Table of Contents

1 Executive Summary

1.1 Context

This research project, launched by the European Commission Directorate General for Enterprise and Industry as part of the European Commission's on-going e-skills agenda is aimed at helping to mature the ICT profession within Europe. This objective of maturing the ICT profession is not unique to Europe: indeed, the project reflects parallel efforts to mature the ICT profession in other parts of the world, such as TechAmerica in United States and ITA in Japan.

This current project is aimed at supporting the development of a European framework for ICT professionalism, with the goal of enhancing professionalism and mobility across Europe. The project also incorporates proposals to support the development of a European training programme for ICT managers.

There are strong motives for maturing the ICT profession:-

- **ICT Skills Gaps** - Skills gaps of up to 13% are forecast over the period 2010-2015[1], potentially acting as a brake on European competitiveness and recovery given ICT's role as an enabler of business value
- **Poor image of ICT profession** – A poor public perception of the ICT profession is impacting on the numbers entering the profession
- **ICT Knowledge Deficiencies** - Low levels of ICT knowledge amongst ICT practitioners, and/or knowledge silos, preventing a view of the "big picture" of ICT, its interconnectedness, and its role in enabling organisational capability planning. In this respect, a 2011 CEPIS survey suggested that "79% of respondents may not have the breadth of e-competences required by their role"[2]
- **Traditional focus and reliance on Computing Science degrees** – Tertiary education providers need to adapt in order to meet the growing industry demand for ICT professionals; moreover, industry demands people from alternative professions/disciplines
- **ICT Project Failures** – Recent research from Saïd Business School[3] identified cost overruns in 8 out of 10 ICT projects, and a disproportionate

---

[1] Empirica (2009). Monitoring e-skills demand and supply in Europe. Available at: http://www.eskills-monitor.eu/documents/Meskills%20Scenario%20and%20Foresight%20report_final.pdf

[2] CEPIS (2011). CEPIS Survey of professional e-competence in Europe. Available at http://img8.custompublish.com/getfile.php/1727380.1488.wvrvfxpfcy/CEPIS+Professional+e-Competence+European+Report.pdf?return=www.dataforeningen.no

http://www.cepis.org/media/CEPIS_Prof_eComp_PanEU_Report_020920111.pdf

[3] Flyvbjerg, B and Budzier, A (2011). Why Your IT Project may be riskier than you think. Harvard Business Review Magazine (September 2011). Available at: http://hbr.org/2011/09/why-your-it-project-may-be-riskier-than-you-think/

number of so-called “ICT black swans”, with one in six projects experiencing a cost overrun of 200%.

The most important reason for change however, stems from the extent to which ICT has the potential to harm society. Professions have traditionally emerged when failure to apply domain-specific knowledge successfully would have had an adverse impact on society. As we now enter the next wave of computing, known as pervasive computing, the extent to which ICT is embedded in society will inevitably grow. If we fail to take steps to mature the profession now, it is likely that the risks to society from ICT will grow to unacceptable levels – as such, the call for action is clear.

The project work was undertaken in two phases: phase I comprised desktop research and analysis, combined with a survey of over 300 ICT experts and practitioners, in order to create the synthesis report on the state of play of ICT Professionalism. In contrast, the second phase focused on the preparation of detailed proposals for a European framework for ICT professionalism, based on the desktop research and analysis, and iterating these proposals with relevant stakeholder groups, the results of which are contained in this document.

1.2 Defining the ICT professional

Across Europe, there currently is no common understanding of the term “ICT Professional”: in some countries, the term is accepted to mean someone who has acquired relevant qualifications and competences; in other countries, individuals can practice as an ICT professional with scant knowledge and experience in the area. For this reason, as part of our research, we developed the following definition for ICT professionals, as stated below:

ICT Professionals:

- possess a comprehensive and up-to-date understanding of a relevant body of knowledge[4],
- demonstrate on-going commitment to professional development[5], via an appropriate combination of qualifications, certifications, work experience, non-formal and/or informal education;
- adhere to an agreed code of ethics/conduct[6] and/or applicable regulatory practices and,
- through competent practice[7] deliver value for stakeholders.

[4] The term “relevant body of knowledge encompasses the requirement for a broad and deep knowledge base which is up-to-date, accommodating both a common ICT body of knowledge, and pertinent specialist knowledge and skills.

[5] Professional development focuses on improving professional competence in a professional role, with the objective of enhancing personal performance and career progression opportunities. It can encompass both technical aspects (e.g. keeping abreast of latest technological trends) as well as non-technical aspects (e.g. developing better presentation skills).

[6] Professionals are accountable to themselves, the ICT Profession and society, through an agreed code of ethics/conduct or applicable regulatory practices.

This definition, which was reviewed and widely accepted by the CEPIS Task Force on ICT Professionalism, and CEPIS Council members[8], reflects the importance of the key building blocks found in other professions : Bodies of Knowledge; Education and Training; Competences and Ethics. These same building blocks constitute the foundations of the proposed framework.

