Technical Publications Development					
C. RUN	C.1. User Support					
	C.2. Change Support					
	C.3. Service Delivery					
	C.4. Problem Management					
D. ENABLE	D.1. Information Security Strategy Development					
	D.2. ICT Quality Strategy Development					
	D.3. Education and Training Provision					
	D.4. Purchasing					
	D.5. Sales Proposal Development					
	D.6. Channel Management					
	D.7. Sales Management					
	D.8. Contract Management					
E. MANAGE	E.1. Forecast Development					
	E.2. Project and Portfolio Management					
	E.3. Risk Management					
	E.4. Relationship Management					
	E.5. Process Improvement					
	E.6. ICT Quality Management					
	E.7. Business Change Management					
	E.8. Information Security Management					

Fig. 1. European e-Competence Framework v. 1.0 [2]

3. The TENCompetence Project

SU actively participates in the EC Sixth Framework European Integrated Project Ten-Competence [16] which develops methodologies and tools to support “individuals, groups and organizations in Europe in lifelong competence development by establishing the most appropriate technical and organizational infrastructure, using open-source, standards-based, sustainable and innovative technology”[6]. A pilot for training of university professors in using the the Personal Competence Manager (PCM) - a tool developed in the frames of the project[5], was run [15]. A large scale in-service teacher training pilot based on the TENcompetence framework was designed and run as well. In addition - two new pilots are under preparation - a pilot on expansion of the Special Education Bulgaria (SEB) internet community [14] and a pilot for consultation and training of a middle size company in the field of electronics how to describe training in terms of competences, sub-competences, how to move from a topic-based training to a competence-based training.

The above mentioned pilots target developing e-business and ICT user skills, while the e-CF is mostly oriented towards development of ICT practitioner Skills. Our next challenge is to pilot implementation of the e-CF by using the TENCompetence framework.

4. Design issues of implementation of the e-CF

At the first stage some alignment of the definition of competence is required. In the EQF, a **competence** is defined as “the proven ability to use knowledge, skills and personal, social and/or methodological abilities in work or study situations and in professional and personal development”[13]. In the terms of the e-CF, a competence is “a demonstrated ability to apply knowledge, skills and attitudes for achieving observable results”[3]. The TENCompetence consortium interprets competence “as all the factors for an actor to perform in an ecological niche” [6]. Performance includes the specific context that is necessary for the interpretation of competence and competences include competencies and knowledge that are necessary to put the competence into performance. All three definitions are semantically

close and the difference in their meanings would not influence the further work.

The European e-CF provides a framework for a multi-stakeholder partnership between universities and companies since it represents the competence needs of the ICT industry which could reflect on designing and refining the academic programs (see fig.2).

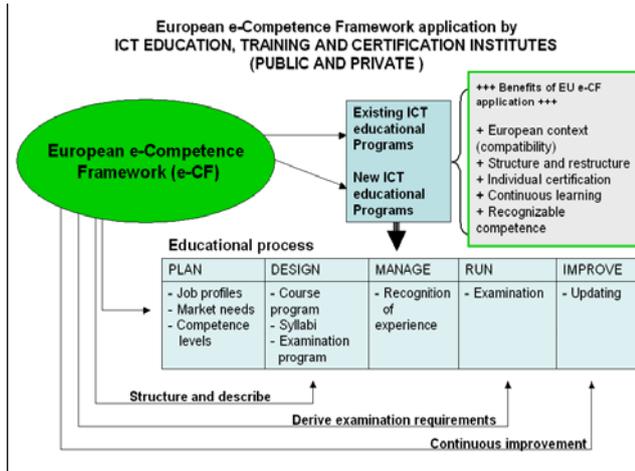


Fig.2: e-CF application by ICT education, training and certification institutes [3]

A process of matching the developed computing curricula at SU towards the European e-CF is initiated and it will reflect its further alignment and enhancement at all four e-CF dimensions for the bachelor, master and doctoral level of education. For instance, the implemented bachelor curricula at Sofia University correspond mostly to the e-Competence area “build” (see fig. 3).

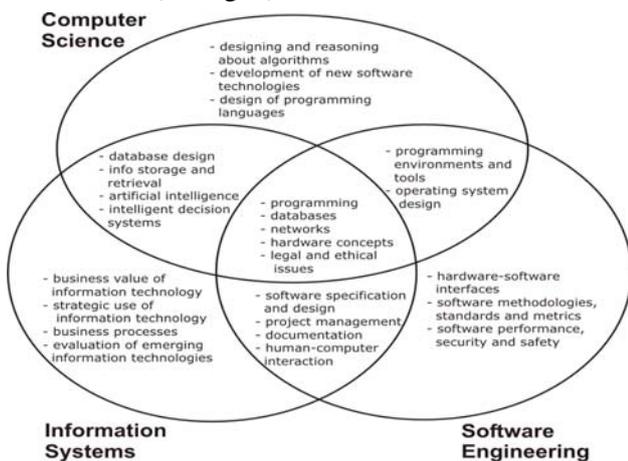


Fig. 3. Intersection of the Computing Curricula in CS, SE and IS

It was identified that only few of the ICT master programs at the university target the other 4 areas, e.g. the master programs in “*e-Business and e-Governance*” and in “*Technology Entrepreneurship and Innovation in IT*”. The further efforts will be directed to embedding in the curriculum more skills and knowledge from the framework and open more close cooperation with the other ICT stakeholders for better covering the requirements of the European e-CF. Since almost all master students work at ICT companies, they are obliged to develop their ICT competence in a real work environment. The European e-CF provides an opportunity to **closer bridge academic education with the student internship program** in ICT companies for further e-competence development in a systematic way. An opportunity is to use the e-CF for supporting students to develop their own ICT carrier and become real ICT practitioners in the companies they work. For instance – they can use the framework for defining their own learning path, self assessment and making visible their personal competence profile. On the other side, the companies that are included in the internship program, could be supported to use the European e-CF for: preparing job descriptions by combining elements from different areas and recruiting people who better match their needs; analyzing the skills gaps and developing training plans for their employees; further supporting development of skills in order to meet the changing demand of skills, etc.

5. Conclusions

For the purpose of the further work the PCM system and already accumulated experience in its application will be used. PCM is not designed around concepts like lecture, course, training program, but rather on concepts like learning network, competence profile, and competence development program[5]. PCM gathers competence related information drawn from sources at multiple levels, and presents this information in a context, structure and format, which are determined by the user. The PCM users can initiate or join a virtual professional community, support development of its competence profile, design competence development plans for each competence profile. Each plan may contain several learning paths, comprised by different learning activities and supported by specific knowledge resources. The users can choose their own competence development plans,

follow them and thus built the desired competences. They can rate any existing plan, activity or resource in relation to achieving specific competence profile. The learners can share their plans, ratings, resources and ideas using the embedded communication tools. There exist a self-assessment instrument and a *best way* map that helps learners to find the most efficient for them learning path through any competence development plan.

Acknowledgments

The work has been sponsored by the TENCompetence Integrated Project funded by the EC 6th Framework Programme (www.tencompetence.org)

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