Driving Informatics Competence in Europe: the EUCIP Programme

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Abstract: After setting ECDL as a paradigm for measuring individual skills in using the most widespread types of information technologies (IT users), in 1999 CEPIS started a new project for the definition of a reference certification framework for IT professionals, now known as "European Certification of Informatics Professionals". In 2003 the first EUCIP Core certificates were released in Italy, Greece and Norway; currently several learning providers are deploying the programme in ten European countries. EUCIP contributes to a European standard classification of vocational paths & primary ICT professional profiles: it offers an independent and unified approach to the definition of professional profiles and to the certification of individual competences aligned with the needs of the labour market; its main feature is the ability to include university courses, IT vendor certifications and independent qualifications into one model that has been designed as the synthesis of contributions from a number of different countries.

1. Introduction

One of the main aspects in the e-Europe 2005 scenario is the increasing need for IT competence at various levels, starting from the e-citizen up to the experienced IT professional. Knowledge – and the ways to manage it within an organisation (KM) – are actually becoming a condition for success in most business sectors.

A practical way to address this need is to define new standards for individual knowledge & skills and to provide tools for measuring them – in a word: "certification".

This paper is going to focus on the concepts, goals and current achievements in various countries of the EUCIP programme promoted by CEPIS, the federation of the main European associations of IT professionals and owner of the ECDL.

Above all, this discussion should be interesting for today's and tomorrow's IT professionals, for companies searching IT-talents and for all those involved in IT training (e.g. technical universities).

Some aspects of this discussion can also be relevant for those who are working on vocational frameworks and standards and for policy-makers willing to facilitate the growth of e-Europe: at CEPIS we believe that certification of individual IT skills can really be a primary driver of informatics competence and thus support Europe in her progress towards a knowledge-based society as stated in the Lisbon declaration.

2. Certification of individual IT knowledge and skills

2.1 Different Ranges of Competence

As a result of the wide spread of Information and Communication Technologies, an increasingly large part of the population in developed countries has to have "some" knowledge of technical matters (e.g. the concepts of bit & bytes, JPEG format) to act effectively on their job or even during their free time: using a smart cellular phone with a

digital camera, wireless headphones and diary functions is not easier than using a PC as a typewriter for simple documents, and requires some understanding of terms like “bluetooth connection” or “touchscreen calibration”. Until 15 years ago, only specialists understood such technical concepts. Today’s society is characterised by increasing general IT literacy.

However, it is more difficult today to evaluate the IT knowledge and skills in an individual and to distinguish between a skilled IT user, a specialist and an IT professional, as everybody knows something but no one can keep up to date with all new technologies. A network manager has little to do with a Java programmer or with a pre-sales support consultant showing demos of a specific CAD system: therefore, it is essential to cope with a higher specialisation and to find some shared criteria for classifying all the different professional profiles at the various levels of IT skills required.

2.2 Certification

Certification of individual IT competence is a way to measure a candidate against an agreed level of knowledge and skills. This requires:

- a precise and up-to-date definition of competence requirements (Syllabus);
- clear criteria and tools for measuring individual competences (QTB, CTT, ATES etc.);
- a certification body and a chain of trusted entities (e.g. ECDL-F, country-level licensee, test centres, quality auditors, publishers of accredited training materials etc.) involved in the deployment of the certification service.

2.3 International Certification Programmes Promoted by CEPIS

The Council of European Professional Informatics Societies (CEPIS) [1] is a non-profit organisation seeking to improve and promote high standards among informatics professionals in recognition of the impact that informatics has on employment, business and society; CEPIS unites 36 professional informatics societies over 32 European countries, representing more than 200.000 ICT professionals.

After setting the European Computer Driving Licence [2] as a paradigm for certification of computer users, in 1999 and 2000 CEPIS started two new projects for the certification of IT Administrators (the reference person for IT in a local unit) and IT Professionals. The EPICS project [3], partly funded by the European Commission through the eTEN programme in 2002-2003, also contributed to what is now called the EUCIP programme (i.e. European Certification of Informatics Professionals) [4].

3. The EUCIP Framework

The conceptual structure of EUCIP (Figure 1) is based on a Core level, an intermediate specialisation and a final certification at Professional level. The various EUCIP titles are defined in accordance with a vocational structure: this includes several profiles (e.g. Business Analyst, Information Systems Project Manager, Software Developer, Network Manager etc.) which correspond to typical ICT related roles within industry.