1.3 Framework Proposals

Reflecting the fundamental elements of the above definition for ICT professionals, the key components of the framework are as follows:

European e-Competence Framework (e-CF) – Currently comprising 36 ICT competences and five proficiency levels, the e-CF is a simple framework aimed at providing transparency of ICT competences across organisations and countries. The e-CF allows ICT practitioners to assess their competences and proficiency in an objective and uniform fashion. ICT job roles can be defined in terms of competences and proficiency levels that practitioners understand across Europe and on a consistent basis. Certifications and qualifications can be promoted in terms of the ICT competence improvements that they in turn will deliver. As such, this represents a significant step forward in terms of promoting a common language and shared understanding of ICT competences across Europe.

The engagement of multiple stakeholders in the planned third iteration of the e-CF will enhance the robustness and scope of the framework to support fully the required use-cases, reinforcing its potential role as a Rosetta stone of ICT competences and facilitating the mobility of workers across Europe.

The e-CF is, in essence, only a framework. However, it is a cornerstone around which an eco-system of organisations will develop in order to provide toolsets and services to facilitate its use among user stakeholders (ie the practitioners, employers, education providers and government users). Coordinated and cooperative action will be required within this ecosystem in order to achieve this goal of supporting users in their transition to the e-CF.

Additionally, e-Competences also form the basis for the ICT Professional Profiles project that defines a selection of ICT profiles with their respective e-competences and proficiency levels. In turn, this can be extended to define ICT career streams, providing practitioners with greater clarity over potential careers in ICT and the competences required to achieve this progression.

Foundational ICT Body of Knowledge meta-model – Other professions, such as medicine, engineering and law, require all members to possess a shared understanding and language of their respective domain. This well-established approach allows practitioners to understand the multiple interactions between areas of the domain (i.e. “to see the big

---

[7] Competent practice communicates the concept of quality of products and services being delivered by practitioners.

[8] CEPIS Council is the governing body of the **Council of European Professional Informatics Societies (CEPIS)**. Meetings are held twice a year and are attended by representatives from CEPIS Member Societies.

picture"), and appreciate the limitations of their own expertise ("to know what you don't know"). By establishing a common language and level of understanding for all ICT professionals, we would aim to improve communication between professionals, as well as reducing risks within ICT projects.

We therefore recommend the definition and adoption of a foundational ICT body of knowledge that would encompass a broad range of topics (potentially including non-ICT topics); however, recognising the highly dynamic nature of ICT, we would propose a meta-modelling approach to facilitate its maintenance over time (that is to say, we would identify the areas and nature of expertise required, possibly in the form of a syllabus, as opposed to defining the actual detailed content therein). In terms of its adoption by practitioners, we would again propose a self-assessment mechanism; and clearly, employers and HR managers would have an important role to play in promoting the importance of this component.

Multiple educational paths – Industry demands professionals with the "the right skills in the right place at the right time". However, tertiary education providers cannot realistically meet the expected demand for ICT professionals due to the inelasticity of supply. At the same time, many people wanting to progress as professionals have acquired deep expertise in the course of their ICT career, but few formal qualifications. For this reason, we must recognise and support the co-existence of different educational paths (including formal qualifications from a higher education institute, certifications from industry providers, non-formal education facilitated by employers, and informal learning). This is particularly important for the ICT profession, given the rate of change and innovation within ICT, and the need to embrace the skills and knowledge of people coming from outside the traditional computing science graduate career streams.

Ethics – while physicians in most countries are no longer required to take the Hippocratic Oath, there is still a need for physicians as with other professionals to behave ethically. In practice, a single code of ethics for all ICT practitioners across Europe is unrealistic, given the diverse languages, cultures, histories, and values possessed by each country. For this reason, we propose the alignment of national codes of ethics/conduct against a common and core set of ethical issues, as outlined in a meta-framework (e.g. a series of relevant criteria/guidelines). Such an alignment would encourage a shared sense of acceptable behaviour within the profession across Europe, and potentially more importantly, it would help to establish precedents for what could be considered unacceptable behaviour for ICT professionals. Reflecting the split of opinion on the topic of adherence, this report makes no concrete suggestions as to how to enforce such adherence to a code of ethics/conduct. If public opinion on the matter shifted considerably, it is possible that Informatics Societies and/or similar communities of professionals could adopt a role in the areas of monitoring and managing enforcement among professionals, but at present, there does not appear to be a clear demand or appetite for such a function.

1.3.1 Value Driven Framework

Some of the key facets shaping the design of the model are as follows:

Self-assessment: from the perspective of aspiring professionals, the framework is entirely based on self-assessment rather than through the introduction of new regulations; practitioners will be offered the opportunity to self-assess their competences against the European e-CF and their baseline knowledge against the Foundational ICT Body of Knowledge meta-model. There is, currently, no identified requirement for external validation (e.g. peer review of experience and competence); over time, however, some

industries may call for this (e.g. information security) but we see that this would be driven entirely by industry, if at all, as opposed to via legislative channels.