Three “Knowledge Areas” are defined:

A. Plan – Addresses the analysis of requirements and planning the usage of ICT. This area is tightly linked to business processes and defining ICT needs in terms of business strategies. Traditional business elements such as ROI, risk and financing are included.
B. Build – Encompasses the specification, development and acquisition of ICT. The crux of this area is traditional technical aspects of systems development, implementation and the ICT life cycle in general.
C. Operate – Addresses installation, supervision and maintenance of ICT. Typical domains are network management, upgrading, support functions etc.

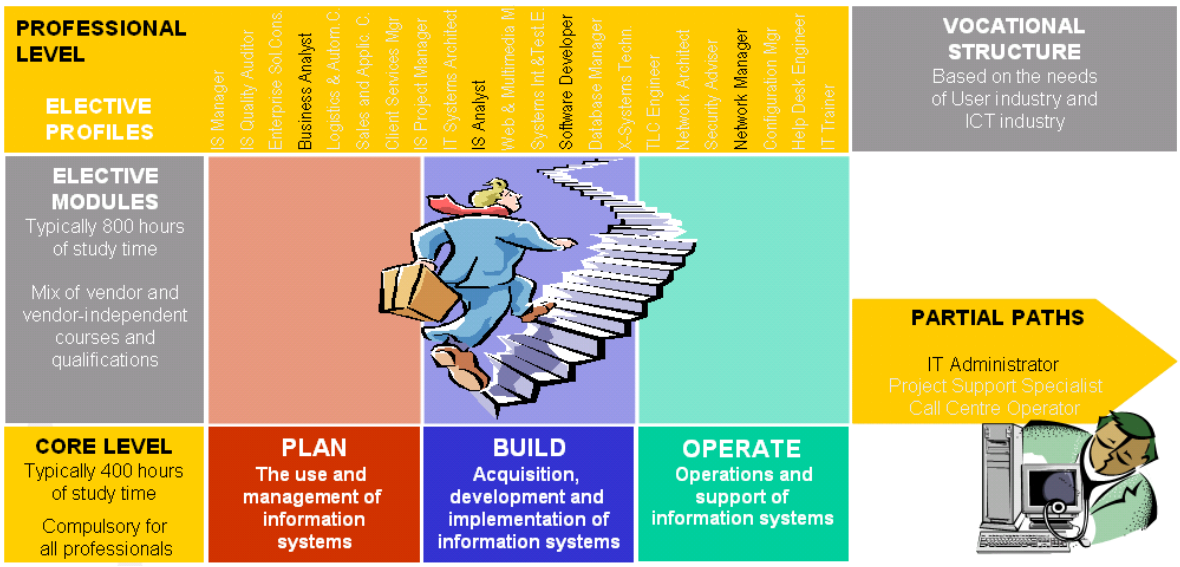

Figure 1: Knowledge areas and certification levels within the EUCIP framework

Each profile description specifies a complete set of competence requirements, which can show commonalities between different roles: for example, a Network Manager and an IT Administrator will share many common "blocks" within the Operate knowledge area.

Certification is based on various methods applying to different requirements per level:

- an automated testing systems (ATES) is used for theoretical parts, assessed through multiple-choice questions, especially at the Core level;
- practical exercises (especially for elective modules in the IT Administrator specialism) are performed partly through manual tests and partly through ATES providing a simulated operating environment;
- other elective modules are mainly external to the EUCIP scheme (e.g. university courses, vendor certifications) and are accredited with a certain number of EUCIP points (maximum 10 per module);
- final examination, resulting in a EUCIP Professional level certification, is based on evaluation of the individual "portfolio" (at least equivalent to 48 EUCIP points, see below for further details) and on a discussion / oral test in front of a panel of senior experts in the candidate's subject area; the members of this examination board are appointed by EUCIP and the local CEPIS member society.

3.1 Core Level

The core level of EUCIP provides a solid foundation for all types of ICT-related work. It gives a broad knowledge of the fundamental aspects of IT demanding approximately 400 study hours for a student at tertiary education level (i.e. during first university cycle).

The topics are evenly divided into the three knowledge areas described above, based on the main phases of the typical ICT lifecycle:

- A – PLAN knowledge area: the use and management of information systems;
- B – BUILD knowledge area: acquisition, development and implementation of information systems;
- C – OPERATE knowledge area: operations and support of information systems.

There are no formal entry requirements for this part of the scheme. Each student must pass all three modules to gain the core certificate, meaning the he/she will have to score more than 60% in each of the three exams (60 minutes for 40-45 multiple-choice questions extracted from the EUCIP Core Question & Test Base).

3.2 Elective Modules and Partial Certification Paths

An IT specialist can differ from a higher level professional in terms of greater need for practical skills in a specific field, than for breadth and depth of core level knowledge.