Parity: acknowledging the multiple entry paths into the ICT profession and the importance of life-long learning, equal recognition and importance is given to formal qualifications and certifications as well as non-formal and informal learning. The ICT profession will not serve itself in the long-term if entry is solely restricted to Computing graduates – the profession must recognise the merits that professionals from other backgrounds can bring.

Compatibility: the framework is aligned with and builds on existing national mechanisms. For example, the e-CF does not replace national competence frameworks, but provides a mechanism for translation between countries. Compatibility is an important criterion: Member States have different levels of maturity and different approaches to key aspects of ICT professionalism. Our proposals therefore are based on points of commonality, and seek to provide the desired benefits while respecting the need for national solutions.

Straightforward – A more complex framework might offer more sophisticated functions and value to specific industry segments, but by adopting a straightforward framework, capable of being understood and adopted by individuals, SMEs, corporates and governments, we feel that the framework stands a greater chance of being widely adopted, and therefore delivering on the anticipated benefits.

Sustainability: the proposals are aimed at establishing a profession which is essentially self-sustaining and driven by market demand, rather than developed and maintained through large-scale central investment. Implicit in constructing a sustainable model is the identification of clear value-streams for each stakeholder in order to foster its adoption, as shown at summary-level in the table below.

Stakeholder	Value/revenue stream
Practitioners	• International recognition of ICT competences and knowledge, enhancing mobility and credibility • Improved clarity over ICT career paths and competence requirements
Employer	• Reduced cost, effort, and time to recruit, deploy, train and develop suitable ICT resources, as well as improved capability to align ICT resources with business requirements • Competent professional IT workforce, reflecting industry demand
Education Provider	• Increased market size opportunities resulting from improved transparency and comparability of educational offerings • Improved demand for education to support life-long learning requirements
Local/National/European Government Entities	• Enhanced visibility of supply and demand of ICT skills, helping to provide a robust and granular basis for informed policy setting at local, national and European level • Enhanced competitiveness on a global stage resulting from improved efficiencies within industry
Professional Associations	• Opportunity to mature the ICT profession and boost membership

	• Stronger role in communicating/shaping emerging industry practice
Trade Unions	• Promote interests of ICT workers at organisational, national and international level (e.g. employment prospects, security) • Potential for increased union strength and coherence
Society	• Reduction in risks emanating from an increasingly ICT-enabled society • Improved employment prospects

Table 1 **Summary of stakeholder responsibilities**

1.3.2 Action Points

As part of the project, we identified a series of action points to support the maturing of the profession in the short to medium term.

Action	Description
1	Establish a scalable and sustainable operating model for promoting ICT professionalism in Europe
2	Form/Mobilise ICT Professionalism stakeholder entities at national and European level
3	Establish and promote adoption of a European meta model for a common foundational ICT body of knowledge (BoK), (for use by educational providers)
4	Drive broad adoption of the European e-Competence Framework (e-CF) within education providers, ICT practitioners and employers
5	Develop pan-European ICT professional career streams
6	Investigate synergies between practitioner ICT competency frameworks and organizational ICT capability frameworks
7	Promote confidence in educational mapping to the e-CF through auditing
8	Provide paths for validation of non-formal ICT education and training as well as informal ICT learning
9	Drive adoption among organisations and ICT professionals of national codes of ethics & conduct aligned with a European meta framework of ethical issues
10	Enhance links between ICT professionalism stakeholders within Europe and globally (eg via annual ICT Professionalism workshop)

Table 2 Selected Action Points

1.4 Conclusion

In the course of this project, we have engaged with many experts and practitioners (>300) in order to understand the current state of ICT professionalism in Europe (see interim report: http://ictprof.eu/index.shtml) as well as comprehend what aspects of professionalism are important to different stakeholders. This insight and knowledge has helped to shape the proposals contained in this document and we have continued this dialogue with different stakeholders throughout Phase II in order to continually test and refine our proposals.

The proposals developed are for the consideration not only of the European Commission but also for EU Member States, education providers, industry participants, as well as other

relevant stakeholders. This is an important distinction as the European Commission is only one player in a large-scale change process demanding the engagement of multiple stakeholders. The European Commission can play a vital role in facilitating engagement and collaboration between interested parties, as well as facilitating the development of artefacts which cannot realistically be produced by any single Member State or organisation. However, engagement by national governments, as well as industry and education providers is also essential to support the sustainability of the proposed framework. Moreover, actions must be coordinated and aligned in order to successfully exploit the best practices, and lessons learned.

We believe that this document reflects a rational, pragmatic response to a real-world problem. In reality, however, the true test of our proposals is the extent to which different stakeholders across Europe accept them and adopt the shared goals and approach as their own.

Establishing a profession takes many years. Moreover, as we propose introducing changes to established ways of working, there will invariably be individuals and organisations opposed to aspects of the proposals. We both recognise this as inevitable and in many ways, desirable – stimulating dialogue and engagement was one of the original objectives of this project, and on-going communication, cooperation and collaboration with relevant stakeholders are determinant in achieving the desired goals in the long term.