For example, an IT Administrator will not have a strong need for core knowledge in the area of Plan and Build, while topics related to operations and support of IS shall be deeper and more practical than in the core level. 500 study hours are estimated a reasonable norm for this profile. After passing 5 exams (each including MCQs and practical tests) the candidate gets the IT Administrator certificate and an exemption/credit for the Operate module if he/she is willing to apply for the EUCIP Core certification.

3.3 Professional Level and Final Certification

At the elective level a student may choose a combination of modules in different knowledge areas. The combination may consist of both vendor-proprietary and vendor-independent courses (with exams) and certifications. The total number of study hours is 800. The combination of elective modules will correspond to a recommended curriculum (elective profile) leading to defined vocational categories, e.g. IS Analyst or Security Adviser.

After accruing EUCIP points through accredited elective modules, the candidate shall present a portfolio showing his/her curriculum and samples of related project work. A EUCIP examination board will evaluate the portfolio and eventually admit the applicant to the final oral examination. Upon successful completion of this process, the candidate will be awarded a EUCIP Professional level certificate.

Figure 2: European Countries Currently Involved in EUCIP Activities (dark colour)

3.4 Accomplishments

In 2003 the EUCIP programme was officially launched: more than 400 tests were made at the Core level, plus about 150 for the IT Administrator profile. The first certificates were released in Italy, Greece, Norway and other countries to 60 certified individuals. In the first half year of 2004, over 2,100 exams were held, and there were over 80 accredited learning providers involved.

Apart from progress in the Core level, an initial set of profiles has been published, and the development of new profiles is in being co-ordinated with other external certification systems like the Irish ICS Skills Cert based on the Skills Framework for the Information Age (SFIA), and the Advanced IT Training System (so-called APO) promoted by the German Federal Ministry of Education and Research.

Current progress in dissemination is sensitive to local conditions: in general 8 countries (Norway, Finland, Estonia, Ireland, UK, Germany, Italy, Greece) have started their EUCIP activities and 6 more are actively involved in the process (Figure 2).

An important achievement announced in the UK is the possible accreditation of the EUCIP Core level by the national Qualification and Curriculum Authority (QCA) for Higher Education, meaning that the UK government should fund educational organisations that offer the EUCIP certification to their students.

EUCIP figures (as of 15/6/2004)		new centres		candidates enrolled		candidates certified		exams		pass rate %	
		<2004	2004 1H	<2004	2004 1H	<2004	2004 1H	<2004	2004 1H	<2004	2004 1H
Austria											
Cyprus											
Denmark											
Germany	Core	**1**		**6**				**18**		28%	
Greece	Core	**2**	**56**	**26**	**547**	**11**	**209**	**33**	**1687**	100%	76%
Estonia	Core	**1**		**2**	**53**	**1**	**12**	**6**	**120**	67%	53%
Finland	Core	**2**		**3**		**2**		**9**		89%	
Ireland	Core		**1**		**22**		**1**		**66**		41%
Italy	Core	**4**	**10**	**85**	**42**	**26**	**20**	**238**	**118**	59%	71%
	IT-Adm		**5**	**26**	**31**	**7**	**6**	**150**	**58**	65%	73%
Netherlands											
Norway	Core	**2**	**2**	**44**	**21**	**6**	**6**	**97**	**35**	51%	83%
Slovenia											
Spain											
UK	Core	**1**	**1**	**27**		**5**		**41**		88%	
Europe		**13**	**75**	**219**	**716**	**58**	**254**	**592**	**2084**	68%	73%
Totals		**88**		**935**		**312**		**2676**			

Figure 3: EUCIP Start-up Facts

3.5 Case Study: EUCIP in Italy

Three Italian associations are members in CEPIS: AICA is by far the most important, and is the local licensee for ECDL and EUCIP; AIP and ALSI, which are not interested in ECDL, are yet very keen to cooperate in the EUCIP programme.

Besides IT professional associations, a number of very different stakeholders is involved in a national “consulta” (panel) on ICT certifications: ministries, industry associations, trade unions, universities and various other entities. This broad commitment could be associated with the fact that our society is evolving from mere formality to a

quality-based approach, i.e. from a state-driven system of professional orders, diplomas, licences and authorisations having legal value to a more liberal system of certifications proposed by independent bodies deserving public trust.

A general support to the concept of certification is facilitating the spread of EUCIP: in a few months, some training materials have been published for the Core level (e.g. a textbook in Italian [6]) and other are under development; AICA is aware of three different initiatives for e-learning modules on EUCIP, all of them initiated by universities.

Some candidates have gained the Core level certificate (46 people) and the IT Administrator (13), whilst some pilot projects are now starting UCIP Elective level courses.

A key partner of AICA in the deployment of EUCIP is CINI – Consorzio Interuniversitario Nazionale per l'Informatica, a consortium grouping the main and largest Italian universities: in 2003 CINI conducted a study on the correspondence between the EUCIP Core syllabus and the contents of university courses in Informatics and Information Engineering, and the results of this work were presented in a conference in Rome on 31/3/2004. The theoretical coverage results almost complete in all sites analysed, but in summer 2004 a wide test (10 different sites) on a sample of over 260 students of the third year who have not attended any EUCIP-specific course will actually show if reality corresponds. This "proof of concept" will provide a statistical base to be used for planning the next steps of a massive dissemination of EUCIP in IT-related university courses. A joint AICA-CINI project ranging over the period from June 2004 till December 2007 will enable all university students in the IT sector to access the EUCIP certification, targeting 7000 students in 30 scientific and technical universities throughout Italy.

Even under these facilitating circumstances, AICA – the local CEPIS member which is currently bearing all the costs through internal financial resources – is fully aware of the long time required for a complete maturation of a new ambitious certification programme: in spite of positive feedbacks and a very good general acceptance, up to date only a few people (including IT practitioners) are aware of the EUCIP concepts.

A clear EU endorsement of the EUCIP programme would speed up the dissemination process in Italy and other large countries; in smaller countries a strong support would be vital for giving equal access to a common system of ICT qualifications.

4. The Future

4.1 EU Standard Profiles

Standards are vital in order to allow both domestic and cross-border integration (just think of electric power plugs). A standard framework for classifying e-skills is not easy to define and maintain, primarily because competence is an intangible asset belonging to the individual or to an organisation. Moreover, some technical knowledge and skills can expire in a very short time, and the importance of each "pill" can vary in a few months due to rapid innovation of technologies.

In spite of all of the above mentioned obstacles, a standardisation process is going on, and some initial concepts towards a European framework of ICT skills have been defined by the European eSkills Forum [6], CEN/ISSS [7], Cedefop [8] and various other contributors. CEPIS is actively involved in this process: the EUCIP initiative gives an important contribution towards a European standard classification of vocational paths and primary ICT professional profiles; in addition to that, EUCIP profiles will definitely converge to these new recommended principles.

5. Conclusions

After the longest market crisis in the ICT history, the current year (2004) is showing a new increase in demand of products and services; in the meanwhile, technology is keeping the pace with a continuous evolution (e.g. more mature websites, ubiquitous computing etc.). The need for high skilled IT professionals is therefore high, and knowledge is actually becoming a condition for success in most business sectors.

The "supply side" in IT education is still very fragmented and influenced by:

- universities, very strong on theoretical aspects, but often weak on practice;
- training on specific technologies (typically vendor-proprietary courses & certifications).

It is really difficult to evaluate the actual individual competence both in the case of young people and for experienced professionals; moreover, different schemes are used in different countries, so that the mobility of IT workers is threatened by concerns about quality and risks for the employing organisation. The above mentioned mobility problem is very well known, and various EU-funded projects and entities are addressing it (e.g. eSkills Forum, Career-Space, CEN/ISSS, Europrofiles, Europass etc.) [9].

EUCIP offers an independent, unified approach to the definition of professional profiles and certification of individual competences; it includes university courses, IT vendor certifications and independent qualifications into one model that synthesises contributions from different national markets monitored by CEPIS Member Societies.

The EUCIP vocational scheme is open, and needs a continuous update to reflect evolving technologies and ever-changing market demand and supply. All existing profiles will be maintained and revised to achieve the maximum alignment between European and national frameworks like APO in Germany or SFIA in the English-speaking countries.

CEPIS, EUCIP and their joining societies are involved in a number of panels in order to achieve a real standard on IT professionalism throughout Europe. It is our mission to coordinate the efforts of different stakeholders in IT culture and to make the technologies easier to understand, to exploit (in a business sense) and to enjoy (for each one of us).

CEPIS initiatives are characterised by three elements:

- true vendor-neutrality, combined with a pragmatic approach deriving from a unique sectoral competence;
- the not-for-profit purpose of CEPIS and all of its member societies;
- the economic independence of the various programmes; this means that public funding is obviously helpful, but not prejudicial.

EUCIP is really the result of a trans-European project, and its future must be consistent with further steps towards eEurope: an endorsement by EU institution is vital for EUCIP, in order to keep IT professionalism aligned with official development policies.

References

[1] For more information on CEPIS visit: http://www.cepis.org
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